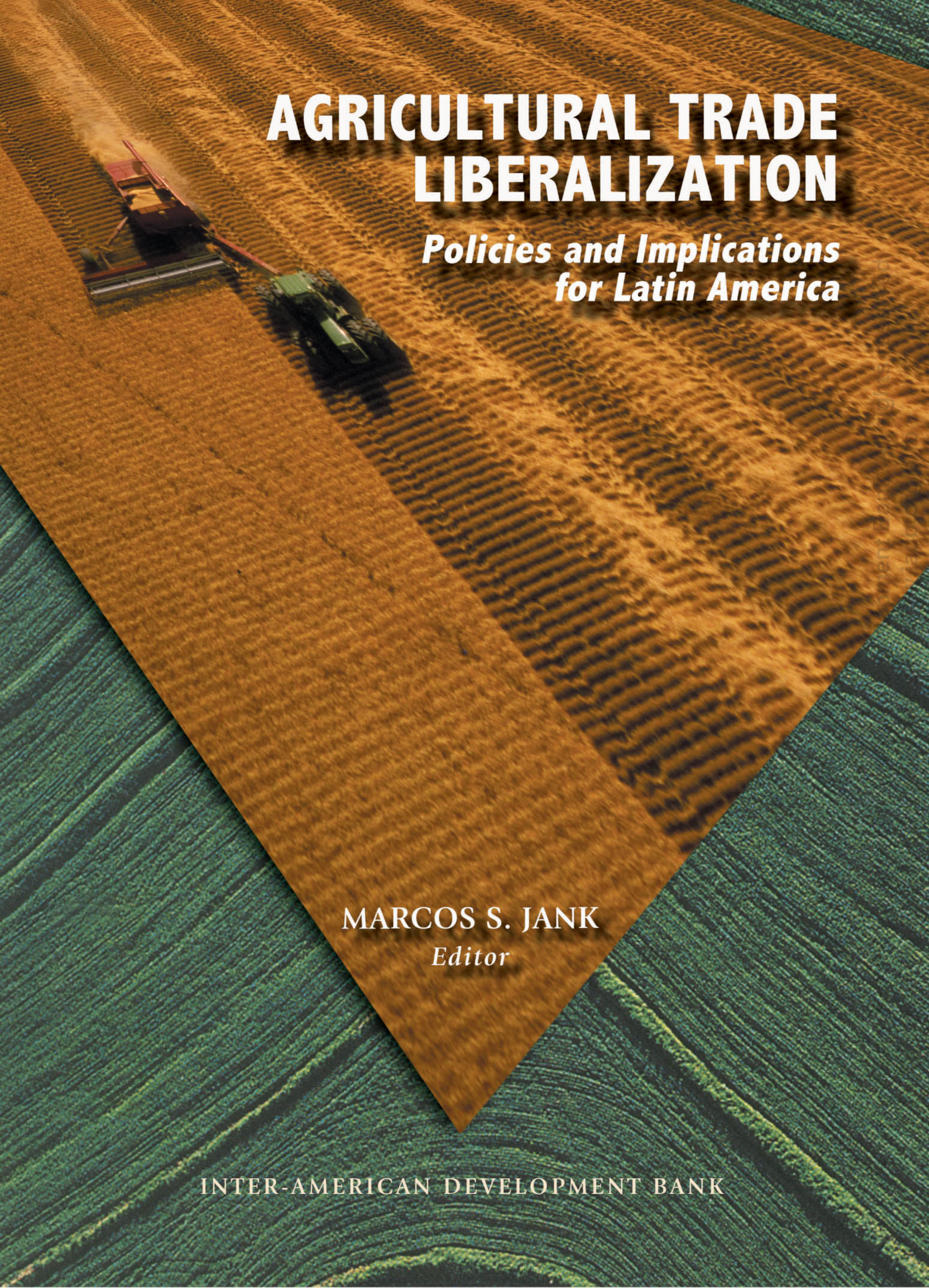

AGRICULTURAL TRADE LIBERALIZATION

Policies and Implications for Latin America

MARCOS S. JANK
Editor

INTER-AMERICAN DEVELOPMENT BANK

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Preface

Agriculture is not an economic powerhouse in the world economy as a whole. Agriculture's value added in world output is only about 4 percent. Meanwhile it accounts for only about 9 percent of the value of world trade. But agriculture's importance far exceeds its weight in the value of global economic activity.

The world's rural population is more than 50 percent of the total. This population is overwhelmingly located in developing countries. Moreover, for many countries—especially some of the poorest—agricultural goods are the major exports. A large number of African, Asian, Latin American and Caribbean countries are extremely dependent on agricultural exports. Among developing countries, Latin America has the highest profile, with agriculture representing about a quarter of total exports.

In developed countries, agricultural export profiles are considerably lower than in developing countries, particularly the poorest ones. Agriculture's share in gross domestic product in developed countries is a little more than one-tenth of what it is in developing countries. The agricultural population is small (7 percent) in developed countries. Nevertheless, in most developed countries the agricultural population's political weight far exceeds its numbers. Moreover, that political influence is reflected in high levels of tariff and nontariff protection, coupled with substantial amounts of trade-distorting subsidies for production and export. Indeed, while developed countries led the impressive postwar trade liberalization under the GATT, their high levels of agricultural protection were allowed to linger.

Agricultural protection in developed countries has frustrated developing country exporters of agricultural products, preventing them from fully exploiting their international comparative advantage. Market access is limited in the large developed markets and developing countries must compete with subsidies in third markets. True, subsidies may have benefited net importers of food, but that is clearly an inefficient way to channel assistance to poor countries. Moreover, subsidies lower world income by frustrating comparative advantage. Models simulating fuller world agricultural trade liberalization generally show that it generates substantial net gains for developing countries and it should also provide gains in the subsidizing countries.

Fortunately, the status quo is under pressure. Agricultural liberalization has become a wedge issue in the WTO's Doha Development Round and other trade negotiations. The Interim Cancun Ministerial collapsed on the inability of the North and South to arrive at a framework for negotiation of agricultural liberalization, including elimination of export subsidies and reduction of domestic support. In Cancun, developing countries arrived at the Ministerial extremely well organized—the formation of the G-20 is the best illustration—and determined not to cave in to the traditional posturing of developed countries to limit their liberalization commitments in agriculture. Member countries finally arrived at an agreed framework for negotiation of agriculture in mid-2004, but it remains to be seen what progress this will bring. Meanwhile, the negotiation of the Free Trade Area of the Americas and the European Union-Mercosur free trade area have had difficulties advancing in large part due to a wedge created by the issue of liberalizing agriculture.

There are few books as timely as this one prepared by Marcos Jank. He undertook this project when he was a member of the Inter-American Development Bank's Integration and Regional Programs Department. The chapters in this volume bring together some of the best minds on the issue of agricultural trade and liberalization. Hopefully their work will bring a better understanding of the problems and foster greater consensus about solutions. The contributions were first presented at a major conference at IDB Headquarters in October 2002. The entire project was supported by the Bank's Special Initiative on Trade and Integration.

Robert Devlin, Deputy Manager
IDB Integration and Regional Programs Department

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Acronyms and Abbreviations

AC	Andean Community
ACP	Africa, Caribbean, and Pacific
ALADI	Latin American Integration Association
AMAD	Agricultural Market Access Database
AMS	Aggregate measurement of support
AMTA	Agricultural Market Transition Act
ASCM	Agreement on Subsidies and Countervailing Measures (WTO)
BST	Bovine somatotropin
CACM	Central American Common Market
CAFTA	Central American Free Trade Agreement
CAP	Common Agricultural Policy (European Union)
CARICOM	Caribbean Community
CBO	Congressional Budget Office (United States)
CCC	Commodity Credit Corporation (United States)
CMO	Common Market Organization (European Union)
CRP	Conservation Reserve Program (United States)
EFTA	European Free Trade Association
ERS	Economic Research Service
FAIR Act	1996 Federal Agriculture Improvement and Reform Act (United States)
FAO	Food and Agriculture Organization of the United Nations
FAPRI	Food and Agricultural Policy Research Institute
FEOGA	European Agricultural Guidance and Guarantee Fund
FSRIA	2002 Farm Security and Rural Investment Act (United States)
FTA	Free trade agreement
FTAA	Free Trade Area of the Americas
GATT	General Agreement on Tariffs and Trade
GMO	Genetically modified organisms
GSP	Generalized System of Preferences
GTAP	Global Trade Analysis Project
HDA	Hemispheric Database of the Americas
HFCS	High fructose corn sweeteners
HS	Harmonized System

IDB	Inter-American Development Bank
IPPC	International Plant Protection Convention
ITC	International Trade Commission
Mercosur	Common Market of the South (Argentina, Brazil, Paraguay, and Uruguay)
MFN	Most-favored-nation status
MPS	Market price support
NAFTA	North American Free Trade Agreement
NFIDCs	Net food importing developing countries
NTB	Nontariff barrier
OECD	Organisation for Economic Co-operation and Development
OIE	International Organization of Epizootics
PSE	Producer support estimate
RTA	Regional trade agreement
SPS	Sanitary and phytosanitary measures
STC	Specific Trade Concerns meetings of the SPS Committee (WTO)
TBT	Technical barriers to trade
TFP	Total factor productivity
TRIPS	Trade Related Aspects of Intellectual Property
TRQ	Tariff rate quota
UNCTAD	United Nations Committee on Trade and Development
URAA	Uruguay Round Agreement on Agriculture (WTO)
USDA	U.S. Department of Agriculture
USTR	U.S. Trade Representative
WTO	World Trade Organization

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Introduction

Marcos Sawaya Jank and Mário de Queiroz Monteiro Jales

Trade in agriculture encompasses systemic and nonsystemic issues. Subsidies are systemic because any reduction in their use by one country will benefit all its trading partners and could have potential spillovers on world prices and market shares. Subsidies are best addressed through multilateral negotiations, such as the Doha Development Agenda of the World Trade Organization (WTO). By contrast, market access issues—such as tariffs, tariff rate quotas (TRQs), and nontariff barriers—are nonsystemic because they can be negotiated on a country-by-country basis without affecting other trading partners. Market access is best addressed in a bilateral or regional framework. Negotiations between a small number of countries tend to allow for deeper trade liberalization because they normally start from applied tariffs.

AGRICULTURAL LIBERALIZATION IN MULTILATERAL AND REGIONAL TRADE NEGOTIATIONS

The best scenario for trade liberalization in the Western Hemisphere would be to implement zero tariffs for all products without exceptions. The use of exception lists would certainly remove most of the protected products from a regional integration agreement, therefore undermining the potential gains that could be obtained through such an agreement. In Chapter 1, Jank, Fuchsloch, and Kutas provide a comprehensive overview of market access and domestic and export subsidies in the context of agricultural liberalization at regional and multilateral trade negotiations. The authors propose that if countries insist on exception lists and/or a long tariff phase–out period, negotiators should use the relative tariff ratio and the regional export-sensitive tariff indexes to balance concessions and achieve progress in bilateral and regional agreements. These indexes could also be used to detect potentially sensitive sectors for future negotiations.

Central American countries face on average higher protection than they impose. They would have high relative net gains in terms of overall market access after a simultaneous lowering of agricultural tariff barriers in North America and industrial tariffs in South America. For Mercosur countries, liberalization of the agricultural sector would encompass trade–offs between gains in agriculture and important concessions in the industrial sector. The reverse would be true for the North American Free Trade Agreement (NAFTA) countries: in order to secure access for their industrial products, they would have to offer broad market access in agriculture. The Uruguay Round Agreement on Agriculture (URAA) provides many ways to circumvent reductions in domestic and export subsidies. Countries that are keen on eliminating production and trade distorting subsidies should avoid every kind of exception in the long run. Negotiators should target the full decoupling of government payments to producers as the best way to prevent distortion of production and trade. In other words, payments should be fully decoupled from the volume of production, planted area, or animal units.

Reductions in subsidies are intrinsically related to enhanced market access and vice versa. Both subsidies through market price support and border measures (tariffs, TRQs, and nontariff barriers) contribute to the fact that producer prices are set at levels higher than world prices. The way market price support is calculated (depending on whether government administered prices are used) is particularly important because it has serious consequences in terms of which type of government intervention should be phased out for each product to liberalize trade.

POTENTIAL ECONOMIC IMPACTS OF AGRICULTURAL REFORM

Latin America and the Caribbean has much to gain from the elimination of import tariffs, domestic support, and export subsidies in developed countries. Monteagudo and Watanuki (Chapter 2) estimate the potential economic impact on Latin America of agricultural reforms in the Western Hemisphere and the European Union. They use a multiregion, multisector computable general equilibrium model to quantify the impending benefits and drawbacks of agricultural liberalization for the countries involved in the Free Trade Area of the Americas (FTAA) agreement and the Mercosur–European Union trade negotiations.

The analysis finds that eliminating import tariffs would increase the region's agricultural exports to the Western Hemisphere by 11 percent in the context of an FTAA. In part because processed food sectors currently have higher rates of protection, they would enjoy greater export growth (15 percent) compared with primary agricultural goods (7 percent). The effects on production in Latin America and the Caribbean would not be as strong as those observed for exports. A Mercosur–European Union trade agreement that fully eliminated tariffs in agricultural products would lead to a 37 percent increase in Mercosur's agricultural exports to the European Union. Mercosur's agricultural imports from the European Union would also rise by more than 50 percent. Mercosur's nonagricultural exports would drop not only to the European Union market, but also to most destinations, as resources would shift away from other sectors and into the booming agriculture sectors. Increased external demand would pull internal demand in Mercosur and lead to increased production across all sectors.

The removal of domestic support in developed countries would have a small positive effect of 0.1 percent on Latin America and the Caribbean's agricultural exports to the Western Hemisphere. Mercosur would benefit the most (0.7 percent increase in exports), while the United States and Mexico would suffer a slight decline in exports. Removal of domestic support would increase Mercosur's agricultural exports to the European Union by 8 percent. Mercosur's nonagricultural exports would slightly decrease. The heterogeneous distribution of European Union domestic support mechanisms would be reflected in the uneven impact across sectors. The impact on production and factor reallocation would be moderate. External demand would drive the increase in the production of bovine meat and grains in Argentina, and oilseeds in Brazil. In the European Union, production in practically all the agricultural sectors would decline, while production in nonagricultural sectors would rise.

The elimination of export subsidies would have a small negative effect on Latin America and the Caribbean's agricultural exports to the Western Hemisphere. Processed food exports would marginally increase (0.1 percent), while exports of primary agricultural goods would experience negative growth (–0.3 percent). Countries that have not used export subsidies would be mostly unaffected, while countries that have used them (the United States, Mexico, Central America, and the Andean Community) would see their exports decrease. In these countries, production would decline in the sectors that currently enjoy export subsidies, and domestic resources would be reallocated either within agriculture or to nonagricultural sectors. Although the elimination of export subsidies would cause the European Union to lose competitiveness in external markets (its agricultural exports would fall by 2 percent), the impact on Mercosur's agricultural exports would be negligible. Production and resource allocation in Mercosur would likewise be only marginally affected.

A simultaneous elimination of tariffs, domestic support, and export subsidies would boost Latin America and the Caribbean's agricultural exports to the Western Hemisphere by 10.7 percent. A simultaneous move toward reform in all three policy instruments would have a sizable impact on Mercosur's agricultural and total exports to the world. The European Union's agricultural exports would decrease by 2.7 percent and total exports would increase by 0.2 percent. The impact of agricultural reform on global agricultural prices would be stronger in a Mercosur-European Union free trade agreement than within an FTAA. The elimination of domestic support would be the primary factor in raising prices.

HOW U.S. FARM PROGRAMS AFFECT WORLD MARKETS

In Chapter 3, Gardner demonstrates how federally funded U.S. agricultural programs affect world commodity markets. He describes market distortions caused by the 1996 Federal Agriculture Improvement and Reform (FAIR) Act, and analyzes potential market effects of innovations introduced by the 2002 Farm Security and Rural Investment Act (FSRIA). Under the FAIR Act, the combination of the marketing loan program, crop insurance subsidies, and direct payment program increased U.S. production of grains and soybeans by 4 percent between 1999 and 2001. The marketing loan program was the main instrument behind this output expansion.

The bottom line of U.S. influence on world markets is given by the impact of its agricultural programs on international prices. Excess supply created by U.S. policy instruments lowers domestic prices, which in turn causes international prices to fall. Despite uncertainties related to price responsiveness to U.S. output over a multi-year period, effects on world prices of grains and soybeans likely averaged a 5 to 8 percent decline.

The U.S. Conservation Reserve Program is estimated to have had a roughly offsetting effect, albeit more pronounced in wheat and less in soybeans and corn, in reducing U.S. output and hence increasing world prices. Other programs—including research and extension, farm credit, and export marketing assistance—have increased U.S. output and contributed to downward effects on world prices. However, it is difficult to quantify the direct effects. Research and extension programs that generate new technology have increased total factor productivity, and thus raised output levels. Total factor productivity in U.S. agriculture has increased about 1.8 percent annually over the past 50 years, but there is no reliable evidence on how much lower that rate would have been in the absence of government supported research and extension programs. Even if only 10 percent of total factor productivity growth was attributable to government policies, the cumulative effects by 2001 could easily be enough to offset land idling under the Conservation Reserve Program.

Signed into law by President George W. Bush in May 2003, the FSRIA is more production inducing than the 1996 FAIR Act. The Congressional Budget Office has projected that the adoption of the FSRIA will cost, over the next 10 fiscal years, $80 billion more than if the FAIR Act had been continued. Projected total spending on commodity, conservation, research, and related programs (excluding food stamps and other nutrition and health programs) is about $19 billion per year for the next 10 years. Although this is a lot, it is $4 billion per year less than the federal government paid in 1999–2001, mostly because market loss and disaster assistance outlays are not completely replaced by countercyclical payments under the new act. Nonetheless, the level is high compared with the $10–$12 billion average annual cost in 1988–97, not to mention the $11 billion baseline for 2002–2005 that was on the books before the FSRIA was enacted, or the projection of $6 billion and declining outlays forecast on enactment of the FAIR Act.

The Food and Agricultural Policy Research Institute estimates that under the FSRIA, the total area devoted to the nine major crops (wheat, corn, soybeans, cotton, rice, sorghum, barley, oats, and sunflowers) will increase by 2 million acres in 2002 and 2003 as compared with the baseline of continuing the FAIR Act. Estimated effects include a reduction of about 5 cents per bushel in the prices of corn and wheat, and an increase of 8 to 9 cents per bushel in the price of soybeans. These are effects of the commodity titles only and do not include effects of other programs previously discussed.

REFORMING THE EUROPEAN UNION'S COMMON AGRICULTURAL POLICY

In Chapter 4, Bureau describes the implications of the European Union's Common Agricultural Policy (CAP) for the region's trade interactions with the rest of the world. The chapter demonstrates that although recent reforms have brought the CAP closer to market mechanisms, further restructuring is necessary in order to remove distortions and achieve greater efficiency.

The Agenda 2000 set the ceiling for CAP expenditures for the 2000–2006 period at an annual average of €42.5 billion, roughly half the total European Union budget and equivalent to 1.27 percent of the sum of the gross national products of the 15 member countries.[1] The producer support estimate, which incorporates transfers from consumers, amounts to more than €100 billion. Support to agricultural producers in the European Union accounts for 35 percent of the sector's gross receipts, and is above the average for OECD countries (31 percent). Despite the levels of support to European agriculture, the European Union remains a net importer of agricultural and food products. Although the most significant imports are in the meat and dairy sectors, the

[1] Agenda 2000 is a reform program of the Common Agricultural Policy to strengthen the European Community and prepare for enlargement.

largest trade deficits are in fruit, oilseeds, and coffee. Surprisingly, the European Union is a net exporter of meat.

Bureau states that the overall effect of the CAP in world markets is not as negative as has been commonly claimed. While it is true that European agricultural policies impose some negative externalities on outside exporting countries, recent simulations have suggested that dairy quotas, the biofuel program, and mandatory set-asides all limit internal European Union production. Therefore, the impact of the CAP on world markets is ambiguous.

Uruguay Round disciplines have had only a limited direct effect on European Union agriculture. Nonetheless, they have had the more important indirect effect of pressuring European Union decisionmakers to consider long-needed reforms. The effect of Uruguay Round stipulations was felt in the conversion of CAP variable import levies into bound tariffs, and in the creation of 87 TRQs in order to meet minimum access provisions. The limit on export subsidies has been the main constraint imposed by the URAA on the CAP. The prospect of piling up stocks that could not be disposed on the world market was a major motivation for the Agenda 2000 reform.

There is significant controversy over the actual level of tariffs imposed by the European Union. Estimates of the average tariff for agricultural products range between 10 and 30 percent, and depend on whether averages are simple arithmetic means or trade-weighted averages, whether bound or preferential rates are considered, and the methodology used to convert specific tariffs into ad valorem equivalents. When accounting for imports under preferential agreements and using a trade-weighted mean, the average European Union applied tariff in agriculture is less than 10 percent. Therefore, Bureau suggests that the protection of what is called "fortress" Europe is sometimes overestimated.

The overall effect of the CAP on developing countries is ambiguous. Preferential agreements provide an opportunity for some of these countries to benefit from high European Union domestic prices, especially in the sugar, beef, rice, and banana sectors. However, the CAP also creates unfair competition for developing countries. In most cases, preferential tariffs for limited quantities do not offset the market opportunities lost because of high European Union tariffs. This is particularly true for Latin America, which gains little from the Generalized System of Preferences (GSP) and has not benefited from the Lomé-Cotonou Agreements.[2]

IMPACT OF SANITARY AND PHYTOSANITARY MEASURES ON AGRICULTURAL TRADE

In Chapter 5, Burnquist, Barros, de Miranda, and da Cunha Filho show that sanitary and phytosanitary (SPS) measures can significantly affect trade in agriculture. Although in principle such provisions are designed to guarantee safety and quality, they can function as barriers to trade. Since intensification in the use of SPS measures has accompanied the reduction and greater discipline of traditional trade barriers, it has been argued that SPS

[2] The Lomé-Cotonou Agreements are trade and development cooperation agreements between the European Union and 77 African, Caribbean, and Pacific countries.

measures have served as mere substitutes for tariffs and quotas. A quantitative study to evaluate the correlation between product categories that have been subject to fewer traditional trade barriers over time and those that have been subject to increased SPS regulation would be appropriate in order to clarify this issue.

SPS measures can affect trade flows in three ways. First, a provision can prohibit trade by imposing a ban or by increasing costs of production and marketing to prohibitive levels. Second, a measure can divert trade from one trading partner to another by establishing regulations that discriminate across potential suppliers. Finally, a provision can reduce overall trade by increasing costs or raising barriers for all potential suppliers.

Although analyses of the trade impact of SPS measures have frequently focused on developed countries, the effect of these measures on developing countries is considerably greater given the relative importance of agricultural and food products to these countries' exports and their lower financial and technical ability to comply with SPS requirements. Developing countries generally are aware of prevailing SPS requirements but lack the required resources to comply with them. SPS provisions have become a major factor influencing the ability of developing countries to exploit export opportunities for agricultural and food products in developed country markets. Although the SPS Agreement commits WTO member countries to facilitate the access of developing countries to technical assistance, no evidence of the implementation of any systematic or comprehensive approach to assist these countries has been found.

The adoption of SPS measures in the agricultural sector has been substantially asymmetrical among Western Hemisphere countries. While the United States and Canada have actively implemented the provisions of the Uruguay Round Agreement on SPS measures, most countries in Latin America and the Caribbean have lagged significantly behind. FTAA negotiations present an opportunity to address this imbalance and improve the application of SPS rules at the hemispheric level.

In the FTAA negotiation process, an SPS Working Group has been created in the Agriculture Committee. To date, commercial rather than scientific subjects have driven the committee, and there are increasing concerns that SPS measures might end up being treated as potential barriers to trade. Nonetheless, the FTAA is an excellent opportunity to reinforce the SPS Agreement and improve regulations at the hemispheric level. Although there is no reason to believe that gains would necessarily be greater at the regional level compared with the multilateral level, it seems that it would be easier to address issues such as information diffusion, technical assistance, counternotification, harmonization, equivalence, and regionalization within an FTAA framework.

OVERVIEW OF BIOTECHNOLOGY ISSUES IN THE WESTERN HEMISPHERE

Although biotechnology issues have the potential to profoundly affect trade flows in agriculture, there exists an international regulatory vacuum regarding biotechnology products. In Chapter 6, Gaisford and Kerr offer a comprehensive overview of biotechnology-related issues in Western Hemisphere trade in agriculture. They discuss how, in the absence of overarching international rules on biotechnology products, domestic regulatory regimes relating to food safety and environmental diversity approach genetically modified (GM) products. Some countries have refrained from producing GM crops and wish to restrict the import of GM products into their markets. Other countries have licensed domestic production of GM products and want access for their products in international markets. International trade regimes need to be structured to allow countries to deal with the uncertainty pertaining to the safety of GM products without unduly inhibiting international commerce.

According to Gaisford and Kerr, FTAA negotiations should seek to overcome the existing regulatory vacuum and establish an open production and trading regime for all agricultural products in the Western Hemisphere, including biotechnology products. Nonetheless, the stakes are high due to the importance of the agricultural sector for most Western Hemisphere countries, the wide range of technical capacity exhibited by countries in the region, and the heterogeneous distribution pattern of GM crops across countries and products.

The United States, Argentina, and Canada are the largest producers of GM goods not only in the region, but also in the world. In 2001 they accounted for 96 percent of the global transgenic crop area. Of the remaining countries in the Western Hemisphere, only Mexico and Uruguay have officially produced GM crops. All of the countries where commercial production of transgenic crops has taken place have temperate climates or large temperate zones. Soybeans accounted for 58 percent of the global acreage, while maize, cotton, and canola accounted for 23, 12, and 6 percent, respectively. Tropical products or varieties of temperate crops suitable to the tropics have yet to be licensed.

There has been little resistance to GM imports in developing countries in the Western Hemisphere. However, since most of them have strong trade ties with markets such as the European Union, which discriminates against GM products, it has been their policy to maintain their GM-free status by refraining from GM licensing. The largest producer of non-GM soybeans in the world, Brazil has benefited from access to the European Union market. However, Brazil has been experiencing difficulties in maintaining its GM-free status due to considerable smuggling of GM seeds from Argentina.

An FTAA that guarantees open access to biotechnology products would pose little risk to the United States and Canada. The approval processes for GM products in these countries are working well, and there is little resistance to GM crops among consumers. The problem comes for Latin American and Caribbean countries that may want the right to restrict imports of GM products in order to maintain their GM-free status and ensure continued access to markets that either are closed to GM products or impose strict labeling regimes for GM imports.

Gaisford and Kerr argue that biotechnology holds great long-term promise for the agricultural sectors of Latin America and the Caribbean. Nevertheless, in adopting more open markets for biotechnology products, countries in the region should insist on the prerogative to label some or all GM foods so that they can respond to consumer concerns should they arise. Furthermore, Latin American and Caribbean countries should demand similar concessions from the United States and Canada on other trade-related issues.

AGRICULTURE IN THE U.S.-CENTRAL AMERICAN FREE TRADE AGREEMENT

According to Hathaway (Chapter 7), the U.S. legislative framework on agricultural trade and the U.S. position in other ongoing international trade negotiations will deeply influence the agricultural negotiations leading to the U.S.-Central American Free Trade Agreement (CAFTA). Negotiations between the United States and the Central American Common Market (CACM) countries are beginning at a time when both sides are already fully engaged in two broader negotiations: the FTAA and the WTO Doha Round. U.S. negotiators will be careful not to undercut their positions in other negotiations by provisions they agree to in a regional trade agreement. Conversely, they may try to use the U.S.-CACM negotiations to develop mechanisms of special interest to U.S. producers—such as a satisfactory safeguard agreement for perishables—that could later be transferred to other agreements. U.S. negotiators will insist that some issues of major interest for Central America can only be successfully handled at the multilateral level. These issues will most likely include any change in the treatment of commodities with TRQs, and the reduction of trade distorting domestic support and export subsidies.

The CAFTA would have similar effects on the agricultural sectors of the five CACM countries. Hathaway cautions that when negotiating with the United States on agricultural issues, Central American countries must keep in mind that granting improved access to their markets for nonagricultural goods and services would not mean that they would obtain improved access to U.S. markets for agricultural goods. U.S. farm groups strongly resist trade-offs between sectors, and only support giving access to the U.S. market if sectors of U.S. agriculture are also gaining greater access. Therefore, Central American negotiators should look for important allies among U.S. commodity groups.

Central American negotiators should use the enormous disparity in subsidization to their advantage. They should insist on maintaining protection against subsidized crops until there is parity in the levels of subsidies and protection. Finally, Central American delegates should make decisions on their own timetable. They should not allow the U.S. timetable to rush decisionmaking to the point where it is not possible to achieve regional consensus and local consultations to bolster positions. Both the Doha Round and the FTAA are unlikely to stay on schedule, so rushing to complete the CAFTA is unnecessary.

INTEGRATION OF SUGAR MARKETS IN THE FTAA

Integration of sugar markets in the FTAA will require considerable policy changes in both importing and exporting countries, according to Orden (Chapter 8). Since a move toward more open trade in sugar would have significant distributional effects, various actors have traditionally opposed sugar liberalization in the Western Hemisphere. Most notably, opposition has come from U.S. sugar producers, who resist any change in market intervention that sustains U.S. sugar prices above levels in world markets. Caribbean countries have also opposed reform because although they are high-cost producers, they have succeeded in maintaining their status as net sugar exporters by heavily protecting their domestic markets and extracting rents from preferential access to other protected markets.

Apart from the United States, seven other Western Hemisphere countries maintain TRQ restrictions on sugar, including four low-cost producers (Colombia, Costa Rica, El Salvador, and Guatemala) and two low-to-medium-cost producers (Mexico and Nicaragua). WTO bound tariff commitments for sugar are generally high throughout the region. They are greater than 100 percent even in some competitive producers, such as Colombia and Guatemala. Liberalizing sugar markets will therefore involve a significant overhaul of current practices.

Brazil, the United States, Mexico, Colombia, Argentina, and Guatemala are the largest producers of sugar in the Western Hemisphere. Brazil and Guatemala are the largest net exporters, while the United States and Canada are the main net importers. These two NAFTA countries account for three-fourths of all sugar imports in the Western Hemisphere and thus play an important role in the dynamics of the regional sugar market.

U.S. sugar producers have fiercely opposed any change in domestic policy. To facilitate a move toward trade liberalization, adopting a variety of cash-out options similar to those adopted for other supported crops could moderate adverse effects on producers. Three main possibilities are direct payments on all output, direct payments on a fixed volume of output, and fully decoupled payments.

The U.S. peanut program reform of 2002 could function as a template for sugar reform. The FSRIA replaced the long-established regime for edible peanuts comprised of domestic price supports well above world levels and quotas on the production eligible for the domestic market with a support program based on a much-reduced loan rate and related loan deficiency payments, decoupled direct payments, and countercyclical payments.

Nonetheless, the adoption of similar reforms in the sugar sector faces several obstacles. First, the transparency of direct payments is a liability to engineering a shift toward a cash-out due to the domestic structure of the sugar industry. The sector is characterized by few very large production units. Direct payments would make explicit the concentration of benefits from sugar policies. For instance, no more than two large corporations account for nearly 80 percent of Florida's sugarcane acreage. A second obstacle arises from federal budget rules. Under congressional pay-as-you-go rules, any proposal assessed to increase budget outlays has to be offset through concomitant revenue increases or budget cuts. This limits the room for adopting direct payments to sugar producers. Finally, the most formidable barrier to sugar reform is the opposition from U.S. sugar producers and processors, who are a more powerful lobby than peanut producers and have repeatedly been able to dominate legislative outcomes. The sugar industry will oppose reform as long as it views the existing program as advantageous and direct payments as undesirable.

INTEGRATION OF DAIRY MARKETS IN THE FTAA

In Chapter 9, Depetris Guiguet argues that, given the differences in competitiveness and the asymmetries in size and level of development among Western Hemisphere countries, liberalizing dairy markets within the FTAA requires significant efforts to reconcile the interests and expectations of the participants. The main stakeholders are the hemisphere's key exporters and importers of dairy products: NAFTA and Mercosur. Trade model simulations show that free trade in dairy products in the Western Hemisphere would generate significant welfare gains for Mercosur's dairy farmers, while producers in NAFTA countries would lose substantial rents.

Southern Cone dairy producers—especially in Uruguay and Argentina—are cost competitive, have been successful in liberalized intra-bloc trade within Mercosur, and have the potential to significantly expand market shares in a more open hemispheric trade environment. Although not as competitive as their southern counterparts, North American dairy producers are the Western Hemisphere's largest exporters of almost all dairy products. U.S. and Canadian dairy farmers have long benefited from domestic support and export subsidies. Unlike the Mercosur experience in subregional dairy trade liberalization, NAFTA countries have not negotiated liberalization of the dairy sector as a bloc. Instead, a bilateral dairy framework has been established between Mexico and the United States. Given the political and economic intricacies of the dairy sector in Canada, changes in its dairy regime seem unlikely in the near future. In the United States, the renewed support granted to the sector by the FSRIA in 2002 also hinders dairy trade liberalization.

If the FTAA process does not include any additional dairy trade liberalization beyond that derived from future WTO negotiations, South American exporters would benefit from increased market access for their products and reduced export subsidies in developed countries. While the United States would suffer only a minimal impact, Canada would see considerably lower milk prices and significant losses in economic rents for milk producers. If instead immediate and complete elimination of dairy tariffs occurred in the FTAA independent of WTO negotiations, the results for specific countries would depend on whether trade distorting measures such as domestic support and export subsidies were equally removed. If the United States and Canada do not eliminate their dairy support policies, third countries now importing from nonsubsidized Argentinean and Uruguayan producers might switch to subsidized U.S. and Canadian products. Nonsubsidizing countries would most likely be the losers. To avoid a situation in which the artificial competitiveness of subsidized exporters diverts trade flows, FTAA negotiations must require the removal of all distorting domestic policies.

Finally, if FTAA negotiators accept WTO commitments as de minimis conditions and agree on further dairy trade liberalization, low-cost producers would have the possibility to expand sales in the short run, while protectionist countries would be allowed some time to adjust policies to the more open environment. This is the most realistic outcome and would allow for parallel negotiations in the FTAA with some tariff reductions consistent with the rules and disciplines of the WTO. No radical changes would occur in the U.S. and Canadian dairy policies in the near future, and South American producers would continue to demand greater market access and fewer market distortions.

THE FOOD INDUSTRY IN BRAZIL AND THE UNITED STATES

Public policies are not always Pareto improving, as they frequently generate winners and losers. The effective removal of trade barriers in the context of the FTAA would foster trade flows, foreign direct investment, and specialization in the affected countries. Consequently, consumers would benefit from lower food prices and higher-quality products. Nevertheless, increased foreign competition would affect domestic production of certain food products—particularly sugar and orange juice in the United States and dairy products in Brazil. Inasmuch as private interest groups are more organized than consumers in these sectors, the complete removal of trade barriers is not likely to happen.

Taking these issues into account, Azevedo, Chaddad, and Farina (Chapter 10) present general policy recommendations focusing on six basic principles for exploring complementary features between U.S. and Brazilian agri-food industries, with expected positive effects for both countries in domestic and international markets. First, an assessment of complementary competencies should be carried out among agri-food industry participants in order to identify potential opportunities for interorganizational collaboration—including strategic alliances, joint ventures, and cross-holdings—between U.S. and Brazilian companies.

Second, service, resource, and capital flows between the two countries should be facilitated as a means to foster foreign direct investment and cross-border interorganizational collaboration. For example, human capital mobility should be facilitated so as to allow for the combination of complementary competencies and organizational learning between U.S. and Brazilian companies.

Third, public standards related to food quality and marketing should be defined—particularly for perishable products such as dairy, meat, and fruits and vegetables. A transition period may be necessary to allow gradual adaptation by Brazilian firms operating in a loose institutional environment. Public financing may also be necessary for smaller firms to make the necessary investments to comply with new public standards.

Fourth, the adoption of private standards related to the procurement of raw or semi-processed materials by food processors and retailers may create demand for public policy regarding financing and contract enforcement.

Fifth, policy alternatives should be identified so that domestic production in noncompetitive industries can be gradually redirected toward alternative uses of factors of production including labor, capital, and natural resources.

Sixth, both countries should carry out an in-depth examination of trade opportunities not harmful to existing domestic production, such as new agri-food products and import substitution.

The FTAA agenda must also include negotiations about the use of anti-dumping as a trade barrier. Both Brazil and the United States have used anti-dumping measures to protect domestic industries in the context of Mercosur and NAFTA, respectively. In addition to the protection of some agricultural sectors by means of trade barriers, federal income and price support programs in the United States are a particularly contentious point in FTAA negotiations. Policymakers interested in the positive net gains of the FTAA will need to be creative in overcoming this potential deal breaker.

FOOD SECURITY AND THE WORLD TRADE ORGANIZATION: A TYPOLOGY OF COUNTRIES

Identifying similarities in the food security profiles of countries is an important exercise because it allows for a more differentiated analysis of food (in)security situations. Its relevance to trade policy derives from the fact that food security categories are utilized by the WTO to determine the specific rights and obligations of contracting parties.

Some of the categories currently used by the WTO to capture food security concerns appear inadequate, the most obvious case being the developing country category. A wide variety of self-identified developing countries have enjoyed preferential treatment in the General Agreement on Tariffs and Trade and the WTO. In Chapter 11, Diaz-Bonilla, Thomas, Robinson, and Cattaneo derive food security profiles for 167 countries based on five measures of food security (calories per capita, protein per capita, food production per capita, the ratio of total exports to food imports, and the share of nonagricultural population). The authors show that developing countries appear scattered across all levels of food security, with the exception of the very food secure group.

Another category utilized by the WTO that presents a weak correlation with food security indicators is that of net food importing developing countries (NFIDCs). The analysis in Chapter 11 finds that of the 18 countries currently identified as NFIDCs by the WTO, only 10 are classified in food insecure clusters. High levels of food imports in some developing countries can be a reflection of the comparative advantage of their production structures. In addition, some countries may be net food importers due to the dominant role of the tourism industry.

The fact that NFIDC status is not a good indicator of serious food security problems does not mean that this categorization of countries should be dismissed. The NFIDC classification has implications under the Ministerial Decision on Least Developed and Net Food Importing Developing Countries, and constitutes an acquired right. The current membership of the NFIDC group does not have to be changed and certainly remains valid for goals other than food security considerations. However, addressing the latter concerns requires a more precise approach based on specific food security indicators.

The least developed countries category corresponds more closely to the list of countries suffering from food insecurity, although food insecurity is not explicitly part of its definition. Of the 44 least developed countries covered in Chapter 11, only three are not food insecure. However, in the WTO classification system, some countries are neither least developed nor NFIDCs but have food security profiles that are similar to those of the most vulnerable countries. Limiting the special and differential treatment related to food security only to least developed countries and NFIDCs ignores the needs of other food insecure countries.

Using the least developed countries category to define specific rights and obligations in the WTO seems an appropriate starting point; however, it is not an optimal solution. An alternative would be to provide special treatment under food security provisions to both least developed countries as defined by the United Nations, and all other countries classified as food insecure according to an objective set of indicators, such as those in Chapter 11. In order to identify the countries most at risk without having to resort to formal cluster analysis, a more limited approach would involve using per capita consumption of calories and protein as indicators of consumption vulnerability, and the food import bill as a percentage of all exports as an indicator of trade stress. Food insecure countries would receive treatment similar to least developed countries for rights and obligations related to domestic support and access to their own markets. They would also be considered for food aid, financial support, and technical assistance as envisaged for least developed countries and NFIDCs. Nevertheless, special access to other countries' markets and additional benefits conferred for reasons other than food security would continue to be limited to countries specified as least developed by the United Nations.

Chapter 1

Agricultural Liberalization in Multilateral and Regional Trade Negotiations

Marcos Sawaya Jank, Ian Fuchsloch, and Géraldine Kutas

For most countries in the Western Hemisphere, agriculture is a sensitive, complex, and heterogeneous sector, and its relevance and meaning vary from country to country. Agricultural trade in the Western Hemisphere totals US$200 billion and accounts for approximately 30 percent of the world's agricultural trade and 9 percent of total trade in the Western Hemisphere. Overall, it absorbs a considerable portion of the economically active population, and represents a high percentage of gross domestic product (GDP) and exports. Small economies, such as most of the Caribbean countries, have a strong dependence on preferential or duty-free access agreements, such as the Generalized System of Preferences or the Lomé-Cotonou Agreements between the European Union and the African, Caribbean, and Pacific countries. The elimination of subsidies is a sensitive issue for the net food importing countries, since they depend on low-cost food imports and consequently resist the elimination of export incentives in the developed world, such as agricultural export and credit subsidies and food aid mechanisms. For medium-size economies, such as Brazil and Argentina, agriculture is a competitive sector with strong potential to generate trade balance surpluses. These countries can be expected to demand further liberalization. For large economies like the European Union, the United States, and Japan, agriculture is a politically sensitive sector due to the pressure that lobby groups exert on the lawmaking process. As a result, agriculture is a strategic issue for all American countries in both regional and multilateral trade negotiations.

MARKET ACCESS FOR AGRICULTURAL PRODUCTS IN THE WESTERN HEMISPHERE AND THE EUROPEAN UNION

Decades ago, high tariffs were the major cause of restricted market access. As a result, most of the efforts of the General Agreement on Tariffs and Trade were dedicated to successive

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Table 1–1

The Evolution of World Agricultural Protectionism

Policy instruments	Regulatory institution/agreement
Tariffs and tariff rate quotas	Agreement on Agriculture (Uruguay Round)
Nontariff barriers (technical, sanitary)	Agreement on Technical Barriers to Trade (Uruguay Round)
	Agreement on Sanitary and Phytosanitary Measures (Uruguay Round)
Subsidies (domestic, export)	Agreement on Agriculture (Uruguay Round)
Export credits and food aid	No multilateral discipline
Anti-dumping and safeguards	GATT Article VI and Agreement on Subsidies and Countervailing Measures
Labor standards	No multilateral discipline
Environmental issues	Issue for WTO Doha Round
Nontrade concerns	Issue for WTO Doha Round

tariff reductions. Today, protection is a much more complex subject with many different faces. Table 1–1 shows that agricultural protectionism has been evolving rapidly in new directions that are not yet completely covered by the rules of the international trading system. Actually, a few measures have been fully or partially covered by the Uruguay Round Agreement on Agriculture (URAA), while some are covered by additional World Trade Organization (WTO) agreements (technical barriers to trade and sanitary and phytosanitary measures), and others will hopefully be negotiated in future rounds.

Despite the achievements of the URAA, agriculture continues to be the most protected sector in the world economy.[1] Although ad valorem tariffs continue to be the main instrument for trade protection, agricultural products are unique in that they are also protected through specific and mixed tariffs, tariff rate quotas (TRQs), sanitary restrictions, domestic and export subsidies, and nontariff barriers (price bands, licensing, standards, prohibitions, and state trading enterprises).

This section examines some of the policy instruments affecting agricultural market access throughout the Western Hemisphere. It analyzes current agricultural trade in the region as well as tariff profiles and comparative levels of protectionism, and introduces new indicators for evaluating tariff protection in bilateral and regional trade agreements.

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[1] Gibson and others (2001) estimate that the simple global average for most favored nation bound tariffs on agricultural imports will exceed 60 percent even after all the cuts that countries carry out through the World Trade Organization Agreement on Agriculture.

Tariff Structure and Trade Profile in the Western Hemisphere

Comparative Trade Profile

Approximately half the countries included in this study have agricultural trade surpluses while the other half have agricultural trade deficits. Figure 1–1 shows trade performance as a share of GDP for the five regional blocs in the Western Hemisphere. Although the North American Free Trade Agreement (NAFTA) is by far the major hemispheric trader of agricultural products, it has the smallest trade as a percentage of GDP. Mercosur (the Common Market of the South) and Central America have the largest trade surplus in relative terms, while the 15 Caribbean countries show an overall deficit, mainly concentrated in food products. In 2000 the United States, Argentina, Brazil, and Canada had the largest agricultural trade surpluses, respectively; Mexico, Venezuela, the Bahamas, and the Dominican Republic had the largest deficits (see Appendix Table 1–1).

The concentration of exports in agricultural product groups is a clear phenomenon in Latin American and Caribbean countries. The Hirschmann-Herfindahl index[2] can be used to measure the level of trade concentration in specific products. According to the index, exports are approximately seven times more concentrated than imports. Caribbean and Central American countries have the highest levels of export concentration in specific products (see Figure 1–2). For example, in St. Kitts and Nevis, raw sugar represents 75 percent of agricultural exports; in St. Lucia, bananas and beer represent 92 percent of exports; and in Honduras, coffee and bananas represent 74 percent of exports.

Figure 1–3 shows that 10 Western Hemisphere countries have more than 50 percent of their agricultural exports concentrated in only three products: coffee, bananas, and sugar. The most diversified countries in terms of exports are the United States, Canada, and Mexico.

Methodology and Data

The first step in developing tariff profiles by country and main group of products is to convert specific and mixed tariffs to ad valorem equivalents.[3] Ad valorem equivalents are usually calculated either by comparing collected custom revenues to the value of imports or by comparing unit values of traded products with the applied non ad valorem tariff. The methodology followed in this study to obtain ad valorem equivalents was to divide the product's specific rate by its import price. In this case, the price was calculated by dividing the value of imports by the quantity of imports. Where no trade data were available, the price of the closest related product was used. The data are for 2000 and come from the 2001 Hemispheric Database of the Americas (2001) and the Agricultural Market Access Database (2001).

This section uses data collected by the Inter-American Development Bank (2000, 2001b) and compiled in the 2001 Hemispheric Database of the Americas for 30 of the

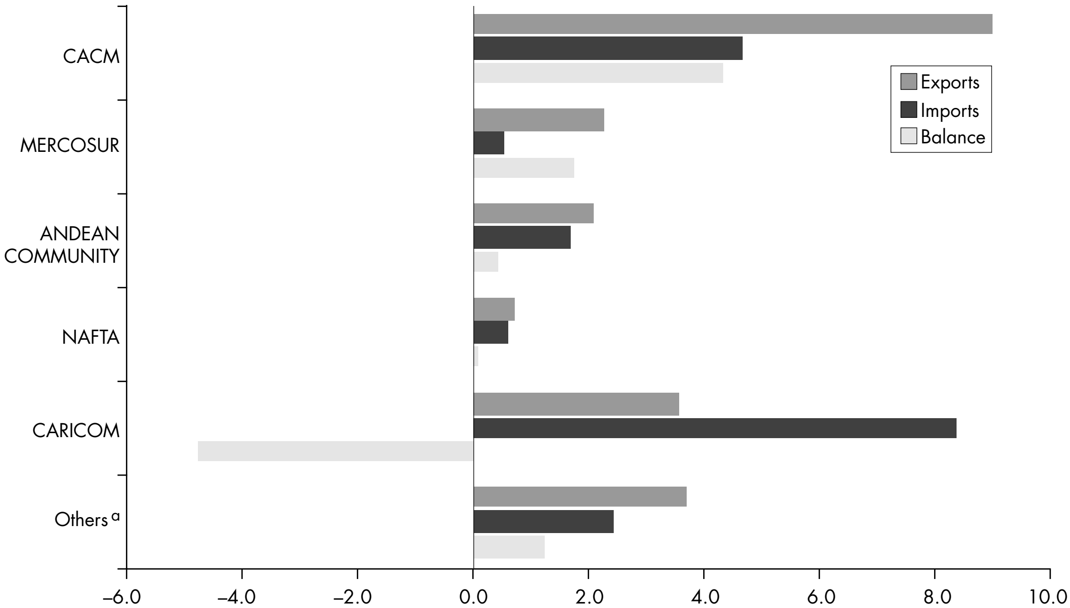
[2] The Hirschmann-Herfindahl index is equal to the sum of the squared shares of all products (tariff lines) exported. When a single export product or tariff line produces all the revenues, the index equals 100; when export revenues are evenly distributed over a large number of products, the index approaches zero.

[3] Specific tariffs are set as a monetary amount per unit of imports, that is, a product can have a specific tariff, which charges $1.50 per kilogram. Countries may also combine ad valorem and specific tariffs so that a product's tariff may be the sum of the ad valorem tariff plus the specific tariff, called mixed or compound tariffs.

Figure 1–1

Total Agricultural Trade in the Western Hemisphere, 2000

(Percentage of GDP)



[a] Others are Chile, the Dominican Republic, and Panama.
Source: Hemispheric Database of the Americas (2001).

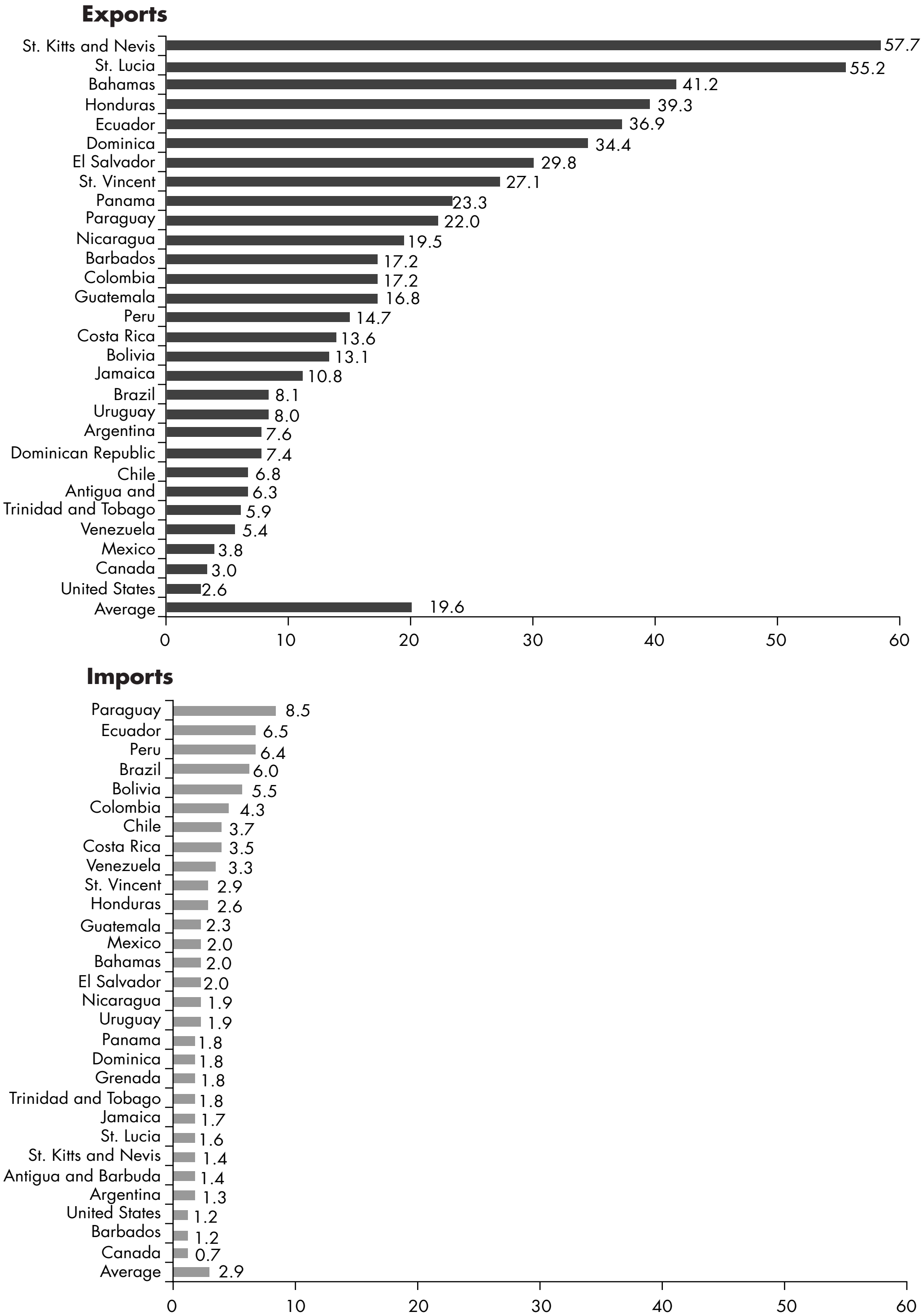
34 member countries of the Free Trade Area of the Americas (FTAA), excluding Belize, Suriname, Guyana, and Haiti, due to lack of trade-related data. The study uses primarily most favored nation (MFN) applied rates, since these will be the tariffs used in the FTAA negotiations. However, to provide a realistic overview of the current level of trade protection, the analysis was extended to include preferential and intrabloc tariffs.[4]

In order to analyze and compare protection levels, several country databases were created for specific countries using data from 2000.[5] The objective was to compile all trade-related data available for products by country into one database. The databases contain data in both 6-digit and 8-digit (or more) Harmonized System Code tariff lines,[6] and include product descriptions, MFN ad valorem tariffs, MFN specific and mixed tariffs, preferential rates, and ad valorem equivalents for such tariffs, import values, quantities, import prices, export values, export volume, an indication of whether the tariff is a TRQ,[7] and tariff peaks (see Appendix Tables 1–1 and 1–2). In addition, the data were

[4] For methodologies to measure trade protection in agriculture, see Bouët (2000) and Bouët and others (2002).
[5] For some countries where data for 2000 were not available, data for 1999 were utilized.
[6] Tariff lines refer to the categories in which WTO members legally establish tariffs.
[7] A TRQ is a two-tiered tariff under which a limited volume of goods (the quota amount) can be imported under the lower in-quota tariff, with any additional import quantity being subject to a higher over-quota tariff. For more details, see IATRC (2000) and Skully (2001a).

Figure 1–2

Agricultural Trade Concentration in the Western Hemisphere: The Hirschmann-Herfindahl Index

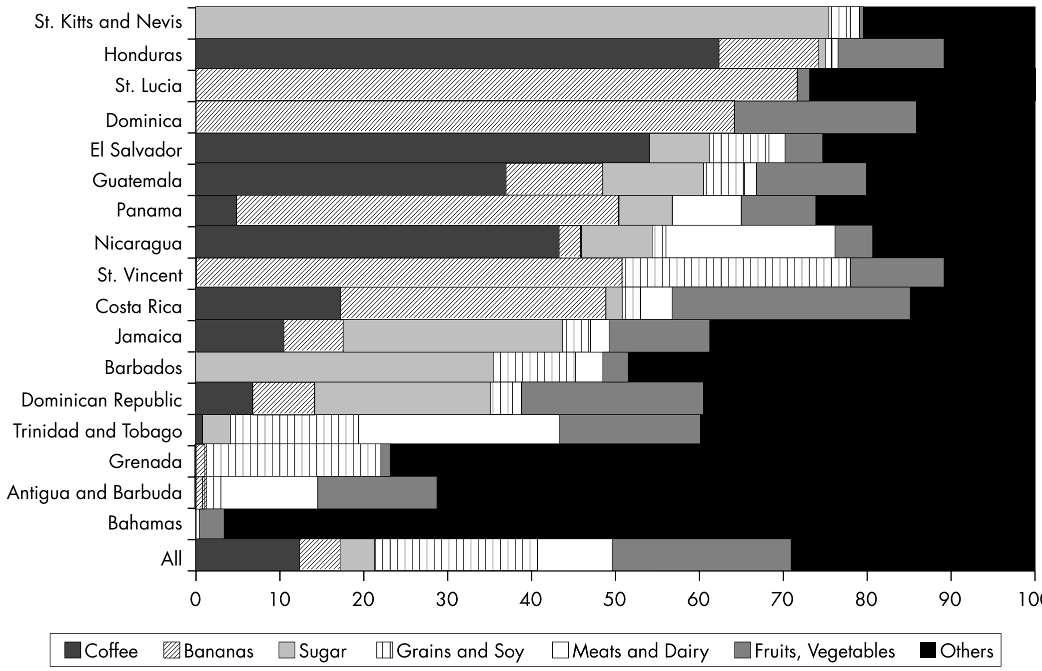


Source: Hemispheric Database of the Americas (2001) and IDB calculations.

Figure 1–3

Agricultural Export Concentration for Caribbean and Central American Countries, 2000

(Percentage of exports)



Note: All is the average for all Latin American and Caribbean countries.
Source: Hemispheric Database of the Americas (2001); IDB calculations.

further analyzed on an aggregate basis by sorting into 32 "sensitive"[8] groups of products based on the International Bilateral Agricultural Trade database. Once all tariffs were expressed in terms of ad valorem equivalents, we were able to calculate the number of tariff lines and TRQs, mean, median, tariff dispersion, maximum and minimum tariffs, and frequency distributions.[9]

Up to the 6-digit Harmonized System level, tariff schedules across countries use identical categories, which are established by the WTO, to aggregate products. Beyond the 6-digit level, this correspondence does not exit, since aggregation may differ from country to country. Thus, in order to calculate the weighted average tariffs, each country's tariff lines and trade flow data were aggregated into 5,113 category definitions to conform to the Harmonized System at the 6-digit level. Agricultural products were aggre-

[8] Sensitive products are those that account for a large percentage of a country's total exports and face relatively high import barriers.
[9] J.C. Bureau from INRA-France provided data for the European Union.

gated into 676 tariff lines, and nonagricultural products were aggregated into 4,437 tariff lines (a subgroup of 833 tariff lines was used for textile products).[10] Furthermore, the over-quota tariff rate was used when TRQ tariffs were aggregated at the 6-digit level. Wainio and Gibson (2001) stress that TRQs do, in most cases, represent a binding constraint on additional trade. As such, over-quota rates give a more accurate account of the level of protection provided by the tariff schedule, and should be used to reflect the overall restrictive nature of a country's trade policy. However, it should be noted that this might overestimate the impact of TRQs in the case where in-quota rates are not 100 percent utilized for a product. Nevertheless, any approach entails some kind of bias: using the simple mean underestimates, while using the maximum overestimates the effect of TRQs.

Comparative Tariff Structure

The most commonly used methods to measure tariff protection are the mean to depict the level of tariffs, and the standard deviation to measure tariff dispersion. Overall, the average tariff on agricultural products in the region is 16 percent, with Barbados, the Bahamas, Mexico, Dominica, the Dominican Republic, and Canada having the highest ad valorem equivalents, averaging more than 20 percent. Nicaragua, Chile, Guatemala, and Bolivia have the lowest average tariffs, below 10 percent (Figure 1–4 and Appendix Table 1–1). However, aggregates such as the mean and dispersion do not tell the whole story. For example, comparing the mean and the median of a country's tariff schedule may provide more valuable insights into the country's agricultural trade policy.[11]

Most Western Hemisphere countries have close mean and median tariffs. The median indicates the midpoint of the ad valorem equivalent tariff schedule distribution in ascending order of value. Nevertheless, in countries such as the United States, Canada, and Mexico, the median is much lower than the mean. This indicates the simultaneous presence of a large number of tariff lines far below the mean, and a few tariff lines with very high rates (greater than 50 percent), commonly called tariff peaks or megatariffs. In other words, NAFTA countries are characterized by the application of high tariffs on a small group of politically sensitive products, while the rest of their tariffs are kept at low levels[12] (see Figure 1–5). The opposite is true for some Central American and Caribbean countries, where a large number of tariff lines are set at high levels (greater than 15 percent), but a small group of low and even zero tariffs exert downward pressure on the mean.

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[10] The definition of the WTO Harmonized System for the agricultural sector is covered by the following chapters: 1 to 24 less fish and fish products; 2905.43 (manitol); 2905.44 (sorbitol); 33.01 (essential oils); 35.01 to 35.05 (albuminoidal substances, modified starches, glues); 3809.10 (finishing agents); 3823.60 (sorbitol n.e.p.); 41.01 to 41.03 (hides and skins); 43.01 (raw fur skins); 50.01 to 50.03 (raw silk and silk waste); 51.01 to 51.03 (wool and animal hair); 52.01 to 52.03 (raw cotton, waste and cotton carded or combed); 53.01 (raw flax); 53.02 (raw hemp). All other chapters were considered to be industrial (nonagricultural) sectors.

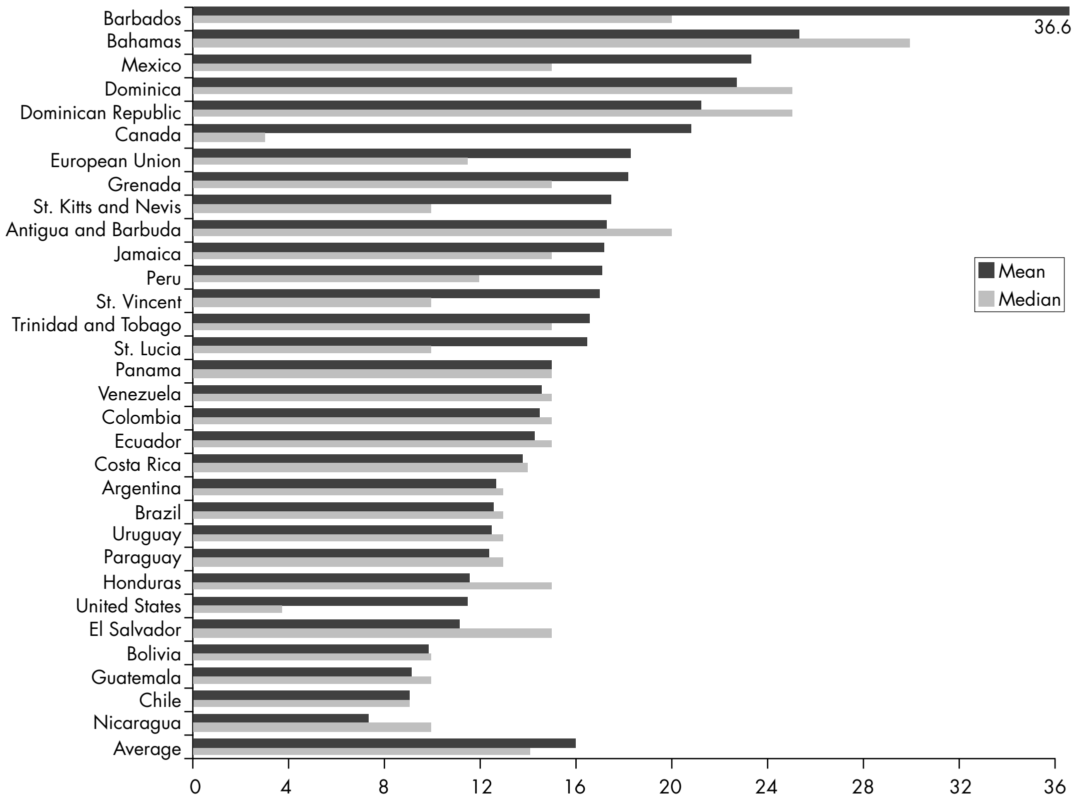
[11] The arithmetic mean is commonly called the average; it is the sum of all the scores divided by the number of scores. Dispersion is measured by the standard deviation, which measures the degree to which a value varies from the distribution mean. The median is the midpoint of a tariff schedule's distribution in ascending order of value: half the scores are above the median and half are below it.

[12] Olarreaga and Soloaga (1998) study several industry conditions that are correlated with high tariff protection, including high levels of industry concentration, low import penetration ratios, low share of sector production that is purchased by other sectors as intermediaries, high labor/capital ratio, and a small share of intra-industry trade.

Figure 1–4

Comparative Tariff Structure in Agriculture, 2000

(Percent)



Note: HS8, in ad valorem equivalents.

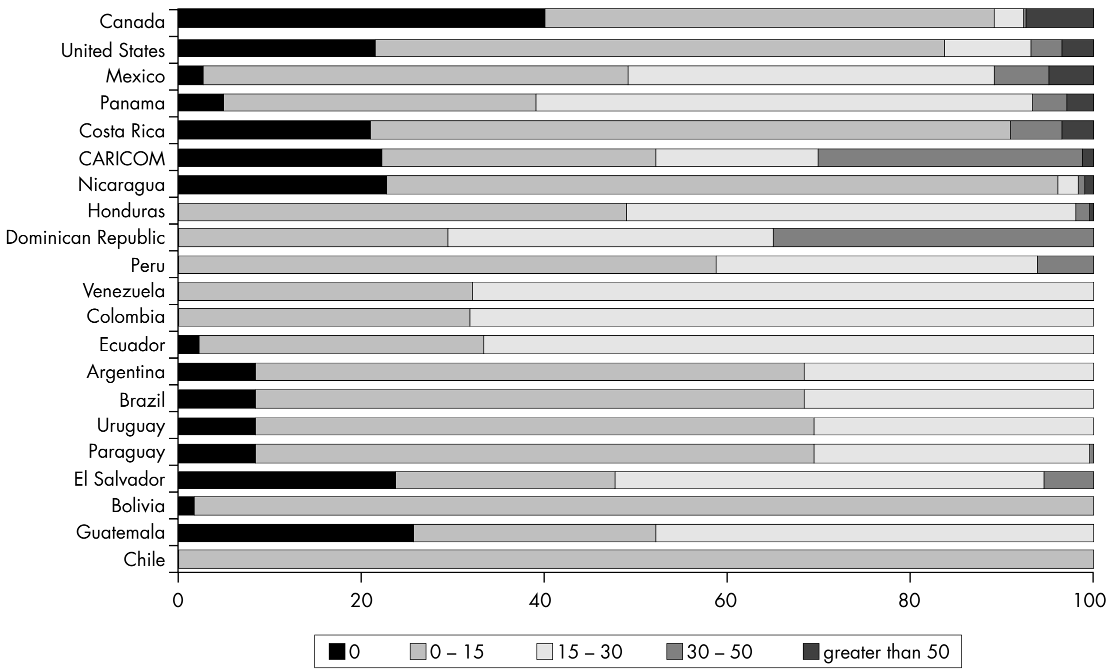
Source: Hemispheric Database of the Americas (2001); IDB calculations.

In fact, NAFTA countries have disparate means and medians, with high dispersion of rates and the highest levels of maximum tariffs in the Western Hemisphere. Canada ranks first in the highest tariffs: 98 tariff lines are above 50 percent, with some products from the milling industry reaching equivalent rates of up to 530 percent. In the case of the United States, 4 percent of its tariff lines (61 lines) have rates above 50 percent, and up to 350 percent on some tobacco products. Nevertheless, the United States has a large proportion of low rates (83 percent of its tariff lines have rates below 15 percent) that offset the impact of its megatariffs and ultimately result in a low overall average. In the case of Mexico, 5.1 percent of its tariff lines (54 tariff lines) are above 50 percent, and up to 260 percent, but Mexico also represents the third-highest mean among all FTAA countries (23 percent). Canada has the largest percentage of zero tariffs (40.1 percent), however, it also has the highest amount of tariff rates above 50 percent (7.3 percent). Mercosur countries have only a small percentage of zero tariffs (8.4 percent), but do not have MFN ad valorem tariffs above 30 percent (only one-third of the tariff lines are above 15 percent).

Figure 1–5

Comparative Tariff Structure: Frequency Distribution, 2000

(Percent)



Note: HS8.

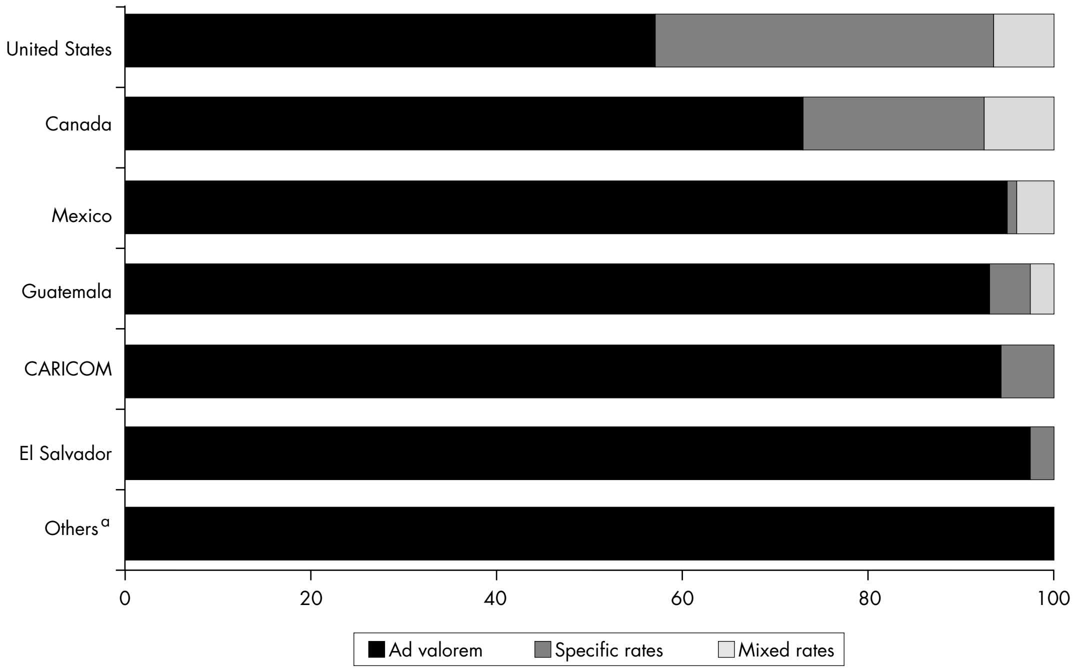
Source: Hemispheric Database of the Americas (2001).

It is interesting to notice that all South American countries except Peru have means and medians that are very close. This shows that the process of liberalization after the 1980s was accomplished without exclusions in the agricultural sector. Mercosur countries in particular have experienced a strong convergence in their agricultural tariffs. Their means are all approximately 12 percent, medians are exactly 13 percent, and standard deviations are about 6 percent. Andean countries have means and medians between 10 percent and 17 percent and dispersions below 6.5 percent. Chile is a special case. Although its ad valorem tariffs appear to be among the lowest, set at 9 percent for all products, agricultural imports are subject to price bands and other restrictions that significantly protect against imports.[13] This is a clear example of how the existence of nontariff barriers makes measurement of tariff protection a difficult task.

[13] Price bands regulate markets so that prices remain within a specified range. In the case of Chile, for example, the price band for wheat is a pair of variable tariffs: one increases to defend a floor price and one decreases to defend the ceiling price. The band has two tariffs, an ad valorem tariff that is always imposed, and a specific tariff that is determined by a tariff algorithm. When international prices are between the floor and the ceiling, the specific tariff

Figure 1–6

Comparative Tariff Structure:
Ad Valorem, Specific, and Mixed Tariffs, 2000
(Percent)



[a] All other South American countries.
Note: HS8.
Source: Hemispheric Database of the Americas (2001).

Another important measure of tariff protection is the type of tariff applied. Tariff barriers in agriculture are not only based on ad valorem tariffs (high means and presence of peaks), but also on the extensive use of specific and mixed tariffs and tariff rate quotas.[14] NAFTA countries particularly stand out in using these kinds of tariffs. More than 43 percent of U.S. tariffs are not ad valorem (specific or mixed), followed by Canada with 27 percent, and Mexico with 5 percent (see Figure 1–6). Some Caribbean countries, such as Antigua, Barbados, and the Bahamas, also widely apply specific tariffs, resulting

is zero and only the ad valorem tariff is imposed. When international prices are below the floor or above the ceiling, the specific tariff is increased or lowered to keep the price within the set limits. The price band loses its capacity to offset international prices when the tariff increase reaches its bound level or when it is decreased to zero. See Skully (2001b).

[14] Ad valorem tariffs are calculated as a percentage of the value of the goods, which is normally the cost, insurance, and freight (CIF) value. Specific tariffs are calculated as a percentage or a fixed amount per volume units (kilograms), and consequently result in higher protection levels the more competitive is the exporting country (lower import prices result in higher ad valorem equivalents). Mixed or compound tariffs are a combination of ad valorem plus specific rates.

in higher protection according to the level of competitiveness of the exporting country. All the other Latin American countries use only ad valorem tariffs, with the exceptions of El Salvador and Guatemala.

Measuring Tariff Protection for Sensitive Export Products

A country that mainly exports raw sugar and bananas is not interested in the overall level of tariffs imposed by another partner, but only the tariffs imposed on its main exports. In fact, this country will concentrate on the additional access it can gain for its primary traded products through multilateral and regional negotiations. Statistical aggregates such as means, medians, and dispersions do not measure the real importance and level of tariff protection on very specific and sensitive products.

A better technique to access the real level of tariff protection would be to use weighted averages instead of simple means, since weighted averages take into account the proportional relevance of sensitive products. The question that arises when calculating weighted averages is what values should be used to properly weight the tariffs that a country faces. Values such as production, consumption, imports, and exports appear to be the natural candidates, but given that the purpose is to measure trade protection, only imports and exports should be considered. However, using import values produces a downward bias because the imports of items facing high tariffs will have little weight, as these high tariffs are likely to create "trade chilling" effects by restraining or even impeding trade. For example, although the Brazilian sugar industry is very competitive, representing 57 percent of the total Western Hemisphere sugar exports, it only accounts for approximately 10 percent of total U.S. sugar imports. This is due to the high above-quota tariff applied to sugar imports.

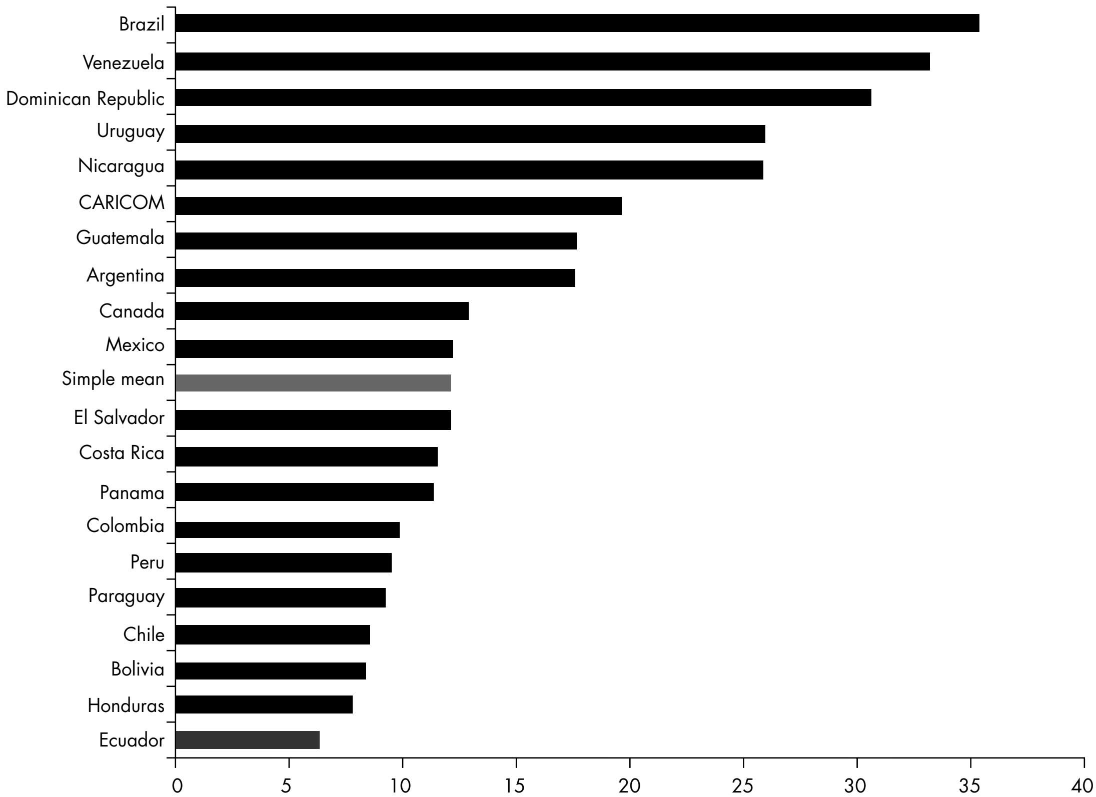
Weighted average tariffs should depend on importer tariffs and the composition of a country's total exports to the world (not the exports between partners). This approach emphasizes those tariffs in importing countries that are of greatest importance for exporting countries, and provides a dynamic view of the level of protection that each country imposes and faces with regard to its trading partners. Another advantage of this approach is that by using global export values, potential trade gains are incorporated, providing a more accurate picture of each country's relative competitiveness. For instance, in the case of sugar, it is expected that once the high U.S. over-quota sugar tariffs are eliminated, Brazil's share in total U.S. sugar imports would increase. Figure 1–7 compares the values of U.S.-imposed MFN tariffs using the weighted average and simple mean methods for each of its Western Hemisphere partners. The figure shows that many countries face a weighted tariff in the United States that is higher than the simple mean tariff. This illustrates that these countries' sensitive exports face high tariffs. Brazil faces the highest weighted average tariff for agricultural products (35.4 percent), mainly explained by the high tariffs on its tobacco, sugar, and orange juice exports. Venezuela's high value is mostly due to tobacco and dairy products.

Appendix Table 1–3 shows the average agricultural MFN tariffs weighted by total exports for all Western Hemisphere countries and the European Union. Using this methodology, on a bilateral basis the highest average duty would be faced by Ecuador (83.8 percent), Panama (76.1 percent), and Uruguay (75.3 percent) if all their products were exported to the European Union. In the case of Ecuador and Panama, the high tariff barriers applied to bananas explain the elevated values to a great extent. Uruguay faces

Figure 1–7

U.S.-Imposed Most Favored Nation Agricultural Tariffs Weighted by Each Partner's Exports

(Percent)



Note: HS6 max.
Source: Hemispheric Database of the Americas (2001); IDB calculations.

high tariffs on its meat and dairy product exports. Considering only the Western Hemisphere countries, the Dominican Republic (55.3 percent) and CARICOM (51.7 percent) face the highest tariffs against Mexico, and Uruguay (51.1 percent) against Canada. For most Caribbean countries and the Dominican Republic, high duties on sugar are the main cause, while for Uruguay it is dairy products. Overall, Mexico has the most protected market for agricultural products, followed by the European Union. Compared with all Western Hemisphere countries, Mexico's average agricultural tariff is approximately 37 percent.

Comparing Tariff Protection in the Western Hemisphere

So far, we have focused on the MFN tariff barriers faced by agricultural products. However, to provide a realistic picture of the effects of trade liberalization, two other factors should be taken into consideration: MFN versus preferential tariffs, and agricultural versus industrial tariffs.

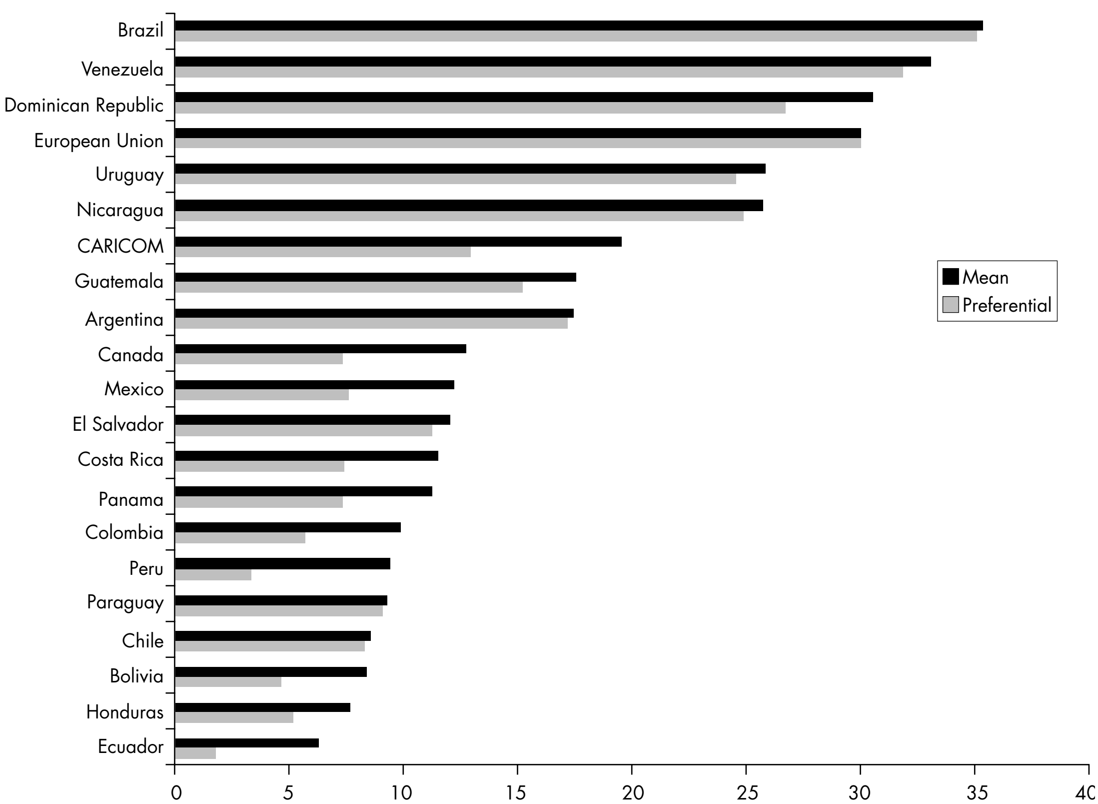
Most Favored Nation and Preferential Tariffs

The first factor is the existence of many preferential trade agreements and free trade areas in the Western Hemisphere. During the past decade, more than 30 bilateral and regional agreements have been negotiated in the region. These agreements have significantly increased trade between partners by providing preferential or duty-free access to a large portion of hemispheric trade. When these preferential agreements are taken into consideration, a different picture emerges. Figure 1–8 compares the U.S. MFN and preferential imposed tariffs, weighted by exports, for agricultural products. In the case of Ecuador, preferential access provides a 73 percent reduction in the tariff, decreasing it from the 6.3 percent to 1.7 percent. For Canada and Mexico, which are partners in NAFTA, the tariff is reduced by approximately 40 percent.

Figure 1–8

U.S. Most Favored Nation and Preferential Imposed Agricultural Tariffs, 2000

(Percent)



Source: Hemispheric Database of the Americas (2001); IDB calculations.

It is also interesting to note that most of the so-called small economies—Caribbean and Central American countries—experience a significant decrease in the level of tariff protection because of the unilateral preferential access granted by the United States for the few commodities that make up the bulk of their exports, such as coffee, cocoa, sugar, and bananas (see Figure 1–3). This provides a striking example of how a reduction in the tariffs faced by a few sensitive products can significantly impact the overall level of the tariff barrier faced by a country. However, in the case of many South American countries, preferential access does not notably decrease the overall agricultural tariff barriers (since these agreements do not provide access to sensitive products). Therefore, in some cases, using MFN rates to measure tariff protection creates an upward bias. Appendix Table 1–4 shows the average agricultural preferential tariffs, weighted by total exports, for countries in the Western Hemisphere and the European Union.

Agricultural and Industrial Tariffs

The second factor to be considered is that any negotiation that addresses the liberalization of trade barriers for agricultural goods will involve trade-offs. Many countries that face relatively high tariff barriers for their agricultural exports impose relatively higher import tariff protection on nonagricultural products. It is thus expected that a decrease in the level of tariff protection in the agricultural sector will require further liberalization of nonagricultural sectors. Any investigation of the effects of trade liberalization would be incomplete if it took only one sector into consideration. In this chapter, nonagricultural products are denoted industrial products.

Figure 1–9 displays the breakdown of the MFN tariff protection imposed by Brazil and the United States, by sector (agriculture and industry). The figure shows that in many cases a greater part of the overall tariff imposed by Brazil is due to industrial tariffs (especially in the case of the NAFTA countries). Almost 90 percent of the 17 percent overall weighted average tariff faced by the United States in Brazil corresponds to tariffs imposed on industrial exports. In the case of the United States, the inverse is true for almost all Western Hemisphere countries. A greater part of the overall tariff is due to agricultural tariff barriers. Of the 11 percent overall tariff faced by Brazilian exports to the United States, for example, more than 75 percent is imposed on its agricultural exports.

One of the advantages of using weighted average tariffs is that the above breakdown exercise can be further segmented. This provides a comprehensive overview of the sensitive products, utilizing both tariff and trade flow information, as shown in Figure 1–10. For the United States, the three most sensitive product categories are electronic equipment, electrical machinery, and transport equipment, with the first two counting for approximately 50 percent of the overall tariff level. In the case of Brazil, tobacco, textiles, orange juice, and sugar are the most sensitive products, and tobacco makes up almost half of the total overall weighted tariff.

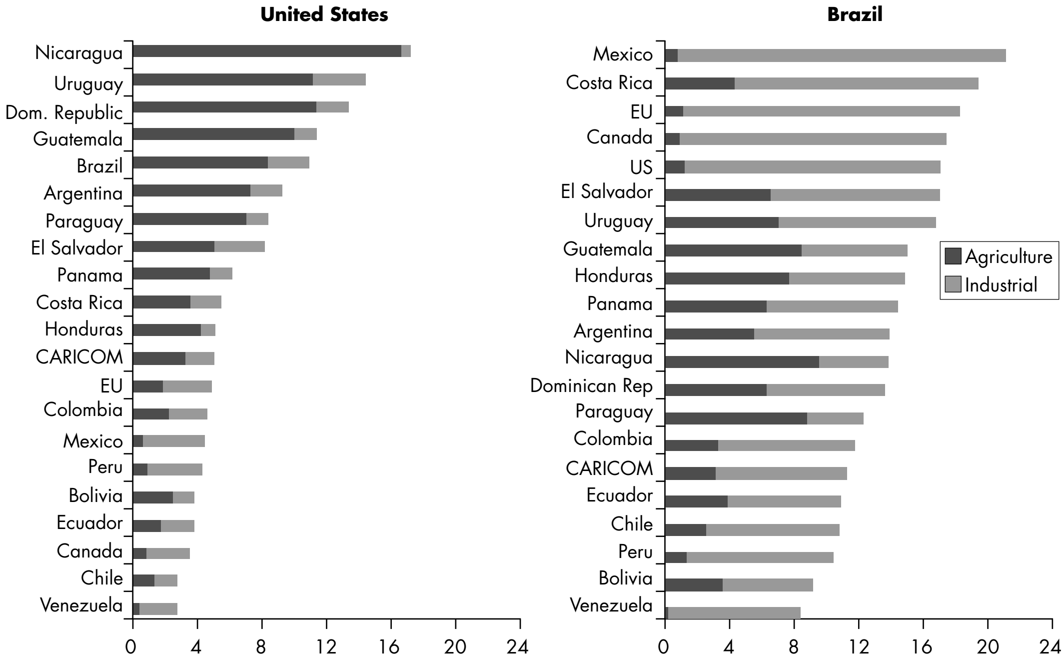
Evaluating Tariff Protection in a Bilateral Agreement: The Relative Tariff Ratio Index

The previous section demonstrated that one of the challenges in trade negotiations is the measurement and comparison of relative levels of tariff protection between trading partners. An index that measures the effects of trade liberalization in a bilateral negotiation is the relative tariff ratio (RTR) index, originally developed by Sandrey (2000) and further developed by Wainio and Gibson (2002) and Gehlhar and Wainio (2002). The index con-

Figure 1–9

Most Favored Nation Imposed Tariffs in the Industrial and Agricultural Sectors, United States and Brazil, 2000

(Percent)



Source: Hemispheric Database of the Americas (2001); IDB calculations.

siders the bilateral protection between two countries, where each tariff line of country A is weighted by country B's total exports to the world for the same tariff line, and vice versa. The index is constructed as the ratio between a country's faced tariffs in the numerator and its imposed tariffs in the denominator.[15]

In general, a ratio close to one means that both countries have similar tariff protection, and thus face/impose comparable barriers. However, this does not reflect the levels of tariffs, only their relative ratios. A ratio of 3.9 between the United States and Mexico means that for every percentage point that Mexico faces in the United States, the United States faces 3.9 points in Mexico, or an RTR index of 3.9/1.0. Conversely, the ratio be-

[15] The relative tariff ratio index is always calculated on a bilateral basis, or:

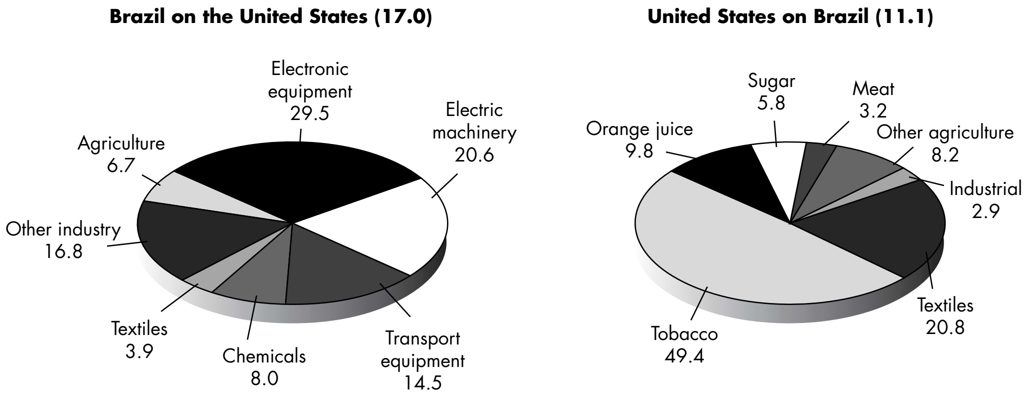
$$RTR_{AB} = \frac{\sum_{i}^{n}\left(X_i^B \cdot Y_i^A\right)}{\sum_{i}^{n}\left(X_i^B \cdot Y_i^B\right)}$$

Where A, B = countries A and B, X_i = ad valorem equivalent tariff rate for product i, and Y_i = share of exports of product i in total exports.

Figure 1–10

Overall Most Favored Nation Imposed Tariffs on Sensitive Products, Brazil and the United States, 2000

(Percent)



Note: HS6.
Source: Hemispheric Database of the Americas (2001); IDB calculations.

tween Mexico and the United States is 0.3, or an index of 0.3/1.0 (= 1.0/3.9). The main advantage of the RTR index is that it summarizes a large amount of data on trade flows and tariff levels in a concise measure that can be easily interpreted.

Table 1–2 contrasts U.S. MFN and preferential RTR index values for the agricultural and industrial (nonagricultural) sectors. In most cases, the U.S. RTR preferential index has higher values than the MFN index, especially for industrial products from the Andean Community countries (for Ecuador, the ratio increased from 2 to almost 3,000). In the case of the Andean countries, this extreme increase from MFN to preferential can be explained by the fact that the United States has practically reduced all import tariffs to zero to improve trade flow and help in the war against drug trafficking. The problem is that as the imposed tariff approximates zero, the RTR tends toward infinity. As a result, when imposed tariffs are very close to zero, the RTR index has to be interpreted cautiously (the imposed and faced tariff values provide information on the underlying dynamics). Nevertheless, these high ratios indicate that the reduction in tariffs by the United States under the preferential agreement has not been followed by a proportional decline in tariffs on the part of the Andean Community.

This increase in the RTR index also occurs for Mexico and Canada, both partners in NAFTA. In the case of Canada, the overall index increased from 1.7 to 4.6, and for Mexico from 3.9 to 9.2 (Table 1–2). This implies that the United States has provided relatively more access than it has gained from its partners in NAFTA, when taking into consideration the RTR methodology. Furthermore, this liberalization has been primarily granted for industrial products.[16] In the case of Mexico, the RTR industrial index increased from

[16] For Canada, the RTR industrial index could not be calculated because tariffs faced and imposed are zero.

Table 1–2

U.S. Most Favored Nation and Preferential Relative Tariff Ratio Index for Western Hemisphere Countries, 2000

	MFN tariffs			Preferential tariffs		
Country	All	Agriculture	Industry	All	Agriculture	Industry
Argentina	1.5	0.8	4.0	1.8	0.8	9.8
Brazil	1.5	0.4	5.0	1.8	0.4	14.3
Paraguay	1.4	1.5	2.0	1.6	1.5	8.9
Uruguay	0.8	0.5	2.0	1.0	0.6	5.1
Canada[a]	1.7	2.9	1.1	4.6	3.5	—
Mexico	3.9	4.2	3.6	9.2	3.5	16.5
Chile	3.2	1.1	5.4	4.2	1.1	9.6
Dominican Republic	1.0	0.6	4.0	1.2	0.7	12.9
Panama	1.6	2.1	3.4	2.7	3.3	10.2
Costa Rica	0.8	1.5	1.2	1.7	2.3	5.5
Guatemala	0.4	0.8	1.2	0.5	1.0	5.7
Honduras	1.1	2.0	2.5	1.9	2.9	8.4
Nicaragua	0.2	0.5	1.3	0.2	0.5	14.4
El Salvador	0.6	1.0	0.7	0.8	1.1	2.1
Bolivia	2.3	1.2	5	6.5	2.1	731
Colombia	2.3	1.6	3	8.2	2.8	265
Ecuador	1.7	2.4	2	13.6	9.0	2,959
Peru	2.9	1.9	3	39.1	5.3	2,434
Venezuela	4.0	0.5	4.4	4.4	0.5	4.8
CARICOM	2.5	1.1	5.4	4.4	1.7	14.9
European Union	1.1	0.9	1.0	1.1	0.9	1.0

[a] Canada's imposed tariff is equal to zero, so the RTR index tends to infinity.

Note: HS6.

Source: Hemispheric Database of the Americas (2001); IDB calculations.

3.6 to 16.5, however, the RTR agricultural index was reduced from 4.2 to 3.5. In other words, while Mexico has reduced agricultural barriers, the United States has provided more access to industrial imports, in relative terms. On the other hand, for countries that have unilateral trade agreements with the United States, the preferential RTR index will be lower than the MFN RTR index. This is the case since these countries have gained market access without reciprocity.

The above illustration provides a powerful example of how useful the RTR index can be for measuring trade liberalization on a bilateral basis. The index can be used as a practical tool to appraise progress in a free trade agreement, and as a starting point to identify potential sectors on which negotiators should focus. Therefore, a next step would be to calculate several years to capture trends, since only one year may not be fully representative. However, the RTR index is limited in terms of accuracy. Sandrey (2000) warns that he would be hesitant to utilize the index to analyze less developed economies because income effects would make some of the assumptions unrealistic. However, he points out that this does not invalidate the examination of exports from the developing world to the developed world. Overall, we believe that the potential data gains of using the RTR far outweigh its deficiencies.

Evaluating Tariff Protection in a Regional Integration Agreement: The Regional Export-Sensitive Tariff Index

Building on the RTR index, we propose an extension at the regional level called the regional export-sensitive tariff (REST) index. The REST index aggregates all tariffs faced and imposed by each country at the regional level into a single indicator, representing a ratio of the weighted value of those tariffs.

The index measures each country's faced tariffs from its partners weighted by its total exports in the numerator, and each country's imposed tariffs weighted by the total exports of all its partners in the denominator, calculated one by one, based on a potential regional integration agreement. Each combination of tariffs and share of export ratios for one country is weighted by the relative importance of total exports to the region in the case of faced tariffs, and total imports in the case of imposed tariffs.[17] Both the RTR and REST indexes can be used to gauge the concessions that each country makes relative to those it receives in the event of the elimination of trade barriers. The advantage of the REST index is that it can go beyond the bilateral level and address the important issue of liberalization at the regional or multilateral level.

However, the REST index, like the RTR index, does have limitations and is more of a pragmatic, mercantilist tool, rather than an elegant academic measure. Two of these limitations deserve special attention. The first limitation is that the REST index is based on tariffs and therefore does not take nontariff barriers into account, such as technical barriers to trade and sanitary and phytosanitary measures. Such barriers are extremely difficult to quantify and may one day become a major barrier to agricultural trade. Sanitary and phytosanitary requirements, for instance, can impede trade with small economies due to the lack of financial and human resources to implement and administer the required procedures.

The second limitation is that the index fails to incorporate the effects of elasticity and trade substitution that may occur once barriers decrease. It assumes that all of a

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$$REST_A = \frac{\sum_{R \neq A}^{N} \left\{ \left(X_R^A / X_T^A \right) \sum_{i=1}^{n} x_i^R \cdot y_i^A \right\}}{\sum_{R \neq A}^{N} \left\{ \left(M_R^A / M_T^A \right) \sum_{i=1}^{n} x_i^A \cdot y_i^R \right\}}$$

Where: A, B, C,…, N = member countries of an RTA and *R* is any country,

x_i^A = maximum ad valorem equivalent tariff rate at HS-96 level for tariff line *i* in country *A*,

y_i^A = share of exports of *i* in total exports, M_R^A = country A's total imports from country *R*,

M_T^A = country *A*'s total imports from all RTA countries,

X_R^A = country *A*'s total exports to country *R*,

X_T^A = country *A*'s total exports to all RTA countries.

country's sector exports will uniformly go to all its partners in the regional agreement. This is somewhat implausible, especially in the case of exports from large to small economies. However, the index is influenced by each country's sensitive exports to its most important partners, giving marginal importance to other products and countries. Thus, the REST index contrasts countries' competitive products with major trading partners' barriers. It seems unrealistic to assume that 92 percent of a Caribbean country's imports from the United States would be industrial products (agriculture corresponded to only 8 percent of total U.S. exports in 2000). This seems even more unlikely considering that these countries are net food importers and have a relatively low level of income per capita. Nonetheless, since the Caribbean Community represents less than 1 percent of total U.S. exports in the Western Hemisphere, it has a small weight in the U.S. REST index.

In sum, the advantages presented by a practical and concise figure that provides a measurement for sensitive product tariff barriers in a regional agreement far outweigh the limitations mentioned. Therefore, the index could be used in negotiations to provide a valid and useful way to measure the mercantilist progress and balanced concessions that are behind most regional trade negotiations.

A final issue should be taken into account to avoid bias when using MFN data to compute the REST index. Preexisting regional free trade area agreements have to be considered when calculating the index by using preferential tariffs or assuming a zero tariff. This is the case because trade has already been liberalized under such agreements, undoubtedly increasing trade flows between partners. In other words, existing free trade areas have already created trade and thus would induce bias in an index that is trying to gauge the level of distortion in trade flows produced by high tariff rates. Only trade data from non-Mercosur countries were used, for instance, to compute Argentina's MFN REST index in the FTAA. As a result, the Argentinean MFN REST value measures the concessions that the country makes relative to those it receives, taking into account only the Western Hemisphere countries outside the Mercosur agreement. The same approach was used for the Andean Community, the Central American Common Market, and the NAFTA countries. It should be emphasized that such a concern does not exist when preferential tariffs are used to calculate the REST index. In this case, the existing trade flows accurately reflect the applied preferential tariffs, and thus there is no distortion to take into account. In calculating the preferential REST index for the FTAA, each country was weighted against all other Western Hemisphere countries. Table 1–3 summarizes the main strengths and weaknesses of the RTR and REST indexes.

Appendix Tables 1–9 and 1–10 provide the aggregated regional tariffs that are weighted, faced, and imposed for Western Hemisphere countries, and the respective REST index (MFN and preferential, respectively). As illustrated for the bilateral case of Brazil and the United States, a breakdown of these aggregated tariffs by product could provide a comprehensive overview of a country's sensitive export products at the regional level. Figure 1–11 displays the faced tariffs for agricultural products, while Figure 1–12 displays imposed tariffs for industrial products. The agricultural tariffs faced are twice as high on average as imposed industrial tariffs. Moreover, most countries experience a significant decrease in the regional agricultural tariff level when preferential agreements are taken into consideration. The same does not hold true when industrial imposed tariffs are analyzed. A possible interpretation is that trade for sensitive industrial products has already been liberalized, for the most part, while many sensitive agricultural products still depend on preferential treaties for market access.

Table 1–3

Summary of the Strengths and Weaknesses of the Relative Tariff Ratio and Regional Export-Sensitive Tariff Indexes

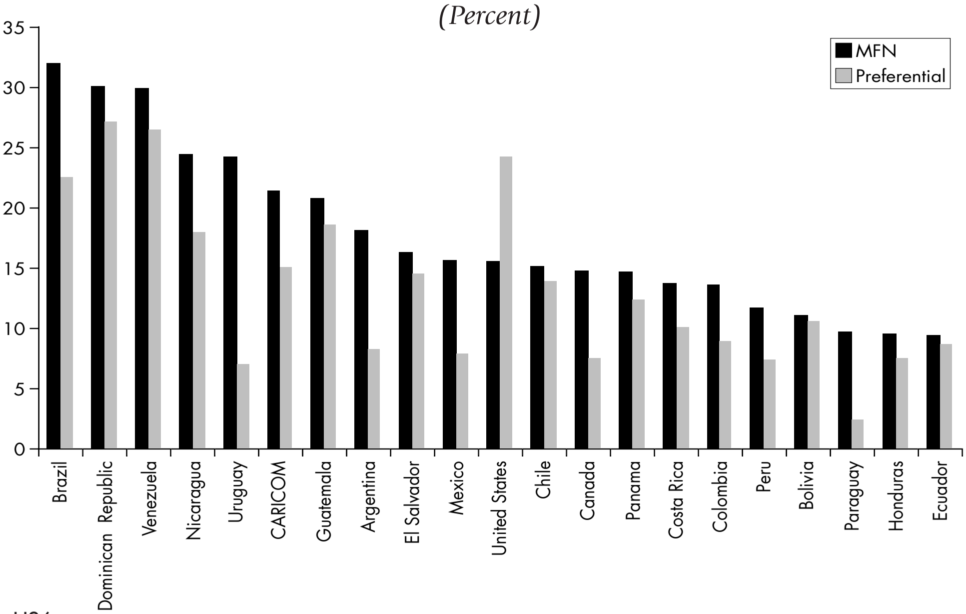
Strengths	Weaknesses
• Pragmatic measure that can be easily interpreted • Summarizes a large amount of trade flows and tariff-level data into a simple and concise number • Tariffs weighted according to their importance with trading partners (index is mostly influenced by sensitive products and major trading partners) • Excellent instrument for trade negotiators; useful for setting starting points and measuring progress in free trade agreements • Highlights potential sectors of possible negotiation difficulty	• Ignores elasticity effects and substitution possibilities that may occur once trade barriers decrease • Assumptions could be unrealistic for some least-developed countries • Does not account for nontariff measures and subsidies (sanitary and phytosanitary measures, technical barriers to trade, anti-dumping, export restrictions, etc.) • The regional export sensitive tariff calculation makes no sense when tariffs tend to zero

Source: Authors' calculations based on Sandrey (2000), Wainio and Gibson (2001), and Gehlhar and Wainio (2002).

Figure 1–11

Most Favored Nation and Preferential Faced Tariffs on Agricultural Products, Western Hemisphere Countries, 2000

(Percent)



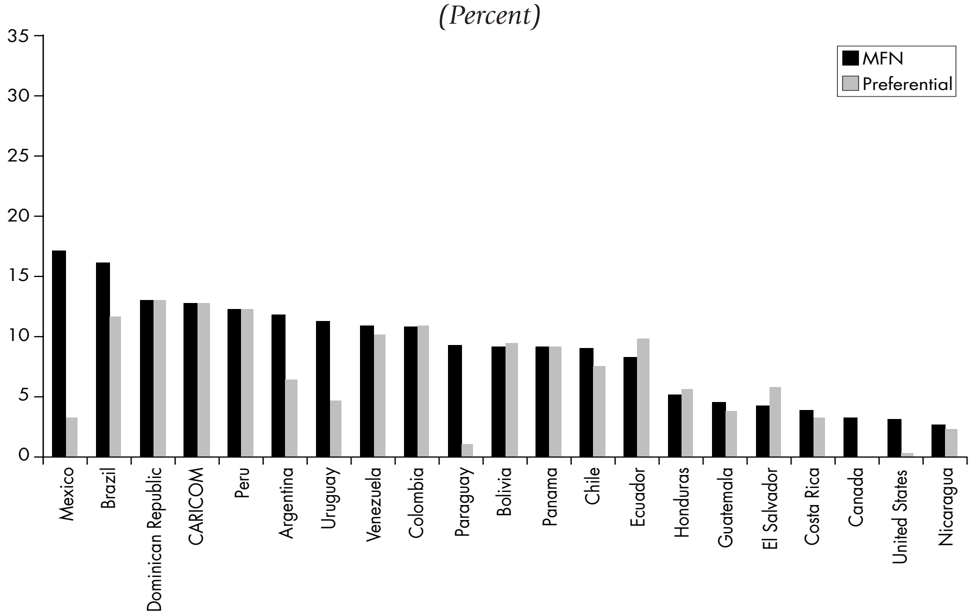
Note: HS6.

Source: Hemispheric Database of the Americas (2001); IDB calculations.

Figure 1–12

Most Favored Nation and Preferential Imposed Tariffs on Industrial Products, Western Hemisphere Countries, 2000

(Percent)



Note: HS6.
Source: Hemispheric Database of the Americas (2001); IDB calculations.

When considering MFN figures, Brazil's agricultural exports face the highest barriers in the hemisphere. On the other hand, Brazil ranks second place in terms of imposed protection on industrial imports. Canada and the United States impose the lowest industrial tariffs for all partners: about 3 percent in the case of MFN tariffs and practically zero when preferential rates are considered. It is interesting to note that the U.S. agricultural preferential faced tariff is actually higher than the MFN tariff. This is because the MFN calculations for regional tariffs do not take into consideration trade between existing regional trade agreement members (NAFTA members in this case). The preferential tariff ends up being higher because the United States still faces some protection on agricultural exports from other NAFTA members (the United States has provided relatively more access than it has gained from its NAFTA partners).

Table 1–4 presents the results for the MFN and preferential REST indexes for the whole economy, the industrial sector, and agriculture. REST index figures from 0.8 to 1.2 represent similar tariff protections. REST index numbers above 1.2 characterize higher faced than imposed weighted tariffs, therefore indicating a protectionist reality that could be reversed. An index value less than 0.8 denotes lower faced than imposed tariffs, and therefore a country that would be a net liberalizer in that sector.

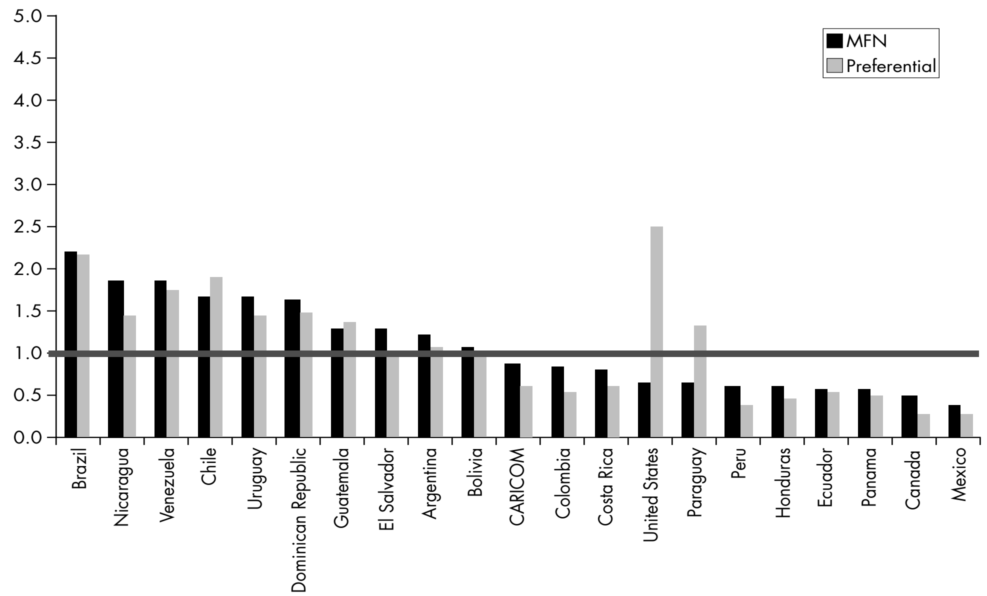
In general, a REST ratio close to one can be interpreted as reflecting overall evenness between a country's tariff regime and that of its regional partners. Consequently, the objective of regional trade agreement negotiations could be to make progress toward REST values that are close to one for all partners. This does not necessarily mean that all tariffs should be close to zero. It rather implies that countries will have equivalent access for their most sensitive export products at the regional level. The following sections provide a detailed analysis of the REST index results by sector.

Agricultural sector. Figure 1–13 and Table 1–4 present the calculation of the REST index for agricultural products using MFN and preferential tariffs. The figure shows that NAFTA, the Caribbean, and most Andean countries impose higher weighted MFN tariffs than they face in the Western Hemisphere (REST index less than 1). The largest face-off is Mexico and Canada, where high tariffs imposed on a small group of key products are significant to potential FTAA partners. In other words, these countries are net liberalizers within the integration process in terms of agricultural tariff protection.

By contrast, Chile and most Mercosur and Central American countries would obtain net gains in terms of agricultural market access. Brazil would rank first in this process above Uruguay, Chile, and Argentina, as a result of the high tariffs faced by Brazil's sensitive products, such as sugar, orange juice, and tobacco, especially in the United States. There are no major differences between the MFN and preferential REST figures for most countries other than the United States and Paraguay. In fact, the U.S. case has provided more access in agricultural trade to its NAFTA partners than it has received. Paraguay's preferential REST is higher because it has provided virtually free access to its Mercosur partners, while it still encounters some tariff barriers.

Figure 1–13

The Regional Export-Sensitive Tariff Index for Agricultural Trade in the Americas, 2000



Note: HS6.

Source: Hemispheric Database of the Americas (2001); IDB calculations.

Table 1–4

The Regional Export-Sensitive Tariff Index, Most Favored Nation and Preferential Tariffs by Sector, Western Hemisphere Countries, 2000

		MFN			Preferential		
	REST	All	Ind	Agr	All	Ind	Agr
Mercosur	Argentina	0.9	0.4	1.2	0.7	0.3	1.1
	Brazil	0.7	0.3	2.2	0.7	0.3	2.2
	Paraguay	0.9	0.7	0.7	1.8	0.6	1.4
	Uruguay	1.4	0.9	1.7	1.1	0.7	1.5
NAFTA	Canada	1.7	4.2	0.5	0.4	13.3	0.3
	Mexico	0.7	0.9	0.4	0.2	0.2	0.3
	US	1.4	3.6	0.7	3.2	11.7	2.5
	Chile	0.9	0.8	1.7	1.0	0.8	1.9
	DomRep	1.1	0.4	1.7	1.0	0.3	1.5
	Panama	1.0	1.1	0.6	0.9	1.0	0.5
CACM	CostaRica	1.6	1.4	0.8	1.2	1.2	0.6
	Guatemala	2.8	1.8	1.3	2.7	1.7	1.4
	Honduras	1.2	0.8	0.6	0.8	0.5	0.5
	Nicaragua	5.5	3.6	1.9	4.0	2.5	1.5
	El Salvador	2.4	2.1	1.3	1.3	0.9	1.1
Andean Community	Bolivia	0.8	0.7	1.1	0.8	0.7	1.1
	Colombia	0.7	0.5	0.8	0.4	0.3	0.6
	Ecuador	0.7	0.6	0.6	0.6	0.5	0.6
	Peru	0.5	0.5	0.6	0.3	0.3	0.4
	Venezuela	0.4	0.4	1.9	0.5	0.4	1.8
	CARICOM	0.5	0.3	0.9	0.4	0.2	0.6

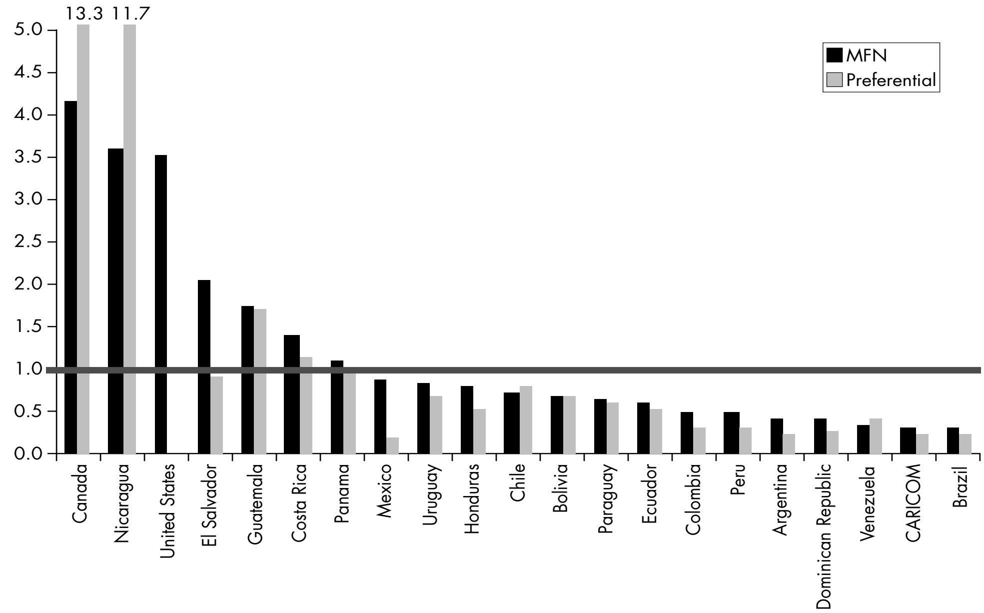
Note: HS6.

Source: Hemispheric Database of the Americas (2001); IDB calculations.

Industrial sector. Figure 1–14 and Table 1–4 provide an overview of the REST index for industrial products. The United States, Canada, and most Central American nations have the highest industrial REST indexes. These high ratios are mainly due to the fact that these countries apply low tariffs on industrial imports. The high preferential REST values for Canada and the United States are a result of the near-zero tariff that these countries impose on Mexico. These preferential ratios should be interpreted carefully because they do not necessarily correspond to high trade-offs (Canada's faced tariff is approximately 0.44, while the imposed tariff is 0.03). For most Central American countries, the above-one REST ratio is a consequence of their below-average imposed tariffs compared with most South American countries and Mexico (they still impose higher tariff barriers than the United States and Canada).

Figure 1–14

The Regional Export-Sensitive Tariff Index for Industrial Trade in the Americas, 2000



Note: HS6.
Source: Hemispheric Database of the Americas (2001); IDB calculations.

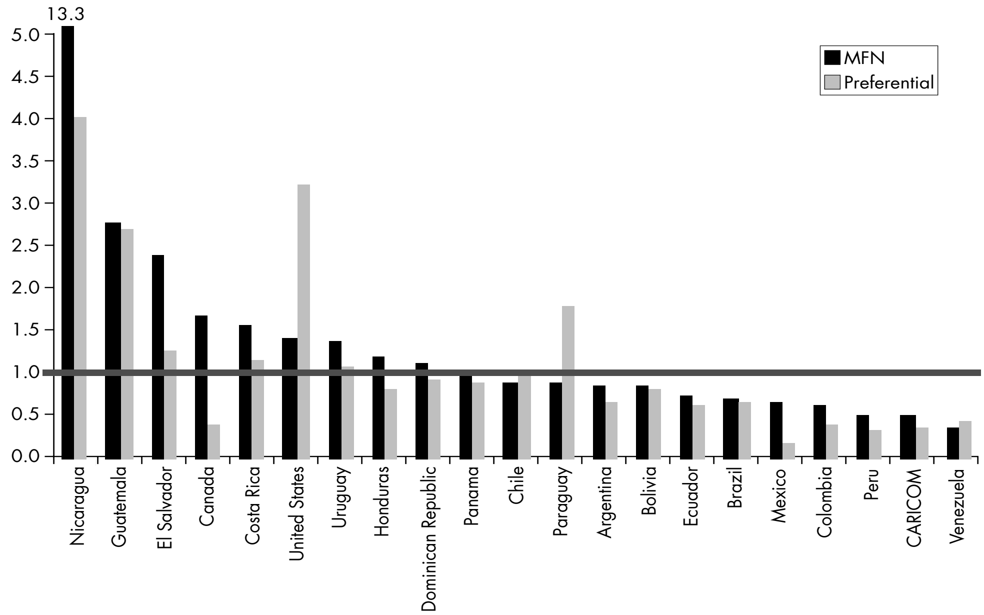
Most Mercosur and Caribbean countries would become net liberalizers in the FTAA in industrial products, as they still enforce higher tariffs (especially compared with the United States and Canada). However, as is shown in Figures 1–11 and 1–12, tariff barriers on industrial products are 50 percent smaller on average than barriers on agricultural products. Although there are still some segments in the industrial sector where further trade liberalization can be achieved, there is much to be accomplished in the agricultural sector.

Both sectors (industry and agriculture). To complete our examination using the REST index, we computed each country's overall ratio, combining both industrial and agricultural tariff barriers (Figure 1–15 and Table 1–4). This analysis provides a better understanding of all the trade-offs that would take place in an FTAA. Most Central American countries face higher tariffs than they impose, regardless of the tariff universe under consideration (MFN or preferential). These countries would have a strong interest in pushing the trade liberalization process forward. Actually, they would have net gains in overall market access from a simultaneous decrease in agricultural tariff barriers in North America and industrial tariffs in South America.[18] The countries in the best position are Nicaragua,

[18] These results are similar to those obtained by Diao, Díaz-Bonilla, and Robinson (2002) in their computable general equilibrium scenarios for the FTAA.

Figure 1–15

The Regional Export-Sensitive Tariff Index for Trade in the Americas, 2000



Note: HS6.
Source: Hemispheric Database of the Americas (2001); IDB calculations.

Guatemala, and El Salvador. In Panama, the Dominican Republic, and Chile, the REST index is close to one. The sensitive products of those countries enjoy relatively even access at the regional level.

The United States would also benefit from a regional trade agreement, independent of the tariff universe considered. It has the second-highest preferential REST ratio because it has provided more access than it has gained from several of its FTAA partners. Furthermore, although the United States imposes megatariffs on some agricultural products, agriculture represented only about 8 percent of total U.S. exports in 2000. Canada has a REST index above one for MFN tariffs and below one for preferential rates. Canada would gain from a decrease in industrial tariff barriers in Latin America. By contrast, the United States still imposes relatively higher agricultural tariff barriers toward its NAFTA partners and most South American countries. Mexico would become a net liberalizer, both in agriculture and industry, independent of the tariff scheme.

Mercosur and most Andean and Caribbean countries would become net liberalizers in the process. Mercosur countries would gain from liberalization of agricultural markets but the trade-off would be liberalization of their high industrial tariffs. For the Andean and Caribbean countries, the below-one REST ratio is largely a result of the existing free trade areas that they have with the United States. Under these free trade areas, Andean and Caribbean countries have gained more access than they have provided (mainly for industrial products).

In summary, it is important for all Western Hemisphere countries to consider the potential gains of balanced FTAA negotiations by sector as well as the setbacks that they could face in the absence of this agreement. It is our opinion that the REST index has the potential to become a powerful tool to help negotiators understand the dynamics that underlie tariff barriers and trade flows for sensitive products in any regional or multilateral trade negotiation process.

OVERVIEW OF DOMESTIC AND EXPORT AGRICULTURAL SUBSIDIES IN THE WORLD

One of the major breakthroughs of the URAA was the recognition of the direct link between agricultural subsidies and international trade. This was accompanied by the identification of the need to include agriculture in the world trading system, and under the same conditions as those that apply to nonagricultural products. The agreement aimed at identifying and reducing the measures that have potential trade-distorting effects on international trade.[19]

Export subsidies for industrial products have been prohibited during the eight multilateral rounds of the General Agreement on Tariffs and Trade. Nevertheless, in the case of agriculture, these subsidies were only subject to limited disciplines and reductions. In terms of domestic support, agricultural policies were classified into four boxes according to their potential to distort trade. Measures that have zero or minimal effects on production and trade were placed into the "green box," and were exempted from any expenditure limits. In addition to measures covered by the green box, two other categories of domestic support were exempted from reduction commitments under the URAA: certain development policies in developing countries that fall in the "S&D box" and government payments under production-limiting programs, which were placed in the "blue box." All other measures of domestic support were considered production and trade distorting, and were placed in the "amber box."

Amber box subsidies are measured through an indicator called total aggregate measurement of support (AMS), which is subject to reduction commitments under the agreement. In addition, the agreement required countries to notify all their export subsidies at the WTO. This section provides an overview of the evolution of the use of domestic and export subsidies in the world, in general, and in the European Union and the United States, in particular, during the implementation period of the agreement.[20] In order to present a coherent view of the ongoing trends and their potential influence on multilateral and regional negotiations, data were analyzed through a comparative approach[21] using three sources: WTO notifications on domestic support, and official data published by the Organisation for Economic Co-operation and Development (OECD) and governments (see Box 1–1). Based on this approach, the evolution of domestic measures of support is discussed, using various methodologies and various criteria and ratios, such

[19] For more details on trade distortions arising from domestic support policies, see Blandford (2001), Burfisher (2001), Josling (1998), OECD (1998), and Diakosavvas (2001).

[20] The implementation period of the URAA was 1995–2000 for developed countries, and 1995-2004 for developing countries.

[21] For other comparisons of agricultural support between countries, see Young and others (2002), Burfisher (2001), Diakosavvas (2001), and ABARE (2000).

Box 1–1

Sources of Information and Methodologies for Measuring Agricultural Subsidies

World Trade Organization: Notifications of Members for Domestic Support

WTO members classify their domestic agricultural programs into four categories:

Green box: to qualify measures that should not be or should only be minimally trade distorting, and that are exempted from reduction commitments. Programs must be financed by the government and must not provide price support to producers. Generally, they are not directed toward particular products, and include direct income supports for farmers that are decoupled from the current level of production or prices. Green box measures also include disaster assistance, government research programs, and pest and disease control.

S&D box: Special and differential treatment is granted to developing countries because government measures of assistance are seen as part of the development programs of these countries to encourage agricultural and rural development. These measures are exempted from domestic support reduction commitments that would otherwise be applicable to such measures.

Blue box: The blue box covers direct payments under production-limiting programs (production quotas and land set-aside programs) that must be based on fixed area or yield, or on 85 percent or less of the base level of production or number of livestock. Currently, few WTO members are using the blue box.

Amber box: The amber includes any other domestic support measure that is production and/or trade distorting. Thirty WTO members have committed to reducing their aggregate measurement of support (AMS) by 20 percent by the year 2000 (13 percent by 2004 for developing countries). Amber box subsidies affecting less than 5 percent of the value of production are exempt of commitments, due to a mechanism called de minimis. Members without commitments have to keep their AMS within the de minimis level, which is 5 percent for developed countries and 10 percent for developing countries. Nonexempt policies include market price support (MPS), and output and input subsidies. To calculate the MPS element of the AMS, the gap between the applied government administered price and a fixed external reference price (fixed at its nominal 1986–88 average) was multiplied by the quantity of production eligible to receive the administered price for each commodity. Trade policies are included only for commodities for which there is an administered price support program.

Export subsidies: In the Uruguay Round Agreement on Agriculture (URAA), the following practices are subject to reduction commitments as export subsidies: (i) the provision by governments of direct subsidies, including in-kind payments, contingent on export performance; (ii) the sale or disposal for export by governments of noncommercial stocks of agricultural products at a price lower than the comparable price charged for like products in the domestic market; (iii) payments on the export of an agricultural product that is financed by virtue of government action; (iv) the provision of subsidies to reduce the costs of marketing exports of agricultural products; (v) internal transport and freight charges on export shipments, provided or mandated by governments, on terms more favorable than for domestic shipments;

(Continued on next page.)

Box 1–1 ***(continued)***

and (vi) subsidies for agricultural products contingent on their incorporation into exported products. Under the URAA, new export subsidies are banned. Twenty-five WTO members can subsidize exports, but they had to reduce the value of subsidized exports by 36 percent and the volume by 21 percent during the implementation period (1995–2000). Countries without commitments cannot subsidize exports at all. The commitments did not include export credit schemes and food aid disciplines.

Organisation for Economic Co-operation and Development: Producer Support Estimate

The producer support estimate (PSE) is the basic estimate of agricultural protection and support for agriculture calculated by the OECD since the mid-1980s. The PSE is an indicator of the annual monetary value of gross transfers from consumers and taxpayers to support agricultural producers, measured at the farm gate level. It is the result of policy measures regardless of their nature, objectives, or impacts on farm production or income, across all countries. Support is expressed as a percentage of gross farm receipts (percentage of PSE), and shows the amount of support to farmers, irrespective of the sector structure of a given country. For this reason, the percentage of PSE is the most widely used indicator for comparisons of support across countries, commodities, and time.

The PSE has two components: MPS and budgetary outlays. The effects of trade policies are included in the measure of MPS, which is calculated as the gap between the domestic producer price and a current world reference price for each commodity. The main differences between the PSE and the AMS are that (i) the PSE uses the price received by producers while the AMS uses the current government administered price; (ii) the PSE utilizes the current international reference price while the AMS utilizes the external reference price for 1986–88.

Budgetary outlays (PSE without MPS) encompass payments based on output, area planted or number of animals, historical entitlements, input use, input constraints, and overall farming income and miscellaneous payments. The indicator measures more than just the subsidy element.

Government Outlays

Data on European Union agricultural outlays come from the European Agricultural Guidance and Guarantee Fund, and Financial Reports and the Agricultural Situation in the European Union Reports. The years mentioned are financial years starting on January 1 and ending on December 31. Government expenditures for the United States are based on the Commodity Credit Corporation net outlays provided by the Farm Service Agency of the United States Department of Agriculture. The years mentioned are fiscal years beginning on October 1 and ending on September 30. Fiscal years are designated by the calendar year in which they end.

as the amount of subsidies granted per hectare and per producer. An analysis by product is also provided to help identify the most sensitive sectors.

Evolution of Domestic and Export Subsidies According to WTO Notifications

Figure 1–16 displays the evolution of domestic and export subsidy notifications in the world. The concentration of support in three major groups contrasts sharply with the low levels of subsidies in the rest of the world. Indeed, more than 95 percent of domestic support measures and export subsidies are concentrated in the United States and other protectionist countries.[22]

In keeping with this tendency worldwide, figures for the European Union and the other protectionist countries group—countries that reported the highest level of AMS agricultural support at the beginning of the implementation period—present a downward trend in current U.S. dollars. Nevertheless, the share of trade-distorting instruments in the European Union is still considerable. In particular, the European Union continues to rely extensively on blue box measures that are somewhat trade distorting but are exempted from reduction commitments. As a result, this element could play an important role in the redefinition of the blue box in 2003,[23] a definition that other WTO members will probably challenge. With 23 percent of its total granted domestic support in 1995–99 concentrated in the blue box, the European Union is the only member (with Norway) to intensively use this instrument. If the blue box were to be eliminated in 2003, the European Union would be very close to its AMS commitment (within 2 percent in 1999). The overall level of support in the United States remains almost constant, but its AMS, although below its commitment limits, increased significantly after 1998.

Table 1–5 shows the evolution of domestic and export subsidy notifications in the Western Hemisphere compared with all other major players in the world. Most potential FTAA members have low levels in both categories of subsidies, but the United States has been increasing its domestic support in recent years, a trend expected to continue with the approval of the 2002 Farm Bill (the Farm Security and Rural Investment Act of 2002). Western Hemisphere countries have traditionally had very low levels of export subsidies and would easily be able to eliminate such subsidies in the near future. However, other similar measures—such as officially supported export credits on agriculture, abuse of international food aid programs, the presence of state trading enterprises, and export restrictions—have been used in the region and could be relevant in multilateral and regional trade negotiations.

Comparing Data on Domestic Support

The discipline on domestic support commitments proved to be the least binding for many countries, which have kept current total AMS below commitment levels. Expenditures on

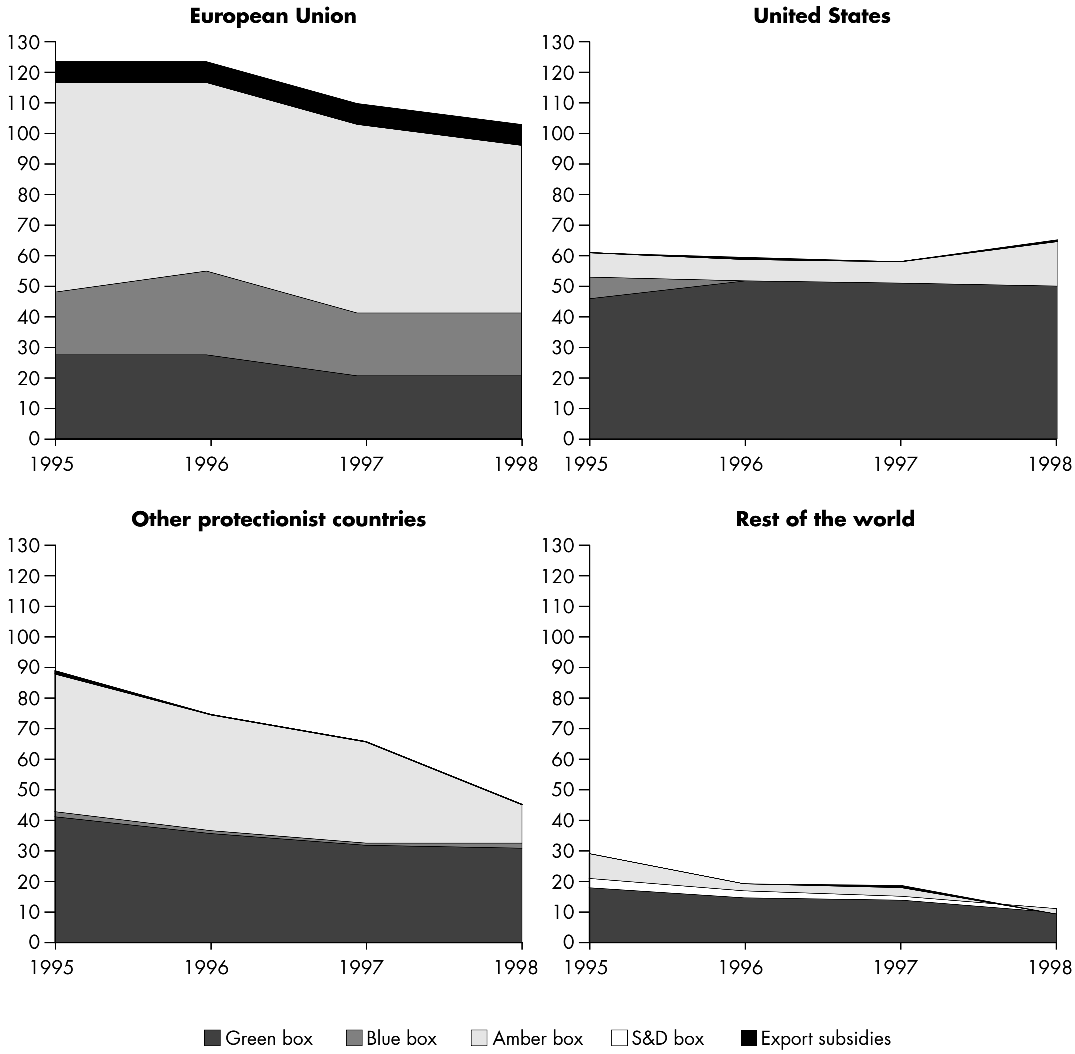
[22] The other protectionist countries are the Czech Republic, Hungary, Iceland, Japan, Korea, Norway, Poland, and Switzerland.

[23] The Agenda 2000 encompassed the last reform of the Common Agricultural Policy for the period 2000–2006, which still relies in many aspects on the blue box exemption to be extended with a potential increase in compensatory payments, in return for further reduction in government supported prices.

Figure 1–16

World Trade Organization Notifications of Domestic Support and Export Subsidies in the World

(Billions of U.S. dollars)



Note: Amber box includes de minimis level. For the rest of the world, the amber box for 1998 is incomplete for most countries.

Source: WTO notifications.

agricultural policies with the greatest potential to affect production and trade have decreased since 1995. However, the actual impact of this reduction has been limited mainly because the agreed reductions only apply to the AMS and exclude blue and green box measures, as well as the trade-distorting subsidies that affect less than 5 percent of the

Table 1–5

World Trade Organization Notifications for Domestic Support and Export Subsidies

(Millions of U.S. dollars)

	Domestic support [a]			Export subsidies		
Country	1995	1998	Average, 1995–98 (percent)	1995	1998	Average, 1995–98 (percent)
United States	6,214	10,400	7.1	26	147	1.5
Mexico	452	1,258	0.8	—	5	0.1
Canada	568	522	0.5	38	—	0.2
Venezuela	542	211	0.4	3	5	0.1
Argentina	123	83	0.1	—	—	0.0
Colombia	58	10	0.0	18	23	0.3
Brazil	—	83	0.0	—	—	0.0
Costa Rica	—	—	0.0	—	123	0.8
Free Trade Area of the Americas	7,957	12,567	8.8	85	303	3.1
European Union	64,436	52,453	58.1	6,292	5,995	88.0
Other protectionist countries[b]	44,716	11,479	31.1	619	440	7.6
Others	2,427	934	2.0	116	62	1.3
World	119,536	77,433	100.0	7,112	6,800	100.0

[a] Notifications of total AMS reduction commitments in the amber box.

[b] Czech Republic, Hungary, Iceland, Japan, Korea, Norway, Poland, and Switzerland.

Source: WTO.

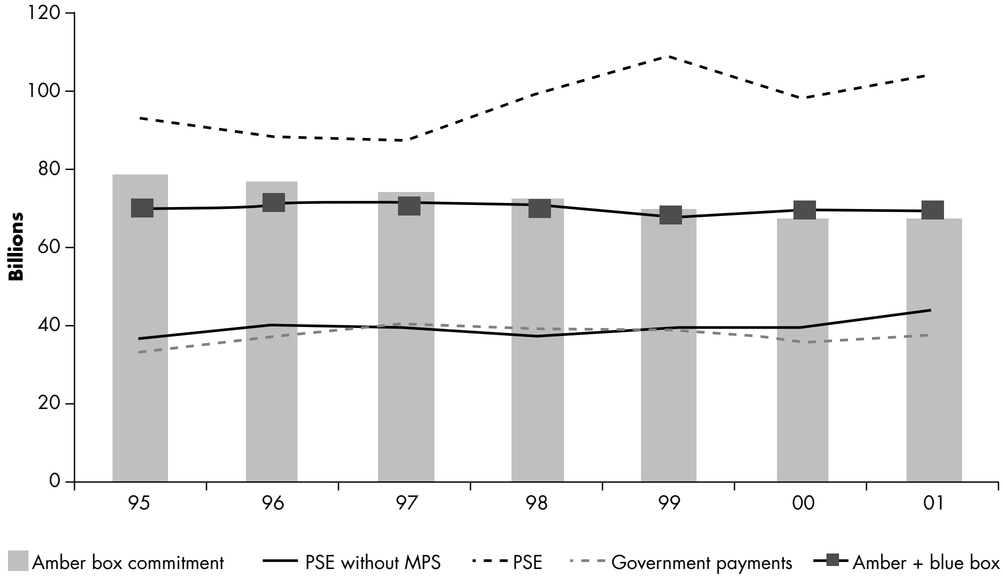
value of production (the so-called de minimis level).[24] In fact, when measured by other methodologies, the evolution of the level of domestic support contrasts with the picture presented until now. Figures 1–17 and 1–18 compare the evolution of domestic subsidies in the European Union and the United States according to three sources—WTO notifica-

[24] There are several reasons why the AMS is a poor indicator of production and trade distortions. First, total AMS production commitments are sector-wide, not product specific (as is the PSE). This gives countries the opportunity to reduce support on some products and leave support for other products unchanged or even greater. Countries' notifications show that some of them have increased support to certain specific products. Second, the market price support component of the AMS is based on the domestic administered support price and a fixed-base-period world reference price (1986–88). The domestic administered support price is a poor proxy for measuring the domestic market price because, in many important cases, it is not representative of actual internal supported prices, while the fixed external reference support price does not represent the actual border price. This calls into question the measure of price support as defined by the URAA (the PSE uses current international reference prices). Third, the exclusion of price support in cases where no administered price exists provides wide flexibility to governments in choosing policy instruments. Fourth, the AMS only includes support provided through domestic measures and does not capture distortions arising from trade measures that are excluded from the AMS provisions (for example, tariffs and export subsidies). For more details, see Diakosavvas (2001) and Blandford (2001).

Figure 1–17

Domestic Support Measures in the European Union

(Billions of euros)



Note: Amber box includes de minimis. Values for 2000–01 are forecasts.
Source: WTO, OECD, European Commission, and FAPRI.

tions in the amber and blue boxes, and OECD and official government data. Contrary to the downward trend shown by the AMS indicator, the producer support estimate (PSE) and official government figures increased between 1995 and 2001, in both the European Union and the United States. Two versions of the PSE indicator are presented. In the second one, the market price support (MPS) component has been removed to facilitate comparisons with government payments (see Box 1–1).

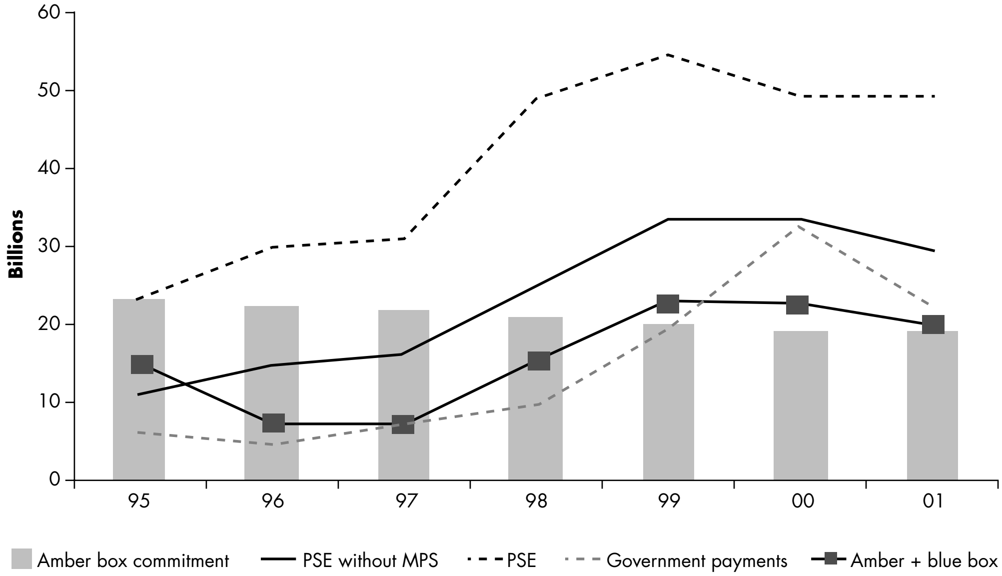
Figures 1–17 and 1–18 also indicate the level of domestic support vis-à-vis the amber box reduction commitments assumed by the European Union and the United States. In both cases, the gap between commitments and current expenditures has been narrowing over this period. Furthermore, according to Hart and Babcock (2002), U.S. subsidies would have exceeded the allowed WTO limits ($19.9 billion in 1999 and $19.1 billion in 2000), mainly because low world prices in the late 1990s triggered high marketing loan and marketing loss assistance expenditures.[25] This scenario would have occurred if the United States could not have extensively used the de minimis provisions. Whether the United States amber box expenditures will continue exceeding commitments after the approval of the 2002 Farm Bill will depend on factors that can-

[25] In order to see the real level of trade-distorting domestic support, current AMS and de minimis levels are included in the amber box.

Figure 1–18

Domestic Support Measures in the United States

(Billions of U.S. dollars)



Note: Amber box includes de minimis. Values for 1999–2001 are forecasts.
Source: WTO, OECD, USDA-FSA, and FAPRI.

not easily be predicted.[26] In any case, the effect of the additional $73.5 billion encompassed in the 2002 Farm Bill on the overall level of domestic support will remain significant.

Share of Domestic Support in the Value of Agricultural Output

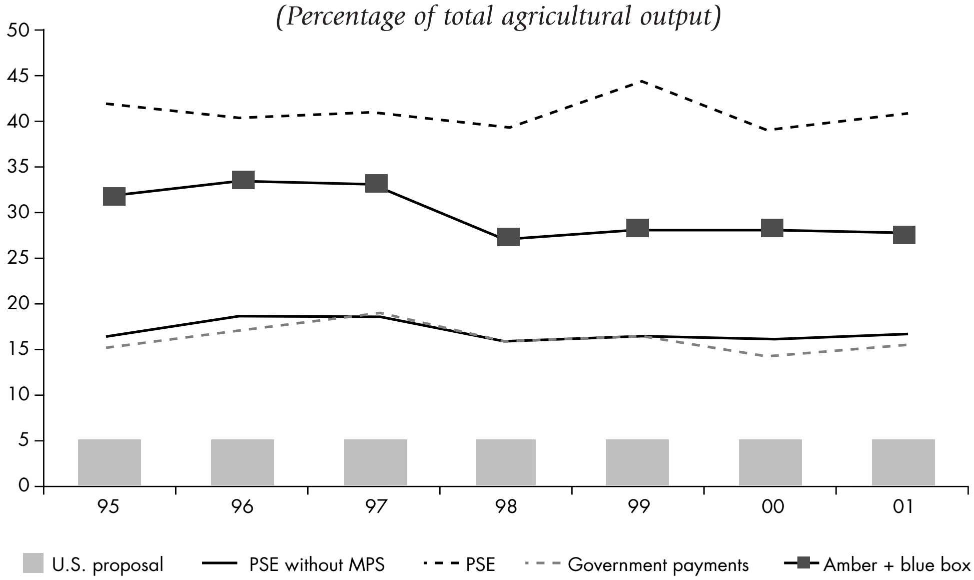
Under the URAA, the European Union's established commitments are more than three times greater than those of the United States. The European Union is still spending more than twice the amount of U.S. subsidies. A similar trend can also be observed by comparing, in global terms, the share of domestic support in the value of production (Figures 1–19 and 1–20[27]). However, considering the expenditures made by governments and the PSE indicator without MPS, we find that the gap between European Union and U.S. outlays has shrunk dramatically due to a surge in U.S. payments during the last three years. In

[26] For more details on WTO commitments and implications for the 2002 Farm Bill, see Becker (2002), Hart and Babcock (2002), *ABARE Current Issues* (October 2000), and Korves and Skorburg (2000).
[27] In Figures 1–19 and 1–20, PSE as a percentage of agricultural output is calculated as follows: PSE divided by total value of production at farm gates. It is not calculated as the OECD percentage PSE, which is obtained using the following formula: PSE/(Q.PP + PP)*100, where Q.PP is the value of production at producer prices and PP is PSE minus MPS.

Figure 1–19

Domestic Support of Agricultural Output, European Union

(Percentage of total agricultural output)

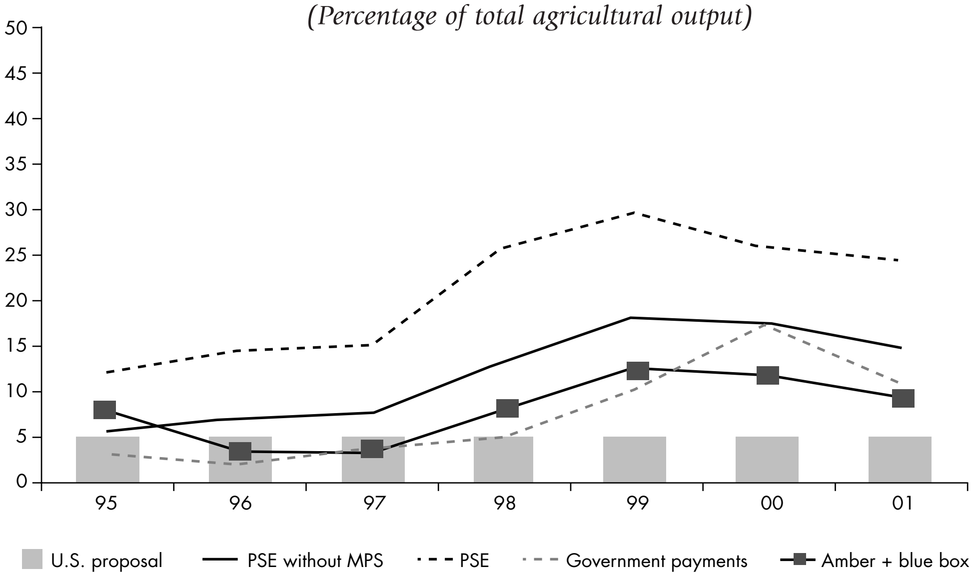


Note: Amber box includes de minimis. Values for 2000–01 are forecasts.
Source: WTO, OECD, European Commission, and FAPRI.

Figure 1–20

Domestic Support of Agricultural Output, United States

(Percentage of total agricultural output)



Note: Amber box includes de minimis. Values for 1999-2001 are forecasts.
Source: WTO, OECD, USDA-FSA, and FAPRI.

fact, in response to the deterioration in world prices, the U.S. Congress adopted four large emergency packages between 1998 and 2001, and dramatically increased the level of U.S. farm support.

In July 2002, the United States presented an ambitious reform package to the WTO. The package had the following objectives: reduced trade barriers for agricultural products, greater equity in world agriculture, and expanded growth opportunities for international trade in agricultural products. Regarding domestic support, the United States proposed to bring down trade-distorting subsidies (amber and blue box measures) to substantially lower levels than those currently allowed by fixing the limit on expenditures at 5 percent of a country's total value of agricultural production over a five-year period. As can be seen in Figure 1–20, the U.S. proposal is an attempt to return the United States to its 1995-97 levels of domestic support. Although many questioned the real U.S. intentions regarding agricultural liberalization after the 2002 Farm Bill was passed, the current proposition actually serves various U.S. interests. First, the 5 percent rule would harmonize the level of support that is permitted among WTO members. Second, a strict commitment at the multilateral level would be a way to pin down U.S. domestic policies and avoid future escalations in domestic support as occurred in the late 1990s. Finally, it would force the European Union to significantly curb its use of subsidies and, as a result, deeply reform the Common Agricultural Policy.

The U.S. proposal faces strong domestic and international resistance. Domestically, resistance comes from sectors that could lose with trade liberalization, such as dairy, sugar, and orange juice. At the international level, the European Union and the other protectionist countries group both object, arguing that this proposition is much more demanding for the Europeans than for the United States. Figure 1–19 shows the extent to which the European Union would have to cut its domestic measures of support if the U.S. proposal were adopted. Compared with the reduction the United States should make, the difference is striking (a reduction of 72 percent for the European Union versus 49 percent for the United States, based on 2001 data).

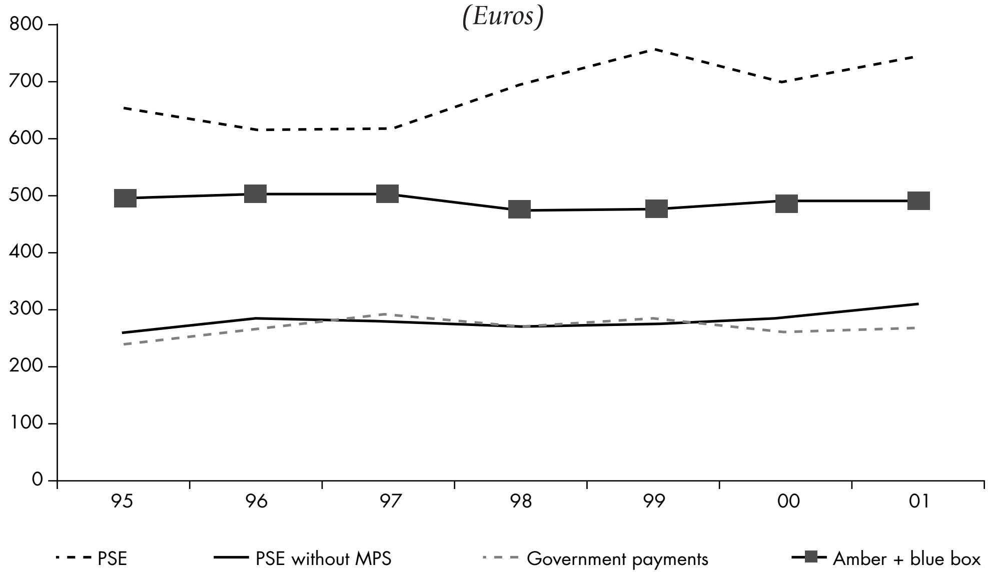
Domestic Support Granted per Hectare and per Farmer

Using other criteria, the imbalance in cost that the European Union and the United States would have to bear is not as clear. Figures 1–21 and 1–22 show the amount of domestic subsidies per hectare. It is worth noting that the quantity of support per hectare increased between 1995 and 2001, while the amount of land used for agricultural purposes decreased. Although the difference in the level of domestic support per hectare granted on both sides of the Atlantic is impressive, we need to keep in mind that domestic subsidies in the United States are highly concentrated in a small basket of products. In fact, the United States heavily supports the grain and cotton sectors while it does not subsidize the production of beef, poultry, or pork. As a consequence, if pastures were removed from the land area used for agriculture, the amount of domestic support per hectare in the United States would be much higher. Furthermore, comparing the level of domestic support granted per farmer in the European Union and the United States, as shown in Figures 1–23 and 1–24, American producers receive more support than the Europeans—a situation that presents a different picture regarding the efforts that would need to be made if the 5 percent rule were enforced. The main reason for these results is that the United States has one-third the number of farmers in the European Union, and therefore U.S. subsidies are highly concentrated, especially in the Midwestern states.

Figure 1–21

Domestic Support per Hectare, European Union

(Euros)

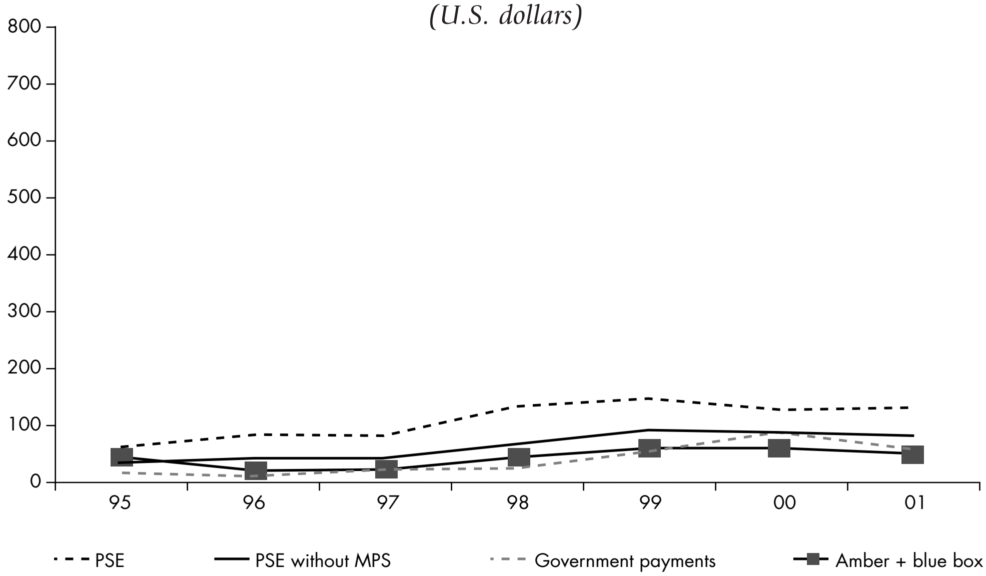


Note: Amber box includes de minimis. Values for 2000–01 are forecasts.
Source: WTO, OECD, European Commission, FAPRI, and FAO.

Figure 1–22

Domestic Support per Hectare, United States

(U.S. dollars)

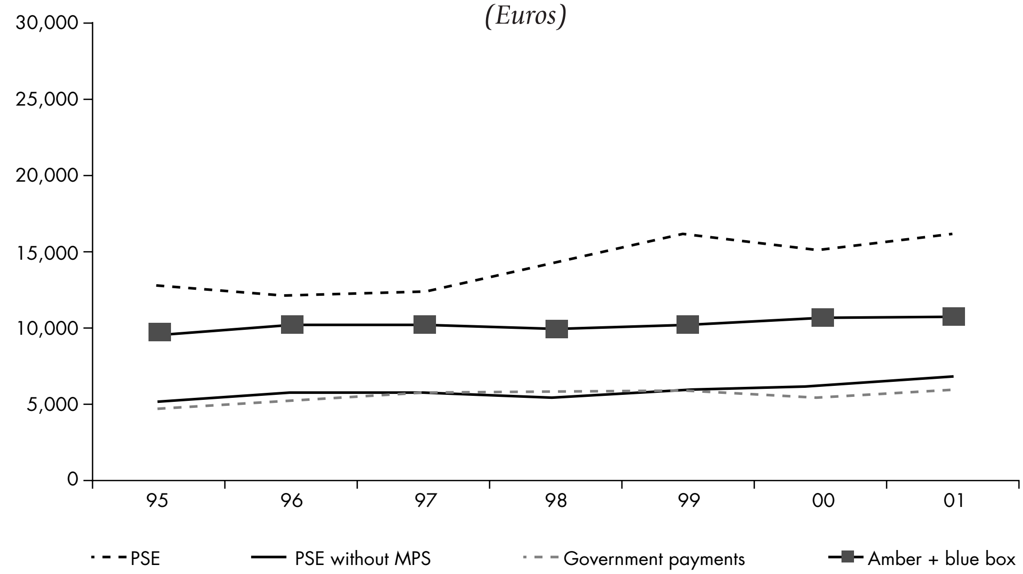


Note: Amber box includes de minimis. Values for 1999-2001 are forecasts.
Source: WTO, OECD, USDA-FSA, and FAPRI.

Figure 1–23

Domestic Support per Farmer, European Union

(Euros)

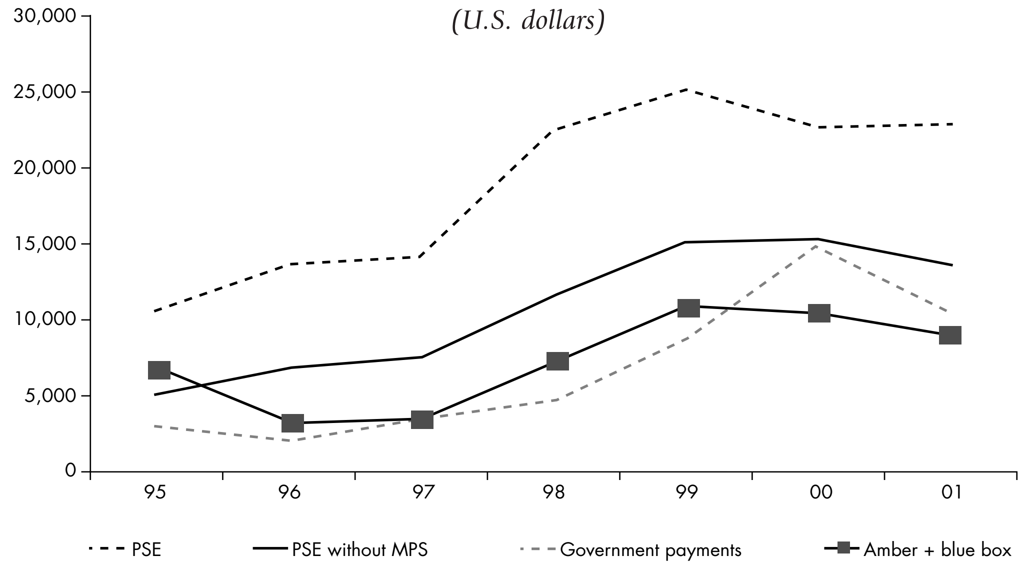


Note: Amber box includes de minimis. Values for 2000–01 are forecasts.
Source: WTO, OECD, European Commission, and FAPRI.

Figure 1–24

Domestic Support per Farmer, United States

(U.S. dollars)



Note: Amber box includes de minimis. Values for 1999-2001 are forecasts.
Source: WTO, OECD, USDA-FSA, and FAPRI.

Distribution of Domestic Support by Product

Figures 1–25 to 1–27 present the distribution of domestic support by product in the European Union, the United States, and other protectionist countries. Generally speaking, the figures based on PSE without MPS data and government payments should be similar since both methodologies show the real government outlays intended for producers. Some payments, such as compensatory and loan deficiency payments, are direct payments to producers, while others are indirect payments, such as export programs and export promotion measures. With respect to the figures that display amber and blue box data on one side and PSE data on the other side, differences in the obtained results can be attributed to the fact that the former excludes green box programs while the latter measures the overall level of domestic support. In addition, the two methodologies use different definitions to calculate MPS (for more details, see Box 1–1). As a matter of fact, the gap between PSE and amber plus blue box reflects the weaknesses of the AMS indicator. These weaknesses have enabled some countries to use loopholes to maintain or increase their agricultural protection.

European Union. In the case of the European Union, Figure 1–25 shows that data reported for government payments and PSE without MPS are consistent, while strong differences are displayed in amber plus blue box and PSE. The level of support for dairy and poultry and pork is larger in PSE than in amber plus blue box, whereas the opposite occurs with cereals. These differences are due to the divergence in methodology when measuring support for prices.

PSE measures not only government subsidies, but also trade barriers, such as tariffs and tariff rate quotas that substantially increase domestic prices at the farm gate level compared with world prices. As a result, if cuts in amber plus blue box are made in dairy, the reduction in the overall level of support for this sector would be less than expected because a large share of the internal market prices for this sector is managed through border measures. Therefore, for products that benefit from border protection, a real reduction in the level of domestic support could only occur if market access for these goods were enhanced at the same time as subsidies were cut. This relation between trade policy and domestic support explains why reduction commitments are easier to reach for some products than others.[28] The share of MPS in the overall support for agriculture is the part paid by the consumers. In the European Union, this component reached 60 percent[29] by the year 2000, revealing that consumers, rather than governments, bear the largest cost of agricultural protection.

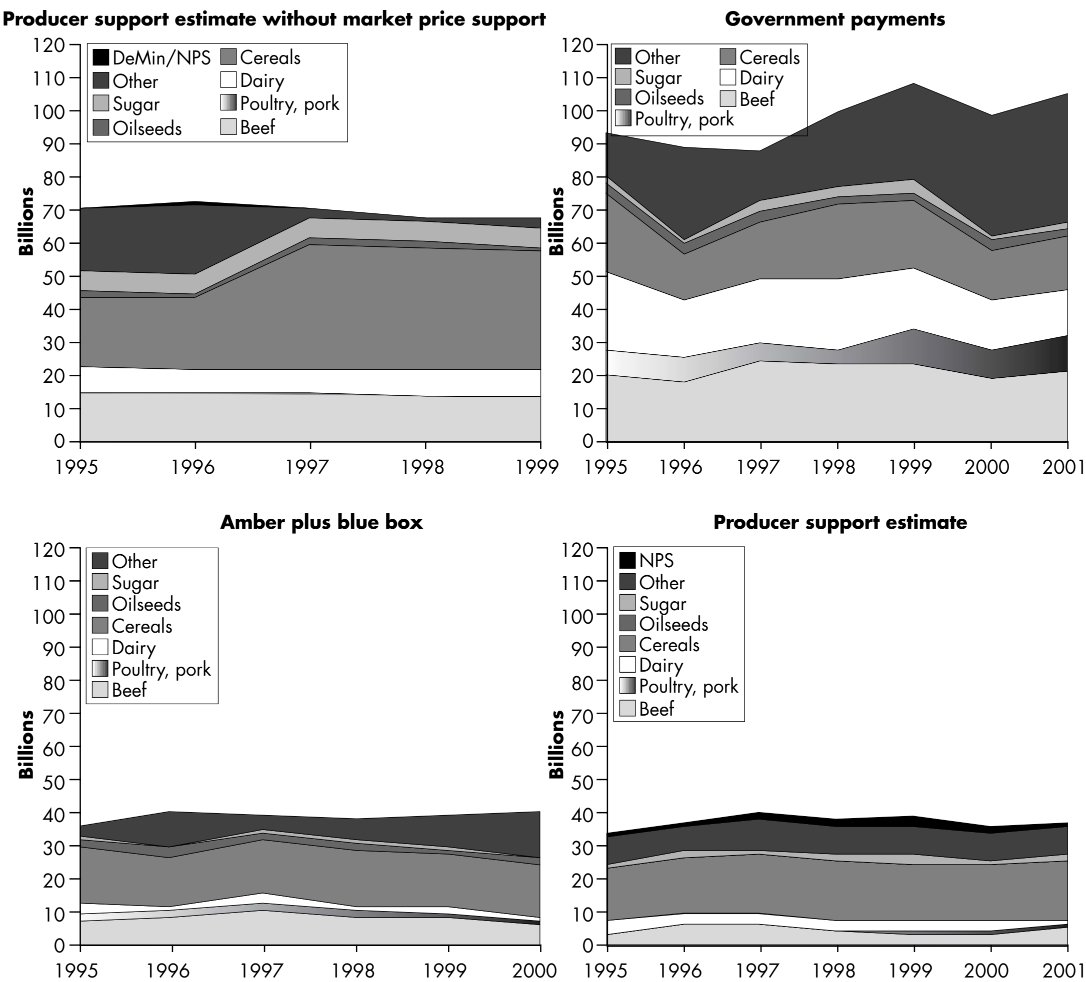
United States. As Figure 1–26 shows, dissimilarities between official government outlays and PSE without MPS in the United States are greater than in the European Union. For instance, the absence of government payments for the meat sectors (beef, poultry, and pork) contrasts with the data provided by the PSE without MPS indicator. The point is that in the PSE, support for these sectors is concentrated in payments based on input use (interest concessions, fuel tax reductions, and subsidies for grazing and irrigation) and to a lesser extent in payments based on overall farming income that are not necessarily prod-

[28] For more details on the relationship between domestic support and trade policies, see de Gorter (1999).
[29] This is according to the OECD definition of market price support.

Figure 1–25

Distribution of Domestic Support by Product, European Union

(Billions of euros)



Source: OECD, European Commission, and WTO notifications.

uct specific.[30] Therefore, these payments may be included in the category "not product specific" of the government payments data.

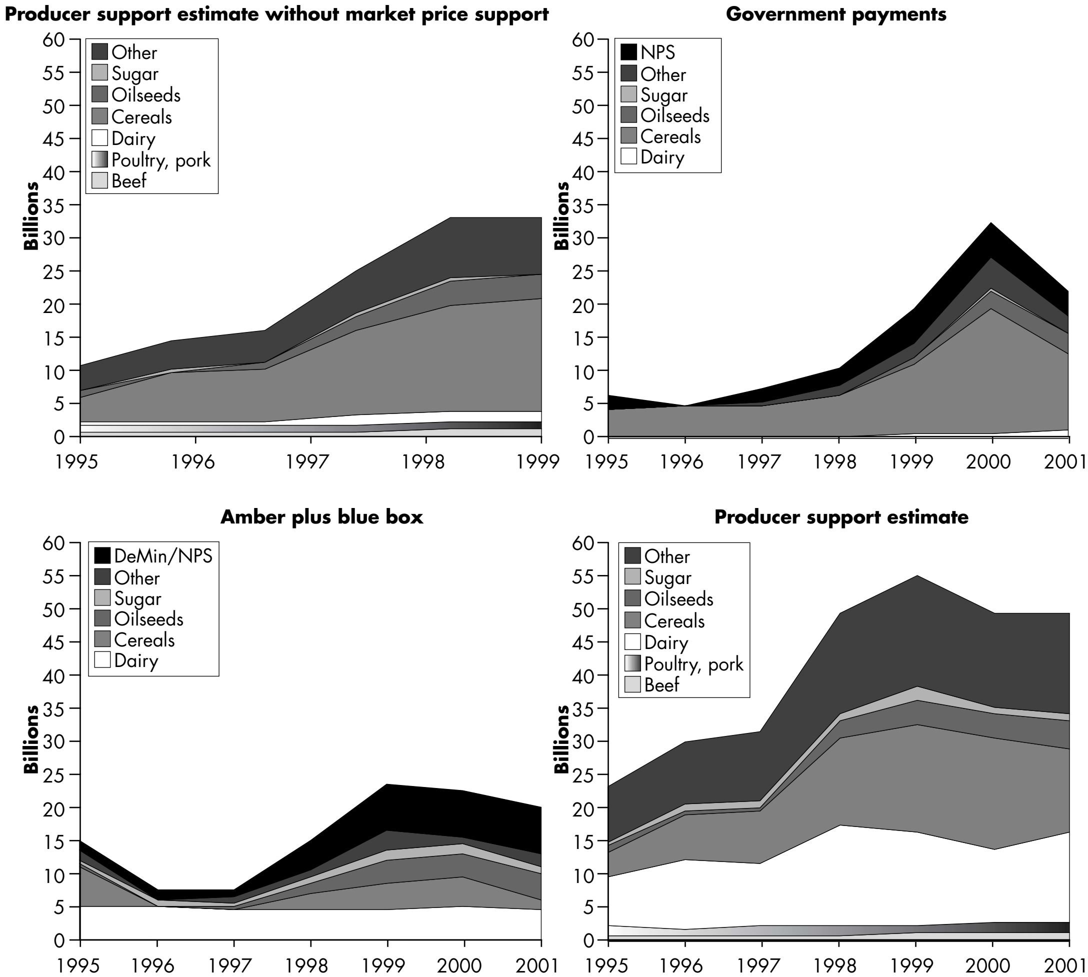
When comparing amber plus blue box and PSE, impressive differences arise not only with respect to products, but also in the overall level of support. According to am-

[30] Payments based on input use include explicit and implicit payments affecting specific variable input costs; the cost of on-farm technical, sanitary, and phytosanitary services; or payments affecting specific fixed-input costs, including investment costs. Payments based on overall farming income do not depend on the production of specific commodities or on the use of specific fixed or variable inputs (OECD 2001).

Figure 1–26

Distribution of Domestic Support by Product, United States

(Billions of U.S. dollars)



Note: For amber plus blue box, values for 1999–2001 are forecasts.
Source: OECD, USDA-FSA, WTO notifications, and FAPRI.

ber plus blue box projections, agricultural support did not reach US$20 billion in 2001, while the OECD reported a PSE amounting to almost US$50 billion. The PSE levels for meats (beef, poultry, and pork), dairy, and cereals are significantly higher than the support reported in amber plus blue box, probably due to the fact that these products benefit from border protections that are included in the PSE measure but are absent from the amber plus blue box calculations.

The de minimis and not product-specific category deserves special attention. Since 1997, the United States has been using this category intensively, and it is exempted from reduction commitments. According to Hart and Babcock (2002), as a result of the forecasted recovery in world prices, the United States could increase its spending even more with de minimis. In fact, higher international prices would raise production values and, as a consequence, the de minimis exemption limits. Contrary to the European Union, the U.S. government largely finances the costs of supporting agriculture (68 percent of the PSE was paid by the government in 2000).[31] However, for certain commodities, the costs borne by consumers are disproportionate. For instance, in 2000 consumers paid 85 percent and 80 percent, respectively, of the support granted to the dairy and sugar industries, two of the largest subsidized sectors in the United States.

Other protectionist countries. As illustrated in Figure 1–27, the cost of supporting agriculture in other protectionist countries is almost exclusively borne by consumers.[32] Dissimilarities between amber plus blue box level support and PSE are even more impressive in these countries than in the European Union or the United States.[33] Furthermore, trends reversed in 1998 when Japan changed its program supporting the rice sector. Japan had traditionally supported this sector through the management of an administered price that maintains domestic prices five or six times higher than world prices. In 1997, Japan's AMS for rice amounted to $19 billion, of which $18 billion was MPS. In 1998, Japan notified the WTO that the government had stopped intervening in the price of rice, reducing its AMS in this sector to zero. However, according to the OECD, internal prices for rice in Japan in 1998 were more than five times import parity. In fact, prices for rice were not affected by the change in government policy because the rice industry in Japan is heavily protected by border measures.

This example illustrates one of the weaknesses in the measurement of the price support element of the AMS that enables some countries to reduce their AMS substantially, although their actual level of market-distorting price support remains high. The simultaneous use of several protectionist instruments, such as high tariffs combined with official administration of prices, as was the case in Japan, can lead to double counting the level of protection benefiting a product. Nonetheless, countries should not be allowed to determine their AMS commitments based on a level of support that is double counted for some products. In fact, once a country has eliminated one of the measures of support it used to give to product A—the official administered price of rice in Japan, for instance—then this country is free to spend the equivalent amount (US$19 billion in the case of Japan) to support other products or measures that were not subsidized or were less subsidized before, while the actual level of support received by the producers of product A remains unchanged.

The support granted by the United States to the dairy sector is another illustrative case. In 1998, the United States notified a US$4.3 billion product-specific AMS for dairy products, using the difference between the Commodity Credit Corporation support price and the base price times production. But in the same year, actual spending on the dairy program was only about US$140 million because the base price was much lower than the 1986–88 prices (base period). So, the notified AMS really overstates protection.

According to ABARE (2000), actual milk prices in the United States are supported through a combination of restrictions on imports through tariff quotas, export subsi-

[31] This is calculated according to the OECD methodology: PSE minus market price support.

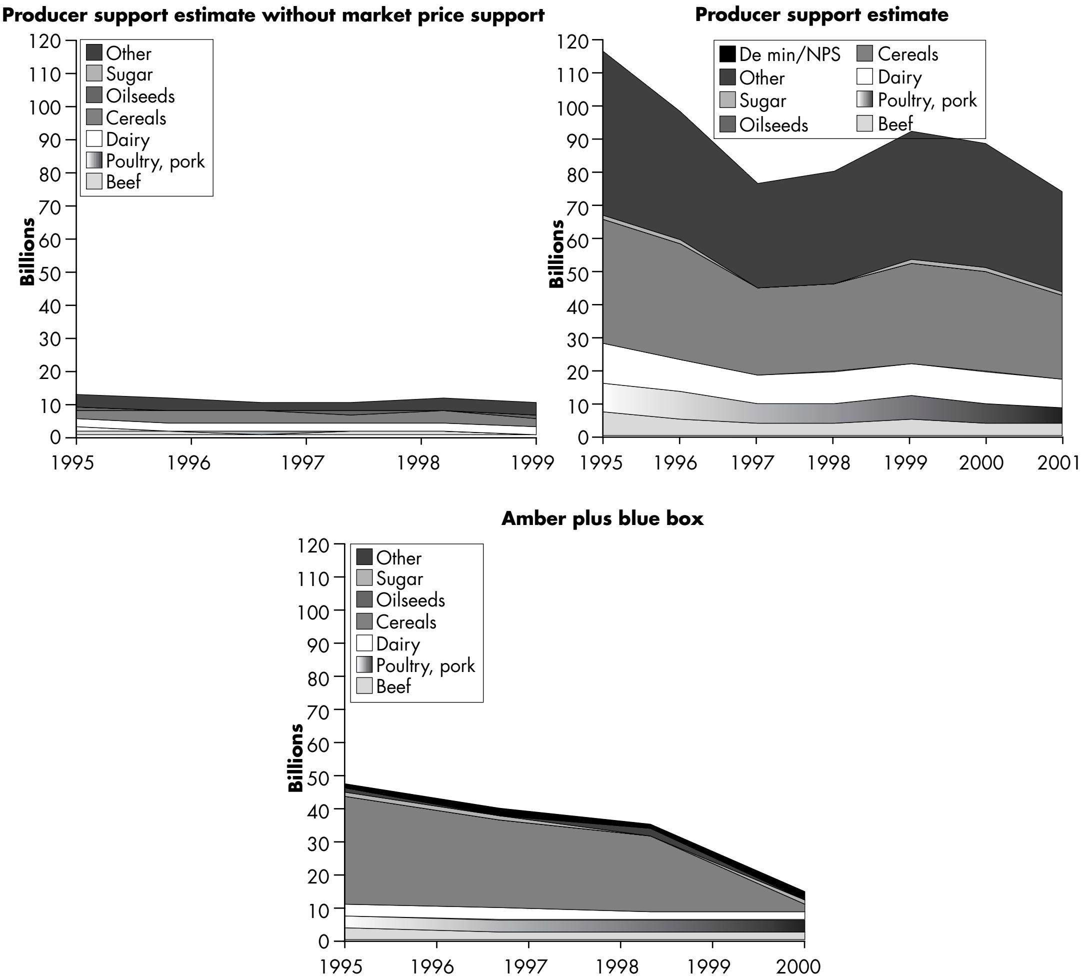
[32] This is according to the OECD definition of market price support.

[33] Government payments are not included due to the difficulty of obtaining official data from the eight countries included in the other protectionist countries group.

Figure 1–27

Distribution of Domestic Support by Product, Other Protectionist Countries

(Billions of U.S. dollars)



Source: OECD and WTO notifications.

dies, and regional pricing and movement restriction arrangements, which are independent of the administered price that is used for AMS purposes. If the administered support price were abolished, it would not alter internal supported prices for milk, but it could provide a potential for the United States to claim that it had no price support, and also virtually no AMS in milk. Such a change could be used to increase the available level of amber box support for other products and measures by about 20 percent without altering the actual levels of support for milk. However, it is interesting to note that the 2002 Farm Act's market loss payment program now looks like it costs about three times what it was scored as costing when the Farm Bill was passed in May 2002 because of the decline in milk prices. This could easily mean adding US$2 billion to the product-specific AMS in 2003, in addition to the US$4.3 billion that will continue because the Commodity Credit Corporation support price continues at the same rate as before.

CONCLUSIONS AND POLICY RECOMMENDATIONS

Considering the complexity and heterogeneity of the agricultural sector in the Americas and its strategic importance in both regional and multilateral negotiations, we offer eight main conclusions and policy recommendations.

First, there are several simultaneous barriers to agricultural trade because countries use various trade-distorting instruments in agriculture. Tariffs are the most commonly used, but other protection mechanisms—such as technical barriers to trade and sanitary restrictions, domestic support, and export subsidies—may also distort trade and are difficult to evaluate. Even tariff barriers are difficult to measure because specific and mixed tariffs and TRQs are widely used by some Western Hemisphere countries. On the one hand, the highest overall level of agricultural tariffs has been observed on small Caribbean islands. This represents a high tax on poor local consumers. On the other hand, developed countries are characterized by the application of high tariffs to a small group of politically sensitive products, while the rest of their tariffs are kept at low levels. These sensitive products are further protected through specific and mixed tariffs, TRQs, and other nontariff barriers, such as sanitary and phytosanitary measures and technical barriers to trade.

Second, in the majority of the Western Hemisphere countries, agricultural exports are highly concentrated in a small basket of specific products. For 10 countries, coffee, bananas, and sugar represent more than 50 percent of agricultural exports. As a result, potential deadlocks in the negotiations will probably concern a reduced group of products, such as dairy, meats, sugar, tobacco, grains, and fruits.

Third, we identified several key issues in regional and multilateral agricultural trade negotiations. Agriculture is an area that encompasses systemic and nonsystemic issues. Topics such as subsidies are systemic issues because a reduction in their use by one country will benefit all countries with which it trades, and could have potential spillover effects on world prices and market shares. It is better to address subsidies through multilateral negotiations, such as the Doha Development Agenda of the WTO. Market access issues, such as tariffs, TRQs, and some nontariff barriers, are nonsystemic because they can be negotiated on a country-by-country basis without benefiting other trading partners. Market access is much better addressed in a bilateral or regional framework because negotiations between a reduced number of countries allow for deeper trade liberalization, normally starting with applied tariffs. So if Western Hemisphere countries continue to invest political and human capital in the FTAA process, the launch of the WTO Development Agenda will be beneficial for hemispheric agricultural integration. The new round will allow for the separation of the two most sensitive issues—market access and subsidies—with market access being discussed primarily at the regional level and subsidies at the multilateral level. However, it is legitimate for countries that are competitive in agriculture to try to ensure that other systemic issues (such as environment disciplines or intellectual property rights) are addressed through multilateral negotiations. In this case, some FTAA issues could be Doha plus while others are not.

Fourth, the RTR and REST indexes are useful tools for balancing tariff concessions. The best solution for trade liberalization in the Western Hemisphere would be to implement zero tariffs for all products without exceptions. The use of exception lists would certainly remove most of the "real" protected products from a regional integration agreement, and therefore undermine potential gains that could be achieved through such an agreement. However, if countries do insist on exception lists and/or a long tariff phase-out period, negotiators could use the RTR and REST indexes as valid and useful tools to balance concessions and achieve progress in bilateral and regional agreements. Furthermore, they can use these indexes to detect potentially difficult sectors for future negotiations.

Fifth, we identified main gains and trade-offs in market access in the Western Hemisphere. The Central American countries, which face, on average, higher protection than they impose, would have the highest relative net gains in terms of overall market access, after a simultaneous lowering of agricultural tariff barriers in North America and industrial tariffs in South America. However, agricultural sector liberalization will encompass trade-offs in the Mercosur countries. They would definitely gain from agricultural liberalization, but they would also need to become net liberalizers of the industrial sector. The opposite is true for NAFTA countries, which will need to make trade-offs in terms of offering broad agricultural access in order to secure access for industrial products.

Sixth, the URAA provides too many ways to avoid reductions in domestic and export subsidies, and there is a need to avoid exceptions. Some of the current loopholes are blue box encompassing payments that are only partially decoupled from production and still produce distorting effects, the presence of trade-distorting programs in the green box, the absence of disciplines on export credit guarantees, and the abuse of food aid programs. In addition, some countries take advantage of the de minimis exemption and subsidies that are not product specific to increase their level of domestic support without exceeding their WTO commitments. In our opinion, de minimis exemptions should be eliminated, and reductions in commitments should be established on a product-by-product basis. The S&D box is another exception that could be phased out if the majority of developing countries continue to be unable to use it. These countries are not applying trade-distorting subsidies, and there is no reason to keep or create boxes that will not be used. If countries are really keen to eliminate all trade and production-distorting subsidies, in the long run they should avoid any kind of exceptions.

Seventh, negotiators should target the full decoupling of government payments to producers as the best way to prevent distortion of production and trade. In other words, payments should be fully decoupled from volume of production, planted area, and animal units.

Eighth, market access should be enhanced at the same time that subsidies are cut. Reductions in subsidies are very much related to market access enhancement and vice versa. In fact, both subsidies through MPS and border measures (tariffs, TRQs, and nontariff barriers) contribute simultaneously to the fact that producer prices are set at higher levels compared with world prices. The way MPS is calculated (depending on whether government administered prices are used) is particularly important because it has serious consequences in terms of which subsidies should be phased out for each product to really liberalize trade. For instance, Japan claimed to have eliminated amber box support for rice after it abolished the government administered price for this product. However, actual prices paid to producers remained unchanged for this sector because they are still supported through border measures. This example illustrates that a real reduction in the level of domestic support could only happen if market access were enhanced at the same time that subsidies were cut. Comprehensive results can only be achieved if market access and subsidies are addressed at the same time. In the case that they are addressed in parallel regional and multilateral negotiations, policymakers should try to build a single global undertaking provision between these processes.

Appendix Table 1–1

Agricultural Trade and Most Favored Nation Tariff Structure of Countries in the Western Hemisphere, HS8-Digit Level, 2000

			Trade	Number of tariff lines		Frequency distribution of tariff rates (percent)					Main statistics				Tariff
		Country	balance (thousands)	Ad valorem	Non-ad valorem[a]	0	0–15	15–30	30–50	Greater than 50	Mean	Median	Standard deviation	Maximum	rate quotas
1	Mercosur	Argentina	9,494,815	940	—	79	564	296	1	—	12.7	13.0	5.9	32.0	—
2		Brazil	8,050,652	940	—	79	565	296	—	—	12.6	13.0	5.8	27.0	4
3		Paraguay	302,221	945	—	79	576	286	4	—	12.3	13.0	5.6	30.0	—
4		Uruguay	579,329	908	—	77	552	279	—	—	12.4	13.0	5.6	23.0	—
5	NAFTA	Mexico	(2,101,401)	1,016	53	30	496	427	62	54	23.3	15.0	37.8	260.0	68
6		Canada	4,142,472	979	362	538	656	46	3	98	22.4	3.0	63.1	538.0	123
7		United States	14,237,485	989	747	372	1,083	161	59	61	11.4	3.7	32.0	350.0	376
8	Andean Community	Bolivia	169,664	873	—	15	858	—	—	—	9.8	10.0	1.3	10.0	0
9		Colombia	1,441,657	881	—	—	280	601	—	—	14.5	15.0	5.5	20.0	66
10		Ecuador	1,117,100	865	—	20	268	577	—	—	14.3	15.0	5.7	20.0	21
11		Peru	(258,173)	900	—	—	530	314	56	—	17.1	12.0	6.5	30.0	0
12		Venezuela	(1,309,192)	865	—	—	278	591	—	—	14.6	15.0	5.4	20.0	59
13	CACM	Costa Rica	1,241,539	1,138	—	238	796	—	64	40	13.8	14.0	20.0	162.0	73
14		Guatemala	919,306	811	60	208	215	388	—	—	9.2	10.0	6.5	20.0	31
15		Honduras	98,404	869	—	—	425	426	13	5	11.5	15.0	8.4	55.0	0
16		Nicaragua	141,281	869	—	197	638	18	7	9	7.3	10.0	7.4	76.7	17
17		El Salvador	(90,269)	937	25	217	217	429	49	—	11.2	15.0	8.9	40.0	37

Appendix Table 1–1 *(continued)*

Agricultural Trade and Most Favored Nation Tariff Structure of Countries in the Western Hemisphere, HS8-Digit Level, 2000

		Country	Trade balance (thousands)	Number of tariff lines: Ad valorem	Number of tariff lines: Non-ad valorem[a]	Frequency distribution of tariff rates (percent): 0	0–15	15–30	30–50	Greater than 50	Main statistics: Mean	Median	Standard deviation	Maximum	Tariff rate quotas
18	Others	Chile	1,567,390	747	—	—	747	—	—	—	9.0	9.0	—	9.0	0
19	Others	Dominican Republic	(327,892)	778	—	—	229	277	272	—	21.2	25.0	10.6	35.0	0
20	Others	Panama	(67,856)	1,334	—	67	455	723	48	41	15.0	15.0	20.8	300.0	57
21	Caribbean Community	Antigua and Barbuda	(73,457)	999	19	218	246	208	327	—	17.3	20.0	14.7	45.0	0
22	Caribbean Community	Trinidad and Tobago	(49,375)	1,000	24	389	80	245	284	2	16.6	15.0	16.7	75.0	0
23	Caribbean Community	St. Lucia	(43,929)	1,024	—	285	238	173	328	—	16.5	10.0	16.0	45.0	0
24	Caribbean Community	St. Kitts and Nevis	(27,211)	998	22	257	257	120	364	—	17.5	10.0	16.3	40.0	0
25	Caribbean Community	Jamaica	(133,611)	1,021	—	410	61	224	321	5	17.2	15.0	17.0	75.0	0
26	Caribbean Community	Grenada	(19,639)	1,015	1	120	351	219	324	—	18.2	15.0	15.1	40.0	0
27	Caribbean Community	Dominica	(8,666)	579	439	159	55	78	287	—	22.7	25.0	17.9	45.0	0
28	Caribbean Community	Barbados	(94,877)	886	27	—	349	194	246	97	36.6	20.0	51.6	243.0	37
29	Caribbean Community	Bahamas	(615,499)	676	—	152	788	—	—	3	25.4	30.0	17.6	260.0	0
30	Caribbean Community	St. Vincent	(4,874)	1,007	13	117	392	228	270	—	17.0	10.0	15.0	40.0	0
		Western Hemisphere	38,277,394	926	60	144	442	261	113	14	16.0	14.1	15.4	98.9	969
31		EU—15	4,625,098	1,227	852	845	505	513	136	80	18.3	11.5	24.5	251.6	256

[a] Non-ad valorem = sum of all specific and mixed rates.

Source: Hemispheric Database of the Americas (2001); AMAD; IDB calculations.

Appendix Table 1–2

Industrial Trade and Most Favored Nation Tariff Structure of Countries in the Western Hemisphere, HS8-Digit Level, 2000

		Country	Trade balance (thousands)	Number of tariff lines		Frequency distribution of tariff rates (percent)					Main statistics			
				Ad valorem	Non-ad valorem[a]	0	0–15	15–30	30–50	Greater than 50	Mean	Median	Standard deviation	Maximum
1	Mercosul	Argentina	(8,591,613)	8,431	—	391	4,631	3,368	41	—	13.4	15.0	6.8	33.0
2		Brazil	(13,958,529)	8,431	—	63	3,841	4,489	38	—	14.3	17.0	6.9	35.0
3		Paraguay	(1,490,719)	8,450	—	397	5,216	2,837	—	—	11.5	11.0	6.7	28.0
4		Uruguay	(1,748,646)	7,945	—	338	4,627	2,980	—	—	12.1	13.0	7.0	23.0
5	NAFTA	Mexico	(1,672,518)	10,272	19	194	5,268	4,345	484	—	15.6	13.0	8.1	35.0
6		Canada	14,088,476	6,777	47	3,291	2,855	677	1	—	4.4	2.5	5.8	41.3
7		United States	(478,163,301)	7,894	546	2,766	5,227	384	58	5	4.5	3.0	5.8	58.4
8	Andean Community	Bolivia	(573,441)	5,815	—	390	5,425	—	—	—	9.1	10.0	2.7	10.0
9		Colombia	192,215	5,740	—	120	4,357	1,253	10	—	11.3	10.0	6.2	35.0
10		Ecuador	283,231	4,509	—	109	3,373	1,020	—	7	10.9	10.0	7.0	99.0
11		Peru	(329,516)	5,694	—	—	4,995	699	—	—	13.0	12.0	2.6	20.0
12		Venezuela	17,373,749	5,742	—	38	4,435	1,257	12	—	11.6	10.0	6.0	35.0
13	CACM	Costa Rica	(1,787,135)	5,119	—	2,671	2,443	—	5	—	4.8	—	5.7	49.0
14		Guatemala	(3,104,732)	5,079	17	2,593	1,788	714	—	1	5.3	—	7.5	25.0
15		Honduras	(1,961,542)	5,044	—	—	3,926	1,111	7	—	6.9	1.0	7.5	35.0
16		Nicaragua	(1,230,168)	5,018	—	2,636	2,382	—	—	—	3.4	—	3.9	15.0
17		El Salvador	(2,374,375)	5,157	—	2,627	1,830	700	—	—	6.7	—	8.4	30.0

Appendix Table 1–2 *(continued)*

Industrial Trade and Most Favored Nation Tariff Structure of Countries in the Western Hemisphere, HS8-Digit Level, 2000

		Country	Trade balance (thousands)	Number of tariff lines: Ad valorem	Number of tariff lines: Non-ad valorem[a]	Frequency distribution of tariff rates (percent): 0	0–15	15–30	30–50	Greater than 50	Main statistics: Mean	Median	Standard deviation	Maximum
18	Others	Chile	(456,412)	5,105	—	—	5,105	—	—	—	9.0	9.0	—	9.0
19		Dominican Republic	(4,826,041)	5,163	—	—	2,838	1,935	390	—	17.3	15.0	10.1	35.0
20		Panama	(2,538,561)	7,213	—	325	6,860	24	2	2	8.2	10.0	5.8	87.0
21	Caribbean Community	Antigua and Barbuda	(230,467)	5,277	—	631	3,082	1,509	45	10	10.9	5.0	10.6	70.0
22		Trinidad and Tobago	(626,901)	5,268	2	2,401	1,555	1,213	101	—	7.6	2.0	9.9	45.0
23		St. Lucia	(228,631)	5,275	—	2,159	1,729	1,190	172	25	9.0	5.0	11.4	95.0
24		St. Kitts and Nevis	(120,848)	5,279	—	1,186	2,490	1,477	116	10	10.9	5.0	11.6	70.0
25		Jamaica	(1,307,825)	5,216	—	3,360								
26		Grenada	(123,467)	5,082	—	221	3,575	1,141	145	—	10.0	5.0	8.4	40.0
27		Dominica	(70,919)	5,275	—	226	3,769	1,128	152	—	10.8	5.0	9.7	45.0
28		Barbados	(715,563)	5,043	—	—	3,701	1,161	142	39	11.0	5.0	11.7	145.0
29		Bahamas	(3,306,719)	4,896	—	247	210	715	3,617	107	32.0	35.0	11.4	100.0
30		St. Vincent	(131,971)	5,257	—	406	3,577	1,153	121	—	9.6	5.0	8.3	40.0
		Western Hemisphere	(499,732,889)	6,016	21	993	3,524	1,321	192	7	10.4	7.8	7.4	47.69
31		EU—15	(66,693,698)	10,659	41	2,314	8,176	210	—	—	4.7	3.7	4.4	26.0

[a] Non-ad valorem = sum of all specific and mixed rates.

Source: Hemispheric Database of the Americas (2001); AMAD; IDB calculations.

Appendix Table 1–3

Agricultural Most Favored Nation Tariffs Weighted by Exports, HS6-Digit Level, 2000

	Mercosur				NAFTA						CACM					Andean Community						
Country	Argentina	Brazil	Paraguay	Uruguay	Canada	Mexico	United States	Chile	Dominican Republic	Panama	Costa Rica	Guatemala	Honduras	Nicaragua	El Salvador	Bolivia	Colombia	Ecuador	Peru	Venezuela	CARICOM	European Union
Argentina		14.5	11.6	16.0	14.2	15.8	14.1	15.4	17.1	15.1	13.9	15.0	13.8	14.9	15.7	12.0	14.7	13.7	14.0	16.4	18.9	17.8
Brazil	13.0		1.4	16.0	14.1	15.7	14.0	15.4	16.5	14.9	13.9	14.5	13.8	14.5	15.5	12.0	14.4	13.8	14.0	16.5	18.2	17.6
Paraguay	12.7	14.1		15.2	13.7	15.5	13.7	14.0	18.7	15.2	13.9	15.7	13.9	15.1	15.9	12.1	15.0	13.7	14.2	16.2	19.8	16.4
Uruguay	12.7	14.1	11.6		13.7	15.4	13.8	15.2	16.6	14.4	13.7	14.4	13.8	14.1	14.5	11.7	14.4	13.7	13.9	16.4	16.0	16.9
Canada	27.9	31.4	4.8	51.1		18.0	36.9	32.3	30.9	19.1	19.4	10.0	3.4	25.5	39.4	19.8	14.8	7.3	13.2	29.9	40.2	67.6
Mexico	45.6	49.8	25.2	38.7	35.1		50.8	32.0	55.3	32.6	28.2	37.9	25.3	37.9	44.3	21.8	38.5	30.1	26.5	30.3	51.7	44.5
United States	17.5	35.4	9.3	25.9	12.8	12.2		8.6	30.6	11.3	11.5	17.6	7.7	25.8	12.1	8.4	9.9	6.3	9.5	33.2	19.6	30.1
Chile	9.0	9.0	9.0	9.0	9.0	9.0	9.0		9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
Dominican Republic	14.3	15.2	9.0	22.8	19.7	24.3	18.0	27.6	22.3		22.6	19.1	17.7	18.0	19.6	10.9	20.9	25.0	21.6	22.9	24.7	23.1
Panama	13.1	35.9	14.6	45.9	18.6	18.4	24.1	14.1	44.0	18.2		32.2	17.1	30.0	25.5	12.3	25.3	16.3	18.9	20.7	42.7	25.8
Costa Rica	10.2	19.3	5.1	24.8	13.7	15.4	17.2	14.6	21.6	17.9	18.3		14.9	21.6	17.5	8.6	17.0	14.1	14.5	14.2	22.2	21.5
Guatemala	10.6	12.9	4.9	40.4	12.9	39.4	14.8	17.0	19.5	15.8	14.9	14.7		15.3	16.2	7.7	15.0	15.5	14.1	30.6	26.7	18.0
Honduras	9.2	15.1	6.4	22.6	11.6	16.3	15.1	16.3	20.2	17.9	17.7	19.4	17.2		19.1	7.6	18.5	17.3	16.6	18.4	21.9	16.1
Nicaragua	8.7	17.8	4.5	16.8	7.2	10.4	13.5	9.4	18.6	12.2	10.4	15.0	10.2	13.6		6.4	12.7	10.3	10.4	9.9	18.3	10.7

Appendix Table 1–3 *(continued)*

Agricultural Most Favored Nation Tariffs Weighted by Exports, HS6-Digit Level, 2000

	Mercosur				NAFTA						CACM					Andean Community						
Country	Argentina	Brazil	Paraguay	Uruguay	Canada	Mexico	United States	Chile	Dominican Republic	Panama	Costa Rica	Guatemala	Honduras	Nicaragua	El Salvador	Bolivia	Colombia	Ecuador	Peru	Venezuela	CARICOM	European Union
El Salvador	8.3	12.6	4.9	20.3	12.4	16.9	12.4	14.6	19.5	16.8	15.0	17.4	15.1	17.1	7.2		16.4	14.7	14.4	15.1	22.3	17.3
Bolivia	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	8.7	10.0	10.0	10.0	10.0	10.0	10.0		10.0	10.0	10.0	10.0	10.0
Colombia	16.6	16.3	15.3	18.6	16.3	16.1	16.1	16.3	16.9	15.6	14.7	13.8	12.5	14.3	14.1	16.1	14.4		14.0	17.4	17.7	17.6
Ecuador	15.9	16.1	14.0	18.5	15.4	16.0	15.4	16.0	16.9	15.2	14.6	13.8	12.5	14.0	14.0	15.9	13.0	14.0		17.3	17.7	17.1
Peru	17.4	17.8	14.4	24.1	20.1	18.0	17.8	21.1	17.2	20.6	21.2	18.9	20.2	19.9	19.0	13.9	18.4	21.6	17.2		17.9	18.5
Venezuela	16.6	16.3	15.2	18.6	16.3	16.1	16.0	16.3	16.9	15.6	14.8	13.9	12.5	14.3	14.1	16.1	13.1	15.0	14.1		17.8	17.5
CARICOM	17.4	23.7	13.8	23.3	19.8	37.7	22.6	30.3	31.9	34.8	36.0	30.9	34.4	28.5	30.7	20.6	33.2	34.7	29.0	30.9		25.6
European Union	19.7	20.4	16.3	75.3	29.4	19.9	28.4	16.6	35.3	76.1	54.2	28.1	21.9	32.8	14.9	6.9	30.7	83.8	11.0	28.1	41.4	
Average	15.5	19.9	11.0	26.4	16.0	17.9	18.7	17.8	23.0	20.1	18.5	18.5	15.0	19.5	18.8	12.2	17.8	19.1	15.1	20.0	23.6	21.8

Source: Hemispheric Database of the Americas (2001); AMAD; IDB calculations.

Appendix Table 1–4

Agricultural Preferential Tariffs Weighted by Exports, HS6-Digit Level, 2000

	Mercosur				NAFTA						CACM					Andean Community						
Country	Argentina	Brazil	Paraguay	Uruguay	Canada	Mexico	United States	Chile	Dominican Republic	Panama	Costa Rica	Guatemala	Honduras	Nicaragua	El Salvador	Bolivia	Colombia	Ecuador	Peru	Venezuela	CARICOM	European Union
Argentina		1.9	0.2	0.1	14.2	15.8	14.1	15.4	17.1	15.1	13.9	15.0	13.8	14.9	15.7	12.0	14.7	13.7	14.0	16.4	18.9	17.8
Brazil	0.0		0.0	0.0	14.1	15.7	14.0	15.4	16.5	14.9	13.9	14.5	13.8	14.5	15.5	12.0	14.4	13.8	14.0	16.5	18.2	17.6
Paraguay	0.0	0.0		0.0	13.7	15.5	13.7	8.1	18.7	15.2	13.9	15.7	13.9	15.1	15.9	3.2	15.0	13.7	14.2	16.2	19.8	16.4
Uruguay	0.0	0.7	0.0		13.7	15.4	13.8	15.2	16.6	14.4	13.7	14.4	13.8	14.1	14.5	11.7	14.4	13.7	13.9	16.4	16.0	16.9
Canada	27.9	31.4	4.8	51.1		9.2	25.6	17.6	30.9	19.1	19.4	14.0	3.4	25.5	39.4	19.8	14.8	7.3	13.2	29.9	23.8	67.6
Mexico	45.6	49.8	25.2	38.7	7.3		26.5	30.0	55.3	32.6	20.6	37.9	25.3	24.2	44.3	17.5	19.4	30.1	26.5	19.2	18.3	44.5
United States	17.3	35.2	9.1	24.6	7.3	7.6		8.3	26.8	7.3	7.4	15.3	5.2	24.9	11.3	4.7	5.7	1.7	3.4	32.0	13.0	30.1
Chile	9.0	9.0	9.0	9.0	9.0	0.4	9.0		9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	0.4	1.3	1.6	9.0	9.0
Dominican Republic	14.3	15.2	9.0	22.8	19.7	24.3	18.0	27.6		22.3	22.6	19.1	17.7	18.0	19.6	10.9	20.9	25.0	21.6	22.9	24.7	23.1
Panama	13.1	35.9	14.6	45.9	18.6	18.4	24.1	14.1	44.0		18.2	32.3	17.1	30.0	25.5	12.3	25.3	16.3	18.9	20.7	42.7	25.8
Costa Rica	10.2	19.3	5.1	24.8	13.7	7.0	17.2	14.6	21.6	12.3		11.3	9.2	10.2	11.3	8.6	17.0	14.1	14.5	14.2	22.2	21.5
Guatemala	10.6	12.9	4.9	40.4	12.9	12.9	14.8	17.0	11.2	15.8	2.4		9.3	6.4	8.0	7.7	15.0	15.5	14.1	30.6	26.7	18.0
Honduras	9.2	15.1	6.4	22.6	11.6	13.8	15.1	16.3	20.2	17.9	17.7	19.4		17.2	19.1	7.6	18.5	17.3	16.6	18.4	21.9	16.1
Nicaragua	8.7	17.8	4.5	16.8	7.2	8.1	13.5	9.4	18.6	10.0	2.7	10.5	6.7		9.4	6.4	12.7	10.3	10.4	9.9	18.3	10.7

Appendix Table 1–4 *(continued)*

Agricultural Preferential Tariffs Weighted by Exports, HS6-Digit Level, 2000

	Mercosur				NAFTA						CACM					Andean Community						
Country	Argentina	Brazil	Paraguay	Uruguay	Canada	Mexico	United States	Chile	Dominican Republic	Panama	Costa Rica	Guatemala	Honduras	Nicaragua	El Salvador	Bolivia	Colombia	Ecuador	Peru	Venezuela	CARICOM	European Union
El Salvador	8.3	12.6	4.9	20.3	12.4	16.9	12.4	14.6	19.5	16.8	15.0	17.4	15.1	17.1		7.2	16.4	14.7	14.4	15.1	22.3	17.3
Bolivia	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	9.7	10.0	10.0	10.0	10.0	10.0		10.0	10.0	10.0	10.0	10.0	10.0
Colombia	16.6	14.9	15.3	18.6	16.3	16.1	16.1	16.0	16.9	15.6	14.5	13.8	12.5	14.3	13.5	16.1		14.4	13.5	17.4	17.7	17.6
Ecuador	15.9	16.1	14.0	18.5	15.4	16.0	15.4	16.0	16.9	15.2	14.6	13.8	12.5	14.0	14.0	15.9	13.0		14.0	17.3	17.7	17.1
Peru	15.0	17.2	14.4	24.1	20.1	18.0	17.8	21.1	17.2	20.6	21.2	18.9	20.2	19.9	19.0	13.9	18.4	21.6		17.2	17.9	18.5
Venezuela	13.1	13.6	10.2	18.0	16.3	16.1	16.0	2.5	16.9	15.6	14.8	13.9	12.5	14.3	14.1	2.6	5.7	11.1	1.8		17.8	17.5
CARICOM	17.4	23.7	13.8	23.3	19.8	37.7	22.6	30.3	31.9	34.8	36.0	30.9	34.4	28.5	30.7	20.6	33.2	34.7	29.0	30.9		25.6
European Union	19.7	20.3	16.3	75.3	29.4	19.9	28.4	16.6	27.9	76.1	52.1	26.6	19.6	32.0	13.9	4.7	27.9	81.9	5.7	21.1	32.2	
Average	13.4	17.7	9.1	24.0	14.4	15.0	17.0	16.0	22.1	19.5	16.8	17.8	14.0	17.8	17.8	10.7	16.2	18.2	13.6	18.8	20.4	21.8

Source: Hemispheric Database of the Americas (2001); AMAD; IDB calculations.

Appendix Table 1–5

Industrial Most Favored Nation Tariffs Weighted by Exports, HS6-Digit Level, 2000

	Mercosur				NAFTA						CACM					Andean Community						
Country	Argentina	Brazil	Paraguay	Uruguay	Canada	Mexico	United States	Chile	Dominican Republic	Panama	Costa Rica	Guatemala	Honduras	Nicaragua	El Salvador	Bolivia	Colombia	Ecuador	Peru	Venezuela	CARICOM	European Union
Argentina		14.6	14.8	17.0	15.4	18.3	14.2	9.7	11.1	13.8	13.8	14.8	15.9	12.3	18.2	7.0	8.2	5.7	9.8	4.0	8.6	16.2
Brazil	14.4		14.9	17.3	17.6	21.3	17.3	9.8	11.7	14.0	21.8	15.6	16.0	12.4	18.1	7.9	11.0	9.6	10.0	8.2	9.7	18.2
Paraguay	9.4	11.3		14.2	10.8	13.8	11.3	9.2	9.9	13.2	13.6	13.7	15.4	11.7	16.6	6.3	7.2	5.0	9.3	3.0	7.8	12.3
Uruguay	10.5	12.0	14.1		11.7	14.7	11.5	8.9	19.8	13.6	11.7	14.1	15.3	11.9	17.2	5.5	7.5	5.3	9.3	3.8	8.1	12.9
Canada	3.6	3.7	6.0	6.2		4.8	3.3	1.1	6.7	3.3	3.7	5.0	4.7	3.3	7.8	1.8	3.5	2.0	3.4	2.4	4.2	4.3
Mexico	16.6	17.1	20.0	19.4	16.7		14.9	14.6	16.5	25.8	12.6	18.9	21.4	23.3	21.5	13.1	15.7	16.7	14.6	14.5	12.9	17.2
United States	3.5	3.5	5.7	5.8	2.9	4.2		1.7	3.3	2.4	2.9	3.3	2.0	1.8	5.4	1.9	3.1	2.8	3.8	2.4	2.2	3.3
Chile	9.0	9.0	9.0	9.0	9.0	9.0	9.0		9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
Dominican Republic	15.2	14.9	22.6	21.6	15.7	17.4	12.9	11.0		26.4	12.6	17.9	21.1	24.8	22.2	11.4	12.9	12.7	14.0	11.0	11.0	15.4
Panama	9.7	9.6	11.9	11.2	9.3	9.3	8.4	10.0	21.7		7.6	8.7	12.7	13.1	12.9	7.3	7.2	6.6	9.8	11.3	5.5	9.4
Costa Rica	5.4	4.8	8.2	8.1	5.7	6.4	3.5	3.0	6.7	9.7		8.2	10.3	8.8	10.2	3.5	5.2	4.8	4.9	4.7	3.4	4.9
Guatemala	5.7	5.9	11.2	10.3	7.3	7.9	4.1	3.1	5.6	10.3	6.0		11.5	9.5	12.7	5.3	5.9	4.5	5.8	3.2	4.8	6.0
Honduras	9.9	6.6	9.9	10.7	10.6	10.9	5.0	4.0	9.3	11.6	6.4	11.9		9.9	13.1	6.4	11.9	14.6	6.6	14.9	7.7	7.5
Nicaragua	3.7	3.1	5.5	5.4	4.2	4.1	2.3	2.1	4.5	7.8	2.9	5.0	7.3		6.4	3.8	3.4	3.2	3.9	2.9	3.4	3.2

Appendix Table 1–5 *(continued)*

Industrial Most Favored Nation Tariffs Weighted by Exports, HS6-Digit Level, 2000

	Mercosur				NAFTA						CACM					Andean Community						
Country	Argentina	Brazil	Paraguay	Uruguay	Canada	Mexico	United States	Chile	Dominican Republic	Panama	Costa Rica	Guatemala	Honduras	Nicaragua	El Salvador	Bolivia	Colombia	Ecuador	Peru	Venezuela	CARICOM	European Union
El Salvador	5.7	5.6	10.6	10.5	7.6	8.5	3.9	3.1	5.6	10.3	6.3	9.6	11.5	9.4		4.1	5.9	5.2	5.9	3.7	4.3	6.4
Bolivia	9.6	8.8	9.9	9.8	9.5	9.6	9.0	9.9	10.0	10.0	9.9	9.8	9.8	9.9	9.9		9.8	10.0	10.0	10.0	9.8	8.8
Colombia	13.2	12.0	13.4	15.6	14.3	15.1	10.3	8.8	10.4	17.5	10.2	14.0	16.1	16.7	15.8	7.7		12.9	11.1	11.3	9.8	12.4
Ecuador	15.0	7.9	13.2	12.6	6.5	5.5	5.7	8.7	35.2	26.4	8.7	12.2	15.3	19.9	20.0	8.0	14.7		14.4	32.9	8.5	7.9
Peru	12.1	12.5	13.1	12.9	12.1	12.6	12.3	12.1	12.2	12.4	12.9	12.8	12.6	12.2	13.7	12.3	12.6	12.1		12.0	12.4	12.5
Venezuela	13.3	12.0	12.6	16.1	14.2	15.3	10.6	8.4	10.3	17.6	10.2	13.9	16.1	16.7	15.8	8.4	12.1	12.9	11.1		9.7	12.6
CARICOM	15.2	13.5	13.3	16.9	16.2	16.9	11.7	10.8	18.4	30.9	11.9	14.9	19.8	27.5	18.8	8.3	11.6	13.3	10.1	14.6		13.9
European Union	4.8	4.2	4.9	6.7	4.5	5.0	3.1	2.6	2.7	11.0	3.1	3.7	3.2	10.4	5.5	1.5	3.0	4.4	2.5	1.8	4.0	
Average	9.8	9.2	11.7	12.3	10.6	11.0	8.8	7.3	11.0	14.1	9.4	11.3	12.7	13.1	13.8	6.7	8.6	8.3	8.5	8.7	7.5	10.2

Source: Hemispheric Database of the Americas (2001); AMAD; IDB calculations.

Appendix Table 1–6

Industrial Preferential Tariffs Weighted by Exports, HS6-Digit Level, 2000

	Mercosur				NAFTA						CACM					Andean Community						
Country	Argentina	Brazil	Paraguay	Uruguay	Canada	Mexico	United States	Chile	Dominican Republic	Panama	Costa Rica	Guatemala	Honduras	Nicaragua	El Salvador	Bolivia	Colombia	Ecuador	Peru	Venezuela	CARICOM	European Union
Argentina		1.6	0.0	2.7	15.4	18.3	14.2	9.7	11.1	13.8	13.8	14.8	15.9	12.3	18.2	7.0	8.2	5.7	9.8	4.0	8.6	16.2
Brazil	0.0		0.0	0.0	17.6	21.3	17.3	9.8	11.7	14.0	21.8	15.6	16.0	12.4	18.1	7.9	11.0	9.6	10.0	8.2	9.7	18.2
Paraguay	0.0	0.0		0.0	10.8	13.8	11.3	3.1	9.9	13.2	13.6	13.7	15.4	11.7	16.6	2.6	7.2	5.0	9.3	3.0	7.8	12.3
Uruguay	1.9	1.4	0.0		11.7	14.7	11.5	8.9	10.8	13.6	11.7	14.1	15.3	11.9	17.2	5.5	7.5	5.3	9.3	3.8	8.1	12.9
Canada	3.6	3.7	6.0	6.2		0.7	0.0	0.0	6.7	3.3	3.7	5.0	4.7	3.3	7.8	1.8	3.5	2.0	3.4	2.4	0.9	4.3
Mexico	16.6	17.1	20.0	19.4	2.7		2.8	14.6	16.5	25.8	10.1	18.9	21.4	12.8	21.5	12.7	7.3	16.7	14.6	4.5	7.6	17.2
United States	1.4	1.2	1.3	2.2	0.0	0.2		0.9	1.0	0.8	0.6	0.7	0.6	0.2	1.9	0.0	0.0	0.0	0.0	2.2	0.8	3.3
Chile	9.0	9.0	9.0	9.0	9.0	1.7	9.0		9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	5.7	1.0	5.7	9.0	9.0
Dominican Republic	15.2	14.9	22.6	21.6	15.7	17.4	12.9	11.0		26.4	12.6	17.9	21.1	24.8	22.2	11.4	12.9	12.7	14.0	11.0	11.0	15.4
Panama	9.7	9.6	11.9	11.2	9.3	9.3	8.4	10.0	21.7		7.6	8.7	12.7	13.1	12.9	7.3	7.2	6.6	9.8	11.3	5.5	9.4
Costa Rica	5.4	4.8	8.2	8.1	5.7	0.7	3.5	3.0	6.7	8.6		0.3	0.3	1.7	1.2	3.5	5.2	4.8	4.9	4.7	3.4	4.9
Guatemala	5.7	5.9	11.2	10.3	7.3	6.7	4.1	3.1	3.6	10.3	0.1		0.0	0.4	0.8	5.3	5.9	4.5	5.8	3.2	4.8	6.0
Honduras	9.9	6.6	9.9	10.7	10.6	9.2	5.0	4.0	9.3	11.6	6.4	11.9		9.9	13.1	6.4	11.9	14.6	6.6	14.9	7.7	7.5
Nicaragua	3.7	3.1	5.5	5.4	4.2	3.6	2.3	2.1	4.5	6.9	0.1	0.0	0.0		0.8	3.8	3.4	3.2	3.9	2.9	3.4	3.2

Appendix Table 1–6 *(continued)*

Industrial Preferential Tariffs Weighted by Exports, HS6-Digit Level, 2000

	Mercosur				NAFTA						CACM					Andean Community						
Country	Argentina	Brazil	Paraguay	Uruguay	Canada	Mexico	United States	Chile	Dominican Republic	Panama	Costa Rica	Guatemala	Honduras	Nicaragua	El Salvador	Bolivia	Colombia	Ecuador	Peru	Venezuela	CARICOM	European Union
El Salvador	5.7	5.6	10.6	10.5	7.6	8.5	3.9	3.1	5.6	10.3	6.3	9.6	11.5	9.4		4.1	5.9	5.2	5.9	3.7	4.3	6.4
Bolivia	9.9	8.8	9.9	9.8	9.5	9.6	9.0	9.9	10.0	10.0	9.9	9.8	9.8	9.9	9.9		9.8	10.0	10.0	10.0	9.8	8.8
Colombia	13.2	11.7	13.4	15.6	14.3	15.1	10.3	8.8	10.4	17.5	10.2	14.0	16.1	16.7	15.8	7.7		12.9	10.2	11.3	9.8	12.4
Ecuador	15.0	7.9	13.2	12.6	6.5	5.5	5.7	8.7	35.2	26.4	8.7	12.2	15.3	19.9	20.0	8.0	14.7		14.4	32.9	8.5	7.9
Peru	10.9	11.1	13.1	12.9	12.1	12.6	12.3	12.1	12.2	12.4	12.9	12.8	12.6	12.2	13.7	12.3	12.6	12.1		12.0	12.4	12.5
Venezuela	9.9	10.7	12.2	15.6	14.2	15.3	10.6	1.9	10.3	17.6	10.2	13.9	16.1	16.7	15.8	2.6	2.0	0.9	2.5		9.7	12.6
CARICOM	15.2	13.5	13.3	16.9	16.2	16.9	11.7	10.8	18.4	30.9	11.9	14.9	19.8	27.5	18.8	8.3	11.6	13.3	10.1	14.6		13.9
European Union	4.8	4.2	4.9	6.7	4.5	1.8	3.1	2.6	0.6	11.0	2.5	3.2	1.9	2.2	5.1	1.5	2.7	1.4	1.9	1.8	2.4	
Average	7.9	7.3	9.3	9.9	9.8	9.7	8.0	6.6	10.7	14.0	8.7	10.5	11.2	11.3	12.4	6.1	7.6	7.2	7.5	8.0	6.9	10.2

Source: Hemispheric Database of the Americas (2001); AMAD; IDB calculations.

Appendix Table 1–7

Overall Most Favored Nation Tariffs Weighted by Exports, HS6-Digit Level, 2000

	Mercosur				NAFTA						CACM					Andean Community						
Country	Argentina	Brazil	Paraguay	Uruguay	Canada	Mexico	United States	Chile	Dominican Republic	Panama	Costa Rica	Guatemala	Honduras	Nicaragua	El Salvador	Bolivia	Colombia	Ecuador	Peru	Venezuela	CARICOM	European Union
Argentina		14.5	12.4	16.6	15.4	18.2	14.2	10.6	13.4	14.4	13.9	14.9	14.8	14.0	17.1	8.5	9.7	7.9	10.2	4.2	10.3	16.3
Brazil	13.8		12.2	16.7	17.4	21.0	17.0	10.7	13.5	14.4	19.4	15.0	14.8	13.8	17.0	9.1	11.7	10.8	10.4	8.3	11.2	18.2
Paraguay	10.8	11.9		14.7	11.0	13.9	11.5	9.9	13.2	14.1	13.7	14.8	14.6	14.0	16.3	8.0	9.0	7.4	9.7	3.2	9.8	12.6
Uruguay	11.4	12.5	12.2		11.8	14.7	11.7	9.9	13.0	13.9	12.3	14.3	14.5	13.4	16.0	7.4	9.0	7.6	9.8	4.0	9.4	13.1
Canada	13.8	10.3	5.1	25.9		5.4	6.1	6.2	15.8	10.0	8.6	10.2	4.0	17.8	21.1	7.1	6.0	3.5	4.3	2.7	10.3	8.2
Mexico	28.7	24.9	24.0	27.8	17.8		17.8	17.4	31.2	28.7	17.4	29.8	23.6	32.9	31.1	15.7	20.8	20.5	15.8	14.7	19.4	18.9
United States	9.4	11.1	8.5	14.6	3.6	4.5		2.8	13.6	6.2	5.6	11.6	5.2	17.5	8.2	3.9	4.7	3.8	4.4	2.8	5.1	4.9
Chile	9.0	9.0	9.0	9.0	9.0	9.0	9.0		9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
Dominican Republic	14.8	15.0	12.2	22.1	16.0	17.7	13.3	13.6		24.7	15.7	18.6	19.2	20.4	21.1	11.2	14.7	16.1	14.8	11.1	13.3	15.9
Panama	11.1	15.9	14.0	26.4	9.9	9.7	9.7	10.6	30.2		10.9	22.3	15.2	24.2	18.2	8.7	11.2	9.3	10.7	11.4	11.7	10.4
Costa Rica	7.4	8.3	5.8	15.4	6.2	6.8	4.6	4.9	12.3	13.1		14.0	12.8	17.1	13.3	5.0	7.8	7.4	5.8	4.8	6.5	6.0
Guatemala	7.8	7.6	6.4	23.5	7.7	9.4	5.0	5.4	10.8	12.6	8.8		13.3	13.3	14.2	6.0	7.9	7.5	6.6	3.4	8.5	6.8
Honduras	9.6	8.7	7.2	15.9	10.7	11.1	5.8	6.0	13.4	14.2	9.9	16.2		14.7	15.6	6.7	13.3	15.3	7.6	15.0	10.1	8.0
Nicaragua	5.8	6.6	4.7	10.4	4.4	4.4	3.2	3.3	9.8	9.6	5.2	10.8	8.9		9.4	4.6	5.5	5.2	4.5	3.0	5.9	3.7

Appendix Table 1–7 *(continued)*

Overall Most Favored Nation Tariffs Weighted by Exports, HS6-Digit Level, 2000

	Mercosur				NAFTA						CACM					Andean Community						
Country	Argentina	Brazil	Paraguay	Uruguay	Canada	Mexico	United States	Chile	Dominican Republic	Panama	Costa Rica	Guatemala	Honduras	Nicaragua	El Salvador	Bolivia	Colombia	Ecuador	Peru	Venezuela	CARICOM	European Union
El Salvador	6.8	7.3	6.2	14.8	7.9	8.9	4.6	5.0	10.9	13.0	9.0	14.1	13.5	14.4		5.0	8.2	7.8	6.7	3.8	7.3	7.1
Bolivia	9.7	9.1	10.0	9.9	9.5	9.6	9.0	9.9	10.0	9.9	10.0	9.9	9.9	10.0	9.9		9.8	10.0	10.0	10.0	9.9	8.9
Colombia	14.6	13.0	14.8	16.9	14.4	15.1	10.8	10.0	12.8	16.7	11.6	13.9	14.1	15.1	15.1	10.2		13.3	11.4	11.4	11.1	12.7
Ecuador	15.4	9.8	13.8	15.2	7.0	6.0	6.5	9.9	28.3	21.7	10.5	13.1	13.7	16.0	17.5	10.4	14.3		14.3	32.7	10.0	8.5
Peru	14.3	13.8	14.1	17.8	12.6	12.9	12.7	13.5	14.1	15.8	15.5	16.3	16.8	17.2	15.9	12.8	13.9	14.8		12.1	13.3	12.9
Venezuela	14.7	13.1	14.6	17.2	14.4	15.3	11.0	9.7	12.8	16.7	11.6	13.9	14.1	15.1	15.1	10.7	12.3	13.5	11.4		11.1	12.9
CARICOM	16.1	15.9	13.7	19.7	16.4	17.9	12.6	13.9	23.5	32.5	19.4	24.1	27.9	28.1	23.8	11.9	16.4	19.2	11.9	14.7		14.7
European Union	11.0	8.0	13.6	36.7	6.0	5.7	5.2	4.8	15.0	38.5	18.9	17.8	13.5	25.0	9.5	3.1	9.2	26.5	3.3	2.1	10.3	
Average	12.2	11.7	11.2	18.4	10.9	11.3	9.6	9.0	15.6	16.7	12.2	15.5	14.0	17.3	15.9	8.3	10.7	11.3	9.2	8.8	10.2	10.9

Source: Hemispheric Database of the Americas (2001); AMAD; IDB calculations.

Appendix Table 1–8

Overall Preferential Tariffs Weighted by Exports, HS6-Digit Level, 2000

	Mercosur				NAFTA						CACM					Andean Community						
Country	Argentina	Brazil	Paraguay	Uruguay	Canada	Mexico	United States	Chile	Dominican Republic	Panama	Costa Rica	Guatemala	Honduras	Nicaragua	El Salvador	Bolivia	Colombia	Ecuador	Peru	Venezuela	CARICOM	European Union
Argentina		1.7	0.2	1.5	15.4	18.2	14.2	10.6	13.4	14.4	13.9	14.9	14.8	14.0	17.1	8.5	9.7	7.9	10.2	4.2	10.3	16.3
Brazil	0.0		0.0	0.0	17.4	21.0	17.0	10.7	13.5	14.4	19.4	15.0	14.8	13.8	17.0	9.1	11.7	10.8	10.4	8.3	11.2	1.1
Paraguay	0.0	0.0		0.0	11.0	13.9	11.5	3.9	13.2	14.1	13.7	14.8	14.6	14.0	16.3	2.8	9.0	7.4	9.7	3.2	9.8	12.6
Uruguay	1.1	1.3	0.0		11.8	14.7	11.7	9.9	13.0	13.9	12.3	14.3	14.5	13.4	16.0	7.4	9.0	7.6	9.8	4.0	9.4	13.1
Canada	13.8	10.3	5.1	25.9		1.1	2.1	2.9	15.8	10.0	8.6	10.2	4.0	17.8	21.1	7.1	6.0	3.5	4.3	2.7	4.8	8.2
Mexico	28.7	24.9	24.0	27.8	3.0		4.8	17.1	31.2	28.7	13.4	29.8	23.6	20.2	31.1	14.1	10.0	20.5	15.8	4.7	9.4	18.9
United States	8.1	9.3	7.3	12.0	0.5	0.5		2.1	10.8	3.6	2.7	9.1	3.1	16.4	5.8	1.4	1.3	0.5	0.3	2.5	2.8	4.9
Chile	9.0	9.0	9.0	9.0	9.0	1.7	9.0		9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	4.2	1.0	5.6	9.0	9.0
Dominican Republic	14.8	15.0	12.2	22.1	16.0	17.7	13.3	13.6		24.7	15.7	18.6	19.2	20.4	21.1	11.2	14.7	16.1	14.8	11.1	13.3	15.9
Panama	11.1	15.9	14.0	26.4	9.9	9.7	9.7	10.6	30.2		10.9	22.3	15.2	24.2	18.2	8.7	11.2	9.3	10.7	11.4	11.7	10.4
Costa Rica	7.4	8.3	5.8	15.4	6.2	1.0	4.6	4.9	12.3	10.2		6.7	5.2	7.3	5.4	5.0	7.8	7.4	5.8	4.8	6.5	6.0
Guatemala	7.8	7.6	6.4	23.5	7.7	7.0	5.0	5.4	6.5	12.6	0.8		5.2	4.3	3.8	6.0	7.9	7.5	6.6	3.4	8.5	6.8
Honduras	9.6	8.7	7.2	15.9	10.7	9.4	5.8	6.0	13.4	14.2	9.9	16.2		14.7	15.6	6.7	13.3	15.3	7.6	15.0	10.1	8.0
Nicaragua	5.8	6.6	4.7	10.4	4.4	3.8	3.2	3.3	9.8	8.2	0.9	6.1	3.7		4.4	4.6	5.5	5.2	4.5	3.0	5.9	3.7

Appendix Table 1–8 *(continued)*

Overall Preferential Tariffs Weighted by Exports, HS6-Digit Level, 2000

	Mercosur				NAFTA						CACM					Andean Community						
Country	Argentina	Brazil	Paraguay	Uruguay	Canada	Mexico	United States	Chile	Dominican Republic	Panama	Costa Rica	Guatemala	Honduras	Nicaragua	El Salvador	Bolivia	Colombia	Ecuador	Peru	Venezuela	CARICOM	European Union
El Salvador	6.8	7.3	6.2	14.8	7.9	8.9	4.6	5.0	10.9	13.0	9.0	14.1	13.5	14.4		5.0	8.2	7.8	6.7	3.8	7.3	7.1
Bolivia	9.7	9.1	10.0	9.9	9.5	9.6	9.0	9.9	10.0	9.9	10.0	9.9	9.9	10.0	9.9		9.8	10.0	10.0	10.0	9.9	8.9
Colombia	14.6	12.4	14.8	16.9	14.4	15.1	10.8	9.9	12.8	16.7	11.5	13.9	14.1	15.1	14.8	10.2		13.3	10.5	11.4	11.1	12.7
Ecuador	15.4	9.8	13.8	15.2	7.0	6.0	6.5	9.9	28.3	21.7	10.5	13.1	13.7	16.0	17.5	10.4	14.3		14.3	32.7	10.0	8.5
Peru	12.6	12.6	14.1	17.8	12.6	12.9	12.7	13.5	14.1	15.8	15.5	16.3	16.8	17.2	15.9	12.8	13.9	14.8		12.1	13.3	12.9
Venezuela	11.2	11.4	10.6	16.7	14.4	15.3	11.0	2.0	12.8	16.7	11.6	13.9	14.1	15.1	15.1	2.6	2.9	3.8	2.4		11.1	12.9
CARICOM	16.1	15.9	13.7	19.7	16.4	17.9	12.6	13.9	23.5	32.5	19.4	24.1	27.9	28.1	23.8	11.9	16.4	19.2	11.9	14.7		
European Union	11.0	8.0	13.6	36.7	6.0	2.6	5.2	4.8	10.9	38.5	17.9	16.7	11.7	21.7	8.8	2.5	8.3	23.8	2.3	2.0	7.5	
Average	10.2	9.8	9.2	16.1	10.1	9.9	8.8	8.1	15.0	16.3	11.3	14.7	12.8	15.6	14.7	7.5	9.5	10.3	8.1	8.1	9.2	10.1

Source: Hemispheric Database of the Americas (2001); AMAD; IDB calculations.

Appendix Table 1–9

The Most Favored Nation Regional Export-Sensitive Tariff Index for Countries in the Western Hemisphere, HS6-Digit Level, 2000

	Imposed			Faced			REST		
Country	All	Industry	Agriculture	All	Industry	Agriculture	All	Industry	Agriculture
Argentina	12.2	11.7	14.6	10.6	5.2	18.1	0.9	0.4	1.2
Brazil	16.1	16.2	14.4	11.7	5.4	32.0	0.7	0.3	2.2
Paraguay	9.9	9.3	14.1	8.9	6.4	9.6	0.9	0.7	0.7
Uruguay	11.7	11.3	14.4	16.0	9.7	24.2	1.4	0.9	1.7
Canada	8.2	3.3	27.7	13.8	13.7	14.7	1.7	4.2	0.5
Mexico	23.8	17.1	38.8	15.6	15.6	15.7	0.7	0.9	0.4
United States	7.9	3.1	22.6	11.3	10.9	15.5	1.4	3.6	0.7
Chile	9.0	9.0	9.0	8.2	6.8	15.2	0.9	0.8	1.7
Dominican Republic	13.4	13.0	18.1	14.9	5.7	30.0	1.1	0.4	1.7
Panama	11.7	9.1	24.2	12.0	10.2	14.6	1.0	1.1	0.6
Costa Rica	5.1	3.9	17.0	8.1	5.6	13.7	1.6	1.4	0.8
Guatemala	5.5	4.5	15.7	15.3	8.0	20.7	2.8	1.8	1.3
Honduras	6.0	5.2	15.1	7.2	4.3	9.5	1.2	0.8	0.6
Nicaragua	3.5	2.6	13.0	19.2	9.4	24.4	5.5	3.6	1.9
El Salvador	5.0	4.2	12.5	11.9	8.7	16.3	2.4	2.1	1.3
Bolivia	9.3	9.1	10.0	7.8	6.5	11.0	0.8	0.7	1.1
Colombia	11.3	10.8	16.1	7.3	5.5	13.6	0.7	0.5	0.8
Ecuador	8.6	8.3	15.4	6.3	5.1	9.4	0.7	0.6	0.6
Peru	13.0	12.3	18.3	6.8	6.3	11.6	0.5	0.5	0.6
Venezuela	11.4	10.9	16.0	4.4	4.1	29.9	0.4	0.4	1.9
CARICOM	14.0	12.8	23.7	7.2	4.3	21.4	0.5	0.3	0.9

Source: Hemispheric Database of the Americas (2001); AMAD; IDB calculations.

Appendix Table 1–10

The Preferential Regional Export-Sensitive Tariff Index for Countries in the Western Hemisphere, HS6-Digit Level, 2000

	Imposed			Faced			Faced/imposed		
Country	All	Industry	Agriculture	All	Industry	Agriculture	All	Industry	Agriculture
Argentina	6.5	6.3	7.6	4.5	1.7	8.3	0.7	0.3	1.1
Brazil	11.5	11.6	10.3	7.7	3.0	22.6	0.7	0.3	2.2
Paraguay	1.1	1.0	1.8	2.0	0.7	2.5	1.8	0.6	1.4
Uruguay	4.4	4.6	4.8	4.9	3.3	6.9	1.1	0.7	1.5
Canada	2.1	0.0	25.5	0.9	0.4	7.5	0.4	13.3	0.3
Mexico	5.2	3.2	26.3	1.0	0.6	7.9	0.2	0.2	0.3
United States	1.4	0.2	9.6	4.5	2.7	24.2	3.2	11.7	2.5
Chile	7.5	7.5	7.2	7.5	6.3	13.8	1.0	0.8	1.9
Dominican Republic	13.4	13.0	18.1	12.8	4.1	27.2	1.0	0.3	1.5
Panama	11.7	9.1	24.2	10.5	9.3	12.3	0.9	1.0	0.5
Costa Rica	5.0	3.2	15.7	5.7	3.8	10.1	1.2	1.2	0.6
Guatemala	5.0	3.7	13.2	13.4	6.4	18.6	2.7	1.7	1.4
Honduras	6.7	5.6	15.4	5.5	3.1	7.5	0.8	0.5	0.5
Nicaragua	3.4	2.3	12.1	13.7	5.7	18.0	4.0	2.5	1.5
El Salvador	7.2	5.7	13.6	9.2	5.3	14.5	1.3	0.9	1.1
Bolivia	9.5	9.4	10.0	7.7	6.6	10.5	0.8	0.7	1.1
Colombia	11.3	10.9	16.1	4.7	3.5	8.9	0.4	0.3	0.6
Ecuador	10.0	9.7	15.2	6.2	5.3	8.6	0.6	0.5	0.6
Peru	13.0	12.2	18.2	4.2	3.9	7.4	0.3	0.3	0.4
Venezuela	10.6	10.1	14.9	4.8	4.5	26.4	0.5	0.4	1.8
CARICOM	14.0	12.8	23.7	5.1	3.1	15.0	0.4	0.2	0.6

Source: Hemispheric Database of the Americas (2001); AMAD; IDB calculations.

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Chapter 2

Agricultural Reform in the Western Hemisphere and the European Union: Effects on Latin America

Josefina Monteagudo and Masakazu Watanuki

Agricultural policy reform in the Western Hemisphere has been undertaken as a two-tier liberalization process: at the multilateral level and at the regional level. In the multilateral arena, the Uruguay Round Agreement on Agriculture (URAA) made significant progress toward less distorted agricultural trade and, for the first time, agriculture was brought under the disciplines of the General Agreement on Tariffs and Trade.[1] Following the URAA, member countries committed themselves to reduce agriculture-distorted measures over six years for developed countries (1995–2000) and 10 years for developing countries (1995–2004) in three main disciplines: market access, domestic support, and export subsidies.

Despite moving toward agricultural reform under the URAA, crucial barriers to trade remain intact or, at best, slightly improved. Tariffs in agriculture are still very high: the global, unweighted, average bound tariff rate is 62 percent, and that of developed countries is 45 percent (USDA 2001). Regarding domestic support, while some countries converted domestic support measures into less trade-distorting programs permitted under the URAA, others, especially developed countries, did not follow in the same direction and recently have even increased protection.[2] The Doha Round of negotiations launched in 2001 will provide a great opportunity for developing countries if developed countries successfully achieve agricultural reform.[3]

The authors acknowledge the helpful assistance of Reuben Kline.

[1] The Agreement states specific commitments to improve market access and reduce trade-distorting measures. In the area of market access, all nontariff barriers are prohibited and converted to the corresponding tariffs through a process called "tariffication." Tariffs are to be reduced by 36 percent (24 percent for developing countries), domestic support by 20 percent (13 percent), and export subsidies by 36 percent (24 percent). The minimum tariff cut per product is 15 percent for developed countries and 10 percent for developing countries. In the export subsidies, the reduction of subsidized quantities is 21 percent for developed countries and 14 percent for developing countries. Least developed countries are not required to reduce tariffs or subsidies. Refer to the WTO secretariat for more details.

[2] The recently enacted Farm Security and Rural Investment Act of 2002 (hereafter, the Farm Bill) nearly doubles transfers to farmers.

[3] The deadline is set for January 2005.

At the regional level, integration initiatives have proliferated in the Western Hemisphere over the past decade and a half, as renewed regionalism has gained momentum (Devlin and Ffrench-Davis 1998; Devlin and Estevadeordal 2001). Latin America and the Caribbean have launched more than 20 free trade agreements or customs unions in the 1990s. In that decade, the North American Free Trade Agreement (NAFTA) was launched between a developing country (Mexico) and developed countries (the United States and Canada), and Mercosur between four developing countries (Argentina, Brazil, Paraguay, and Uruguay). In these agreements, agriculture has been progressively liberalized within each bloc. Countries in the Western Hemisphere are now steadily moving forward to create a hemisphere-wide free trade area (the Free Trade Area of the Americas, FTAA). This historic event poses unprecedented challenges for all partners. The agenda of the negotiations involves longstanding but nonetheless contentious topics, including agriculture reform. In the meantime, some Latin American and Caribbean countries are involved in trade negotiations with the European Union, their most important extra-hemispheric partner. Mercosur and the European Union agreed to initiate free trade talks at the 1999 Rio de Janeiro Summit. The talks are moving slowly, but the European Union expressed its desire to accelerate the negotiations in view of the progress of the FTAA process.[4]

One of the key and most contentious issues in both the FTAA and the transatlantic negotiations is the liberalization of agriculture. In the Western Hemisphere, agricultural trade amounts to US$200 billion, representing some 30 percent of global agricultural trade and around 7 percent of total hemispheric trade. Agriculture has a high share in gross domestic product—around 15 percent in Mexico and Brazil, and 20 percent in Central America and Caribbean, and Argentina—and represents leading exports for most Latin American and the Caribbean countries. Because the sector absorbs a significant portion of the workforce, it is also politically sensitive in Latin America and the Caribbean. However, trade in agriculture is restricted by a number of barriers, including high tariffs and nontariff measures, such as tariff rate quotas, technical regulations and quantitative restrictions, domestic support, export subsidies, and sanitary and phytosanitary measures. Most of these policy measures are essentially active in both the United States and the European Union. Given Latin American and the Caribbean global competitiveness in agriculture, the agricultural reform in the Western Hemisphere and the European Union will definitely bring about large opportunities and sizable gains to Latin America and the Caribbean.

In order to prepare for the negotiations and to prepare the economy for the structural adjustment that the liberalization process will generate, Latin America and the Caribbean will greatly benefit from having an a priori estimation of the potential economic impact of such reform. Important questions include: (i) What will be the impact of the agricultural reform in developed countries on Latin America, specifically on sector production, export patterns, and resource allocation? (ii) Which countries will gain and

[4] An important aspect of the Mercosur-European Union relationship is that in light of growing U.S. trade dominance and ongoing negotiations in the Western Hemisphere, Mercosur views the European Union as a counterbalance to the United States, particularly in the FTAA negotiation process. For the European Union, Mercosur is an important extra-regional trade partner: it absorbs some 50 percent of its exports to Latin America, and represents half of the total exports from Latin America to the European Union market. Mercosur has been a traditional stronghold in the Americas, and is now an increasingly important partner for the European Union to block U.S. dominance and restore the lost share in Latin America by strengthening trade relations.

lose, and which sectors will be most affected as a consequence of the agricultural reform at the hemispheric level? (iii) To what extent will the effects of agricultural liberalization with the European Union differ from those of the FTAA for Mercosur countries?

To answer these questions, we use an applied general equilibrium model that quantifies the impact of liberalizing agriculture as a result of the FTAA and the Mercosur-European Union agreements. The model is a multiregion, multisector, computable general equilibrium (CGE) model. The analysis focuses on the effect on Latin America and the Caribbean of the elimination of three policy instruments distorting world prices and restricting trade flows in agriculture: tariffs (ad valorem as well as ad valorem equivalent estimations), domestic support, and export subsidies. In order to evaluate the effect of agricultural reform, the simulations assume that only the agricultural sector is completely liberalized; trade barriers in nonagricultural sectors remain unchanged.[5] Under this assumption, we are able to measure the cost that agricultural protection in the developed world has on Latin America and the Caribbean.

For the two trade agreements considered, we estimate the impact of each policy reform variable individually, as well as the effect of moving toward liberalization simultaneously in the three areas. It may seem unlikely that regional trade agreement negotiations will go beyond tariff elimination to include domestic support and export subsidies, since it has been argued that these nontariff issues should be addressed at the multilateral level. However, many Latin American and Caribbean countries are pushing for the inclusion of these topics in the regional negotiations. No matter what the final result of the negotiations may be, to assess the cost for Latin America and the Caribbean of protectionism in the developed world is a relevant economic and policy question.

The model is benchmarked in 1997 and given that many countries have reduced trade barriers since then—although less than agreed under the URAA—the analysis may overestimate the potential impact of agricultural liberalization. However, because countries also have nontariff barriers in place not covered in the model, such as sanitary and phytosanitary measures, and a handful of countries including the United States have recently raised trade protection, the results may underestimate the impact of a comprehensive agricultural reform.

Our results show that the elimination of tariffs in the Western Hemisphere increases Latin America and the Caribbean's agricultural exports by 11 percent. The removal of domestic support has a small positive effect on Latin America and the Caribbean's exports, and eliminating export subsidies alone does not appear to enhance exports. The results also show that the United States will benefit from opening up its agricultural market, as its agricultural exports expand by 12 percent. For Mercosur countries, the impact of the agreement with the European Union is quite different from that of the hemispheric agreement and generates larger positive effects and more heterogeneous impacts across sectors. The elimination of tariffs between the two blocs increases Mercosur's exports to the European Union by 37 percent. The European Union's removal of domestic support increases Mercosur's agricultural exports by 8 percent. As in the Western Hemisphere scenario, the abolishment of the European Union's export subsidies does not boost Mercosur's exports. For the European Union, agricultural reform reduces agricultural exports by around 3 percent.

[5] This is a hypothetical situation since trade negotiations include both the agricultural and nonagricultural sectors.

Thus, Latin America and the Caribbean will benefit from agricultural reform in developed countries, since the elimination of tariffs is the main factor behind the trade gains. This is due largely to the more extensive use of tariffs across countries compared with domestic support and export subsidies, and to the discriminatory nature of tariffs compared with the nondiscriminatory effects across countries of the other two policy instruments. This fact is reflected in the gains that third parties outside the agreements experience due to the elimination of domestic and export support.

THE COMPUTABLE GENERAL EQUILIBRIUM MODEL

The model used for this study is a multicountry, multisector, and comparative static general equilibrium model that follows the standard specifications of trade-focused applied general equilibrium models. The model is highly nonlinear and simulates a decentralized market economy. It deals with the real side of the economy, and does not consider financial or monetary markets. The model comprises 10 regions or countries: Canada, the United States, Mexico, Central America/Caribbean, the Andean Community, Argentina, Brazil, Chile, the European Union, and the rest of the world. All regions are fully endogenized and linked through trade. Since the chapter focuses on agricultural reform, we incorporate 16 agriculture-related sectors, including processed food industries.[6] The other 10 sectors in the model are: mining, manufactures (three light and four heavy industries), utilities, and services. The base year of the model is 1997. Table 2–1 summarizes the main features and assumptions underlying the model.

The model extends beyond standard, static CGE models in three areas. First, it incorporates trade-linked externalities that lead to efficiency gains in the production process as a result of increased trade. It is widely acknowledged that a greater liberalization or the creation of free trade agreements has dynamic effects resulting from economies of scale, technological spillovers, access to inputs, specialization, and increased investment (Lewis, Robinson, and Wang 1995; López-Córdova and Moreira 2002). Several studies show that developing countries can boost domestic productivity through technological spillovers by importing a variety of intermediate and capital goods that embody foreign knowledge (Coe and Helpman 1995; Coe, Helpman, and Hoffmaister 1997). This is an extremely important element in Latin America and the Caribbean, where trade, especially exporting, has become a key policy variable as a source of growth and foreign currency earnings.

In order to capture some of these dynamic effects, the model includes three types of trade-productivity links.[7] The first externality is a sector export externality linked to sector export performance: higher export growth leads to an increase in productivity at the

[6] The 16 agricultural sectors are grains, wheat, other cereal grains, vegetables and fruits, oilseeds and soybeans, sugar, plant-based fibers, coffee and tea, bovine cattle, other animal products, bovine meat, poultry meat, vegetable oils, dairy products, beverages and tobaccos, and other food products. The sector classification is based on the Global Trade Analysis Project (GTAP) classification. GTAP is a consortium of international and national agencies and academic institutes.

[7] De Melo and Robinson (1992) first formalized and modeled the linkage between productivity and externalities in an applied general equilibrium analysis that applied it to export-led growth in Korea. The introduction of externalities in our model follows Hinojosa-Ojeda, Lewis, and Robinson (1995, 1997).

Table 2–1

Main Features and Assumptions of the Model

Item	Description
1. Production sectors	All regions produce 26 goods using primary inputs and intermediate goods with a constant elasticity of substitution production technology. The 26 sectors in the rest of the world are fully endogenized. Manufacturing industries have an increasing returns to scale technology, while the other sectors have a constant returns to scale technology.
2. Market structure	Manufacturing industries face a contestable market structure, while the other sectors face a perfectly competitive market structure.
3. Demand	Final private demand in each country or region is derived from the households' utility maximizing behavior subject to their budget constraint. Intermediate demand is determined by the fixed input-output coefficients.
4. Trade	Exports are specified by a constant elasticity of transformation function and differentiated by market of destination. Imports are modeled with a constant elasticity of substitution specification and differentiated by market of origin.
5. Factors	Factors are mobile across sectors, but immobile internationally. Total supply in each country or region is fixed.
6. Trade-linked externalities	
(i) Sectoral export externality	
(ii) Import externality of intermediate inputs and capital goods	
(iii) Aggregate export externality	
7. Major assumptions	
(i) Saving-investment identity: Current savings are fully utilized for investment.	
(ii) Balanced trade: Trade remains balanced for each country and region. In other words, the initial balance of trade in goods and services remains constant.	
(iii) Balanced budget: Government balances revenues and expenditures including fixed income transfers and exogenous foreign transactions.	
(iv) No financial market: The model deals with the real side of the economy.	

sector level. The second externality is an import externality associated with imports of intermediate inputs and capital goods, with the degree of efficiency gains depending on the import share of intermediate products and capital goods in production. The last externality is an aggregate export externality: an increase in aggregate exports raises the physical productivity of capital leading to economy-wide efficiency gains in the domestic production process. The three externalities are expressed in equations (2–1) to (2–3). E_i^k is sector exports, where i represents the sector and k the region; $ETOT^k$ and $MTOT^k$ correspond to the aggregate exports and imports in each region. The exponents ηe^k, ηm^k and ηk^k are the externality elasticities, and n_i is the import share of intermediate products and capital goods. The subscript 0 refers to the benchmark.

(2–1) Sector export externality: $$SEE_i^k = \left(E_i^k / E_{0i}^k\right)^{\eta e^k}$$

(2–2) Import externality: $$SME_i^k = n_i \cdot \left(MTOT^k / MTOT_0^k\right)^{\eta m^k} + \left(1 - n_i\right)$$

(2–3) Aggregate export externality: $$AEE^k = \left(ETOT^k / ETOT_0^k\right)^{\eta k^k}$$

The externality elasticities are key parameters that influence the simulation results. We use direct estimations from Moreira and Najberg's (2000) productivity analysis of Brazilian manufacturing industries. These values, adjusted for trade flows, are applied to other regions in Latin America and the Caribbean.[8]

The second extension of the model is the inclusion of economies of scale in manufacturing industries. The degree of economies of scale is specified with one parameter, the cost disadvantage ratio (*CDR*), defined as the difference between average cost (*AC*) and marginal cost (*MC*) over average cost for the industry or representative firm in each sector, namely the ratio of fixed cost (*FC*) over total cost (*TC*).[9] Thus, scale economies are modeled by introducing a fixed cost component in the cost function, where the fixed cost component is directly estimated by multiplying the *CDR* by the total cost.[10]

(2–4) Cost disadvantage ratio: $$CDR_i^k = \frac{AC_i^k - MC_i^k}{AC_i^k} = \frac{FC_i^k}{TC_i^k}$$

We use a contestable market structure for manufacturing industries. The specification is analogous to perfect competition in the presence of constant returns to scale. It assumes low-cost entry or exit, and that the threat of entry drives incumbent firms to behave competitively so that they set the price at average cost. Thus, average cost pricing under the contestable market implies that no firm will enter or exit the industry. Since the number of firms in each industry remains constant, the efficiency gains are directly influenced by two elements: (i) industry outputs, as the total cost of each firm moves down along its average cost curve, and (ii) trade externalities arising from increased trade.

The third extension of the model is the inclusion of domestic farm programs in place in the Western Hemisphere and the European Union. Since evaluating agricultural policy reform is the main objective of this chapter, this is a key element of the analysis. In addition to tariffs and export subsidies, we incorporate the producer support estimate

[8] The estimations come from Roberts (2000) and Stiroh (2001) for the United States. For Canada and the European Union, we follow estimations by Lewis, Robinson, and Wang (1995); Hinojosa-Ojeda, Lewis, and Robinson (1997); Giordano and Watanuki (2002); and Monteagudo and Watanuki (2003), with some sector adjustments.

[9] See François and Roland-Holst (1997) for a detailed discussion.

[10] Industrial data to estimate the CDR, including direct estimations from the literature, are available for six countries or regions: Brazil, Chile, Mexico, Venezuela, the United States, and the European Union. Estimated values are used for the other countries in Latin America and the Caribbean.

from the Organisation for Economic Co-operation and Development (OECD). In the model, producer support estimates are modeled either as price wedges that directly affect output decisions (coupled measures) or lump sum income transfers to farmers (decoupled measures), which do not directly affect production decisions but influence household purchasing power. Following Diao, Somwaru, and Roe (2001) and Burfisher, Robinson, and Thierfelder (2002), the model specifies fixed, per unit ad valorem subsidies to inputs and output for coupled measures. The lump sum income transfer is treated as an exogenous direct payment to farm households in the model.

The rest of the model follows the standard trade-focused CGE models. It includes three factors of production: labor, capital, and land. Factors do not necessarily receive uniform returns across sectors, as the model imposes factor market rigidities or distortions. Regarding factor mobility, it is assumed that all factors are mobile across sectors, but immobile internationally. The aggregate supply of each factor is exogenously fixed in each region. Land is used only in agriculture.

The model traces the circular flow of income from producers to households and firms through factor payments, and back to demand for goods for use as intermediate and final goods in private and public consumption plus investment. The representative household in each region receives factor income plus exogenous foreign remittances, which it spends on goods following a fixed sector expenditure share function. Firms receive factor income as well as foreign capital, but do not consume goods. Government revenues include sector differentiated indirect and commodity taxes, household and corporate income taxes, and social security taxes; there are also import tariffs and export taxes (or subsidies). Government expenditures include public consumption, income transfers, and foreign payments.

Regarding the treatment of international trade, exports are modeled using a constant elasticity of transformation function, differentiated by destination country. Following the Armington assumption, imports—modeled by a constant elasticity of substitution function—are differentiated by country of origin. Since the model only determines relative prices, the aggregate consumer price index in each region is defined as the numeraire.

There are three key macro closures in the model: the saving-investment identity, balanced trade, and a balanced public budget. Since the model is of a comparative static nature, investment needs to be completely financed by savings within each region. Savings by government and households are modeled as the difference between revenues and expenditures. Trade is also balanced for each region valued at world prices. In other words, the initial trade balance in goods and services remains constant, and the exchange rates adjust to achieve the equilibrium. The government also maintains a balanced budget. On the revenue side, taxes from various sources are endogenous, while foreign borrowing is treated as an exogenous variable. On the expenditure side, government consumption is held constant in real terms, while nominal expenditures are endogenized. The government also allocates fixed income transfers to households and firms plus exogenous amortization payments abroad. Government saving is then derived as a residual to maintain the balanced budget.

Finally, like any other static CGE model, the model focuses on the medium to long-run horizon, allowing factor and commodity markets to clear. Thus, the model does not explicitly mention how long it takes for an economy to reach a new equilibrium, but considers it to be long enough for factors and prices to adjust fully.

ECONOMIC STRUCTURE: TRADE FLOWS AND TRADE-DISTORTING MEASURES

The CGE model is constructed on the basis of an individual country/regional social accounting matrix (SAM) for each region, benchmarked in 1997. The SAM displays a comprehensive snapshot of each economy in the base year. The SAM-based analysis provides an overview of the economic structure of the respective economies and linkages among partners, and its close examination ex ante gives a crucial understanding of the simulation results reported later. This section presents the agricultural trade flows and the structure of protection by sector, two key elements in determining the sector and aggregate impacts of the policy shocks under study.

Trade Flows in Agriculture

Table 2–2 presents the pattern of agricultural exports among partners. The European Union is by far the largest world supplier of agricultural goods, selling 40 percent of world exports. Since intra-European Union exports account for approximately 70 percent of its agriculture exports, the world share of extra-European Union agricultural exports is approximately the same as Latin America's. For the European Union, neither Latin America and the Caribbean nor the Western Hemisphere as a whole is an important destination market. With a share of 46 percent, the United States is the largest agricultural exporter in the Western Hemisphere, whereas its share in world exports is 13.8 percent. Latin America and the Caribbean is also a significant world supplier of agricultural goods, with a share of 12.6 percent. In Latin America and the Caribbean, Brazil is the leading exporter, with a share of 24.4 percent, followed by the Andean countries and Argentina, with a share of 21 percent each.

Only 16 percent of U.S. agricultural exports go to Latin America and the Caribbean, while the United States accounts for 24 percent of Latin America and the Caribbean's exports and its importance varies from a low 6 percent for Argentina to a high 72 percent for Mexico. The European Union, which buys 28 percent of Latin America and the Caribbean's agricultural exports, is the largest market for the Andean Community, Argentina, and Brazil. For Mexico and Chile, it occupies the second position after the United States. For Central America and the Caribbean countries (hereafter Central America), both the United States and the European Union have an equal share of 34 percent. Most Latin American and Caribbean countries have a surplus in agricultural trade with the European Union, which, coupled with high trade barriers and massive domestic support in the European Union, suggests that Latin America and the Caribbean will benefit considerably from agricultural reform in the European Union, possibly more than from the reform in the United States. Finally, while bilateral trade in Latin America and the Caribbean remains relatively low, Latin America and the Caribbean as a whole absorbs 18 percent of the region's agricultural exports.

Trade-Distorting Measures in Agriculture

As policy measures, we consider the three-pillar policy instruments reported to the URAA: market access, domestic support, and export subsidies. For market access, we focus on

Table 2–2

Agricultural Exports by Destination Market, 1997

Exporting country/region	Value (millions of dollars)	Canada	United States	Mexico	Central America	Percent Andean Community	Argentina	Brazil	Chile	European Union	Rest of the world
Canada	17,935.5	—	52.0	1.9	1.2	1.9	0.0	1.1	0.3	7.8	33.7
United States	65,717.5	10.3	—	8.1	3.9	2.5	0.5	0.8	0.2	14.8	58.9
Mexico	6,541.7	1.9	71.5	—	3.1	1.1	0.2	1.0	0.4	10.1	10.6
Central America	9,120.3	3.0	34.4	1.0	8.9	1.3	0.0	0.1	0.8	34.2	16.3
Andean Community	12,736.9	1.4	25.3	0.7	1.8	8.1	2.4	8.3	1.6	29.4	21.1
Argentina	12,627.3	0.5	5.8	0.6	1.9	8.0	—	18.8	4.1	22.8	37.4
Brazil	14,660.7	1.6	10.1	0.4	0.5	4.1	3.0	—	0.4	38.5	41.3
Chile	4,440.7	2.3	23.2	1.9	1.3	8.8	3.0	3.7	—	19.3	36.6
European Union	189,159.5	0.6	4.4	0.3	0.5	0.4	0.1	0.4	0.1	69.4	23.7
Rest of the world	143,669.6	1.2	8.5	0.3	0.3	0.3	0.1	0.7	0.1	26.5	62.1
Total	476,609.5	2.2	9.3	1.5	1.2	1.4	0.3	1.3	0.3	41.4	41.2

Source: IDB's CGE model database.

Note: All rows sum to 100 percent.

tariffs, including ad valorem tariffs for all countries, and ad valorem equivalents of specific and mixed tariffs and tariff rate quotas levied by Canada, the United States, and Mexico. Unlike in the North American countries, trade barriers in the rest of the Western Hemisphere are mostly ad valorem tariffs. For the European Union, we incorporate ad valorem tariffs plus ad valorem equivalents of specific and mixed tariffs, but we do not include tariff equivalents of tariff rate quotas.[11] For single countries, the most favored nation ad valorem tariff equivalents are estimated as simple averages of the tariff line schedules in each sector. For regional blocs, they are estimated as simple averages of the tariff lines across countries. Tariffs are estimated on the basis of the 8-digit tariff line schedule of the Harmonized System.

Table 2–3 presents the most favored nation ad valorem tariff equivalents applied by the countries and regions in the model. The tariff information shows a complex protection structure in a highly protected sector, where domestic political economy considerations are also in place. Weighted by trade, processed foods are more protected than primary agricultural products, especially in the European Union where the protection of processed foods is 2.5 times higher than that of primary agricultural products. Import-sensitive products are heavily protected, although the degree of protection varies considerably across countries.

Canada has by far the most heterogeneous protection structure, showing a high degree of tariff dispersion. It has relatively modest protection on most agricultural products, but imposes extremely high tariffs on selected import-sensitive products, such as dairy products (133.4 percent) and poultry meat (66.2 percent). Although the United States has a low weighted average tariff of 11.1 percent, it levies high protection on dairy products (22.2 percent), oilseeds and soybeans (19.3 percent), and beverages and tobacco (17.6 percent). Mexico, which has the highest average tariff (26.4 percent) and the second most heterogeneous protection structure, imposes very high tariffs on sugar (89.8 percent), poultry meat (68.3 percent), and wheat (67.0 percent).

The other Latin American and Caribbean countries have a different tariff structure with a lower dispersion. The extreme case is Chile, with a uniform tariff rate of 11 percent. The Central American region has the second-highest trade-weighted most favored nation tariffs (18.2 percent) after Mexico. With relatively high average protection (14.5 percent), the Andean Community has the second-lowest protection deviation after Chile. Mercosur is still an incomplete customs union, as the applied most favored nation tariffs between Argentina and Brazil differ slightly. Like other hemispheric partners, the two countries have higher protection on processed foods, except for sugar. In the European Union, the agricultural sector is heavily protected under the Common Agricultural Policy (CAP). The tariff data show a high level of dispersion and high protection levels on wheat (68.5 percent) and rice (62.1 percent), followed by bovine meat (55.4 percent) and dairy products (40.7 percent).

In addition to the most favored nation tariffs, the model incorporates the main preferential trade arrangements in place in the Western Hemisphere. This is an important improvement in protection data compared with other studies that do no incorporate preferential treatment arrangements. We include seven regional trade agreements: NAFTA, the Central American Common Market, the Caribbean Community, the Andean Community, Mercosur, the G–3 (Mexico, Colombia, and Venezuela), and the European

[11] The European Union's agricultural protection was estimated by J.C. Bureau with data from the WTO General List and Comext; industrial protection is from UNCTAD (2000).

Table 2–3

Most Favored Nation Ad Valorem Tariffs, 1997

(Percent)

Product	Canada	United States	Mexico	Central America	Andean Community	Argentina	Brazil	Chile	European Union
Rice	0.4	4.7	15.0	28.6	16.4	12.1	13.9	11.0	62.1
Wheat	34.8	3.9	67.0	1.2	11.6	6.5	6.5	11.0	68.5
Cereal grains	8.6	0.8	38.4	9.7	12.0	6.6	6.6	11.0	38.5
Vegetables and fruits	4.2	5.7	17.9	18.1	15.0	11.1	11.1	11.0	8.5
Oilseeds and soybeans	0.0	19.3	3.1	4.7	10.6	5.9	5.9	11.0	0.0
Sugar	6.9	10.4	89.8	29.8	14.4	19.0	17.2	11.0	32.2
Plant-based fibers	0.9	2.1	10.8	6.9	9.6	8.5	8.2	11.0	0.3
Coffee and tea	2.7	14.9	10.3	9.7	9.8	9.3	9.4	11.0	3.5
Bovine cattle	0.3	1.5	8.3	7.9	8.8	2.6	2.6	11.0	17.3
Other animal products	13.7	0.6	13.0	12.5	11.6	9.2	9.3	11.0	5.8
Total primary products (weighted)	4.3	8.2	9.4	12.4	11.9	7.1	8.2	11.0	8.1
Bovine meat	15.6	5.6	34.7	17.5	16.5	12.0	12.0	11.0	55.4
Poultry meat	66.2	3.7	68.3	34.3	17.3	13.9	13.9	11.0	15.3
Vegetable oils	11.1	4.7	19.2	12.9	14.9	12.2	11.9	11.0	10.9
Dairy products	133.4	22.2	41.5	37.3	17.9	18.2	19.9	11.0	40.7
Beverages and tobacco	13.6	17.6	32.3	22.6	17.3	21.0	21.1	11.0	20.0
Other food products	15.8	10.1	19.9	16.2	16.2	15.2	15.3	11.0	17.1
Total processed products (weighted)	22.4	12.3	32.9	21.9	16.5	14.4	16.9	11.0	20.3
Total (weighted average)	16.0	11.1	26.4	18.2	14.5	10.9	12.7	11.0	13.2

Note: European Union agricultural protection prepared by J.C. Bureau with data from WTO General List and Comext; industrial protection from UNCTAD (2000). Sector ad valorem protection rates are estimated as the simple average of the corresponding tariff line schedules. For countries and regions in the Western Hemisphere, data include ad valorem tariffs and tariff equivalents of specific, mixed and tariff rate quotas. European Union data include ad valorem, specific, and mixed tariff equivalents. For Central America and the Andean Community, the most favored nation rates are estimated as the simple average of all partners for the corresponding tariff lines. Tariff rates for primary products, processed products, and the total average are weighted by trade flows.

Source: FTAA Hemispheric Database, and IDB data.

Union; three bilateral agreements: Mercosur-Chile, Canada-Chile, and Mexico-Chile; and four preferential treatments: three U.S. preferential trade arrangements (Generalized System of Preferences, Andean Trade Preference Act, and Caribbean Basin Initiative) and Canada's preferential trade arrangement (General Preferential Tariff).[12] Regarding the status of some of these agreements, NAFTA trade is yet to be completely liberalized, although intra-bloc barriers are fairly low. The United States has the lowest average intra-group tariffs, but Canada and Mexico still maintain between 2 and 3 percent average intra-group protection. Mercosur's intraregional trade barriers are nearly completely removed, except for dairy products, beverages and tobacco, and other food products, all of which have tariffs lower than 1 percent on intra-bloc trade. The European Union has no intra-bloc trade barriers on agricultural products.

Table 2–4 presents agricultural domestic support for Canada, the United States, Mexico, and the European Union measured by the OECD producer support estimate.[13] The European Union spends $33 billion, nearly 60 percent of world domestic support, followed by the United States with spending of $15 billion, which accounts for 20 percent of total world support. Grains, including wheat and other cereal grains, receive the largest subsidies, representing more than 64 percent of the total agricultural producer support in the United States, 93 percent in Mexico, and 43 percent in the European Union. Bovine meat in the European Union receives the largest amount of subsidies, accounting for 41 percent of the European Union's total outlays. In terms of the producer support estimate, grains record the highest rates in the Western Hemisphere: wheat in Canada (14.9 percent) and the United States (24.8 percent), and other cereal grains in Mexico (21.8 percent).[14] In the European Union, grains also record high producer support estimate rates: 29.3 percent for wheat and 27.1 percent for other cereal grains. The high producer support estimate rate (34.6 percent) in oilseeds and soybeans is due to low production value.

Finally, Table 2–5 reports export subsidies by country based on the World Trade Organization (WTO) notifications in 1997. The European Union is by far the world's largest export subsidizer, accounting for 85 percent of global export subsidies, an amount 15 times larger than that of the Western Hemisphere. In the European Union, processed food industries, especially dairy products and bovine meat, receive approximately two-thirds of the bloc's total export subsidies. The two sectors rank among those with the highest export subsidy rates: 58.6 percent for bovine meat and 28.2 percent for dairy products, although sugar (52.2 percent) and cereal grains (38.8 percent) also have high export subsidy rates.[15]

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[12] Data for the Western Hemisphere agreements come from the FTAA database.

[13] The OECD producer support estimate comprises two components: market price support (MPS) and budgetary outlays. MPS measures the gap between domestic market prices and border prices, and thus incorporates the effects of trade policy: import protection and export support. Since the model uses applied tariffs and export subsidies to evaluate the wedge between domestic and border prices as separate policy instruments, we exclude MPS in the estimation of domestic support to avoid double counting. Budgetary outlays in the OECD's producer support estimate consist of government expenditures on farm programs, including measures exempted from reductions (green box), nonexempted (amber box), and an exemption from the general rule about subsidies (blue box), according to the WTO classification. We focus on the amber box programs, following USDA (2001) for the concordance between the OECD producer support estimate and WTO boxes.

[14] Producer support estimate rates are the ratios of domestic support budgetary outlays over the value of production in each sector, as reported to the OECD.

[15] Export subsidy rates are measured by the amount of export subsidies received by each sector over the value of exports in that sector.

Table 2–4

Domestic Support from the OECD Producer Support Estimate, 1997

Product	Millions of dollars				Percentage rate			
	Canada	United States	Mexico	European Union	Canada	United States	Mexico	European Union
Rice	—	244.0	9.1	44.4	—	10.8	9.9	4.5
Wheat	186.0	3,623.7	59.4	8,213.1	14.8	24.8	9.6	29.3
Cereal grains	154.6	5,978.8	992.6	5,941.7	6.6	17.5	21.8	27.1
Vegetables and fruits	—	—	—	—	—	—	—	—
Oilseeds and soybeans	282.6	1,449.7	7.7	2,710.9	5.5	3.2	7.0	34.6
Sugar	—	125.0	6.5	290.5	—	4.7	0.5	4.9
Plant-based fibers	—	2.0	—	—	—	3.4	—	—
Coffee and tea	—	—	—	—	—	—	—	—
Bovine cattle	—	—	—	—	—	—	—	—
Other animal products	7.5	200.8	6.6	118.8	2.0	3.4	0.5	2.0
Bovine meat	292.9	1,995.0	29.9	13,762.0	5.0	3.7	0.8	25.6
Poultry meat	24.0	756.9	10.2	257.0	2.0	3.4	0.5	2.4
Vegetable oils	—	—	—	—	—	—	—	—
Dairy products	170.4	1,086.0	12.7	1,762.2	5.7	4.0	0.6	4.6
Beverages and tobacco	—	—	—	—	—	—	—	—
Other food products	—	—	—	—	—	—	—	—
Total	1,118.0	15,461.7	1,134.7	33,100.7				

Note: The producer support estimate (PSE) does not include market price support. PSE rates are estimated based on the budgetary outlays over production values in each sector reported to the OECD. Concordance between WTO criteria identified in the color box and the OECD PSE classification follows USDA (2001).

Source: OECD Agricultural Database CD-ROM, 2001.

Table 2–5

Export Subsidies: WTO Notification, 1997

	Subsidies (millions of dollars)					Subsidy rate (percent)				
Product	United States	Mexico	Central America	Andean Community	European Union	United States	Mexico	Central America	Andean Community	European Union
Rice					36.8					22.4
Wheat					200.8					16.0
Cereal grains	1.2				308.7	0.02				38.8
Vegetables and fruits			104.7	16.5	29.4			5.8	0.86	1.1
Oilseeds and soybeans										
Sugar		36.0		4.9	880.1		33.1		1.05	52.2
Plant-based fibers										
Coffee and tea				3.0					0.09	
Bovine cattle										
Other animal products					14.7					0.6
Bovine meat					1,033.9					58.6
Poultry meat	0.9				86.0	0.02				2.0
Vegetable oils				1.2	8.8				0.25	0.25
Dairy products	110.2				1,535.7	15.0				28.2
Beverages and tobacco				1.0	161.2				0.48	1.1
Other food products				0.6	6.4				0.02	
Total	112.2	36.0	104.7	27.2	4,302.5	112.2	36.0	104.7	27.2	4,302.5

Source: WTO notifications.

Most countries in the Western Hemisphere provide export subsidies for a small group of selected agricultural products. The United States allocates almost all subsidies to dairy products, which have a subsidy rate of 15 percent. In Mexico, the targeted sector is sugar, with a 33.1 percent rate, and in Central America the targeted sectors are vegetables and fruits, with a 5.8 percent rate. The Andean Community allocates export subsidies over a variety of agricultural sectors, although their subsidy rates are 1 percent or less.

POLICY SIMULATIONS

Agricultural Policy Reform

The protection measures described in the previous section distort world prices, restrict trade, and can inflict real costs on both home countries, mostly developed countries, and their trade partners, largely developing countries. Trade barriers hinder trade by making domestic prices higher than world prices; this lowers demand for imports, inducing a supply reduction from exporting countries. At home, consumers are worse off, since trade barriers raise domestic prices of imports above world prices. Domestic support may cause an oversupply of agricultural products, lowering global market prices and inducing unfair competition. Export subsidies allow high-cost producers to be competitive in international markets and may lead to an excess world supply. The measures could allow inefficient domestic producers to be in operation and hinder an efficient allocation of domestic resources, which could otherwise be utilized more efficiently in other industries.

In order to evaluate the economic costs that these trade-distorting policies have on Latin America and the Caribbean, and the potential gains of a comprehensive agricultural reform by developed countries, we quantify the effects of completely eliminating the three support measures: tariffs, domestic support, and export subsidies. We simulate two important scenarios for Latin America and the Caribbean: (i) agricultural reform in the Western Hemisphere that measures the impact of a comprehensive FTAA in agriculture; and (ii) agricultural reform between Mercosur and the European Union on the basis of the ongoing free trade negotiations between the two blocs. In the simulations, only the agricultural sectors are liberalized, whereas trade barriers in nonagriculture remain intact, thus providing an estimate of the cost that agricultural protectionism in developed countries, mainly the United States and the European Union, has on Latin America and the Caribbean. For the two scenarios, we simulate the complete elimination of each of the trade-distorting barriers separately as well as simultaneously.[16]

The model captures the main effects of policy shocks on the economy, among others: production, government revenue, welfare, and trade effects. Elimination of tariffs

[16] These scenarios may not be realistic in actual negotiations. First, due to their nondiscriminatory nature, domestic support and export subsidies may not be issues discussed at the regional level, but rather would be addressed at the multilateral level. Second, the complete elimination of tariffs in import-sensitive agricultural products may be politically infeasible, especially in the United States and the European Union. In fact, in most trade agreements, these products are either excluded from the agreements or phased out over a certain period. Although these concerns are valid, our results should be interpreted as evaluations of the economic costs that Latin American and Caribbean countries incur from high protectionism in agriculture in the developed world.

reduces the price of imports and causes domestic firms to adjust production along their production possibility frontier. Although tariff elimination reduces government revenue, it raises household real income because domestic prices decline. Regarding domestic support, eliminating ad valorem subsidies raises prices for domestically produced goods and directly affects farmers' production decision, and eliminating lump sum transfers directly affects household income. Eliminating export subsidies lowers the domestic price of exports and reduces domestic producers' price competitiveness in global markets. As a result, exports decrease. Elimination of domestic support and export subsidies reduces government expenditures to farm households and firms, and reduces households' real income as domestic prices rise.

Simulation Results

In analyzing the effects of agricultural reforms, we essentially focus on the external sector—in particular export growth and changes in the economies' international specialization—and on changes in the structure of production.

Two major factors contribute to the observed trade effects: (i) the initial level of protection in the countries involved in the trade agreements, especially the United States and the European Union; and (ii) the countries' initial trade linkages. The higher the initial protection and the smaller the trade linkage at the benchmark, the larger the impact will be. Given the number of countries, sectors, and scenarios considered, what follows is a summary of the main results. To make the analysis easier, the 16 agricultural sectors are aggregated into two macro sectors—primary agriculture and processed foods.[17]

Western Hemisphere Agricultural Reform

Simulation 1: Tariff elimination. Tariff elimination increases Latin America's agricultural exports to the Western Hemisphere by 11 percent. In part because they are more protected within the hemisphere, processed food sectors enjoy faster export growth than primary agricultural goods: 15 percent compared with 7 percent. The Latin American and Caribbean region expands exports of poultry meat and beverages and tobacco by more than 20 percent. In the primary sector, exports of sugar jump by 19 percent, and oilseeds/soybeans by 16 percent. In contrast, wheat exports show the lowest growth rate (2.3 percent), followed by bovine cattle (3.2 percent). Figure 2–1 presents growth in Latin America's exports to the hemisphere decomposed by policy shock.

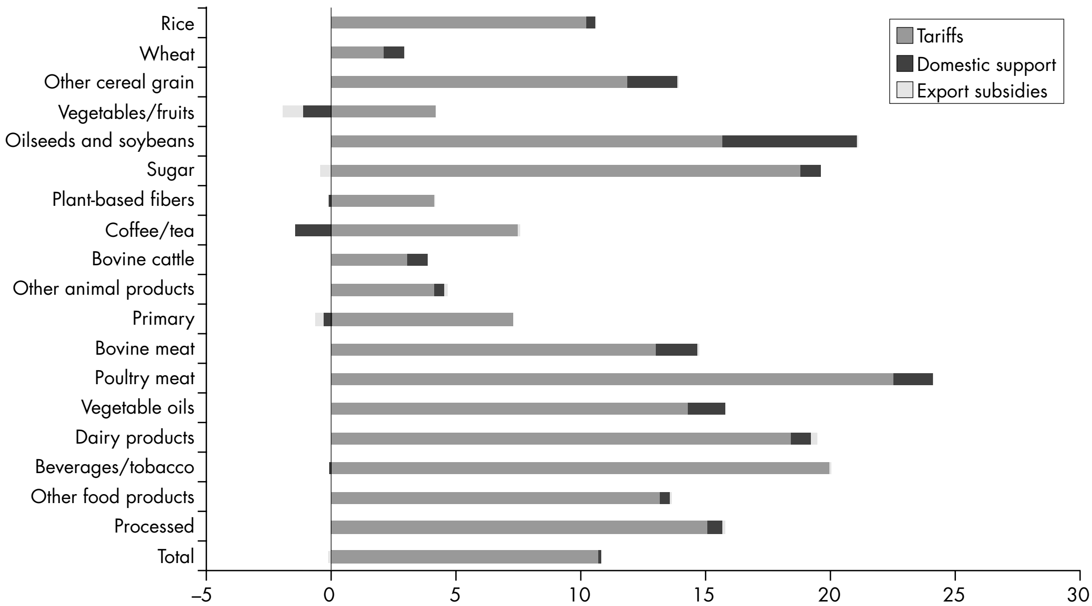
All countries in the Western Hemisphere benefit from the creation of a free trade area in agriculture. Brazil and Chile experience the largest growth in exports to the hemisphere—20 percent and 19 percent, respectively. U.S. exports expand by 12 percent, largely to non-NAFTA partners. Mexico benefits the least—5.4 percent export growth—due to its already freer access to the U.S. and Canadian markets. Central American and Andean countries that enjoy preferential access to the U.S. market under the Caribbean Basin Initiative and Andean Trade Preference Act programs also increase exports hemisphere-wide, including to the U.S. market. The exclusion of some key agricultural sectors from

[17] Primary agriculture includes grains, wheat, other cereal grains, vegetables and fruits, oilseeds and soybeans, sugar, plant-based fibers, coffee and tea, bovine cattle, and other animal products. Processed foods include bovine meat, poultry meat, vegetable oils, dairy products, beverages and tobacco, and other food products.

Figure 2–1

Impact of Western Hemisphere Agricultural Reform on Latin America and the Caribbean's Exports

(Percentage change from the base year)



Source: Authors' calculations.

the preferential programs and the different export structure compared with the new competitors in the U.S. market, mainly the Southern Cone countries, are the main factors behind this finding. Exports decrease in only a couple of sectors in their respective subregional markets. Figure 2–2 shows the impact on exports to the hemisphere by policy shock.[18]

Figure 2–3 reports the impact on exports by macro sector and country. Appendix Table 2–1 shows a more detailed analysis by sector and country. In all countries, processed food industries enjoy booming exports relative to primary sector exports, which have more moderate export growth, and relative to nonagricultural goods, which on average decrease. Chile experiences the greatest export growth in processed foods (9.7 percent), followed by Central America (9 percent). Primary goods exports increase at slower rates, ranging from 2 percent in the United States to 7 percent in Chile.[19]

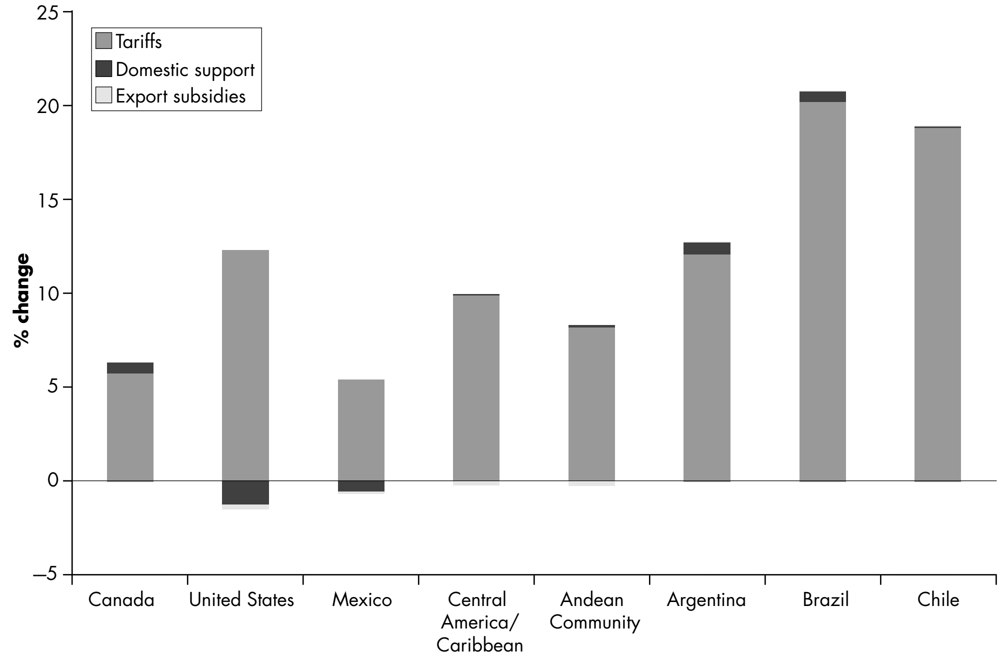
The intensity of the change in export structure varies across countries, with Canada and the United States having more uniform shifts in export composition, and Chile and Central America having the largest change in export composition.[20] The change in pro-

[18] The European Union, excluded from the agreement, suffers a slight export decline in agriculture (–0.1 percent).
[19] Central America shows high export growth in processed food, mainly due to the small export share at the benchmark.
[20] Export composition is measured by the dispersion (standard deviation) of the growth rates across macro sectors.

Figure 2–2

Impact of Western Hemisphere Agricultural Reform on Exports to the Western Hemisphere

(Percentage change from the base year)



Source: Authors' calculations.

duction structure is the combination of the differentiated sector impact on external and internal demand—final and intermediate goods—given the domestic resource constraint. In most countries in Latin America and the Caribbean, production of processed foods grows faster than primary agriculture, the main exception being Central America. While structural changes in production are not as strong as those that are observed in exports, there is significant heterogeneity in sector growth. Greater heterogeneity is observed in Chile and Central America, whereas Andean countries have the least heterogeneous impact. The NAFTA countries have the smallest dispersion in growth in sector production.

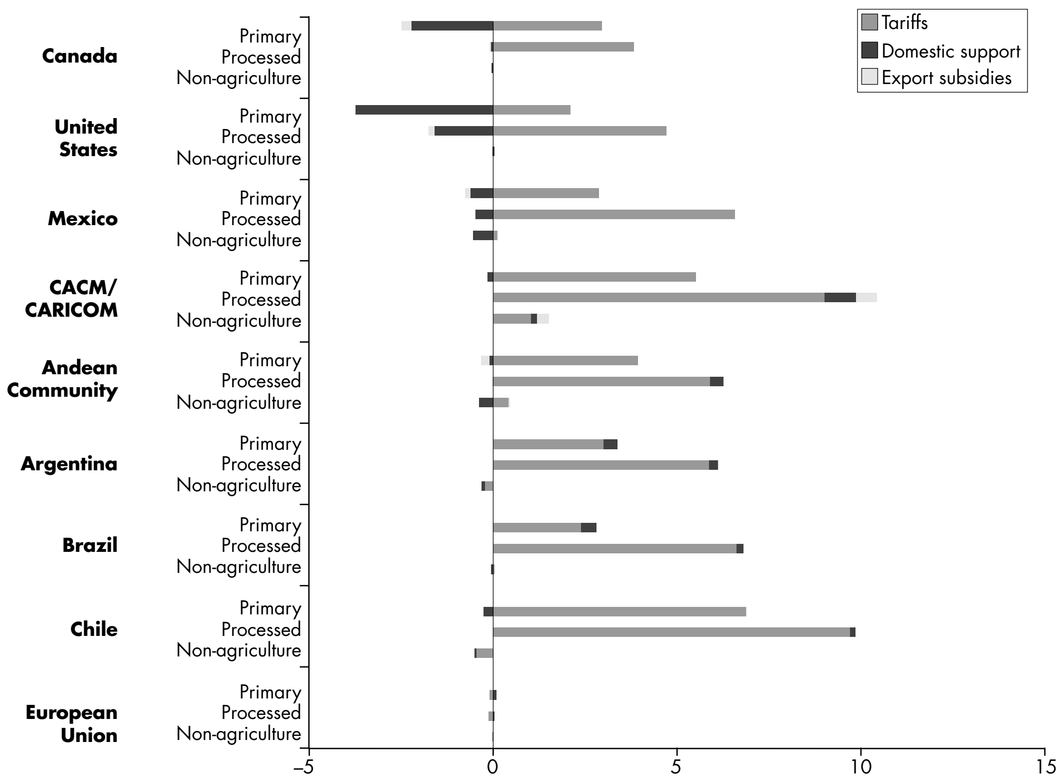
Simulation 2: Elimination of domestic support. Elimination of domestic support enhances Latin America's agricultural exports to the Western Hemisphere by only 0.1 percent, with a mixed impact of –0.2 percent for primary agriculture and 0.6 percent for processed foods (Figure 2–1). Mercosur countries benefit the most, with agricultural exports increasing by 0.7 percent, followed by the Andean Community, with a marginal increase of 0.1 percent. The United States and Mexico, the two largest users of domestic support in the Western Hemisphere, suffer a slight decline in exports.

We might expect that Latin America and the Caribbean's exports of the now-unprotected goods to the NAFTA region would increase, as production prices in this market rise due to elimination of domestic support. This is, in general, what happens. However, no country in Latin America and the Caribbean increases exports of wheat, a highly

Figure 2–3

Impact of Western Hemisphere Agricultural Reform on Total Exports by Macro Sector

(Percentage change from the base year)



Source: Authors' calculations.

protected good in NAFTA countries, to this market, while Canada increases exports to the United States and Mexico. There are several reasons behind this result. First, except for Argentina, countries in Latin America and the Caribbean do not seem to have a strong ex ante comparative advantage in wheat exports, while Canada does.[21] Second, any of the NAFTA countries might gain price competitiveness in the other two markets due to the degree of protection applied prior to liberalization.

For Latin America, the most positively affected products are oilseeds and soybeans, a sector in which export growth to the Western Hemisphere increases by 5 percent. Among processed food sectors, Latin America's bovine and poultry meat exports to the Western Hemisphere increase by 1.5 percent. Countries in the Southern Cone expand exports of other cereal grains to the U.S. market by 10 percent. As observed in Figure 2–3, elimination of domestic support does not cause much change in export composition for non-NAFTA countries. The reform leads to a slight export specialization in primary agricultural

[21] The share of wheat in world exports is around 9 percent for Argentina and 20 percent for Canada.

exports in Argentina and Brazil, while Central America and the Andean countries increase export specialization in processed foods. In NAFTA countries, primary agriculture is the most negatively affected sector.

Regarding the effects on production, the patterns follow the effects on exports. For Latin America and the Caribbean, the effect on production structure is less heterogeneous than in the elimination of tariffs scenario. However, for NAFTA countries, the dispersion of growth rates across macro sectors and the sector impact are greater than in the first scenario. For these countries, agricultural production shrinks and resources move to nonagricultural sectors.

The simulation exercises show the nondiscriminatory effects associated with the elimination of domestic support, also benefiting partners outside the agreement. In particular, the reform leads to an increase in U.S. imports from the rest of the world of 40 percent for wheat, 15 percent for paddy rice, and 19 percent for oilseeds. Likewise, the European Union also benefits from nondiscriminatory effects, as its exports to NAFTA increase by 0.8 percent.

Simulation 3: Elimination of export subsidies. The elimination of export subsidies has a small, negative impact on Latin America's exports. This is due to the fact that nonuser countries are not much affected, while exports for Central America and the Andean Community—the users in Latin America and the Caribbean—decrease as domestic producers reduce exports along their supply curve in face of the decline in the price of exports.

Although the region's exports as a whole are barely affected, the impact varies by sector and by country/region. Processed food exports marginally increase by 0.1 percent and primary agricultural exports decline by 0.3 percent. The most affected goods are vegetables and fruits, followed by sugar. In Central America, vegetables and fruits suffer a total export decline of 2 percent (3.9 percent to the Western Hemisphere). Similarly, in the Andean Community, total sugar exports drop by 0.8 percent, and vegetable and fruit exports drop by 0.5 percent (1.3 percent and 1.2 percent to the Western Hemisphere). Dairy product exports from the United States and sugar exports from Mexico decrease by 6 percent (16 percent to the Western Hemisphere). Production also declines in these sectors and domestic resources are reallocated, either in agriculture or to nonagricultural industries. The impact on production by sector is small and presents the smallest growth dispersion across scenarios.

Simulation 4: Elimination of all agricultural protection and support. The effects of full agricultural reform in the Western Hemisphere are nearly the sum of the individual policy reform effects. Latin America and the Caribbean expands agricultural exports to the Western Hemisphere by 10.7 percent. Processed food exports sharply increase by 16 percent, a rate more than twice as high as that for primary exports. Among processed foods, poultry meat enjoys the greatest export growth (24 percent), followed by beverages and tobacco (20 percent), and dairy products (19 percent). Among primary exports, Latin America and the Caribbean expands exports of oilseeds and soybeans (23 percent) and sugar (18 percent).

The reform activates agricultural trade among blocs in the Western Hemisphere: Mercosur increases exports to NAFTA by 21 percent and to the Andean Community by 32 percent. NAFTA and the Andean Community increase exports to Mercosur by 21 and 11 percent, respectively. Processed foods are the leading commodities between Mercosur and NAFTA, and from Mercosur to the Andean Community.

Booming agricultural sectors boost agricultural production in Mercosur and Chile, absorbing domestic factors displaced from nonagricultural sectors. Due mostly to the elimination of domestic support, production in agriculture dampens in sensitive key agricultural sectors in NAFTA countries. For instance, in the United States, wheat production declines by 9 percent and oilseeds and soybeans by 6 percent. Central America and the Caribbean experiences the most heterogeneous impact on production. In this subregion, wheat output expands by 7 percent, and poultry meat industries suffer a production loss of more than 7 percent.

Agricultural Reform between Mercosur and the European Union

Simulation 1: Tariff elimination. The European Union and Mercosur's reciprocal tariff elimination in agriculture has a large impact on inter-bloc trade. Mercosur's total exports to the European Union market increase by 19 percent, and while agricultural exports grow by 37 percent, exports in nonagricultural sectors slightly decline. The European Union's total exports to Mercosur rise by 4 percent; all sectors increase exports, in the case of agriculture by more than 50 percent. Figure 2–4 shows the impact on Mercosur's agricultural exports to the European Union by policy shock, and Figure 2–5 shows the impact on total exports by country and macro sector, also decomposed by policy measure. Appendix Table 2–2 presents more detailed sector results.

Among agricultural products, Mercosur's exports to the European Union of rice, wheat, and bovine meat—the goods with the highest tariff protection in the European Union—jump by more than 200 percent. Other products that also benefit, with growth rates above 100 percent, are dairy products, cereal grains, and sugar. The products with the lowest export growth are those facing the smallest tariff protection in the European Union market: oilseeds and soybeans (0.2 percent) and plant-based fibers (0.6 percent). In value terms, processed food products led by bovine meat account for 80 percent of Mercosur's increased exports to the European Union. Regarding the European Union's exports to Mercosur, the fastest-growing exports are beverages and tobacco (70 percent), dairy (67 percent), and other food products (49 percent). These are the agricultural products in which the European Union shows the highest agricultural export specialization and that have the highest tariff protection in Mercosur.[22] For these three products, growth in exports to Mercosur slightly compensates for the decline in exports to non-Mercosur countries; for the other agricultural products, total exports decline. Exports of nonagricultural products increase, as domestic resources move away from agriculture, but overall export growth is negligible (0.1 percent).

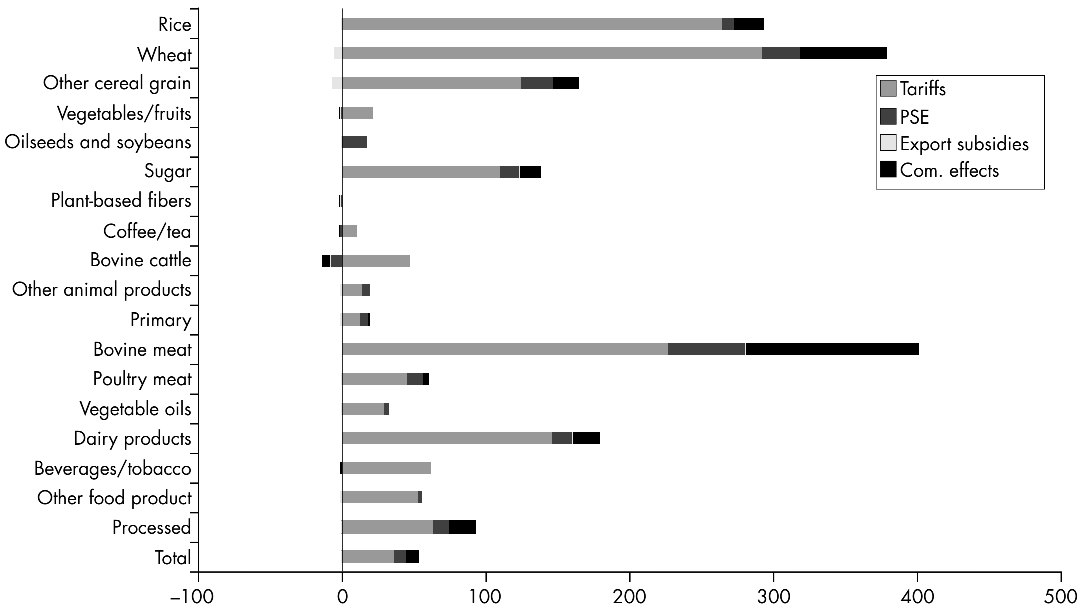
The impact on total exports to the European Union is larger for Argentina than for Brazil, as agricultural exports to the European Union market grow by 60 percent and 26 percent, respectively. This result reflects the fact that Argentina shows strong export specialization in three of the most protected products in the European Union market—wheat, cereal grain, and bovine meat, while Brazil has strong export specialization in one highly protected sector, sugar. Most agricultural exports to third countries decrease due to trade diversion. Exports of nonagricultural products drop not only to the European Union market, but also to most destinations as resources shift away from

[22] Here export specialization in a sector is synonymous with a high sector export share. The indicator is measured prior to reform and using total exports minus exports to the other bloc in order to minimize the effect of the protection measures.

Figure 2–4

Impact of Agricultural Reform in Mercosur and the European Union on Mercosur's Exports to the European Union Market

(Percentage change from the base year)



Source: Authors' calculations.

nonagriculture to the booming agricultural sectors. Given the resource constraint that the countries face and Mercosur's international competitiveness in agriculture, the sector liberalization will force a change in the countries' export specialization patterns.

Many would argue that specializing in agriculture is not an optimal outcome, since manufactures are likely to be more technologically advanced goods and tend to bring more positive externalities to the countries in terms of backward linkages and spillovers. However, both Argentina and Brazil increase their international specialization in processed foods that involve more technology and skilled labor than primary agricultural goods, thus mitigating the negative effects of increased specialization in agricultural goods.[23]

Turning to the impact on the structure of production, the increase in external demand pulls internal demand—intermediate and final—in practically all sectors in the economy, leading to an increase in production across sectors (including small changes in manufactures). The different dynamism across sectors leads to a concentration of production in agricultural goods (processed products driven largely by external demand

[23] This result contrasts with the new export specialization pattern after a full free trade agreement with the European Union (the results not shown). While Argentina continues to specialize in processed foods (87 percent), Brazil strongly expands exports of nonagricultural products (31 percent).

and nonprocessed products by internal demand). In both Argentina and Brazil, bovine meat and cattle enjoy the highest production rate growth (the first drags the second). Along with the expansion of production, domestic resources (labor and capital) are also mobilized toward agricultural sectors, displaced mainly from manufacturing industries. For example, in Argentina the labor force in bovine meat production increases by 7 percent and in bovine cattle production by 13 percent.

Simulation 2: Elimination of domestic support. Under this scenario, Mercosur increases total exports to the European Union by 4 percent and agricultural exports by 8 percent—11 percent for Argentina and 6.4 percent for Brazil. There is also a very small negative effect on nonagricultural exports to the European Union. Total exports grow by only 1 percent in Argentina and 0.7 percent in Brazil, as exports to the extra-European Union market either stagnate or slightly decrease, especially in Argentina.

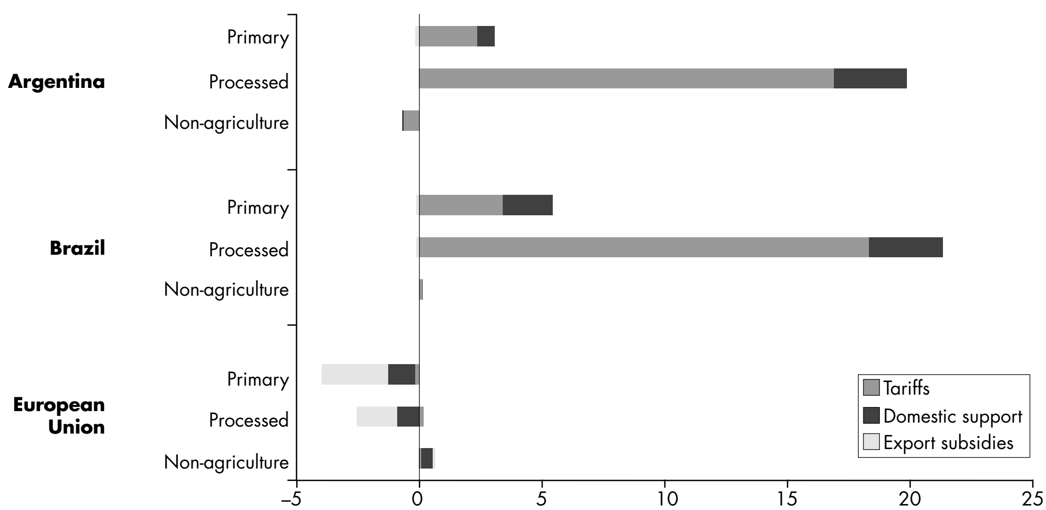
The uneven impact across sectors shown in Figure 2–4 reflects the heterogeneous distribution of the European Union's domestic support. Mercosur's bovine meat exports to the European Union increase by 53 percent, followed by wheat (26 percent) and other cereal grains (22 percent). Oilseeds and soybeans also increase exports to the European Union by 17 percent. In value terms, bovine meat and oilseeds account for 78 percent of the increased exports to the European Union market.

As Figure 2–5 summarizes, total exports of primary and processed foods increase in Mercosur countries, while total exports of nonagricultural goods suffer a slight decrease of less than 1 percent. As a consequence of these export dynamics, the countries' relative export specialization in agricultural goods increases and, compared with the first sce-

Figure 2–5

Impact of Agricultural Reform in Mercosur and the European Union on Total Exports by Macro Sector

(Percentage change from the base year)



Source: Authors' calculations.

nario, the bloc's export specialization in primary agriculture increases.[24] The elimination of the European Union's domestic support increases European Union agricultural prices. Total European Union exports increase by 0.3 percent, due to a combination of growth in nonagricultural exports (0.5 percent) and a decline of 1 percent in agricultural exports. Imports of the most protected products increase: bovine meat by 20 percent, oilseeds and soybeans by 14 percent, and wheat and sugar by 10 percent each. An interesting observation is that extra-European Union agricultural exports are strongly affected, as expected. However, intra-European Union trade values in the most protected sectors—wheat, cereal grains, and bovine meat—slightly increase because the increase in prices is greater than the decrease in volumes.

The effects on production and reallocation of factors are moderate in both blocs. External demand drives the increase in production in bovine meat and grain in Argentina and oilseeds and soybeans in Brazil. For instance, bovine meat production in Argentina is up by 2.5 percent and the production of Brazilian oilseeds increases by 2.1 percent. In the European Union, production in practically all agricultural sectors declines—bovine meat by 19 percent and oilseeds by 11 percent—while production in nonagricultural sectors increases.

As with the Western Hemisphere reform simulations, when comparing the results on Mercosur's exports to the European Union under domestic support and tariff elimination scenarios, it seems that elimination of domestic support in the European Union has relatively little effect on countries compared with tariff elimination. However, tariff elimination is a discriminatory measure that favors only member countries, while the elimination of domestic support is a nondiscriminatory measure that also benefits nonmember third countries. In fact, other Latin American and Caribbean countries expand agricultural exports to the European Union: 4.5 percent for Mexico, 3.6 percent for the Andean Community, 2.1 percent for Central America, and 2.1 percent for Chile. Moreover, the real gains associated with elimination of domestic support may not be related to trade effects, but rather to the impact on prices.

Simulation 3: Elimination of export subsidies. Since the elimination of export subsidies directly affects the European Union's export prices and most European Union agricultural exports are intraregional, the effect of this measure on Mercosur's exports is small. The reform causes the European Union to lose competitiveness in external markets, and European Union agricultural exports decrease by 2 percent—a decline of 2.7 percent for primary agriculture and 1.7 percent for processed foods. In the European Union, the most affected sectors are the most protected sectors and those for which the extra-European Union market represents a considerable share: sugar, –21 percent; other cereal grains, –9.5 percent; and dairy, –7.8 percent. These are also the sectors in which extra-European Union countries experience a positive but small increase in exports to third markets.

The impact on production and resources is small for Mercosur and other Latin American and Caribbean countries. The negative effects are significant on highly protected sectors in the European Union: sugar production decreases by 6 percent and dairy and other cereal grains by 2.3 percent each.

[24] The main reason is that domestic support is more concentrated in primary agricultural goods in the European Union market, compared with tariff protection.

Simulation 4: Elimination of all agricultural protection and support measures. A complete reform of the agricultural sector generates a sizable impact on Mercosur's exports: total exports increase by 7.5 percent in Argentina and 4.1 percent in Brazil; agricultural exports expand by 15.9 percent in Argentina and 13.6 percent in Brazil.

Mercosur's bovine meat exports to the European Union market jump by 400 percent, due largely to the elimination of trade protection and to the bloc's small export base, but also to the complementary effects of the reforms. The same happens with wheat, which expands exports by 370 percent, and paddy rice, which expands by 290 percent. Total export growth is 3.1 percentage points higher than the sum of the impact of the individual policy reforms in Argentina, and 1.2 percentage points higher in Brazil. The complementary effects are larger in those sectors heavily protected by the three measures in the European Union. Bovine meat shows the largest complementary effect (120 percentage points), followed by wheat (60 percentage points) and paddy rice (18 percentage points). Other sensitive goods, such as dairy and sugar, show complementary effects of 19 and 15 percentage points, respectively.

While nonagricultural exports modestly decrease in Argentina, they slightly increase in Brazil. The compound result is export specialization in processed foods, especially in Argentina; their share in total exports increases from 29 percent to 36 percent, while the share of nonagricultural goods drops from 50 percent to 46 percent. In Brazil, the share of processed foods increases from 13 percent to 15 percent, while the share of nonagricultural goods declines from 71 percent to 68 percent. For the European Union, the reform process increases total exports by 0.2 percent, due mainly to a 0.7 percent increase in nonagricultural exports as agricultural exports decrease by 2.7 percent.

The impact on production follows the pattern observed under the tariff elimination scenario for Mercosur economies and the pattern observed under elimination of domestic support for the European Union economy.

Effects on World Prices of Agricultural Products

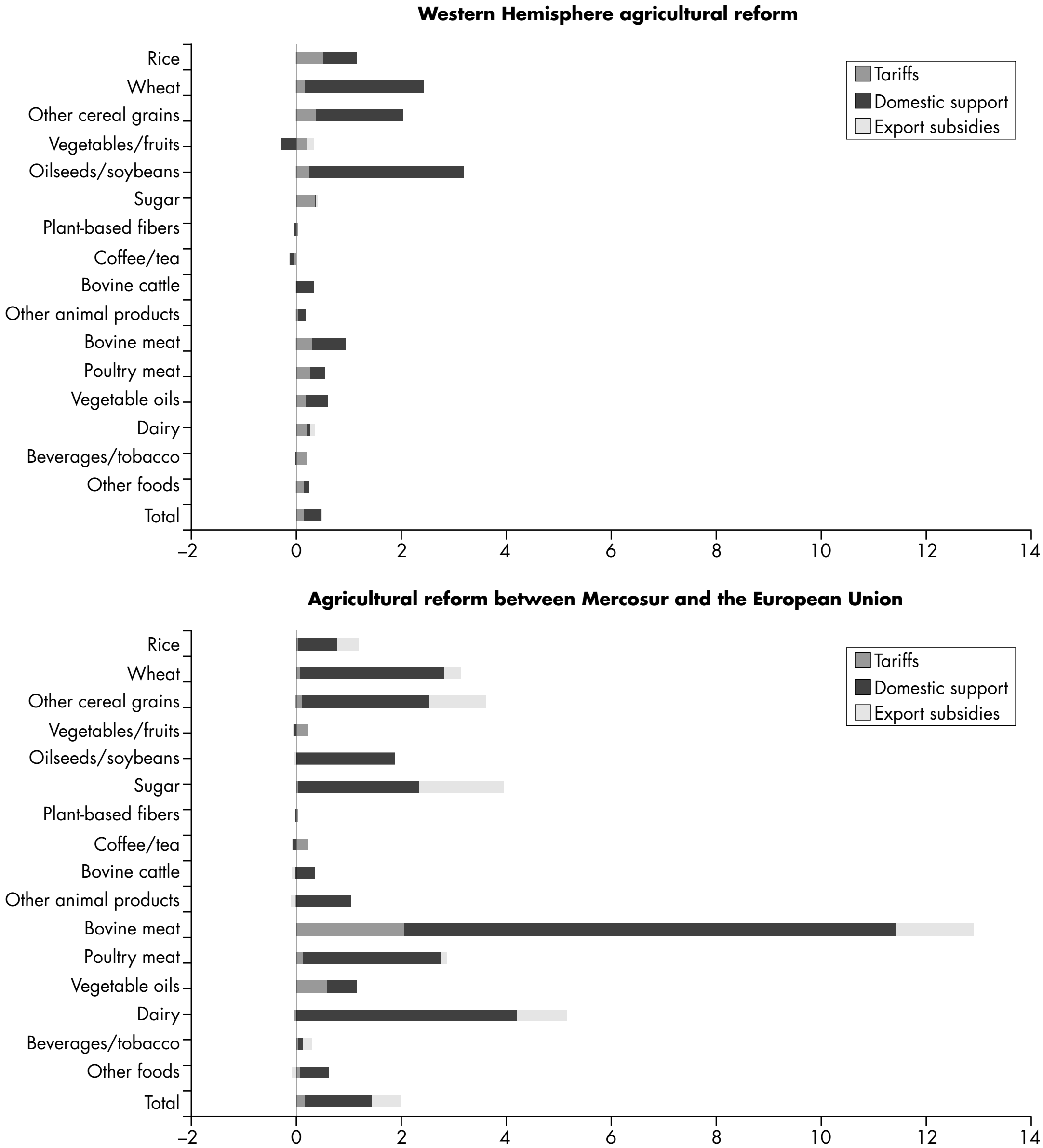
Figure 2–6 shows the impact of agricultural reform policies in the Western Hemisphere and in the European Union and Mercosur on global agricultural prices. In the Western Hemisphere reform case, the elimination of tariffs leads to an increase in average agricultural prices of only 0.2 percent. World prices for rice rise by 0.5 percent, followed by sugar and other cereal grains by 0.4 percent. The elimination of hemispheric domestic support increases world agricultural prices by 0.3 percent, but the impact is greater on some agricultural products than in the tariff elimination case. World prices of oilseeds and soybeans increase by 3 percent, the price of wheat jumps by 2.3 percent, and that of other cereal grains by 1.7 percent. The elimination of export subsidies has almost no effect on world prices. The elimination of the three trade-distorting barriers in agriculture increases world prices by 0.5 percent.

Agricultural reform between Mercosur and the European Union generates a stronger impact on global agricultural prices. The effect of tariff elimination is small, except for bovine meat, for which prices increase by 2 percent. The elimination of domestic support is the primary factor in raising global agricultural prices, with a very heterogeneous impact across sectors. World prices of bovine meat jump by 9 percent, and those of dairy products rise by 4.2 percent. Other products—wheat, other cereal grains, poultry meat, and sugar—experience price increments of more than 2 percent. The removal

Figure 2–6

Impact of Agricultural Policy Reform on Global Commodity Prices

(Percentage change from the base year)



Source: Authors' calculations.

of export subsidies in the European Union increases world prices for all subsidized goods, especially sugar (1.6 percent) and bovine meat (1.5 percent).

The simulation exercises indicate that the European Union's trade-distorting policies in agriculture lower world agricultural prices. This discourages production and exports of agricultural products in which the countries in Mercosur and other Latin American countries are competitive in world markets.

SUMMARY AND CONCLUSIONS

URAA brought agriculture under the disciplines of the General Agreement of Tariffs and Trade for the first time. The URAA created multilateral rules for global trade, and agricultural trade is now governed within the multilateral trade system. Despite the commitments for reducing trade-distorting barriers on agriculture by WTO members, agriculture continues to be the most protected sector. By and large, developed countries have not complied with their commitments, while countries in Latin America have greatly reduced import duties as well as export subsidies and trade-distorting domestic support.

The Doha Round of multilateral negotiations launched in 2001 provides a great opportunity for developing countries in general—and Latin America and the Caribbean in particular—to push for a true liberalization of the sector in developed countries. The region is also immersed in an intense negotiation for the creation of a hemispheric free trade area (FTAA) for which agriculture poses a large challenge. The United States, the country with the most distorted agricultural market in the Western Hemisphere, seems reluctant to make concessions in this area, as the recently approved Farm Bill indicates. Furthermore, Mercosur countries are also negotiating a free trade agreement with the European Union, the region with the most protected agricultural sector in the world. Negotiations for liberalizing agriculture pose a major challenge and obstacle in both trade agreements. The domestic sensitivity of the sector in developed countries slows progress. Given Latin America's competitiveness in agriculture, freer access to the large markets in the hemisphere and the European Union will offer promising opportunities and economic gains for the region.

In this chapter, we have evaluated the impact of agricultural liberalization on Latin America and the Caribbean, using a multiregion, multisector, comparative static CGE model that includes trade-linked externalities and scale economies. We have focused on the three pillars of agricultural policies distorting world prices and restricting trade flows—tariffs, domestic support, and export subsidies—and examined the individual and complementary effects of eliminating these policy measures in the Western Hemisphere and between Mercosur and the European Union. Thus, the chapter has considered four scenarios each for the creation of an FTAA in agriculture and for a free trade agreement in agriculture between Mercosur and the European Union. To the extent that the elimination of domestic and export subsidies might end up being negotiated at the multilateral level, the scenarios can be considered hypothetical cases. However, they provide an estimate of how much developed countries' protectionism costs Latin America and the Caribbean.

Regarding the structure of protection, countries in Latin America and the Caribbean apply neither domestic support nor export subsidies, with the exception of Mexico, while NAFTA countries and the European Union use all three distorting measures. All countries apply tariff protection across all sectors. This fact and the discriminatory nature of tariff elimination (excluding third parties) explain the larger impact on Latin America and the Caribbean of the removal of tariffs, compared with the removal of domestic and export subsidies. Subsidies are concentrated in a few sectors and are used mainly by developed countries, and their elimination necessarily takes place in a non-discriminatory way.

In the Western Hemisphere, the elimination of tariffs increases Latin America's agricultural exports to the hemispheric market by 14 percent. The removal of domestic support has a small, positive effect on Latin America's exports, while eliminating export subsidies marginally affects Latin America and the Caribbean's exports. The effects of the European Union reform on Mercosur's exports show a similar pattern: the bloc's agricultural exports to the European Union increase by 37 percent under the tariff elimination scenario, and around 8 percent under the elimination of domestic support, while the European Union's elimination of export subsidies hardly affects Mercosur exports.

With regard to hemispheric reform, all countries in the Western Hemisphere benefit from tariff elimination. Exports to the United States account for 40 percent of Latin America and the Caribbean's increased exports to the hemisphere's market. Brazil and Chile are the largest beneficiaries. Due to the high initial protection in processed foods across countries, the sector experiences the highest export growth, leading to an export specialization in these products. The Southern Cone countries, which are competitive in processed foods relative to other Latin American and Caribbean countries, realize the greatest benefits.

For Mercosur, trade gains from the agricultural reform in the European Union are greater than those from the Western Hemisphere reform. The high initial protection in the European Union and Mercosur's strong international competitiveness in agriculture and strong trade linkages with the European Union are the main factors behind the results. The reform process leads to export specialization in the processed food sectors, which tend to use more highly skilled labor and more sophisticated technology than primary agriculture, factors that tend to moderate the negative effects of a traditionally agriculturally oriented export sector. Still, we should keep in mind that our simulations do not consider reform in the nonagricultural sectors, and therefore the results are likely to be biased against manufactures.

Trade-distorting measures in agriculture keep world agricultural prices below the level otherwise anticipated. While the hemispheric agricultural policy reform slightly increases world prices, the European Union reform raises agricultural prices by 2 percent. The effect is heterogeneous across sectors. Prices of oilseeds and soybeans increase by 3 percent under the Western Hemisphere reform, and bovine meat and dairy prices increase by 13 and 5 percent, respectively, under the European Union-Mercosur reform. In both cases, elimination of domestic support is the policy shock with the greatest impact on prices.

The results show the cost that the distorted agricultural sector—mainly in developed countries—has on Latin America and the Caribbean. However, the results should be interpreted with caution when evaluating the effects of the FTAA or the free trade agreement between Mercosur and the European Union. First, we evaluate the impact of reform only in the agricultural sector and the liberalization of the whole economy will generate larger gains and a less heterogeneous impact between agriculture and manufactures. Second, the model simulates a complete elimination of the trade-distorting barriers in agriculture, which may not be the case in real negotiations, which often exclude sensitive products or agree on a phase-out period for them. Third, although tariff elimination is an issue being negotiated at the regional level, domestic and export subsidies may be topics that end up being discussed at the multilateral level.

Appendix Table 2–1

Impact of Agricultural Reform in the Western Hemisphere on Total Exports

(Percentage change over base year)

Simulation 1: Tariff elimination

Commodity	Canada	United States	Mexico	Central America	Andean Community	Argentina	Brazil	Chile	European Union
Rice	0.00	17.24	63.99	2.06	9.10	6.56	0.01	0.00	−0.17
Wheat	3.13	1.25	1.41	1.89	9.06	0.52	−0.06	0.00	−0.11
Other cereal grains	0.41	2.76	6.19	−5.02	8.37	3.70	5.05	0.55	−0.03
Vegetables and fruits	5.93	2.01	1.46	2.66	2.62	1.48	4.29	7.11	−0.07
Oilseeds and soybeans	5.88	0.75	30.28	13.15	4.16	4.50	1.78	33.33	−0.17
Sugar	20.11	24.91	10.10	9.00	12.93	16.96	3.22	−0.74	−0.11
Plant-based fibers	2.13	1.73	3.03	3.04	2.73	1.45	3.34	0.07	−0.01
Coffee and tea	3.18	0.89	5.21	5.67	2.60	11.99	2.18	20.01	−0.27
Bovine cattle	0.67	0.97	0.27	2.19	6.28	10.95	14.58	18.53	0.00
Other animal products	0.14	2.35	0.22	4.78	4.31	0.49	1.58	2.89	−0.01
Total primary commodities	2.96	2.10	2.87	5.51	3.94	3.01	2.39	6.89	−0.10
Bovine meat	5.56	3.72	0.06	7.89	8.36	4.02	0.65	7.89	−0.01
Poultry meat	3.10	6.49	2.65	5.09	21.54	6.89	2.46	21.25	−0.04
Vegetable oils	0.16	6.18	4.58	13.53	5.72	3.53	0.53	19.18	−0.09
Dairy products	14.38	18.87	37.76	14.85	17.79	12.24	8.06	34.88	−0.11
Beverages and tobacco	3.54	2.53	4.03	15.36	16.49	16.31	35.01	19.57	−0.24
Other food products	3.62	4.40	7.97	6.23	3.88	9.71	14.48	6.94	−0.10
Total processed commodities	3.84	4.72	6.58	9.03	5.91	5.89	6.63	9.72	−0.1
Total agriculture	3.36	3.29	4.45	6.53	4.74	4.70	4.24	8.67	−0.11
Total nonagriculture	0.00	−0.03	0.12	1.02	0.42	−0.22	0.04	−0.41	0.01
Total	0.30	0.22	0.30	1.95	1.15	2.12	1.05	1.57	0.00

(Continued on next page.)

Appendix Table 2–1 *(continued)*

Impact of Agricultural Reform in the Western Hemisphere on Total Exports

(Percentage change over base year)

Simulation 2: Elimination of domestic support

Commodity	Canada	United States	Mexico	Central America	Andean Community	Argentina	Brazil	Chile	European Union
Rice	0.00	−7.44	−3.59	1.35	0.29	0.11	0.08	0.00	0.52
Wheat	−2.58	−12.97	−3.02	2.02	2.24	0.40	0.06	0.00	0.51
Other cereal grains	−2.26	−4.69	−4.74	4.96	0.98	0.40	0.61	8.54	0.43
Vegetables and fruits	−0.77	0.97	−0.79	−0.77	−0.49	−0.13	−0.88	−0.69	−0.08
Oilseeds and soybeans	−6.57	−6.55	7.94	7.40	1.87	3.72	2.11	9.97	2.68
Sugar	1.20	−1.39	−0.52	0.74	0.28	0.45	0.05	0.00	−0.02
Plant-based fibers	−0.51	0.55	0.15	0.39	0.03	−0.05	−0.11	−0.06	−0.05
Coffee and tea	−0.77	1.77	−0.68	−0.70	−0.51	−0.86	−0.08	−1.14	−0.17
Bovine cattle	−0.19	−2.85	1.08	0.62	0.20	0.10	−0.17	0.74	0.12
Other animal products	−0.26	−1.02	−0.43	0.79	0.41	0.23	0.17	0.27	0.00
Total primary commodities	−2.22	−3.76	−0.61	−0.15	−0.10	0.39	0.43	−0.25	0.10
Bovine meat	−3.26	−3.19	−0.71	4.06	0.91	0.05	−0.01	0.46	0.04
Poultry meat	0.75	−2.60	−0.66	1.16	0.35	1.23	0.19	0.16	0.05
Vegetable oils	2.46	−4.60	0.34	4.30	0.74	0.28	0.25	0.04	0.34
Dairy products	−3.10	−1.70	−1.58	0.85	0.34	0.08	0.01	−0.04	0.11
Beverages and tobacco	0.13	0.07	−0.23	0.43	0.00	−0.11	−0.18	−0.11	−0.04
Other food product	0.20	−0.83	−0.60	0.56	0.28	0.19	0.25	0.22	0.03
Total processed commodities	−0.06	−1.59	−0.48	0.88	0.37	0.25	0.20	0.16	0.05
Total agriculture	−1.25	−2.77	−0.55	0.15	0.09	0.31	0.33	0.01	0.07
Total nonagriculture	−0.04	0.04	−0.55	0.17	−0.37	−0.09	−0.06	−0.05	−0.03
Total	−0.15	−0.06	0.00	0.26	−0.27	0.04	−0.02	−0.01	−0.02

Appendix Table 2–1 *(continued)*

Impact of Agricultural Reform in the Western Hemisphere on Total Exports

(Percentage change over base year)

Simulation 3: Elimination of export subsidies

Commodity	Canada	United States	Mexico	Central America	Andean Community	Argentina	Brazil	Chile	European Union
Rice	0.00	−0.05	−0.18	0.51	0.00	0.00	0.00	0.00	−0.01
Wheat	−0.18	−0.01	−0.03	0.78	0.03	0.00	0.01	0.00	0.00
Other cereal grains	−0.40	−0.01	−0.01	0.84	0.03	0.00	0.00	−0.05	0.00
Vegetables and fruits	0.16	0.06	0.10	−1.90	−0.49	0.02	0.06	0.06	0.01
Oilseeds and soybeans	−1.36	0.01	−0.07	0.70	0.02	−0.03	−0.01	0.01	0.01
Sugar	0.09	0.07	−6.27	0.70	−0.81	0.21	0.01	0.02	−0.01
Plant-based fibers	0.03	−0.02	−0.04	0.68	0.02	0.00	0.00	−0.01	0.00
Coffee and tea	0.05	−0.04	−0.08	0.75	−0.12	−0.01	−0.02	−0.02	−0.02
Bovine cattle	0.02	0.00	−0.03	0.43	0.02	0.01	0.01	−0.01	0.00
Other animal products	0.02	−0.02	−0.03	0.57	0.00	−0.01	0.00	−0.02	0.00
Total primary commodities	−0.27	0.00	−0.15	−0.01	−0.22	0.01	−0.01	0.04	0.00
Bovine meat	−0.08	−0.01	−0.02	0.50	0.01	0.00	0.00	−0.01	0.00
Poultry meat	0.00	−0.02	−0.02	0.49	0.01	−0.01	0.00	−0.01	0.00
Vegetable oils	−0.15	0.00	−0.01	0.56	−0.26	0.00	0.00	0.11	0.01
Dairy products	−0.67	−6.25	0.24	1.22	0.12	0.05	0.04	0.13	0.01
Beverages and tobacco	0.01	−0.01	−0.03	0.67	−0.56	0.03	0.09	−0.02	0.00
Other food products	0.02	−0.01	−0.04	0.51	−0.01	0.00	0.00	−0.01	0.00
Total processed commodities	−0.04	−0.16	−0.03	0.57	−0.05	0.00	0.01	−0.01	0.00
Total agriculture	−0.17	−0.07	−0.10	0.15	−0.15	0.00	0.00	0.01	0.00
Total nonagriculture	0.00	0.00	0.01	0.37	0.04	0.00	0.01	−0.01	0.00
Total	−0.01	−0.01	−0.01	0.40	0.03	0.00	0.01	−0.01	0.00

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Appendix Table 2–1 *(continued)*

Impact of Agricultural Reform in the Western Hemisphere on Total Exports

(Percentage change over base year)

Simulation 4: Elimination of all agricultural support and protection

Commodity	Canada	United States	Mexico	Central America	Andean Community	Argentina	Brazil	Chile	European Union
Rice	0.00	8.52	58.75	3.09	9.53	6.75	0.08	0.00	0.37
Wheat	0.69	–11.80	–1.57	3.36	11.69	0.98	–0.02	0.00	0.40
Other cereal grains	–1.53	–1.98	1.12	–0.65	9.54	4.14	5.73	9.07	0.41
Vegetables and fruits	5.32	3.15	0.84	–1.20	1.65	1.36	3.42	6.44	–0.13
Oilseeds and soybeans	0.81	–5.91	41.83	21.93	6.16	8.80	4.12	48.09	2.48
Sugar	21.79	23.59	1.72	9.32	12.36	17.92	3.31	–0.72	–0.12
Plant-based fibers	1.55	2.31	3.18	2.89	2.75	1.39	3.20	–0.03	–0.07
Coffee and tea	2.29	2.74	4.49	4.45	1.51	10.84	2.11	18.44	–0.43
Bovine cattle	0.41	–1.88	1.34	2.42	6.52	10.98	14.35	19.33	0.12
Other animal products	–0.17	1.33	–0.22	5.20	4.73	0.68	1.74	3.13	–0.01
Total primary commodities	1.03	–1.69	2.14	4.18	3.44	3.46	2.88	6.61	0.02
Bovine meat	2.21	0.50	–0.66	11.72	9.43	4.07	0.63	8.33	0.03
Poultry meat	3.83	3.78	1.98	5.80	22.10	8.19	2.67	21.45	0.01
Vegetable oils	2.15	1.37	4.85	18.31	6.31	3.87	0.78	19.29	0.24
Dairy products	11.96	7.76	36.40	16.53	18.49	12.46	8.12	35.11	0.01
Beverages and tobacco	3.67	2.62	3.80	15.04	15.91	16.20	34.86	19.42	–0.27
Other food products	3.81	3.56	7.31	6.24	4.13	9.93	14.85	7.17	–0.06
Total processed commodities	3.75	2.85	6.06	9.41	6.25	6.19	6.87	9.89	–0.06
Total agriculture	2.25	0.38	3.81	5.70	4.58	5.06	4.63	8.67	–0.04
Total nonagriculture	–0.05	0.01	–0.47	0.82	–0.01	–0.32	–0.02	–0.48	–0.02
Total	0.15	0.15	0.06	1.83	0.83	2.17	1.03	1.55	–0.02

Source: Authors' calculations.

Appendix Table 2–2

Impact of Agricultural Reform between Mercosur and the European Union on Mercosur's Total Exports

(Percentage change over base year)

Simulation 1: Tariff elimination

Commodity	Argentina	Brazil	European Union
Rice	–1.53	67.61	–0.03
Wheat	0.34	–2.11	–0.28
Other cereal grains	5.04	0.32	–1.13
Vegetables and fruits	7.19	9.90	–0.02
Oilseeds and soybeans	–2.78	–0.54	–0.48
Sugar	–1.58	0.25	–0.06
Plant-based fibers	–1.12	0.65	0.25
Coffee and tea	0.36	6.09	–0.14
Bovine cattle	0.39	13.02	–0.89
Other animal products	2.81	4.82	0.08
Total primary commodities	2.37	3.42	–0.17
Bovine meat	116.98	162.73	–1.50
Poultry meat	13.29	11.57	0.00
Vegetable oils	3.01	12.27	–0.33
Dairy products	1.94	21.59	0.24
Beverages and tobacco	11.18	0.64	0.68
Other food products	9.22	17.48	0.18
Total processed commodities	16.91	18.35	0.16
Total agriculture	10.89	9.95	0.07
Total nonagriculture	–0.63	0.13	0.09
Total	5.14	3.00	0.08

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Appendix Table 2–2 *(continued)*

Impact of Agricultural Reform between Mercosur and the European Union on Mercosur's Total Exports

(Percentage change over base year)

Simulation 2: Elimination of domestic support

Commodity	Argentina	Brazil	European Union
Rice	–0.21	1.67	–3.98
Wheat	–0.06	–0.76	0.80
Other cereal grains	0.80	–0.01	0.18
Vegetables and fruits	–0.48	–0.31	0.23
Oilseeds and soybeans	10.02	11.20	–4.48
Sugar	–0.42	–0.48	–3.56
Plant-based fibers	–0.27	–0.44	0.47
Coffee and tea	–0.58	–0.97	–0.03
Bovine cattle	–0.92	–1.11	–10.29
Other animal products	1.52	1.82	–1.72
Total primary commodities	0.71	2.04	–1.10
Bovine meat	27.64	38.12	–3.01
Poultry meat	3.49	2.69	–0.99
Vegetable oils	–0.02	1.94	–0.88
Dairy products	0.27	2.21	–1.78
Beverages and tobacco	–0.34	0.11	0.27
Other food products	–0.07	0.72	–0.96
Total processed commodities	2.98	3.01	–0.90
Total agriculture	2.04	2.46	–0.96
Total nonagriculture	–0.05	0.00	0.47
Total	1.00	0.72	0.29

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Appendix Table 2–2 *(continued)*

Impact of Agricultural Reform between Mercosur and the European Union on Mercosur's Total Exports

(Percentage change over base year)

Simulation 3: Elimination of export subsidies

Commodity	Argentina	Brazil	European Union
Rice	0.03	–0.04	–4.51
Wheat	0.02	–0.02	–5.51
Other cereal grains	–0.48	0.08	–9.50
Vegetables and fruits	–0.03	–0.06	–0.65
Oilseeds and soybeans	–0.15	–0.19	–0.05
Plant-based fibers	–0.01	–0.08	0.13
Sugar	0.00	0.03	–21.49
Coffee and tea	–0.03	–0.13	0.07
Bovine cattle	0.04	–0.12	–0.87
Other animal products	–0.27	–0.27	–0.25
Total primary commodities	–0.15	–0.11	–2.70
Bovine meat	0.19	0.24	–3.91
Poultry meat	–0.12	–0.09	–0.60
Vegetable oils	–0.06	–0.16	–0.13
Dairy products	0.41	0.25	–7.82
Beverages and tobacco	0.06	0.17	–0.67
Other food products	–0.10	–0.18	–0.02
Total processed commodities	–0.03	–0.12	–1.65
Total agriculture	–0.08	–0.11	–1.95
Total nonagriculture	0.00	–0.02	0.10
Total	–0.04	–0.04	–0.1

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Appendix Table 2–2 *(continued)*

Impact of Agricultural Reform between Mercosur and the European Union on Mercosur's Total Exports

(Percentage change over base year)

Simulation 4: Elimination of all agricultural protection and support

Commodity	Argentina	Brazil	European Union
Rice	–2.34	74.37	–8.16
Wheat	0.25	–3.45	–4.45
Other cereal grains	5.57	0.36	–9.52
Vegetables and fruits	5.78	9.31	–0.43
Oilseeds and soybeans	6.56	10.36	–4.94
Sugar	–2.37	–0.43	–23.41
Plant-based fibers	–1.98	–0.17	0.87
Coffee and tea	–0.84	4.56	–0.05
Bovine cattle	–2.09	10.79	–11.94
Other animal products	3.32	6.40	–1.91
Total primary commodities	2.65	5.06	–3.74
Bovine meat	206.89	287.01	–8.15
Poultry meat	16.89	15.21	–1.60
Vegetable oils	1.70	14.01	–1.36
Dairy products	2.40	27.45	–8.81
Beverages and tobacco	9.84	0.69	0.28
Other food products	7.99	18.16	–0.81
Total processed commodities	25.34	24.64	–2.30
Total agriculture	15.94	13.63	–2.71
Total nonagriculture	–0.96	0.16	0.66
Total	7.51	4.09	0.22

Source: Authors' calculations.

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Chapter 3

U.S. Agricultural Policies and Effects on Western Hemisphere Markets

Bruce Gardner

This chapter reviews and analyzes U.S. agricultural commodity support policies since 1995, a period of major policy changes. The 1996 Federal Agriculture Improvement and Reform (FAIR) Act opened up new avenues for farm support, and subsequent debate culminated in 2002 with a new Farm Bill whose consequences may be quite significant. The main issues are the extent of income transfers to producers and the market distortions created by those transfers. In particular, supply response to subsidies influences the production-consumption balance, U.S. commodity prices, and, through price transmission, commodity prices as well as trade flows elsewhere in the world. The chapter reviews the available data and research findings on the extent of these effects.

POLICY REVIEW

Beginning with the New Deal programs of the 1930s, the emphasis in U.S. commodity programs was supply management, mainly by taking stocks off the market and requiring farmers to idle acreage during low-price periods. Production controls gained ascendancy during prolonged price depressions because those policies involve smaller budgetary outlays than stockpiling, and do not accumulate stocks that must be disposed of later at the risk of further depressing prices. Acreage idling can be considered a stabilization program, since cropland can be brought back into production in high-price periods, thus increasing supplies if shortages appear. However, unlike a buffer stock, acreage idling increases the average level of prices over the years the program operates, and so it is not purely a stabilization program.

Acreage idling cannot work for an open economy that is too small for its output reductions to influence world prices, unless the country cuts itself off from world markets. The United States in the past has essentially isolated its market for some imported commodities. And for export crops where the United States has a large world export market share, such as corn, wheat, and cotton, the acreage controls have at times been successful in raising prices. Over the longer term, however, especially in the 1980s, the view became widely accepted that U.S. acreage idling mainly encouraged commodity production by export competitors abroad, and could not for long be effective in placing a floor under the U.S. farmer's price. So, beginning with the Food Security Act of 1985, the role of acreage idling was reduced, and U.S. Department of Agriculture (USDA) Commodity Credit Corporation (CCC) stocks of grain were gradually eliminated and not replaced.[1] By the mid-1990s, U.S. agricultural policy had largely abandoned both government-held stocks and acreage set-asides. The last grain set-asides occurred in 1995.

The Agricultural Market Transition Act (AMTA) title of the 1996 FAIR Act entrenched these ideas. Fixed payments, no acreage set-asides, and avoidance of CCC commodity stockpiles provided a possible means of transition to market-based agriculture that would not require government intervention to prop up the agricultural economy. The fixed payments, known as production flexibility contract (PFC) payments, were made in proportion to what producers had received in 1990-95, or could have received if they had enrolled in the programs available then. Each participating producer received a fixed schedule of payments that gradually declined through 2002. The aggregate of these payments left the 2002 level well below historical payment levels, but after initial hesitation, farm groups came to support the legislation when it became clear that the initial payments of 1996 would be well above what producers could expect to receive under the pre-1996 programs (because 1996 commodity prices were above the supported levels).

However, in 1997 prices headed lower, mainly because of weakness in world demand for U.S. grain. Grain and soybean prices have remained at historically low levels ever since. Congress responded by supplementing the fixed payments with emergency market loss assistance payments approximately equal to 50 percent of PFCs in 1998 and 100 percent in 1999, 2000, and 2001. The result was CCC outlays that far exceeded those expected in 1996 and used by the Congressional Budget Office (CBO) to "score" the FAIR Act. Figure 3–1 shows actual and projected outlays.

Table 3–1 shows outlays for each major commodity, and the percentage of the market value of each commodity accounted for by those outlays. This is a measure of the percentage subsidy for each product, a limited version of the producer subsidy equivalent as calculated by the Organisation for Economic Co-operation and Development (OECD). The payments grew phenomenally in 1999–2001 as commodity markets weakened. The payments varied from year to year not only because market prices changed, but also because of the timing of payments. In fiscal year 2000, payments were especially high because the market loss assistance payments that supplemented the PFCs were made for two crop years in the same fiscal year.[2]

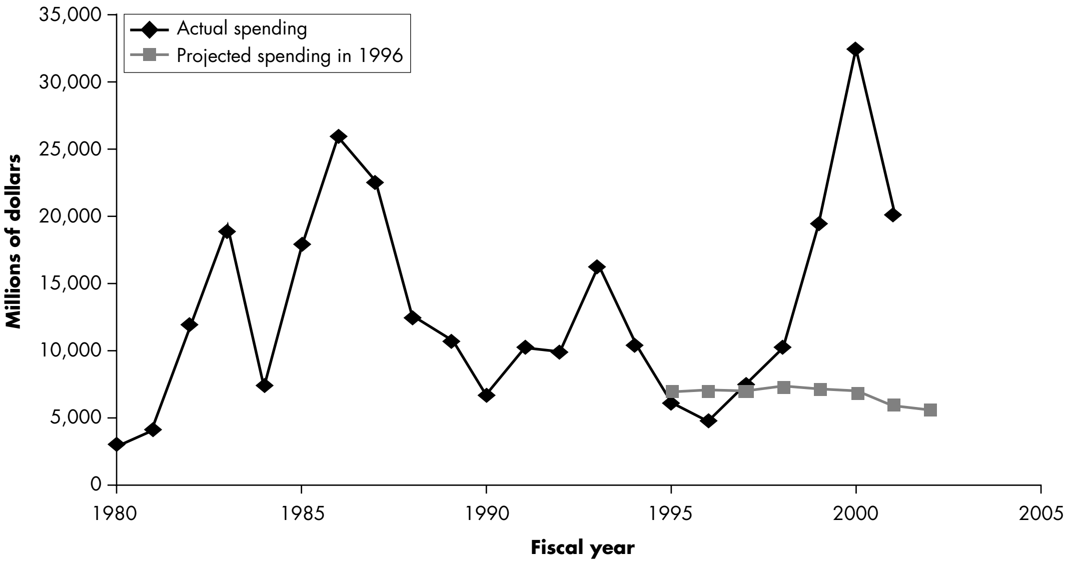
Payments to farmers under commodity programs are important in determining output, trade, and market prices to the extent they induce farmers to increase production. In this respect, it is necessary to distinguish two separate payment mechanisms: the fixed PFC payments and payments under loan programs.

PFC payments are fixed in the sense that a farmer could do nothing to increase them once the farm was signed up in 1996. But the farmer could lose the payments by selling the farm with the land going into uses other than the permitted crops—for example, the land being developed for commercial purposes. Also, PFC payments are lost

[1] The Commodity Credit Corporation (CCC) is a government-owned corporation charged with implementing commodity market interventions. Its officers and board of directors are USDA officials. The CCC structure provides flexibility in that it can spend funds on commodity support without explicit advance budget appropriations from Congress.
[2] The reason is said to be that the supplementary payments on the crops harvested in the fall of 2000, which normally would have been paid in fiscal year 2001 (which began October 1, 2000) were instead rushed ahead through authorities of the Agricultural Risk Protection Act of 2000 (enacted in June 2000) to be in farmers' hands before the November 2000 Congressional elections, so payments for both 1999 and 2000 crops were made in fiscal year 2000.

Figure 3–1

Commodity Credit Corporation Outlays (USDA Commodity Programs)



Source: USDA.

Table 3–1

Commodity Credit Corporation Outlays

Fiscal year	Corn	Soybeans	Wheat	Cotton	Rice
Value (millions of dollars)					
1996	2,021	–65	1,491	685	499
1997	2,564	5	1,332	561	459
1998	2,873	139	2,187	1,132	491
1999	5,402	1,298	3,435	1,882	911
2000	10,135	2,839	5,320	3,808	1,774
2001	4,355	3,029	1,645	1,095	950
1999–2001 average	9,117	2,415	5,137	3,054	1,695
Percentage of commodity value					
1996	8.4	–0.4	15	10	31
1997	10	0.0	14	8.8	27
1998	13	0.8	26	19	28
1999	29	10	51	46	55
2000	59	23	95	100	144
2001	23	23	28	23	89
1999–2001 average	48	19	76	69	125

Source: USDA, Agricultural Outlook.

if the program acreage is planted to fruits or vegetables. So, while PFC payments are unlikely to have caused acreage or yield increases, the payments may have forestalled reductions in acreage that might have taken place with the low prices of 1998–2001 in the absence of the payments.

Under the 1996 FAIR Act (continuing provisions that had been in law, but little used, since 1986 for cotton and rice, since 1991 for soybeans, and since 1993 for wheat and feed grains), the traditional commodity price support mechanism through CCC loans is replaced by the marketing loan program. The marketing loan program has a direct impact on production. Each county has a "loan rate" for each program crop, a price that USDA will guarantee the producer. If the local market price is below the loan rate, the producer has the option of placing the crop "under CCC loan." The producer then receives a sum of money equal to the loan rate times the quantity placed under loan. The producer may settle an outstanding loan by repaying the loan (plus interest and other charges) within a nine-month period, or by delivery of the commodity to the CCC. Delivery is accepted by the CCC in full repayment of principal plus interest. Because delivery takes the commodity off the market, the loan program has traditionally been used as a means to support the market price at the loan level. However, delivery also results in CCC ownership of commodity stocks. Storage costs have become large in past programs, and the CCC stocks must at some point be sold, depressing market prices.

In the marketing loan program, in order to avoid the accumulation of CCC stocks, the farmer is given the option of repaying CCC loans at the "loan repayment rate." This is a price per bushel announced each day for each county, adjusted daily for movements in market prices relevant to that county. As long as market prices are below the loan rate, the loan repayment rate will be less than the loan rate, so the producer will obtain a "marketing loan gain" if a CCC loan is redeemed on such a day.

Alternatively, producers who are eligible for a CCC loan, but who agree to forego the opportunity to put the crop under loan, may obtain a "loan deficiency payment." This payment is the difference between the county loan rate and the county loan repayment rate times the quantity eligible to be placed under loan on the day the producer commits to forego the loan. With either the marketing loan or loan deficiency payment mechanism, the producer is guaranteed the loan-rate price for the output produced. The program is therefore a production subsidy whose monetary value per unit of output is the expected value of the payment. This is analytically the same as the value of a put option with a strike price equal to the loan-rate price.

Table 3–2 shows a broader picture of federal government activity in support of agriculture. It shows federal spending on a broad range of USDA activities. In addition to the commodity programs, there are conservation programs, export programs, government-underwritten loan programs for farmers, crop insurance, research funding, and marketing and regulatory programs. These additional activities had a price tag of $18.5 billion annually in 2001–02.[3] The sum of $38 billion for fiscal year 2001 amounts to 18 percent of the market value of U.S. farm cash receipts for all crops and livestock.

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[3] "Price tag" is a vague term and is used because the figures shown in Table 3–2 are not all derived from a consistent set of U.S. budgetary concepts. Most notably, the export credit guarantees are not the expenditures of the government on these guarantees; rather, they are the value of loans guaranteed. Unless there are defaults on these loans (funds borrowed by foreign importers to buy U.S. exports are not repaid to the U.S. lenders), the actual outlays on these programs are negligible. In fact, defaults are rare. In U.S. budgetary parlance, the value of loans guaranteed is the "program level," and this is what the USDA budget summary shows.

Table 3–2

USDA Budget Data

(Millions of dollars)

Fiscal year[a]	2001	2002 (estimated)
Commodity program outlays		
Contract payments (1996 Act)	4,105	3,962
Supplemental payments	5,455	4,200[b]
Loan deficiency payments	5,293	5,201
Price support loans and sales	1,377	3,276
Disaster assistance	3,146	133
Other[c]	3,168	2,295
Subtotal	22,544	14,867
Conservation programs		
Conservation reserve	1,358	1,821
EQIP and other programs	288	292
Subtotal		
Export programs		
Export credit guarantees[d]	3,227	3,926
Market development programs	119	120
Export subsidy programs	15	539
Foreign food assistance	1,659	1,613
Farm loan and grant programs (budget authority)	171	217
Crop insurance, net indemnities paid	2,200	1,690
Administrative costs, above programs	2,223	2,440
Federal research funding	1,999	2,196
Marketing and regulatory programs	1,279	1,357
Natural resource management programs	1,000	1,198
Total activity in support of agriculture	38,082	36,476
	15,538	21,609

[a] Fiscal years are October to September. For example, fiscal year 2001 is October 1, 2000 to September 30, 2001.
[b] Expected to be funded by the 2002 Farm Bill.
[c] Includes cotton user payments, interest expenses, and "Section 32" commodity purchases (the last one is not in the CCC budget but is included here).
[d] Amount of loans guaranteed, not the government's costs (which are much lower)

Source: U.S. Department of Agriculture, FY 2003 Budget Summary, http://www.usda.gov/agency/obpa/Budget-Summary/2003/2003budsum.htm (October 2002).

Which government expenditures count as support of agriculture is itself a difficult analytical question. The preceding accounting leaves out the large domestic food assistance programs—the Food Stamp Program and the School Lunch Program—which had fiscal year 2001 outlays of $34 billion, almost as much as all the other programs listed in Table 3–2 combined. These programs are omitted on the grounds that they do not distort markets, but are analytically comparable to welfare programs that transfer cash to poor households. Because lower-income households spend higher budget shares on food, these transfers may be expected to increase the domestic demand for food products. Empirical estimates of the effect on demand have been difficult to pin down, and generally are small; but it is likely that the whole welfare system (including state and local programs like soup kitchens and "meals on wheels" for the elderly) does provide some support for agriculture.

The only food programs included in Table 3–2 are those that explicitly attempt to support agricultural markets where surplus production is a problem. The major programs in this category are P.L. 480, where a mix of foreign need and domestic political interests come into play (spending about $800 million), and "Section 32" purchases by USDA, a program under which USDA, at the discretion of the Secretary of Agriculture, purchases commodities deemed to be in surplus for use in school lunch or other feeding programs (spending about $700 million).

For an independent attempt to measure U.S. activity in support of agriculture, consider the calculations of the OECD. The OECD developed the producer support estimate (PSE),[4] which is defined as follows: "An indicator of the annual monetary value of gross transfers from consumers and taxpayers to agricultural producers, measured at the farm-gate level, arising from policy measures that support agriculture, regardless of their nature, objectives or impacts on farm production or income" (OECD 2001, p. 25). The focus is on payments that go to producers and programs that support market prices directly, so they exclude food assistance programs and activities such as research and extension programs that do not involve payments to producers. The OECD estimates a PSE of 23 percent of U.S. gross farm receipts for 1999–2001 (25, 22, and 21 percent for each year, respectively).

The question for analytical purposes is what the effect of this activity is on U.S. agricultural output and trade. As the OECD definition of the PSE makes clear, this issue is sidestepped in measures like the ones just calculated. The issue has been confronted most directly in the context of international trade negotiations. The World Trade Organization (WTO) aggregates "all domestic support measures considered to distort production and trade" (WTO 2002) as the aggregate measure of support. Under the Uruguay Round Agreement on Agriculture (URAA) of 1994, the members of the WTO agreed to discipline their spending on these "amber box" programs, with some exceptions. The exceptions are de minimis provisions that exempt spending that is less than 5 percent of a commodity's value (for commodity-specific programs) or 5 percent of all agricultural commodities produced in a country (for programs not tied to a specific commodity), and a "blue box" of programs that provide subsidies that are linked to production limitations.[5]

[4] Formerly known as the producer subsidy equivalent.

[5] With the product-specific de minimis provision, it makes a difference how products are aggregated. For example, if butter receives support worth 10 percent of its value and cheese and other milk products receive no support, it is still possible not to exceed the de minimis level of support for dairy products as a whole. Therefore, a country has

Each WTO member country is charged with notifying the WTO of its actions as related to URAA commitments. The United States, according to its notifications, has not provided support at levels that have reached its aggregate measure of support commitments, and so has not had to undertake reductions in support under the URAA. The largest component of support up to 1996, deficiency payments were in the blue box and so not disciplined. Since 1996, the largest component of support, PFC payments under the FAIR Act, have been placed in the green box, defined as program outlays that do not have the effect of supporting prices and "have no, or at most minimal" trade-distorting effects on production.

The latest notifications tabled by the United States are those for 1998. They are as follows (in billions of dollars):

Notification	URAA commitment	Amber box total	Amber box net of de minimis
Product specific		10.55	10.39
Not product specific		4.58	0
Total	20.70	15.13	10.39

The product-specific items include dairy price supports ($4.33 billion), loan deficiency payments and marketing loan gains ($3.82 billion), sugar support ($1.04 billion), and several lesser programs. Those items that are not product specific include market loss assistance payments ($2.81 billion), benefits from crop insurance programs ($0.75 billion), and input supply subsidies, mainly irrigation and grazing rights ($1.04 billion).

In addition, the United States notified the WTO of $9.11 billion in 1998 green box support, including $5.66 billion in Production Flexibility Program payments, $1.69 billion in Conservation Reserve Program (CRP) payments, $1.41 billion for relief from natural disasters, and other environmental and credit programs of $0.35 billion (data from Nelson 2002).

As analytical categories, the amber box and green box raise several questions. The most obvious is how PFC payments can be green, and at the same time how market loss assistance payments, which provided a 50 percent supplement to PFC payments on exactly the same payment base, can be amber. Since both are decoupled from the farmer's production decisions in the sense that they do not change if the producer increases or decreases acreage or output of the covered crops, why are they not both equally green?[6]

an incentive to define commodities broadly. In fact, the United States spreads its support for all dairy products over a single aggregate dairy category (which is appropriate since what is being supported at the farm level is the underlying raw material, milk). But fruits and vegetables are not aggregated. U.S. submissions to the WTO report product-specific support for the following commodity categories: barley, beef, corn, cottonseed, cotton, dairy, pork, honey, canola, flaxseed, mustard, rapeseed, safflower, sunflower, mohair, oats, peanuts, rice, rye, sorghum, soybeans, sugar, tobacco, wheat, wool, potatoes, apples, cranberries, and lamb.

[6] This is the key issue behind the dispute between the House Agriculture Committee leadership and the Bush Administration (which made the decision to notify market loss assistance as amber—a decision that a year earlier had been postponed by the Clinton Administration), which surfaced in spring 2001. It became serious because House Agriculture Committee Chairman Combest expressed the view that under the circumstances it would be difficult for him to support "trade promotion authority" legislation (formerly known as "fast track" authority) under which Congress agrees to vote up or down (rather than amend) WTO agreements negotiated by the President (only the

The answer in the URAA text, as cited in USDA's explanation to Congress of why the United States notified the WTO that market loss assistance payments fall into the amber box, is that market loss assistance payments, as a Congressional policy response to low prices, are in fact coupled to market conditions and are therefore amber. The URAA is taken to require this, although the fixed payment base for the market loss assistance payments makes these payments not notably more production distorting than the PFC payments.[7]

With respect to risk management policies, a series of experiments in insurance offerings continued through the 1980s and 1990s. Under the Federal Crop Insurance Reform Act of 1994, premium subsidies on privately issued crop insurance averaged about 50 percent. Outlays for premium subsidies were about $900 million annually (Schnepf and Heifner 1999).

Even with expanded crop insurance coverage under the 1994 Act, Congress felt impelled in 1998 and 1999 to appropriate $4 billion for various forms of disaster relief for farmers.[8] This led to another round of legislation, the Agricultural Risk Protection Act of 2000, which further increased subsidies on crop insurance. For example, for an insurance policy that provided indemnity payments when a farmer's yield fell below 75 percent of the established yield for the farm, the 1994 Act subsidy rate of 23.5 percent rose to 55 percent of the premium in the 2000 Act. The overall cost to the government of the crop insurance program as of 2001 was estimated to be about $3 billion annually (Glauber and Collins 2002).

MARKET EFFECTS OF POLICIES

While measuring the transfers to producers that result from commodity policies is not straightforward, the direction of output effects is clear; namely, the policies increase production over the quantity that would have been produced in the absence of the policies. The overall direction of the effects was not so clear under the pre-1995 U.S. policies, be-

Senate votes on such agreements as treaties, but both Houses vote on enabling legislation needed to implement the agreement). Subsequently, trade promotion authority passed the Senate and the House (by a single vote) but, as of July 2002, there has been no House-Senate conference to reconcile differences in their bills. The residual effect of this dispute in 2002 was that the USDA continued holding back WTO notification of the U.S. aggregate measure of support for 1999 and 2000, out of concern, it was said, that further political fallout would come if the Bush Administration continued to hold that market loss assistance is amber.

[7] The URAA has two requirements for payments to qualify for the green box. First, there is the basic criterion that payments "shall have no, or at most minimal, trade-distorting effects or effects on production" (Annex 2, paragraph 1). The second is a policy-specific requirement that "the amount of such payment in any given year shall not be related to, or based on, the prices, domestic or international, applying to any production undertaken in any year after the base period" (Annex 2, subparagraph 6(C). It would be possible to read this second requirement as pertaining to production over and above that of the base period (otherwise why use the term "undertaken," which could be omitted if all production is meant). This interpretation preserves the sense of the basic criterion, and the Bush Administration's unwillingness to embrace this plausible way of notifying market loss assistance payments as green may be a reason why agricultural interests in Congress were irritated.

[8] Legislation in 1998 provided $2.4 billion for financial assistance to farmers who had crop losses due to drought or other natural disasters and reached new levels of generosity in two respects. First, it covered losses not only in 1998 but retroactively provided assistance to producers who had crop losses in three of the preceding five years. Second, under the 1994 Act, producers who had declined to purchase subsidized crop insurance had to sign waivers indicating they would be ineligible for disaster assistance; but nonetheless the 1998 legislation made such producers eligible.

cause of their reliance on acreage set-asides. Economic analysis of those programs typically found that they reduced U.S. grain production, and indeed in years of surplus production provided some support for worldwide grain prices.[9]

A substantial production control policy remains in place with 34 million acres idled in 10 to 15-year contracts under the CRP. Nonetheless, the absence of annual acreage reduction programs since 1996 changes the focus to supply-increasing effects of commodity program payments and subsidies. The effects to be considered, for the major crops of grains and oilseeds, arise from three main sources: the loan program, PFC and market loss assistance payments, and crop insurance programs. The effects to be considered are those during the 1999–2001 marketing years (rather than the first years under the 1996 FAIR Act). Following the analysis of recent past program effects, the chapter undertakes a prospective analysis of the likely consequences of the new Farm Bill replacing the FAIR Act that became law in May 2002.

Marketing Loan Programs

The most important element of USDA's commodity loan programs since 1996 has been loan deficiency payments. The key analytical issue for purposes of estimating market distortion is determining what the expected producer price is, including the subsidy (the loan deficiency payment). The simplest approach would be to just use the loan rate levels ($1.89 for corn, $2.58 for wheat, $5.26 for soybeans, and 51.92 cents per pound for cotton during 1998–2000). But that approach would be mistaken. One reason is that the loan rate is a price floor, but if market prices rise above that level, the farmer gets the market price. So the appropriate price expectation is the probability of the market price being at or below the loan level times the loan level plus the probability of the price being above the loan level, times the expected price given that outcome. This latter outcome did not occur in 1999–2001, but that does not mean the probability was zero ex ante (although it may reasonably be taken as small).

A second reason for not taking the loan level as the relevant price expectation is that loan deficiency payments and marketing loan gains have provided revenues to producers that exceed the loan rate in each of the last three years, so farmers can be expected to count on this in making their planting decisions. On average, corn growers could expect to receive 12 percent more than the loan rate based on 2000 results; soybean growers, 4 percent; wheat growers, 16 percent; and cotton growers, 9 percent. The price wedge between producer price received and buyer price paid is even larger, because farm-level market prices are less than the loan rates.[10]

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[9] The situation in Canada is complicated by supply management programs for livestock products, which continue to the present. By holding down livestock numbers, they tend to reduce the demand for feed; but by increasing livestock product prices, they increase the marginal value of feed per animal. This provides no incentive to increase grain production, but may nonetheless place marginal downward pressure on world grain prices by reducing total feed demand.

[10] A complicating factor is payment limits, which could possibly make a large farm ineligible for loan program benefits, but the farm would have to be quite large. The loan deficiency payment limit for 1999 and 2000 was $150,000 ($75,000 doubled under provisions of the Agricultural Appropriations Act of 2000) and a "person" for payment purposes can benefit from up to a 50 percent interest in two additional farming entities, so the effective limit is typically $300,000, and a farm jointly owned by husband and wife could double this. For the crop with the highest average loan deficiency payment per bushel in the program, wheat, the average crop payment in 1999 was

Assuming the loan program was expected ex ante to generate the ex post benefits that actually occurred, the data indicate that producer incentive prices average about 20 percent above market prices for grains and oilseeds. Assuming aggregate elasticities of supply at 0.2 and demand at –0.5, the implied output increase due to the loan program is .2/(1/.2+1/.5) = 2.9 percent. The implied decrease in the market prices of these commodities is 5.8 percent. Thus, assuming full transmission of the change in the farm price to wholesale prices and hence to prices at port locations, world commodity prices are reduced by about 6 percent under the U.S. loan program compared to the situation if there were no program. That is a short-run estimate, corresponding to a low elasticity of demand. Experience indicates that a U.S. drought, for example, raises world prices substantially, but that reductions in U.S. output over many years, such as occurred under set-aside programs, has much smaller price effects as other countries adjust production (that is, the longer-run elasticity of demand for U.S. commodities is substantially larger). Suppose the long-run elasticity is –1.5 instead of 0.5. The output effect is .2/(1/.2+1/.5) = 3.5 percent and the market price decrease is 2.4 percent instead of the 5.8 percent calculated above.

Westcott and Price (2001) make a more detailed estimate of the effects of the FAIR Act's marketing loan provisions under the market conditions of 1998. They remove price wedges attributable to loan deficiency payments and other marketing loan provisions as of 1998 and then simulate the effects for each commodity in the FAPSIM model that USDA uses for its baseline commodity market projections to 2005. This model embodies a complete set of commodity supply and demand elasticities and cross-elasticities, with baseline projections of yields and export demand (so it is not a comparative statics exercise like the crude calculations above, but rather an exercise in comparative dynamics). Taking an average of their results for 1999–2001, that is, two to four years after the loan program is taken away, they estimate the following percentage changes in prices and quantities attributable to the program:

Commodity	Market price	Acreage
Wheat	–2.2	1.5
Corn	–1.4	0.4
Soybeans	–3.7	1.4
Cotton	–9.0	6.0

Note: The cotton figures are Westcott-Price estimates only for quantity. I estimate producer price based on a demand elasticity of minus two-thirds.

These estimated price effects are smaller for short-run effects on grain prices as calculated above, but close to the long-run effects. Note that the base (no program)

$0.47 per bushel. To obtain the maximum payment, a producer would need a beneficial interest in 638,000 bushels, which would require an operation of 15,000 acres at the U.S. average 1999 wheat yield (42.7 bushels per acre). Moreover, in February 2000 the Secretary of Agriculture ruled that loan deficiency payments could be made in certificates that can be used to acquire commodities placed under loan, which can then be sold and not count against payment limits. This made payment limits essentially a dead letter as far as the marketing loan program was concerned, although the amount that can be taken in the form of direct cash payments that do not require physical dealing in commodities remains limited at $150,000 (see Womach 2000).

prices estimated from the 1998 perspective were greater than they subsequently turned out to be.

The Farm Security and Rural Investment Act of 2002 increased the loan levels by 4.8 percent to $1.98 per bushel for corn and by 8.5 percent to $2.80 per bushel for wheat, and reduced the loan level by 5.0 percent to $5.00 per bushel for soybeans. Extrapolating from the above calculations, this would be expected to reduce grain prices further.

Production Flexibility Contract Payments

The substantive issue with PFC payments is their effect on output and hence prices and trade. Payments cannot be increased by a farmer planting greater acreage or increasing crop yields, and hence they are decoupled in the sense of being independent of output increases. However, several reasons have been given why the payments may nonetheless result in commodity production that is more than would be the case in the absence of the program. Most notable among them are wealth effects, insurance effects, anticipatory effects, and absence of complete decoupling.

First, guaranteed payments are an annual income flow analogous to what a farmer would receive from an increase in financial or other forms of wealth. If a farmer would respond to a wealth increase by investing some of the gain in the farm operation, then even decoupled payments would have an output effect. Standard theory would say this effect should be negligible because investment should be governed by the expected rate of return, and decoupled payments do not increase the rate of return to investment. But suppose the farmer was credit constrained, that is, the expected rate of return on investment in the farm was higher than the interest rate in credit markets, yet a loan could not be obtained because the farmer had reached the credit limit as seen by the lender (or because of some other credit market imperfection). Then quite possibly the farmer would invest decoupled payments in the farm and thereby increase output.[11]

Second, if a farmer is risk averse, and increasing agricultural production increases the variability of income, then a payment program that reduces income variability will tend to increase output. Lump sum payments add a constant to income and so do not reduce the variance. But, as emphasized by Hennessy (1998), increases in wealth reduce marginal risk aversion for some standard representations of production risk and farmer utility, so the payments might induce more output by reducing the obstacle that risky production would otherwise place in the farmer's way. Moreover, the payments may in practice not be a constant addition to income, but may be increased by Congressional action when commodity prices are unexpectedly low. In fact, this occurred with the market loss assistance payments that supplemented the PFC payments in 1998–2001. Payments that are expected to operate in this way will reduce farmers' anticipated risks in farming.[12]

[11] A story goes that a farmer won the lottery and was asked what he would do with the winnings. He replied: I'll just keep farming until the money is gone.

[12] Evidence that such adjustments were foreseen by policymakers comes from a statement by Senator Roberts, Republican of Kansas. He responded to criticism by Democrats that the FAIR Act removed the "safety net" that deficiency payments had formerly provided to protect against low prices by saying: Congress is the safety net.

Third, apart from wealth effects or risk aversion, a farmer might feel impelled to maintain acreage and production levels because at some future date the program is likely to be restructured and the base for payments updated (as is actually happening with the 2002 Farm Bill). Under current market conditions, this incentive is a reason to refrain from reducing output in the face of low prices rather than a reason to increase output because of the payments. However, in either case the relevant distortion in 1998–2001 worked in the direction of keeping production higher than was warranted by market conditions.

Fourth, the payments are not actually totally decoupled. A producer is not allowed to grow most fruits and vegetables on land covered by the program. So there is an incentive to keep growing program crops even if market conditions indicate higher returns from switching to those alternatives.

Whether any of these effects are quantitatively important is an empirical issue, and one that is difficult to estimate from the data available. Westcott and Young (2000), following up on Young and Westcott (2000), use estimates of wealth effects on planted acreage, developed from pre-1990 data by Chavas and Holt (1990). Westcott and Young (2000, p. 11) estimate that during the period of the FAIR Act PFC payments, "the possible increases in aggregate planted acreage range from 225,000 to 725,000," or about 0.3 percent of total cropland. Adams and others (2001) consider 1997–2000 acreage data for 11 major U.S. program-crop states. They find a positive effect of PFC plus market loss assistance (supplemental PFC) payments, but the effect has only marginal statistical significance. Nonetheless, the Food and Agricultural Policy Research Institute (FAPRI), which carries out economic analysis of program alternatives for Congress, has incorporated an effect of these payments in its modeling. In view of the weak statistical significance, the estimates should be regarded as an upper limit of the program's effects. FAPRI's simulations imply that $10 billion in payments, about the average level in 1998–2001, would cause about 2.75 million acres of U.S. cropland to be devoted to program crops that would not have been in the absence of the FAIR Act, that is, 1 percent of the acreage planted to those crops. The implied output effect of about 1 percent means the payments introduced in the FAIR Act had about half the downward world price effect of the marketing loan program.

Crop Insurance and Other Risk Management Programs

The Federal Crop Insurance Program has increased its subsidies and hence participation in the program since the 1994 Reform Act. The subsidies are now sufficiently large to provide a significant incentive to produce crops in locations where production is sufficiently risky that producers would arguably choose to produce less risky crops or pasture the land instead of cropping it, if subsidized insurance were not available. Estimates of the effects are difficult to make with confidence, and attempts to provide such estimates have resulted in greatly varying findings both for shifts among crops and for aggregate crop acreage.

Estimates in the literature imply that $3 billion in crop insurance subsidies would increase aggregate U.S. crop acreage by 0.5 to 10.0 percent, a remarkably wide range of uncertainty (Glauber and Collins 2002; Young, Vaneveer, and Schneff 2001; Orden 2001; Keeton, Skees, and Long 1999; Skees 2001). The most careful and detailed of these studies suggest the lower end of this range is most plausible. Young, Vaneveer, and Schneff project average acreages and yields during 2001–2010 in the absence of subsidized crop insurance. They estimate 960,000 acres would be withdrawn from grain, soybean, and cotton production (less than one-half of 1 percent), with more than half of this acreage from the Great Plains, a primarily wheat growing area. Their implied estimate is that production of wheat would decline about 0.8 percent; cotton, 1.7 percent; feed grains, 0.2 percent; and soybeans, 0.1 percent.

Overall Effects from the Literature

Although any estimate is conjectural, the most reasonable estimates indicate that the marketing loan program increases the U.S. output of grains and soybeans by about 2 percent, the direct payment program by one-half to 1 percent, and crop insurance subsidies by more than 1 percent. The total effect is that about 4 percent more of these commodities were produced in 1999–2001 than would have been the case in the absence of the programs. But the range of possible effects is large, roughly 2–10 percent.

Given elasticities of demand for these products in aggregate that range from possibly –0.4 (short run) to –1.0 (intermediate run), an argument could be made for world commodity price effects ranging from a decline of 2 percent to a decline of 25 percent. The latter figure, however, would only be at all plausible for a short-run (a year or less) scenario. Considering adjustments in supply and demand in both the United States and other countries, the most likely point estimate from the literature for effects two to three years after a policy shock is about 4 percent for output with a demand elasticity of –0.7. This gives a world price decline of 6 percent or more for the average of grains and soybeans, attributable to U.S. commodity support policies in place in 1998–2001.

A full long-run picture should also include the effects of the ongoing CRP. If the 34 million acres enrolled in that program (10 percent of all land used for crops) as of 2001 were to be released from it, what would the output effects be? Most land in the CRP is designated as highly erodible or having other characteristics that make cropping it more than usually threatening to water quality (such as land within 100 feet of a stream or lake). These lands are expected to have lower than average yields when cropped, but analysis by the USDA's Economic Research Service (USDA-ERS) has estimated that yield capacities of CRP land are not far below corresponding cropped acreage on average; but 58 percent of CRP land is in the relatively low-yield Great Plains states and only 18 percent is in the Corn Belt. So bringing this land back into production would have a disproportionately large effect on wheat production (11 million acres of wheat under former programs). Assuming two-thirds of CRP land would return to crop production with 85 percent of the yield of average U.S. cropland, assumptions consistent with USDA-ERS analyses, a reasonable estimate of the effect on aggregate grain and soybean output is that the CRP has decreased output by the equivalent of (34_0.67_0.85 =) 19 million U.S. average cropland acres, for about a 7 percent reduction due to the CRP. Thus, the CRP would slightly more than offset the production-increasing effects of marketing loans, crop insurance, and direct payments that operated in 1998–2001.

In its benefit-cost analysis of the CRP, the USDA's estimates imply that 34 million acres in the program would raise the prices of wheat, corn, and soybeans by 11 percent, 13 percent, and 12 percent, respectively (USDA 1997, p. 7602).[13] These estimated ef-

[13] The USDA provides point estimates for 28 and 36.4 million acres in the CRP. The estimate of 34 million acres is my interpolation. Wheat has a smaller price effect despite its large production effect because the demand for U.S. wheat is assumed to be more elastic than the demand for corn or soybeans.

fects are probably too large as long-run impacts, but even if the long-run effects are only half as large, they still roughly offset the effects of the FAIR Act's production-increasing programs as of 1998–2001.

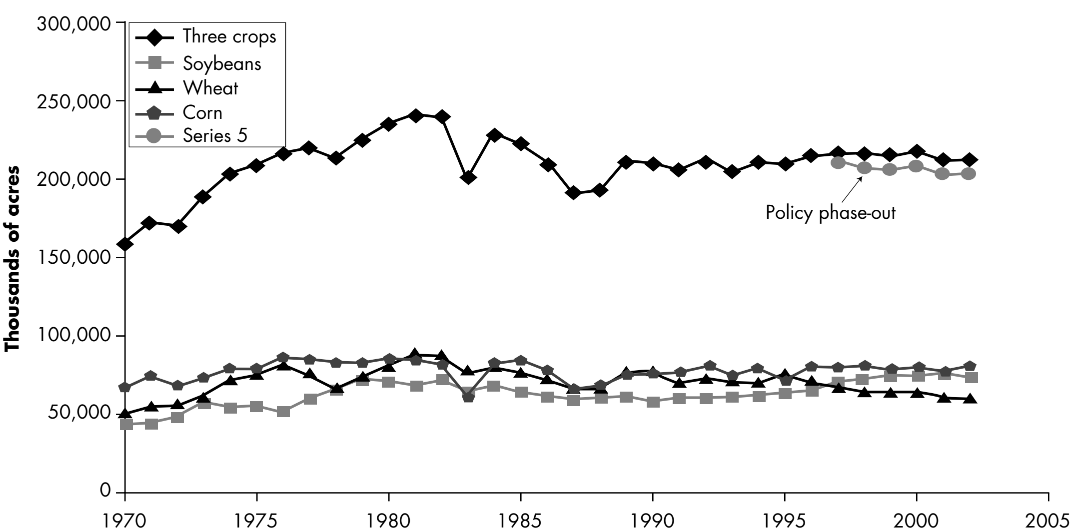
However, if the analysis includes the production effects of the CRP in assessing U.S. policy consequences for world markets, it should also include research and extension programs that generate new technology, which has increased total factor productivity (TFP) and thus increased output. TFP in U.S. agriculture has increased about 1.8 percent annually over the past 50 years, but there is no reliable evidence on how much lower that rate of increase would have been in the absence of publicly supported research and extension. Even if only 10 percent of TFP growth is attributable to U.S. policies, the cumulative effects by 2000 could easily be enough to offset the land idling of the CRP.

Data Evidence

In order to provide an informal reality check for the preceding estimates of commodity program effects (not counting long-term effects of conservation or research programs), consider the time-series data on corn, soybean, and wheat acreage, as shown in Figure 3–2. In 1970–81 there was a huge increase in plantings of these crops, from 160 to 240 million acres, a 50 percent increase. This expansion was induced by price increases in which farm-level corn and soybean prices more than doubled and wheat prices tripled. During the commodity crash and consequent farm income crisis of the 1980s, this acreage fell back, partly in response to lower prices and partly because of federal acreage idling programs in pre-1996 legislation. The acreage reductions of 1983, 1986, and 1987 are specific consequences of these programs. By 1990–95 relative stability in acreage emerged

Figure 3–2

U.S. Acreage Planted, 1970–2001



Source: USDA.

for aggregate grain and soybean acreage, but with a moderate continuing trend away from wheat and into soybeans. In this context, the FAIR Act of 1996 was intended to let farmers respond more fully to market prices rather than deficiency payments (a goal already partly achieved in the 1990 Farm Act and likely responsible for some of the move to soybeans in 1990–95).

What are the apparent consequences of moving to "freedom to farm" in the 1996 Act? What was most clearly expected was a further shift to soybeans, and indeed this shift occurred. Beyond price incentives, one reason was the desire of some Corn Belt growers to introduce a two-year corn-soybean rotation for pest control purposes. They had been trapped in continuous corn or nearly so by the loss of corn deficiency payments if they shifted to soybeans beyond the limits allowed under the limited flexibility provisions of the 1990 Act. However, regional data make it clear that the move to soybeans was not just a Corn Belt adjustment. Table 3–3 shows planted acreage for the main regions comparing the two years just before the FAIR Act (1994 and 1995 average) with the last two years (2000 and 2001 average). Soybean acreage increased by about the same amount (6 million acres) in both the Midwest and the Great Plains, and by a much larger percent in the latter.

Table 3–3

Increase in Planted Crop Acreage, 1994/95 to 2001/02

(Millions of acres)

Area	Corn	Soybeans	Wheat	Total
Midwest				
Acres	150	6,550	–1,802	4,897
Percent	0.3	16.6	–23.1	5.2
Great Plains				
Acres	2,030	6,083	–5,462	2,651
Percent	12	69.2	–13.2	3.9
South				
Acres	–293	–1,380	–49	–1,721
Percent	–5.6	–11.8	–1.1	–8.1
All other states				
Acres	564	876	–1,255	185
Percent	10.2	41.8	–7.8	0.8
Total				
Acres	2,452	12,128	–8,567	6,013
Percent	3.3	19.5	–12.3	2.9

Note: Values are changes in the averages for two crop years. States in the Midwest are Idaho, Illinois, Indiana, Michigan, Montana, Missouri, Ohio, and Wisconsin. States in the Great Plains are Kansas, North Dakota, Nebraska, Oklahoma, South Dakota, and Texas.

Source: U.S. Department of Agriculture, Agricultural Statistics, 1996, 2001.

Aggregate acreage for the three crops increased most in the Corn Belt. As Figure 3–2 shows, the main jump in acreage occurred in 1996. The predominant causes were the high commodity prices that persisted over a year from mid-1995, and the end of legislated acreage reduction programs. The effect of the FAIR Act's marketing loan, PFC payment, and crop insurance programs was to maintain that higher acreage. This can be seen most clearly by plotting the data in price-quantity space. Figure 3–3 shows corn acreage planted and the average price received by farmers for the preceding crop.[14]

It is noteworthy that the 1998–2002 levels of plantings are clustered in the lower right-hand corner of price-quantity space. This means that the acreage response supply function lies below the supply function of earlier years. Why? One reason is that the real cost of producing corn has declined (note that prices are deflated to give real values) due to technological advances, such as improved seed and machinery. There is an overall tendency for successive observations to lie lower and to the right, as the division of the data by period indicates (Figure 3–3). In addition, corn programs, particularly set-asides, make a difference. This is most obvious in the case of the payment-in-kind acreage idling program of 1983, which brought planted corn acreage down to 60 million. The 7.5 percent corn acreage reduction in the 1995 program was the only year in which corn had an acreage reduction program.

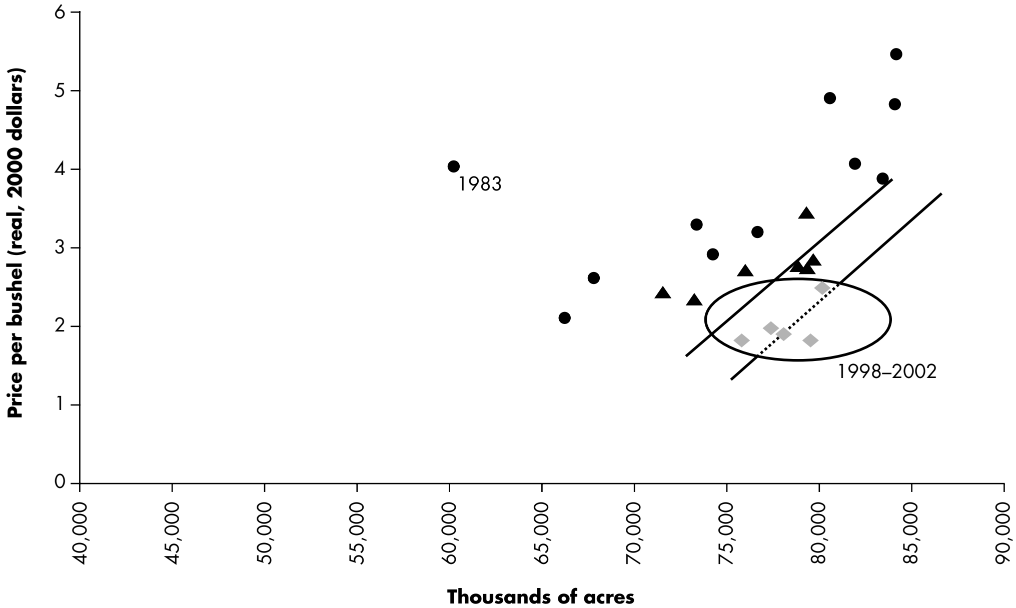
The data suggest that the loan deficiency payments and perhaps the market loss assistance payments of 1998–2001 also played a role. Sketching in supply functions (adjusted for acreage reductions in years when they occurred) as shown in Figure 3–3 indicates that the curve shifted down by about 65 cents per bushel between 1991–97 and 1998–2002. If technical progress reduced costs by 2 percent per year during this period (USDA's estimate of the long-term average TFP growth for U.S. agriculture), this could have accounted for a shift of about 12 percent over the six years from the midpoint of the 1991–97 period to the midpoint of the 1998–2002 period, which at an average price of $2.50 would amount to 30 cents. This leaves a 35-cent apparent supply shift unaccounted for. That is, in 1998–2002, farmers planted an amount of corn that, based on farmers' historical behavior, would have required a price 35 cents per bushel higher than the actual price in 1998–2002. (If there were no cost reductions, and the underlying real cost situation remained the same since 1991, then the apparently missing price incentive is 65 cents per bushel.)

Recall from the earlier discussion of marketing loans that the average marketing loan benefit for 1999–2000 was 26 cents per bushel. This explains a substantial part of the apparent supply shift—if producers expect a 26-cent marketing loan benefit, they will commit acreage to corn that they would commit if the market price (which does not include the marketing loan benefit) was 26 cents higher and there were no marketing loans (there were none in the higher-priced years of 1991–97). Since the total apparent supply shift (measured vertically) is 65 cents, this leaves a 9-cent (if corn production

[14] This price is called the lagged price in the diagram because it is received in marketing the crop preceding the crop whose planted acreage is shown. But the time at which the prices are observed actually coincides with the planting period. For example, the price that corresponds to planted acreage in 2001 is the average price received for the 2000 crop. Most of the crop is sold in the months immediately following the harvest, in October 2000 to January 2001, just a few months before planting the 2001 crop; but some sales whose prices make up the 2000 season's average price for the corn crop occur throughout the marketing year, which goes through August 2001. Therefore, it is possible that observation of plantings could influence the lagged price to some extent, so that it is not possible to identify the acreage-proxied supply function exactly.

Figure 3–3

Corn Acreage Planted and Lagged Price, 1980–2002



Source: USDA.

costs were reduced 12 percent) to 39-cent (if costs were not reduced at all) shift to be explained by other factors. The prime candidate is the production flexibility and market loss assistance payments made under the FAIR Act.

To estimate the additional corn production created by the policies, the vertical shift has to be converted to a horizontal one. For this transformation, only one parameter is necessary, the elasticity of supply. Assuming it is 0.3, the horizontal shift is between 1.2 (12 percent cost reduction) and 4.5 percent (no cost reduction). Taking the midpoint and assuming no yield effects, the implication is that policies in place under the FAIR Act generated about 3 percent more corn than would have been the case under pre-1996 policies.

The preceding calculations can be carried out statistically by means of a linear regression estimating the inverse (price dependent) supply function, explaining prices during 1980–2002 as a function of time period (1991–97 or 1998–2002, with 1980–90 being the intercept), time trend (for technical change over time), and acreage. The resulting equation has a trend decline in real price of 5 cents (1.7 percent), a FAIR Act effect of 59 cents (compared with 1991–97), and an elasticity of supply of 0.32. All the variables are statistically significant at the 5 percent level and the adjusted R^2 is 0.85. Carrying out the calculation of the preceding paragraph, the estimated acreage effect of the FAIR Act on production is 59/302_0.32 = 0.06, that is, 6 percent more output than would have occurred under pre-FAIR Act policies.

A problem is that with errors in variables, the inverse estimating equation overstates the elasticity. Estimating the same equation with acres as a dependent variable and price on the right-hand side gives an elasticity of 0.20, which would imply a FAIR Act effect of 4 percent. This is a lower bound for the elasticity (because of the possible identification problem mentioned above as well as errors in variables).

Figure 3–4 provides a similar set of data for soybeans. These data indicate an even larger soybean acreage effect in 1998–2002. Despite record low real prices, acreage keeps increasing. In part, following the discussion earlier, this is attributable to the FAIR Act's removal of previously existing disincentives to grow soybeans. This effect is not a matter of subsidies on soybeans. Since the means of identifying the FAIR Act's production effect was simply to use a dummy variable for the 1998–2002 period, the two effects cannot be sorted out by the method used above for corn. Indeed, the soybean data call into question the estimate of the corn effect because it too could be in part a result of corn acreage moving to soybeans as a result of FAIR Act soybean provisions rather than corn subsidies. Moreover, the regression analysis cannot correct for the problem by using soybean prices in the corn equation, because the analysis is not hypothesizing a market response phenomenon, but rather the result of the removal of a prior policy disincentive to plant soybeans.

The most straightforward way to avoid the problems of corn-soybean entanglement is to look at the acreage of corn and soybeans together, as a corn-soy aggregate. Figure 3–5 shows these data. Applying the procedures used above, the elasticity of the aggregate corn-soybean supply is 0.2 and the production effect of the FAIR Act is 6 percent.

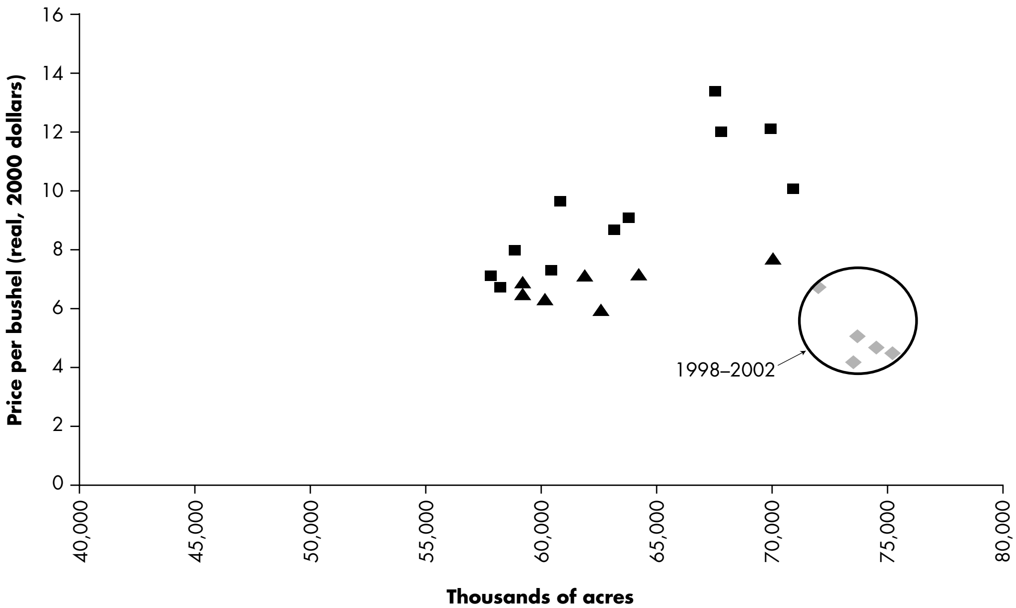
The data in Figure 3–2 and Table 3–3 indicate that even a corn-soybean aggregate does not tell the whole story because there has been a substitution of both of these crops, but especially soybeans, for wheat. For the three-crop aggregate, the data indicate an acreage effect of about 4 percent, which would imply a slightly smaller production effect because substituting corn and soybeans for wheat increases the yield per acre. Earlier, based on other studies, I conjectured an output effect of the FAIR Act for these three crops ranging from 2 to 10 percent, but with a point estimate of 4 percent. Analysis of the raw data in Figures 3–3 to 3–5, without any specific analysis of the policy instruments used, gives a similar estimate of effects, providing more confidence that the true effect is not at the extreme high end of that range, but is most probably in the 3 to 5 percent range. Accordingly, Figure 3–2 plots the path labeled "policy phase-out" as an estimated 4 percent less during 1999–2001, which is the difference between the U.S. acreage actually planted to corn, soybeans, and wheat and the acreage that would have been planted in the absence of the PFC payments, market loss payments, marketing loan payments, and added crop insurance subsidies that were paid in those years.

Consequences for International Trade and Prices

Given the acreage, output, and U.S. market price effects just discussed, the consequences for trade are generated by the excess U.S. supply created by the policies that have been discussed. Of course, the level of excess supply also depends on production and demand in the world as a whole, and the prices that result from the overall supply-demand balance. The end results of the confluence of all the relevant causal factors for U.S. exports of grains and oilseeds are shown in Figures 3–6 and 3–7. For grains, despite the movement away from a supply management policy regime and the increase in payments late in 1998–2001, there is no appreciable increase in either the quantity of exports or the U.S. share of world exports. For soybeans, there is an increase of about 3 million metric tons in 1999–

Figure 3–4

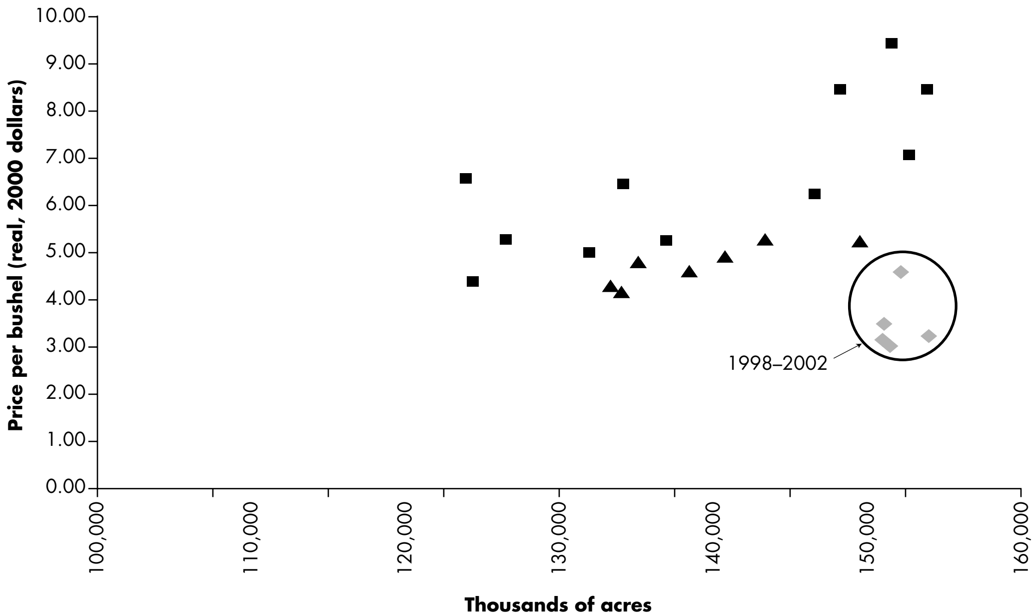
Soybean Acreage Planted and Lagged Price, 1980–2001



Source: USDA.

Figure 3–5

Soybean and Corn (Aggregated) Acreage Planted and Lagged Price, 1980–2002



Source: USDA.

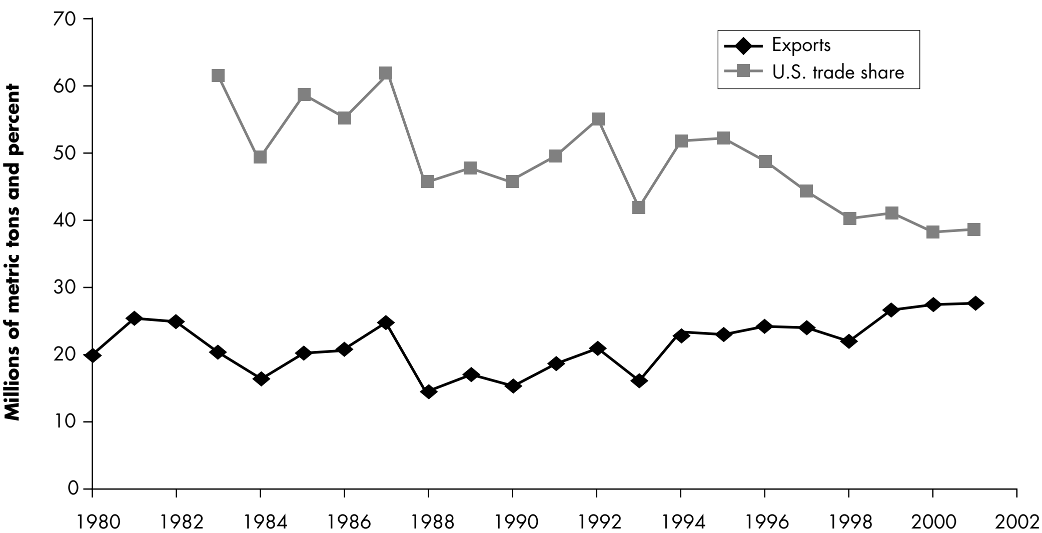
Figure 3–6

U.S. Grain Exports and World Market Share

Source: USDA.

Figure 3–7

U.S. Soybean Exports and World Market Share



Source: USDA.

2001 compared with the mid-1990s, but this has only slowed the decline in the U.S. share of soybean trade, as other countries' exports have increased faster than U.S. exports.

The bottom line of U.S. influence on the world grain and oilseed markets, and on producers who sell to those markets, is given by transmission of U.S. prices to internationally traded prices in the countries of interest, which here are other countries in the Western Hemisphere. In principle, the effects of U.S. policies on exports and world prices could be quite different from the production and domestic price effects, if border measures on the one hand kept U.S. products at home, or on the other hand the U.S. subsidized the shipment of commodities abroad. But in fact the prices U.S. exporters receive at borders they ship to (prior to tariffs or other import barriers), and the market prices other agricultural exporters must compete with, are U.S. border prices that move practically dollar for dollar with U.S. internal market prices. Thus, the price effects that have already been discussed essentially measure the impact in terms of revenue loss per unit of quantity exported or revenue gain per unit of quantity imported, of U.S. policies on other countries.

THE 2002 FARM BILL

The Farm Security and Rural Investment Act of 2002—the Farm Bill—was signed into law by President Bush on May 13, 2002. It has 10 titles in 421 pages of legislative language.[15] It replaces the programs of the FAIR Act that have been discussed above, with extension of some programs and creation of new ones, mostly authorized for the next six years (crops planted in 2002–2007). The Act was popular in Congress, having passed in the House of Representatives by a vote of 280 to 141 and in the Senate by a vote of 64 to 35. The President signed the bill in the presence of farm group representatives with words of praise.[16] However, small farm and environmental advocacy groups were unhappy that amendments failed that would have imposed more stringent payment limits on large farms, redirected some commodity program payments to conservation/environmental programs, and imposed various regulatory restraints on agribusiness.[17]

Outside the community of agricultural interests, the 2002 Act has been widely reviled. *Business Week* magazine said, "It's a dreadful piece of legislation—bad for most farmers, bad for consumers, and horrendous for taxpayers" (May 7, 2002). *The New York*

[15] See text at U.S. House Agriculture Committee website *http://agriculture.house.gov/farmbill.htm*. This section uses material from Gardner (2002), which also contains further discussion of economists' contributions to the policy debate.

[16] As a reminder that presidents do not always accept what Congress delivers in support of agriculture, President Reagan in 1985 vetoed a farm bill on budgetary grounds, in the midst of the farm crisis of the 1980s, which was much more severe than the 2002 situation in the agricultural economy. Congress could not muster the two-thirds majority needed to override the veto, so the President's action was decisive. (On a political note, it has been argued that this veto contributed to the Republicans' loss of Congressional control in the subsequent 1986 elections—perhaps a reason why the Bush Administration was more cautious in 2002, a key election year with Congress almost evenly divided in both Houses.)

[17] It is also notable that the more market-oriented members of Congress, even if they represent agricultural constituencies, opposed the bill. Among the opponents were not only the House Republican leadership, but also members of the Agriculture Committee, such as Boehner (R-Ohio) and Dooley (D-California), who wrote an opinion piece in *The Washington Post* titled "This Terrible Farm Bill" (May 2, 2002). Similarly strong opposition was voiced in the Senate by Richard Lugar (R-Indiana), the senior Republican on the Senate's Agriculture Committee.

Times, The Washington Post, and other national media also editorialized against the bill. Most critical of all have been those speaking from the viewpoint of agricultural exporting nations and economists who take a global view.

A full analysis of the 2002 Act is not feasible at this stage, but the following discussion addresses the two main issues that bear on the subjects of this chapter: the level of spending on subsidies, and the market-distorting effects of the new provisions.

Commodity Program Outlays

The main budget news about the 2002 Act is the projection by the CBO that the innovations of the Act will cost $80 billion over the 10 fiscal years 2002–11.[18] This includes $45 billion for direct payments as an extension of current PFC payments and the new countercyclical payments (basically a re-institution of pre-1996 deficiency payments but without set-aside requirements). In addition, there are estimated 10-year spending increases of $5.2 billion in marketing loans and loan deficiency payments, $4.9 billion for a new peanut program, $1.6 billion for a new dairy program, and $430 million for increasing support in the sugar program, partly offset by savings projected at $260 million from slightly tightening payment limitations, for a total of $56.7 billion in all commodity programs (Title I of the Act).

CBO's cost accounting scores legislation relative to a baseline of spending if current law (the FAIR Act) had been continued. After considerable debate in 2001, the budget baseline was constructed to include a continuation of production flexibility payments at the 2002 level, although those payments were to end after 2002 under the terms of the FAIR Act. The baseline also includes continuation of loan deficiency payments at the loan levels of 2002.[19] Projected total spending on commodity, conservation, research, and related programs (but not including food stamps and some other nutrition and health programs) is about $190 billion for the next 10 years.

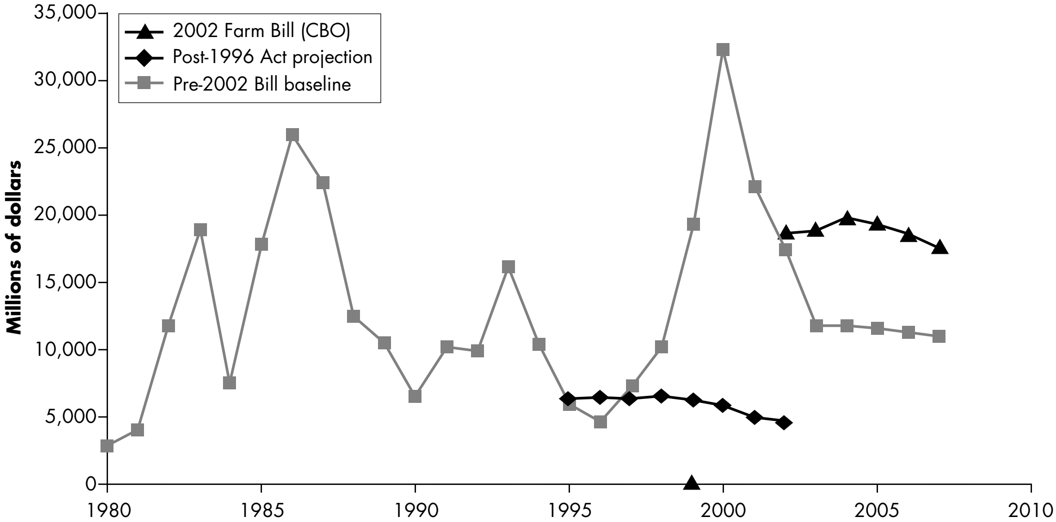
To place prospective outlays under the 2002 Act in historical perspective, Figure 3–8 shows data since 1980. Over the next five years, when the uncertainties of baseline

[18] Ten-year projected spending is estimated in accordance with Congressional budgetary procedures, even though the Act only authorizes programs for the next six years. The assumption is that those programs will be reauthorized to cover the 10-year period.

[19] Since budget outlays are determined by the extent to which farm prices received fall below the loan level, a crucial set of assumptions in constructing the baseline concerns future commodity prices, the level of which is needed to estimate future outlays. CBO assumes gradually rising (nominal) prices over the next 10 years, which implies gradually declining baseline outlays. Projection of baseline prices is of course subject to huge errors, which is the main reason past CBO budget projections for agricultural programs have been wildly inaccurate (see Figure 3–8). With respect to the CBO's budget scoring of the 2002 Act, uncertainty and mistrust were created because just after the Farm Bill was passed, at the beginning of May 2002, the CBO estimated a 10-year cost of $73.5 billion, and then a few days later raised the estimate to $80 billion. The first estimate used the March 2001 baseline that had been the basis for farm bill budget scoring during the previous year of debate, but in the revised estimate the CBO switched to an updated March 2002 baseline, which had lower commodity market prices in future years. Because of the uncertainties in baseline projections as well as what will actually transpire in policy decisions in the later years of the Act, analysts can easily differ in their assessments of likely spending. The other substantial scoring effort (besides the CBO's) that has been published since the 2002 Act became law is that of the Food and Agricultural Policy Institute of the University of Missouri and Iowa State University. They estimate 10-year commodity program spending of about $3 billion more than the CBO estimate, apparently because their projection of future market commodity prices is lower.

Figure 3–8

Commodity Program Outlay Projections



Source: USDA.

prices, though still substantial, are less egregious than in the 10-year projection, commodity program spending is projected at about $19 billion per year. This is a lot, but as the figure shows it is about $4 billion per year less than the federal government has been spending over the last three years. The reason for the decline is that the market loss assistance and disaster assistance outlays of FY1999–2001, which averaged $8.5 billion annually, are not in the baseline and are not completely replaced by the new countercyclical payments. Nonetheless, the level is high compared with the $10 billion to $12 billion average annual cost in 1988–97, or the $11 billion baseline for 2002–05 that was on the books before the 2002 bill was enacted—not to mention the CBO projection of $6 billion and declining outlays forecast in 1996 on enactment of the FAIR Act (shown in Figure 3–8).

An issue raised by the projected spending levels is whether amber box outlays will remain within the WTO ceiling of $19.1 billion for domestic support (for all years after 2000). Although the levels shown in Figure 3–8 are quite close to the ceiling, some of the outlays do not fall in the amber box as defined earlier, namely CRP payments and the direct payments that continue the production flexibility payments under the FAIR Act. If these continue to be accepted in the WTO as green box, that will reduce typical outlays subject to discipline by about $6.5 billion ($1.5 billion in CRP payments, $4 billion in continuation of the FAIR Act level, plus $1 billion in the expansion to soybeans) to about $13 billion. In addition, it has been suggested that the new countercyclical payments will be notified as not commodity-specific amber, presumably because those payments perform the same function as the market loss assistance payments that were notified in that category in 1998. This determination is important because it could mean that several billion dollars in payments each year could be used to fill the roughly $9 billion de minimis box of payments not counted against the $19.1 billion ceiling.

It may be questioned whether direct payments will continue to be green because of the opportunity given to farmers to update their payment acreage bases to 1998–2001 levels. But the fact that the payments made each year do not vary with the farmer's plantings, or with market prices, suggests that direct payments might still be successfully argued as green under WTO criteria.[20] Even if this argument prevails, the possibility remains that market prices of the major crops could fall sufficiently below the baseline projections in the next few years such that increases in marketing loans or countercyclical payments could raise outlays above $19.1 billion even excluding direct payments. Hart and Babcock (2002), using exchange-traded futures and options prices, estimate a 29 percent probability that the $19.1 billion ceiling would be exceeded in the 2002/03 marketing year (but this was before the late summer increases in commodity prices that reduced this probability substantially).

As evidence that Congress took U.S. WTO obligations seriously, the risk of exceeding the $19.1 billion cap is addressed through a provision in the 2002 Act, stating that if the Secretary of Agriculture determines that expenditures under the commodity titles of the Act will exceed Uruguay Round Agreement ceilings "for any applicable reporting period," then "the Secretary shall, to the maximum extent practicable, make adjustments in the amount of such expenditures during that period to ensure that such expenditures do not exceed such allowable levels" (Section 1601). The necessary adjustment could be accomplished, for example, by reducing the percentage of production on which countercyclical payments are made. This approach, implemented through a 15 percent nonpayment base, was used to meet congressionally mandated budget reductions in the late 1980s. Alternatively, USDA could impose a pro rata reduction in all payments for commodities in the Farm Act titles covered (grains, rice, cotton, oilseeds, peanuts, sugar, and milk).[21]

Market-Distorting Effects

It is possible that the 2002 Farm Act creates only small market distortions. One line of argument is that the additional spending on direct and countercyclical payments, although large, is essentially a set of lump sum payments that farmers cannot change through their decisions about what to produce, how much to produce, or the production practices followed. Therefore, there are small if any output effects or price effects, and few if any deadweight losses due to market distortions. This need not have been the case. The bill could have brought back set-asides along with target prices, or reestablished export subsidies or CCC purchase and storage programs. But Congress eschewed these possibilities and indeed replaced market-distorting programs with payment programs in peanuts and dairy (replacing a supply control program and the Northeast Dairy Compact, respectively).

[20] Similarly, it could be argued that countercyclical payments should not fall into the not commodity-specific category, since they are in fact allocated according to individual commodity price and payment bases. The counterargument is that with planting flexibility, the payments are unrelated to what the farmer receiving them actually does in growing program crops, or to the prices that the farmer receives for commodities produced.

[21] It would make sense to exclude from such reductions any payments for which de minimis exemptions are exceeded, and probably to make the pro rata reductions a percentage of each payment category that is in excess of the relevant de minimis exemption. However, there could well be acrimonious disputes among commodities about burden sharing if price declines in only one or two commodities were to be responsible for the Secretary's determination that the $19.1 billion level will be breached.

What does this argument miss? One issue is the updating of acreage bases for payments, which blunts the point that the payments do not influence production decisions. Now farmers will have an incentive to maintain acreage in order to be in a favorable position for future updating.

Second, the addition of the soybean base into the acreage for direct payments means reduced incentives for farmers to substitute vegetables or other nonprogram crops for grains and oilseeds. This is a subtle point since producers who received PFC payments under the FAIR Act were already restrained from expanding vegetable acreage through loss of all payments if they grow such crops on contract acreage (a disincentive enacted at the behest of vegetable growers). Midwestern vegetable processors have argued that under the 2002 Farm Bill, this provision will more seriously hinder the expansion of processing vegetable acreage. Under the 1996 FAIR Act, such expansion could occur because soybean acres were not part of the PFC payment base, so vegetables could be grown on those acres, typically 40 to 50 percent of a farm's acres in some Corn Belt areas. But under the 2002 Act, virtually 100 percent of a farm's acreage will often be in the payment base, and under the rules any expansion of vegetable acreage would cause the loss of all payments. Thus, the 2002 Act's incentives to keep cropland in program crops are stronger than was the case under the FAIR Act.

A third issue is a set of individually small but collectively significant changes: the market-distorting sugar support price is effectively increased by 1 cent per pound (4.5 percent); the new Dairy Market Loss Program makes payments on a current production base, projected to be about 50 cents per hundred pounds (5 percent); part of the new peanut support system is a marketing loan program that makes payments on a current production base; and similar marketing loan programs are introduced for wool, mohair, honey, and pulses (chickpeas, lentils, and dry peas). These are significant new market-distorting (production-inducing) subsidy programs.

Finally, the 2002 Act creates new opportunities and incentives to withdraw land from the CRP and plant it to program crops. The new Conservation Security Act and expansion of the Environmental Quality Improvement Program pay subsidies for investment in conservation practices on cropped acreage (or working lands) and these investments are unlikely to cause yield reductions, although they may generate some increased acreage by making it profitable to grow crops on marginal acreage that might otherwise not be cropped. Similarly, the Farmland Protection title, whose budget authorization increases substantially, will to the extent its purposes are achieved keep land in farming that would otherwise be converted to nonagricultural uses. However, the Act also has features that may work to reduce crop output. It raises the maximum land area in the program by 2.8 million acres, and some of the new programs could encourage farmers to try organic or other low-input production methods that would result in lower yields, at least for a learning period during which new methods are tried out. The likely overall impact of the Conservation title is small and not predictable in direction.

While the provision of the 2002 Act in total will add marginally to the supply of crops and so to excess supplies from the United States on world markets, other provisions will add to the U.S. domestic demand for crops and so reduce U.S. excess supply. USDA is required to increase its purchases of nonprogram commodities for school lunch and other food programs. The dairy title is projected by FAPRI to increase milk production by about 1 billion pounds per year (about two-thirds of 1 percent) in 2002–05. This will marginally add to U.S. feed demand.

Most important, and potentially sufficient to offset all the other factors that have been discussed, is a provision that is not in the 2002 Farm Act, but rather appears in the Energy Bill that passed in the Senate in spring 2002 (but had not been enacted as of October 2002). This is a mandate that calls for 5 billion gallons of corn-based ethanol and soy-based fuels by 2010. This would roughly triple the use of agricultural products for fuel products. Since an estimated 650 million bushels of corn were used for ethanol in 2001, tripling the use would add more than a billion bushels to corn demand (11 percent of annual production), which would remove from supply essentially all the additional production plausibly attributable to price supports and other subsidies under the 2002 Farm Act.[22]

The regulations that will implement the 2002 Act are not yet in place, and some of them will not affect production until 2003. An early estimate of the production effects of the Act has been made by FAPRI. It estimates that the area planted in the nine major crops (wheat, corn, soybeans, cotton, rice, sorghum, barley, oats, and sunflowers) will be increased by 2 million acres (0.8 of 1 percent) in 2002 and 2003, compared with the baseline of continuing the FAIR Act. Wheat and corn plantings are estimated to be increased by about 1 million acres each, and soybean acres decreased by about 1.2 million in each year (because the loan rate is decreased for soybeans and target prices determining countercyclical payments for corn are favorable relative to soybeans). Correspondingly, the estimated price effects of the 2002 Act in 2002 and 2003 are to reduce corn and wheat prices by about 5 cents per bushel, and to increase the soybean price by 8 to 9 cents per bushel (FAPRI 2002, p. 2). These are effects of the commodity titles only and do not include effects of the related programs discussed in the immediately preceding paragraphs.

CONCLUSIONS

The United States has had agricultural support programs that distort commodity markets since the 1930s. Because domestic markets for the major crops are largely not insulated from world markets through tariffs or other trade barriers, the distortions have world price effects. Although the United States up to 1990 devoted a lot of policy effort to supply management programs that helped support world prices, since that time policies have created incentives leading to larger agricultural output, hence lower prices, than would have been the case without the policies.

In the past 15 years, policies have moved in the direction of reduced market-distorting incentives. But they have maintained and even increased their financial transfers

[22] A complication is that added ethanol from corn (under the dry milling process) creates as a by-product distillers dried grains (DDG) that compete with corn and soybean meal, so the net demand effect for U.S. crops is reduced from the gross effect that the billion-plus bushel figure suggests. Each ton that goes into ethanol production results in approximately 0.3 ton of DDG. This product has a feed value that is about the average of corn and soybean meal as used in cattle feeding (based on a protein content of DDG of 27 percent, compared with 48 percent for soybean meal and 10 percent for corn; and the fact that a 50-50 combination of corn and soybean meal also has about the same caloric energy content as DDG). Therefore, USDA analysts consider that each ton of corn used in ethanol production reduces the demand for feed corn by 0.15 ton and soybean meal by 0.15 ton.

to farmers, and in the face of historically low commodity prices since 1998, have maintained policies that have forestalled output reductions that these low prices would otherwise have induced. This chapter has considered in detail the effects of policies for grains and oilseeds since the FAIR Act of 1996.

The findings are that the combination of loan deficiency payments, direct but decoupled PFC payments, and crop insurance subsidies increased U.S. production of grains and soybeans about 4 percent above what it would have been in the absence of those programs during 1999–2001. The world price effects likely averaged roughly a 5 to 8 percent decline, although this is difficult to gauge because of uncertainty about price responsiveness to U.S. quantities over a multi-year period. However, the CRP is estimated to have had a roughly offsetting negative effect, albeit more pronounced in wheat and less pronounced in soybeans and corn, in reducing U.S. output and hence increasing world prices. Still other programs, including research and extension, farm credit, and export marketing assistance, contributed to downward effects on world prices. These effects are undoubtedly important, especially the long-term cumulative effects on the downward trend in real commodity prices, but no attempt was made in this chapter to quantify those effects, and there are no well-established empirical findings on the subject available in the literature.

The 2002 U.S. Farm Act commits substantial sums to commodity support, and does so in ways likely to be more production-inducing than the FAIR Act programs. But the effects remain only marginal, and are arguably not commensurate with the huge international outcry that the Act has generated.

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Chapter 4

Reforming the European Union Common Agricultural Policy

Jean-Christophe Bureau

The 1957 Rome Treaty set the basis of the Common Agricultural Policy (CAP). The creation of the European Agricultural Guidance and Guarantee Fund (FEOGA) made it possible to finance the Common Market Organizations (CMOs) aimed at supporting and managing markets. Because one of the objectives was to ensure a safe supply of food for European consumers, the policy aimed at boosting production in the Community, which in 1962 only produced 80 percent of its food consumption, and where memories of food shortages were still recent. Administrative prices were set at a level that exceeded world prices and an intervention mechanism ensured a guaranteed outlet for all quantities produced.

The CAP was the first and remains the major common policy. It has helped European Union integration and has served as an experimental field for the functioning of an economic as well as political union. The CAP has successfully accompanied one of the most dramatic economic transitions in Western Europe, that is, the rapid shift from an agrarian society to an industrial and service economy: between 1950 and 1990, some 20 million farmers left the agricultural sector (compared with 4 million in the United States).

However, setting institutional prices at a high level led to surplus production. High prices drove resources to production of the most supported commodities and lowered demand. The decisionmaking process, in particular the permanent need for compromises in the so-called "marathon" negotiations on institutional prices, had an inflationary effect on agricultural prices. Technical change played a major role by lowering unit production costs, while open-ended intervention led to considerable quantities stored in public stocks. The disposal of surplus in the 1980s involved large budget costs, which were inflated by the negative effect of European export subsidies on world prices. Intervention provided incentives for producing large amounts of low-cost products, regardless of the quality. The CAP has also contributed to increased use of chemical inputs, intensification of agriculture, and regional specialization. This has proved particularly damaging to the environment, in particular to the quality of groundwater and rivers. Finally, the CAP policy instruments failed to provide decent income to a large share of farmers. Price supports mainly benefit larger producers and lead to larger consumption of intermediate inputs, creating a rent that capitalizes on the price of land.

A SUCCESSION OF REFORMS

In the 1990s, the increasing imbalance between supply and demand and budgetary expense created considerable pressure for CAP reform. The cereal sector raised particular problems, since high prices of European Union wheat and corn had led the feedstuff industry to look for cheaper substitutes. Pig and poultry producers were using marginal quantities of European Union grains, but increasing quantities of imported cassava or corn gluten feed. The situation was such that taxpayers had to subsidize exports of products that were so expensive that they could not find an outlet in the European Union market, while consumers imported substitutes.

The 1992 reform of the CAP was a considerable change, following decades of ineffective policies aimed at curbing supply. The central aspect of the reform was to cut the support price for grain by 35 percent (Appendix Table 4–1). The purpose was to make European Union cereals more attractive to the animal feed industry. Area-based payments on acreage devoted to cereals, oilseeds, and protein crops were designed to compensate for the price decrease. Beyond a certain farm size, these payments were conditional on setting aside a portion of the arable land, in a proportion that, in practice, turned out to be set annually, between 5 and 15 percent. Farmers received payments for the set-aside land, where they were allowed to grow nonfood (mainly energy) crops. In the beef sector, existing premiums per head of cattle were increased to compensate for a 15 percent reduction in support prices. The reform also included agri-environmental measures to encourage less intensive farming, environmental protection, reforestation of agricultural land, and an attractive early retirement scheme.

The reform fell short of initial proposals. The sugar, wine, and fruit and vegetable sectors were not reformed. Direct payments kept providing significant incentives for extra production in both the arable crops and beef sectors. The reference production level was determined on the basis of a reference (regional) yield, but remained coupled with the acreage in production. In the beef sector, payments were a function of the number of head of cattle and, in spite of stocking density limitations, still provided incentives for production. However, the 1992 reform was a breakthrough in the history of the CAP.

The Agenda 2000

At the end of the 1990s, talks with the Central and Eastern European countries reached the point where the CAP needed to account for future enlargement. In addition, the Uruguay Round Agreement had set a limit on export subsidies, making it more difficult to sell quantities purchased by public intervention on the world market. The European Commission therefore proposed deepening the 1992 reform, and curbing the evolution of the CAP toward fewer incentives for production but more incentives for the provision of positive externalities.

The Agenda 2000 agreement reached in 1999 shapes the CAP until 2006. It sets a ceiling for CAP expenditures over the 2000–06 period, with an average level of 40.5 billion euros a year plus 14 billion for rural development as well as veterinary and plant health measures. Intervention prices for cereals and beef experienced an additional decrease, and were again (partially) compensated by direct payments (Appendix Table 4–2). Although direct payments remain the dominant instrument, it is clearly stated that rural development is the "second pillar" of the CAP. The reform aims to reorient the CAP toward measures in favor of a multifunctional, sustainable agriculture, including in regions facing particular difficulties. It emphasizes maintenance of the landscape and the countryside to respond to consumer concerns and demands regarding food quality and safety, environmental protection, and maintaining animal welfare standards. Although the second pillar only represents a small share of the budget, the changes in 1999 were considerable (Appendix Table 4–5). In addition to recognizing the traditional roles of agriculture, such as producing food and raw material, the reform emphasizes new functions: agriculture must contribute to regional planning; complement other industries and tourism; and meet environmental requirements, including conserving land, maintaining biodiversity, and protecting the countryside.

Ten Years of Reformed Common Agricultural Policy

The 1992 reform was successful in many aspects. In the grain sector, a consequence was the larger use of local grain production (barley, wheat, and maize). The volume of grain used as compound feedstuff rose from 82 million tons in 1992 to 117 million tons in 2001. Guaranteed prices were brought close to world prices, especially in the wheat sector, making it possible to limit export subsidies. In the beef sector, intervention stocks, which exceeded 1 million tons before the reform, fell to almost nothing in 1995, even though the Bovine spongiform encephalopathy crisis subsequently resulted in a fall in demand, making the effect of the 1992 reform less apparent.

Prior to 1979/80, the agricultural population decreased at a very fast rate (3 percent a year, reaching 5 percent during 1987–90). Since 1995, the reduction in the agricultural labor force has eased off (1.7 percent a year), largely because of the 1992 CAP reform. During the implementation period of the 1992 reform in 1992–96, agricultural income increased by 4.5 percent in the European Union because of the combination of high world prices and direct payments. However, at the end of the 1990s, world prices decreased and producers relied more and more on direct payments. The 1999 reform brought the CAP even closer to market mechanisms. However, the reforms have had the following questionable effects:

- The effect of the reform on intensive practices has not been clearly visible. The partial decoupling of direct payments may have limited the historical trend of using more capital and intermediate inputs, but yields have kept increasing in most crops.
- The 1992 and 1999 reforms resulted in increased budgetary outlays. The decrease in storage expenditures was more than offset by the increase in direct payments. This reflects the fact that the burden of farm support has shifted from consumers to taxpayers.
- While the shift from market price support to direct payments is likely to have increased the efficiency of transfers as well as transparency, the amount of payments is such that they now exceed the net agricultural income of a large number of farms. This has raised problems in terms of the acceptability of the reforms because farmers feel that their work is not remunerated and that they receive assistance. Because they replaced price instruments, direct payments have not contributed to the decrease in inequalities in farm support. Larger farms simply

receive larger payments. The large support directed to (mostly Northern European) arable crops has become more visible, but the imbalance in support between sectors and countries has remained intact.

THE COMMON AGRICULTURAL POLICY IN 2002

Market Organizations

Most CMOs combine market management and protection from third-country exports, as well as export subsidies to dispose of surplus produce. For many products, including grains, butter, milk powder, sugar, and beef, special intervention bodies purchase excess production in order to guarantee a floor price to producers. For some other products, this goal is achieved by financial incentives to encourage private storage in periods of excess production (wine, pork, and some fruits and vegetables). Direct payments are a large component of the CMOs in the arable crop and beef sectors (Appendix Tables 4–4 and 4–5).

Several CMOs condition support on limitations in supply. In the case of cereals and oilseeds, per hectare payments are conditional on setting aside a certain percentage of the land in arable crops. In the case of milk and sugar, administrative prices are guaranteed under the constraint of respecting a production quota. In the case of sugar, tariff rate quotas are combined to ensure a high European Union internal price, while producers pay the cost of disposing of production in excess of the quota through producer levies. Support in the beef sector takes several forms: a guaranteed price, aid for private storage, and aid per head of cattle, on the basis of a fixed reference and subject to stocking density limitations.

The Second Pillar of the Common Agricultural Policy

Concerns emerged in the 1980s that agriculture had positive externalities. Indeed, the decline in the farm population had cumulative effects in some areas, leading to closing schools and reducing public services, which made rural areas less attractive. Supporting infrastructure and activities that are not directly linked to production is seen as a way to revitalize the countryside and generate public goods.

The Agenda 2000 laid the foundation for a rural development policy that supplements market-focused policy. In European Union jargon, rural development includes structural policies as well as policies that focus on economic development in rural areas, not necessarily tied to agricultural production. That is, it refers to agri-environmental policies and investment, settlement of young farmers, training, early retirement, support to areas with natural handicaps (for example, mountains) and areas subject to environmental constraints, forestry, improvement of processing and marketing of agricultural products in rural areas, and diversification of rural areas. The expression "second pillar" of the CAP is meant to show that rural development is considered to be of equal importance to market support in the CAP. The rural development measures funded by the guarantee section of the FEOGA amount to an annual average of 4.3 billion euros (constant 1999 prices) over the 2000–06 period. The second pillar CAP represents roughly 16 percent of the total FEOGA budget (Appendix Table 4–3).

Farm Support

The general budget of the European Union is currently 89 billion euros per year. Agriculture accounts for almost half of the expenses of the European Union budget. The Agenda 2000 package established a seven-year financial framework taking into account changes such as further enlargement of the European Union and reforms in spending policies such as agricultural and structural funds. Spending throughout 2000–06 will remain within the ceiling agreed for 1999, that is, 1.27 percent of the European Union's gross national product.

Budgetary outlays do not provide a complete picture. Focusing on production support, it is necessary to take into account transfers from consumers. Focusing on overall transfers, it is necessary to include payments (including domestic payments) to the agricultural sector, although they are not directly tied to production. The Organisation for Economic Co-operation and Development (OECD) calculates the producer support estimate (PSE), an indicator of the annual monetary value of gross transfers to agricultural producers arising from policy measures that support agriculture. The PSE expresses support to producers relative to the value of total production plus budgetary support. The OECD compiles other indicators that include transfers not directed to producers. The total support estimate is an indicator of the annual monetary value of all gross transfers from taxpayers and consumers arising from policy measures that support agriculture, net of the associated budgetary receipts (Appendix Table 4–6).

The PSE amounts to roughly 104 billion euros in the European Union, far more than transfers to producers that were identified in the FEOGA budget. In spite of a significant reduction since the 1980s, market price support is still the dominant way to subsidize producers, and amounts to 60.6 billion euros. Support for producers represents 35 percent of the gross receipts of the sector, compared with an OECD average of 31 percent. Among OECD members, Iceland, Japan, Korea, Norway, and Switzerland are the only countries that display a higher PSE percentage.

In the European Union, the PSE percentage for arable crops is between 40 and 50 percent. The PSE is 40 percent for milk, 46 percent for poultry, 20 percent for pork, 91 percent for beef, and 72 percent for sheep. The data on the total support estimate show that under the current CAP, transfers from taxpayers (mainly budgetary expenses such as direct payments and general services) are roughly equivalent to transfers from consumers (mainly transfers induced by market prices). This results from the successive policy reforms that have made support more transparent through a decrease in price intervention and greater use of direct payments.

THE COMMON AGRICULTURAL POLICY AND THIRD COUNTRIES

The European Union's Agricultural Trade

The European Union remains a net importer of agricultural and food products. Its external trade data show that agricultural and food imports amounted to 182.1 billion euros, while exports amounted to 177.5 billion euros. The largest imports are not in the oilseed sector (7.6 billion euros) or the coffee and cocoa sector (respectively, 6.7 and 6.4 billion euros), but in the meat sector (17.5 billion euros) and the dairy sector (16.4 billion euros). The European Union's trade deficit, however, is largest in the fruit sector (5.4 billion euros) and the oilseeds and coffee sectors (4.4 billion euros each). In spite of the considerable imports, the European Union is a net exporter of meat (surplus of 1.9 billion euros).

In the grain sector, European Union exports remained relatively constant over the 1992–2001 period. The increase in production was used domestically, thanks to the constant decrease in prices over the period. Imports have surged since 2000, with some 11 million tons of wheat imported from Russia and Ukraine, due to very low prices. The European Union, which is structurally a net exporter of wheat, became the largest importer in the world in 2001.

The European Union is the largest importer of oilseeds. The low ratio of self-sufficiency in proteins (25 percent) is a matter of concern for some policymakers as well as farm organizations, which fear the effect of an international crisis (such as an embargo) on the European Union's livestock sector. This effect has been magnified by the Agenda 2000, which, by reducing the level of direct payments for oilseeds, has resulted in a decrease in oilseed production. The trade deficit is covered mainly by imports of soybeans, making the European Union the largest importer in the world.

The European Union is a net exporter of beef and live animals. However, with the decrease in the amount of export subsidies allowed, the surplus has decreased significantly since 1992, and the Bovine spongiform encephalopathy crisis resulted in a collapse of European Union exports at the end of the 1990s. In the lamb sector, the rate of self-sufficiency of the European Union has fallen to 80 percent, due to increasing imports since 1992. The European Union is a net exporter of dairy products. However, imports increased over the 1995–2000 period (from 1.6 to 2.7 million tons of milk equivalent), while exports decreased significantly (from 12.7 to 10.6 million tons).

Third countries have criticized the overall effect of the CAP on world markets. The Cairns Group as well as the U.S. Department of Agriculture stress that the CAP is one of the most disruptive policies as far as world markets are concerned. They claim that CAP market support mechanisms impose a huge cost on agricultural exporters. While it is clear that the CAP imposes some negative externalities on other exporting countries, recent simulations suggest that, because of the production-limiting effect of the dairy quotas, biofuel programs, and mandatory set-asides, the impact of the CAP on world markets is perhaps more ambiguous. Box 4–1 describes some general and partial equilibrium simulations.

The European Union and the World Trade Organization Discipline

The Uruguay Round

The 1994 Uruguay Round discipline has had only a limited direct impact on European Union agriculture because it imposed few constraints in the short run. However, it has had considerable indirect impact by putting pressure on European Union decisionmakers for long delayed but necessary reforms.

The 36 percent decrease in tariffs that followed the Uruguay Round Agreement has not fundamentally changed the level of protection in the European Union. The references that were used for the calculation of tariff equivalents gave some degree of freedom. High tariffs have persisted on most sensitive commodities. Some particular

Box 4–1

The International Effects of the Common Agricultural Policy

General Equilibrium Simulations

Most of the simulations conducted with computable general equilibrium (CGE) models rely on the same dataset, that of the Global Trade Analysis Project, which fails to capture the complex preferential agreements that exist in the European Union's tariff structure. Nevertheless, the models provide useful information on linkages with other sectors, and their theoretical properties improve consistency in the results.

Simulations with the standard version of the Global Trade Analysis Project (GTAP) model suggest that the CAP boosts agricultural production in the European Union by 50 percent. The impact of the CAP is, according to this model, particularly high in the nongrain crops sector. The CAP would be responsible for a decrease of more than 70 percent in dairy exports in the United States and Canada, and a decrease in crop exports of between 25 and 46 percent. Restrictions on the European Union's market access for food products would be responsible for a 50 percent decrease in dairy output for Australia and New Zealand, compared with a hypothetical situation without the CAP. Without the CAP, world prices of sugar could increase by as much as 38 percent (figures from Borrell and Hubbard 2000, based on the standard version of GTAP; see Hertel (1997) for details).

Partial Equilibrium Simulations

The recent USDA Economic Research Service/Penn State World Trade Organization model is a multi-commodity, multiple-region, dynamic model of agricultural policy and trade that provides a much more detailed disaggregation of commodities than most CGE models. Simulations suggest that if price intervention and export subsidies were eliminated in the European Union, leaving the present tariffs in place for agricultural goods, the largest internal European Union impacts would be in the dairy, coarse grains, and beef sectors, with a decrease in European Union output ranging between 6 and 8 percent. If agricultural tariffs were also eliminated, European Union production would fall in the case of sugar (–52 percent), beef (–40 percent), milk (–20 percent), butter (–44 percent), wheat (–8 percent), and corn (–34 percent). The model suggests that unilaterally ending the CAP (tariffs, export subsidies, intervention prices, and mandatory set-asides) would not result in a considerable change in these results (Stout, Leetmaa, and Normile 2002).

Using a partial equilibrium model, the Food and Agricultural Policy Research Institute recently investigated the effect of removing the CAP as well as the agricultural policies of other developed countries. The removal of all border measures, including all tariff quotas, tariffs, and direct export subsidies, would lead to substantial but heterogeneous terms-of-trade effects. Most world prices would increase, except for oilseed meals. Dairy prices would exhibit the highest increases, followed by those in the meat and crop categories. Significant expansion of production would occur in countries that are natural exporters, such as Brazil, Argentina, Australia, and other countries competing with the United States in world markets. However, the simulations show that the removal of all domestic farm programs would not have much impact on world prices, with the exception of butter and cotton. The main reason is the production-limiting programs that (partially) offset the effect of farm support. Much of this is due to the effect of set-asides on European Union grain production. The contention that the CAP depresses world prices should be qualified carefully in light of this result (FAPRI 2002).

commodities, such as fruits and vegetables, are still partially isolated from world market prices. In other cases, the special safeguard clause can be invoked and results in extra duties if imports surge or import prices fall below a certain threshold (for example, for sugar and butter).

One of the main consequences of the Uruguay Round has been the conversion of the CAP variable import levies into bound tariffs. That is, internal European Union prices are no longer isolated from fluctuations in world market prices. In spite of high tariffs, for low levels of the world price, imports are able to compete with domestic products (such as wheat and high-quality beef). For commodities such as cheese, the Uruguay Round resulted in a significant flow of imports. For a large range of products, minimum access provisions led to the opening of tariff rate quotas. It was also largely because of the market access arrangements that in 2001 the European Union became the world's largest importer of wheat. More importantly, market access provisions have had a significant long-run impact by constraining the setting of intervention prices. The indirect effect was the change in the intervention system that took place in the late 1990s in the case of cereals, beef, and wine.

The internal support measures of the Uruguay Round Agreement on Agriculture have not imposed major constraints on the CAP. Most direct payments for beef and arable crops do not enter in the calculation of the aggregate measure of support. This has exempted a large share of the CAP from the domestic support reduction discipline. The Uruguay Round has nevertheless had an indirect effect by constraining the domain for possible reform of the CAP. Trade-distorting instruments could not be expanded, and all the CAP reforms and reform proposals after the Uruguay Round have steered away from the traditional solutions of increased reference prices and coupled payments. It is anticipated that the future of the blue box in the ongoing negotiations is, at best, uncertain, adding pressures for a CAP reform.

The cap on export subsidies has so far been the main constraint on the CAP imposed by the Uruguay Round (Appendix Table 4–7). Basically, beyond a certain quantity, the commodities purchased by public intervention can no longer be sold on the world market, the world price being lower than the intervention price. European Union exports benefited from high world prices in the late 1990s, and subsequently from the depreciation of the euro. This has limited the effect of the constraints on export subsidies. However, the prospect of piling up stocks that could not be disposed on the world market has been a major motivation for the Agenda 2000 reform, in particular for the decrease in intervention prices. This also played a significant indirect role in the reform of the beef and wine CMOs. From this point of view, the external constraint of the World Trade Organization (WTO) proved politically useful for imposing on some member states a reform that was useful for domestic reasons.

Not So Fortress Europe

There has been a lot of controversy on the actual level of tariffs in the European Union. Estimates of the European Union's average agricultural tariff range between 10 and 30 percent (Appendix Tables 4–8 and 4–9). There are three main reasons for this broad range. First, most studies rely on bound tariffs, that is, the tariffs the European Union applies under the most favored nation (MFN) clause. The data are readily available, since this is the official list of tariffs submitted to the WTO. However, half of the value of agricultural imports in the European Union enter under preferential agreements, at a much lower tariff than the bound tariff. The use of the customs dataset (TARIC) is necessary to capture the whole extent of these agreements, but this dataset is particularly user-unfriendly.

Second, the European Union tariff structure is very complex, with a large number of specific tariffs (that is, in euros per ton, liter, or head). In order to construct useful indicators, they need to be converted into ad valorem (percentage) tariffs. This introduces a bias in the appreciation of the overall effect of the tariff (a specific tariff affects low-unit-value commodities more than high-quality products). In addition, the price used for the conversion has, in practice, a considerable impact on the value of the ad valorem equivalent (see the difference in results between Bureau, Fulponi, and Salvatici (2000) and Gibson and others (2001), who use similar initial data on bound tariffs).

Third, there are several ways to construct average tariffs. Using a simple arithmetic mean and a trade-weighted average leads to different results because of the large quantities of commodities such as coffee or soybeans that are imported with very low tariffs. Bureau, Fulponi, and Salvatici (2000) show that in spite of imperfections, the trade-weighted average provides a better estimate than a simple, nonweighted average.

When accounting for imports under preferential agreements and using a trade-weighted mean, the average European Union applied tariff in agriculture is less than 10 percent (figure based on TARIC; see Gallezot 2002). The overall bound tariff that WTO members face under the MFN clause is 18 percent (Bureau, Fulponi, and Salvatici 2000). There are relatively few very high tariffs (only 8 percent of bound tariff lines are greater than 50 percent ad valorem equivalents). This suggests that the protection of what is called "fortress Europe" is sometimes overestimated. The European Union is indeed the largest importer of agricultural and food products in the world. Imports of coffee, cocoa, soybeans, cassava, and palm oil, for example, which account for considerable quantities, face zero tariffs (although a 7.5 percent tariff is applied on roasted and processed coffee imports on an MFN basis, suggesting tariff escalation).

However, these relatively low figures result from the many tariff concessions made to a group of countries. Countries that are excluded face (high) bound tariffs. In addition, tariff peaks are concentrated in specific sectors that are seen as crucial by other countries because they could represent large market opportunities. Would-be exporters from the Cairns Group in multilateral negotiations, or Mercosur countries in bilateral negotiations, face very large tariffs in the beef sector (European Union tariffs exceed 80 percent), the sugar sector (they exceed 65 percent), and the dairy, grain, and fruit sectors.

Nontariff Barriers

There are not many estimates of the impact of nontariff barriers. A 1997 study by the U.S. Department of Agriculture suggests that European Union regulations imposed a loss of 900 million dollars on the U.S. food export sector. However, the study was based on industry surveys and the measures considered are not always clear trade barriers, since they also apply to domestic goods. Fontagné and Mimouni (2001) survey regulations on some 4,917 products and identify as technical barriers those measures that affect trade of particular products only in a small percentage of countries. They show that sanitary, phytosanitary, and environmental barriers are much less a trade obstacle in the European Union than in Cairns Group countries or even some developing countries. Overall, these measures affect three times fewer products in the European Union than in the United States or Canada.

Observers often mention the lack of measures to restrain invasion of pests and unwanted species in the European Union, as well as the poor capacity of European Union countries to perform border inspections compared with countries such as Australia, Japan, and the United States. Nevertheless, many developing and transition countries have complained that they were hurt by European Union sanitary and technical standards. More generally, European Union standards on hygiene and capacity control make it difficult for small businesses in the Central and Eastern European countries to comply. The issue is particularly difficult for African and Asian countries. The recent (temporary) import ban on some fish products from Eastern Africa, for example, had dire consequences for the local producers. The low standards for aflatoxins that the European Union plans to implement might constitute a considerable obstacle to exports of grain and dried fruits from developing countries (Otsuki, Wilson, and Sewadeh 2001).

Administrative barriers can also impede trade. The European Union has a reasonable record in terms of import license administration compared with other OECD countries (Bureau and Tangermann 2000). However, in some preferential agreements, in particular with Mediterranean countries, a complex system of administration of tariff rate quotas has an impact on trade, and may shift the rent to importers (García-Alvarez-Coque 2002). The rules of origin regulations are strictly applied, and the definition of "sufficient transformation" for a product to be declared as originated in a particular country creates difficulties for would-be exporters under preferential agreements.

Domestic and import regulations that do not primarily have protectionist purposes may have significant effects for would-be exporters to the European Union. In the European Union, consumer organizations are particularly vociferous and impose regulations that are stricter than in other countries in areas such as biotechnology. For example, the ban on imports of hormone-treated beef was seen as an illegitimate nontariff barrier by the United States. The United States imposed 114 million dollars of retaliatory tariffs after a WTO panel and the appellate body concluded that the European Union had not provided enough scientific evidence to justify its ban. However, most of the European Union population opposes the use of such hormones, and the ban was endorsed by a democratically elected parliament (the ban also applies to domestic production). Although this has not led to a WTO challenge, the mandatory labeling of genetically modified food in the European Union is also seen as a trade barrier by the United States. However, the assumption that this measure has not been taken for protectionist purposes cannot be defended. It has clearly been imposed by the pressure of worried consumers, while most producers were willing to adopt genetically modified material.

The situation where public opinion imposes stricter rules and trade policy is constrained by international agreements such as the Sanitary and Phytosanitary Agreement sometimes puts the European Union in a difficult position. For example, the use and marketing of bovine somatotropin (BST or rBGH) is banned in the European Union. The official reason is the effect on animal welfare and the fact that it causes mastitis and therefore creates hygiene problems for milk, but the real motive is that consumers oppose the use of such hormones even though they cannot be detected in milk. Because of international agreements, the ban is not applied to imports from the 25 countries or so where BST is permitted. This creates significant distortions of competition, since BST is said to increase yields by some 8 to 10 percent. The issue of the competitiveness of European Union products is likely to become a problem in the future, given that consumers impose stricter standards than the international standards on animal welfare, environment, and social issues, while trade is increasingly liberalized.

Tariff Quotas

The Uruguay Round Agreement stated that, starting in 2000, the European Union and other WTO members must leave access to imports for amounts that represent 5 percent of domestic consumption. These provisions are referred to as "minimum access." In addition, it was agreed in the Uruguay Round Agreement on Agriculture that preexisting access had to be preserved. That is, access conditions for historical import quantities had to be maintained (provisions referred to as "current access"). For a number of products, the European Union opened up tariff rate quotas (TRQs) in order to meet the obligations of current access. When traditional imports did not represent a sufficient percentage of domestic consumption, TRQs were also opened so as to meet minimum access commitments. Altogether, the European Union established 87 TRQs, out of the 1,370 TRQs established by 34 WTO member countries.[1]

Under current access, the ratio between within-quota tariffs and above-quota tariffs varies widely across products. Individual TRQs reflect their historical origin, and hence the (usually) low levels of protection that the European Union had historically agreed upon with the concerned exporting countries. For most minimum access TRQs, the European Union has set within-quota tariffs at a universal percentage (32 percent) of over-quota tariffs and has not distinguished between less and more sensitive products.

Bureau and Tangermann (2000) show that fill rates of TRQs in the European Union have been reasonably high and have increased over time. Some of the larger current access quotas for feedstuffs have exhibited low fill rates, mainly because the significant cut in European Union cereal support prices has resulted in a decline in import demand. Bureau and Tangermann conclude that, overall, the European Union has played a reasonably fair game as far as TRQs are concerned, and that the separate notification of minimum access and current access quotas makes the system more transparent than for most WTO members using TRQs. However, concerns remain about the exact articulation of regional agreements and the quotas under minimum access. The European Union has indicated in its schedule that imports under the (preferential) Central Europe an agreements could be counted against certain quotas. Third countries fear that this could result in the Central and Eastern European countries taking greatest advantage of the European Union's increase in market access.

Preferential Agreements

In 2002, only nine WTO members were subject to exclusively MFN treatment in all product categories: Australia, Canada, Chinese Taipei, Hong Kong China, Japan, Korea, New Zealand, Singapore, and the United States. All other countries benefit from preferential access for some products.

[1] It is important to stress that the economic importance of the imports covered varies widely. For example, in the European Union, TRQ volumes are as little as 300 tons of meat or 129 tons of poultry, while some other TRQs deal with 2 million tons of maize, 34,000 tons of tenderloins, or 2.2 million tons of bananas. The number of TRQs therefore has little meaning.

One of the oldest regional agreements is the European Free Trade Association (EFTA). Over time, many members have joined the European Union. However, the agreement still involves Iceland, Norway, Liechtenstein, and, for some aspects, Switzerland, which benefit from preferential tariffs for some goods, such as cheese, processed foodstuffs, wine, and fish. The European Union has a free trade agreement with Israel, which, for agricultural products, mainly involves fruits and vegetables, and covers 85 percent of Israeli agricultural exports to the European Union. The European Union also admits a quota of citrus from the occupied Palestinian territories.

The 1999 agreement with South Africa raised controversial issues on appellations of origin, fisheries, wine, and spirits, which were finally resolved in 2002. The agreement involves almost total liberalization of trade by 2012, including 60 percent of agricultural trade and partial liberalization of 13 percent of other agricultural goods (exceptions include beef, sugar, fruits, and vegetables). South Africa is now excluded from the trade regime of the Lomé/Cotonou Protocol. The 2000 free trade agreement with Mexico focuses mainly on industrial products. It covers 62 percent of bilateral agricultural trade, but excludes meat, dairy, and cereals until 2003. The agreement provides access for Mexican fruits, beer, and liquor. Some concessions, including cut flowers and fruit juices, are provided within quotas.

Free trade agreements are also being used as an instrument to integrate the Western Balkans. These agreements seem to create some problems of re-exportation from the Balkans of imported products, raising the issue of the rules of origin (a recent problem with sugar imports from Croatia, which turned out to be cane sugar).

However, the agreements that have the largest impact on the European Union's agricultural sector are the Generalized System of Preferences, the Lomé/Cotonou Agreement, and the association agreements with the Central and Eastern European countries. Two negotiations with potential major implications for European Union agriculture are also under way, one with Mediterranean countries, and the other with Mercosur. The Everything But Arms agreement could also have significant impact on agriculture in the longer run.

Central Europe

The Central Europe association agreements were signed in 1991 (Hungary and Poland), 1993 (Romania, Czech Republic, Slovakia, and Bulgaria), and 1995 (Latvia, Estonia, Lithuania, and Slovenia). All entered into force between 1994 and 1996. Protocols on reciprocal tariff concessions on agricultural products raised the share of duty-free agricultural exports from the 10 Central and Eastern European countries to the European Union to 75 percent and the share of European Union duty-free exports of agricultural products to the Central and Eastern European countries to 61 percent. The U.S. administration believes that the Central and Eastern European countries actually capture the largest share of the European Union minimum access TRQs for pork and butter and a substantial share for milk powder and poultry meats (minimum access quotas are normally not allocated to particular countries). It is planned that 10 new members join the European Union in 2004, including the Baltic countries, Cyprus, Malta, and the Central European countries (Bulgaria and Romania will join in a second wave). Box 4–2 provides some indications on the planned effect of enlargement.

Box 4–2

The Impact of European Union Enlargement on Markets

In March 2002, the Commission analyzed the impact of European Union enlargement on agricultural markets. The assumption was that the 10 Central and Eastern European country candidates would become members in 2007. (It turns out that Bulgaria and Romania will actually join in a second phase.) Several scenarios were investigated: adhesion without direct payments, adhesion with the direct payments based on historical references, and adhesion with the references proposed by the Central and Eastern European countries.

With the integration of the Central and Eastern European countries, cereal production in 2007 would reach 315 million tons, compared with 221 million tons in the European Union-15. Cereal uses would modestly expand, and the surplus would increase to levels close to 40 million tons (mainly wheat, but also barley and rye; the European Union-25 would remain a net importer of maize), compared with 24 million tons without accession. In 2007, the granting of full direct payments would increase production of cereals in the Central and Eastern European countries to approximately 5 million tons more than the implementation of the CAP without direct payments. In all scenarios, the EU-25 would keep importing some 20 million tons of oilseeds.

Pork production would increase in the EU-15, which would compete successfully with new members, at least until 2007. Production in Central and Eastern European countries would likely increase afterward. Overall, the EU-25 surplus would be likely to increase by between 1 and 2.5 million tons, depending on the scenario, while surplus in poultry would increase by 0.7 million tons.

The beef market in the EU-25 would depend on the level of milk quotas. Enlargement with the CAP direct payments would lead to a surplus of lower-quality beef produced in the Central and Eastern European countries. Despite a forecasted increase in the consumption of fresh dairy products and cheese, surpluses of butter would continue to increase in the EU-15, and the new members might bring in some additional market surpluses.

The Generalized System of Preferences

The Generalized System of Preferences (GSP) was initiated by the European Union in 1971, and then adopted by other countries. It gives preferential European Union market access to products originating from developing countries. Since 1996, new rules account for the level of development of the beneficiary countries in order to calculate preferential margins. Access is limited for a country that would account for a large share of the European Union's imports under this arrangement, in order to spread the benefits across a large number of countries. This limits the exports of, say, beef from Argentina.

A new scheme went into effect in 2002, covering approximately 180 countries. With the exception of the 48 poorest countries, agricultural products are only partly covered. The new GSP provides an additional 5 percent tariff reduction for countries that meet additional environmental and labor conditions. It also has an expulsion provision for those countries that seriously and systematically violate minimum labor standards. Duty-free access is granted to countries effectively fighting drug production and trafficking and those encouraging human rights and protection of the environment. Use of forced labor and money laundering can result in temporary withdrawal of preferences.

The Lomé-Cotonou Agreement

Between 1975 and 2000, four successive Lomé Conventions provided unilateral preferential access to the European Union market for exports from African-Caribbean-Pacific (ACP) countries. Most of the products under a CMO were excluded (with the exemption of fruits and vegetables, which could enter the European Union with low tariffs, but at periods different from the European Union's production period). However, three protocols provided significant access to the European Union market for ACP countries: the sugar, bananas, and beef protocols. Special arrangements within quantitative limits also included horticultural products, tobacco, and rice. Under the agreement, ACP countries have access to the European Community market for 1.3 million tons of sugar and receive the high European Union internal price for this quantity. That is, the European Union imports raw sugar at the European Union guaranteed price. ACP countries benefited from preferential access for bananas (857,000 tons) under a complex scheme (importers of bananas from outside ACP countries were provided import licenses if they also imported ACP bananas).

The United States and Central American countries obtained a ruling of a WTO dispute panel against this import regime. The dispute was subsequently resolved, but involved a revision of the Lomé Protocol. After a period of expanding tariff quotas, a new regime relying only on tariffs will enter into force in 2006. It will result in the ending of large preferences for ACP countries, affecting particularly Caribbean countries. The beef protocol exempted almost totally (92 percent) from tariffs imports from ACP countries, up to a (very) limited quantity.

The unilateral trade preferences for ACP countries under the Lomé Convention were not consistent with WTO rules because they were limited to a subset of developing countries and were unilateral preferences (and therefore not a free trade agreement). In addition, the European Union wanted to apply greater aid selectivity and differentiation in the treatment of ACP countries, to link aid and performance, and to ensure closer involvement of the private sector.

In 2000, a major reform of the relations between the European Union and the ACP took place with the Cotonou agreement, signed with 77 ACP countries. The new agreement is designed to run for 20 years, and includes a budget of 13.5 billion euros for the first five years. It recapitulates some of the arrangements included in the Lomé IV Convention. It also relies on trade preference and technical and financial assistance, but is likely to make the status of ACP countries less specific than it was, compared with other developing countries. The current all-ACP nonreciprocal tariff preferences will be maintained until the end of 2007, when a set of reciprocal economic partnership agreements will normally replace them. These free trade agreements will cover essentially all trade and will include provisions for cooperation and support in areas other than trade (such as structural adjustment).

The Everything But Arms Agreement

In 2001, the European Union amended its GSP to grant duty-free access for all goods except arms to 48 least developed countries. Three of the most sensitive products (bananas, rice, and sugar) are to be liberalized gradually. Import duties on bananas will be suspended as of 2006. European Union imports of sugar and rice from the least developed countries are subject to transition arrangements until 2009.

The Commission has presented this Everything But Arms agreement as a major instrument to support development in the poorest countries, under the principle that trade is better than aid. The shift from aid to market opportunities resulted from a genuine concern about the impact of past European Union policies on these countries. This agreement was signed in spite of the opposition of European Union farmer organizations. The French Ministry of Agriculture, echoing French sugar producers in particular, managed to delay signature for months, but also to delay implementation of the agreement for that commodity for eight years.

Mediterranean Countries

The agreement with Malta grants tariff reductions for products such as fruits, vegetables, and flowers. In the case of Cyprus, a customs union is progressively leading to the phasing out of all tariffs for products such as wine, fruit juice, citrus, grapes, potatoes, and carrots. Farm products are excluded from the 1996 free trade agreement with Turkey, but they benefit from tariff concessions under the previous preferential regime that provides special access (68 percent duty-free and 35 percent subject to reduced duties) for Turkey's agricultural exports. It covers products such as wine, citrus, olive oil, dried fruit and nuts, tobacco, and cereals. Since 1976, the European Union has had agreements with Morocco, Algeria, and Tunisia that provide free access for nonagricultural goods and substantial concessions in the form of tariff reductions of 20–80 percent for agricultural products. The agreement covers products such as wine, citrus, olive oil, fruits, and vegetables. In 1977, the European Union entered the Mashreq agreement with Egypt, Jordan, Syria, Lebanon, and Palestine. This agreement covers tariff concessions for onions, potatoes, beans, tomatoes, citrus, olive oil, and tomato paste. Palestine and Jordan also benefit from a 3,000 ton quota for tomato paste.

The so-called Barcelona process, launched in 1995, has provided a framework for agreements between the European Union and 12 Mediterranean countries. The partnership has three main objectives: to create an area of stability based on human rights and democracy, to improve mutual understanding, and to promote shared prosperity with trade and financial assistance. One of the aims of the Barcelona process is a free trade agreement by 2010. However, agricultural products are largely excluded. Agricultural goods benefit mainly from tariff rate quotas and lower preferential tariffs. Under this framework, agreements have been in force since 1997 with the Palestinian authority, since 1998 with Tunisia, and since 2000 with Morocco and Israel.

A trade agreement with Southern Mediterranean countries that fully includes agriculture could have a significant impact on some of the CMOs, including for politically sensitive products such as tomatoes, citrus, grapes, melon, strawberries, wine, and flowers. This has given rise to serious disputes during the negotiations between European Union members. Several agreements within the Euro-Mediterranean partnership have been delayed by the refusal of formal ratification by European Union member states that object to some agricultural provisions. The reluctance of the European Union to liberalize trade in the agricultural sector is partly caused by the low cost of labor and the comparative climate advantages in fruits, vegetables, and agriculture in the Southern Mediterranean countries.

Mercosur

A cooperative agreement was signed in 1995 between the European Union and the four South American states of Mercosur (Argentina, Brazil, Paraguay, and Uruguay). It fully entered into force in 1999, with three priority areas: strengthening Mercosur institutions, developing economic and trade structures in the region, and supporting civil society. Negotiations for a new interregional association agreement were formally launched in June 1999 in Rio de Janeiro, and there were three years of preparatory work prior to the actual trade negotiations. Mercosur and the Commission presented their respective offers on tariffs in 2001 (Devlin, Estevadeordal, and Krivonos 2001).

While trade is roughly balanced between the two entities, European Union imports from Mercosur include mainly agricultural commodities, and exports include mainly industrial goods. Proposals for liberalizing agricultural trade, a condition for Mercosur to sign an agreement, have so far met strong opposition from some European Union members. As part of a regional negotiation, the European Union has offered to dismantle tariffs over 10 years on around 2.2 billion euros of agricultural exports from Mercosur countries. The European Union offer covers 96 percent of tariff lines (the Mercosur offer is 38 percent). However, for sensitive products (beef, sugar, dairy, and cereals), the European Union has offered to adopt TRQs, a proposal which has so far met little enthusiasm from Mercosur countries. Mercosur countries have proposed a progressive elimination of tariffs on a significant share of imports, but insist that greater access to European Union markets on commodities such as beef and sugar is crucial for an agreement.

The Common Agricultural Policy and Developing Countries

The overall effect of the CAP on developing countries is ambiguous. The Everything But Arms agreement is widely recognized as a major instrument of development. The fact that it includes agricultural products is clearly an opportunity for these countries, which will benefit from high European Union domestic prices. The major expected effects are in the sugar, beef, rice, and banana sectors. Currently, all but two of the least developed countries are net importers of sugar, and they are not likely to become a serious threat for European Union beet producers in the short run, although the export potential of Sudan and Zambia is said to be about 200,000 tons of sugar.

However, in the longer run, the rent provided by high European Union domestic prices may attract significant investment in the sugar sector in the least developed countries that could boost their production potential. In addition to sugar, the least developed countries could rapidly become major exporters of rice to the European Union after 2006, especially because of the provision that re-exports of Asian products are eligible under the agreement if they have been processed in the least developed countries so that the value added has reached 100 percent. Imports of bananas with a zero tariff could also rapidly become very large.

The Lomé Convention has been the most complete framework for North-South cooperation, and opened the European Union market to some 8.3 billion euros of food exports from ACP countries (exports from the European Union to ACP countries amounted to 3.4 billion euros). The sugar protocol has put a considerable dent in the European Union's policy of protecting agriculture. It is estimated that the transfer to ACP countries resulting from the sales of sugar at high guaranteed prices amounts to roughly 500 million euros on average, and up to 1 billion euros in years with a particularly low world price. The banana protocol also provided considerable advantages to ACP countries (partly at the expense of other countries), as did the import regime of fruits and vegetables, since the entry price system acted in a way that was relatively similar to a voluntary export restraint, enabling the exporting country to capture a significant share of the rent (Grethe and Tangermann 1998). For some countries, such as Mauritius, Senegal, and Côte d'Ivoire, Lomé Agreements have been particularly helpful, although the bureaucracy involved in the agreement and the concentration of benefits have often been criticized. (The beef arrangements only provide access to the European Union market for six countries, and under the sugar protocol only five countries benefit from the possibility of exporting more than 100,000 tons.)

However, the CAP creates some unfair competition for developing countries. Forty years of community preferences have hit traditional exporters to Europe (Caribbean and South American countries for sugar, and Southern African countries for beef). For most developing countries, preferential tariffs for limited quantities do not offset the loss of market opportunities because of the high European Union tariffs. This is particularly true for Latin America, which has not benefited from the Lomé Agreement, and which gains little from the GSP.

Domestic subsidies also hit developing countries in the beef, sugar, and tobacco sectors. In the case of cotton, for example, Burkina Faso has complained that European Union producers receive three times more than Burkinabe producers per kilo of cotton, once subsidies are included. (The fact that Burkina Faso has access to the European Union market under the Everything But Arms agreement does not prevent unfair competition in direct payments.) In addition to tariff barriers, developing countries face considerable obstacles to exporting to the European Union. A major problem is conforming to the European Union's high sanitary standards. Measures against pest dissemination are major import barriers for these countries (fruits and vegetables), as are sanitary standards (fishery products and dried fruits).

Some net importing countries have benefited from European Union export refunds and low world prices that were depressed by European Union output subsidies. However, in general, export subsidies have hit farmers in developing countries. British nongovernmental agencies claim that the dynamic Jamaican dairy sector was suddenly swamped and ruined by subsidized powdered milk imported from the European Union. And the dumping of European Union surplus beef on West African markets has deterred domestic production in these countries for decades.

CONCLUSION

Most economists have long acknowledged that the CAP, still mostly directed at supporting production, no longer fulfills the needs of a society that has changed more rapidly than the agricultural policy instruments. For years, critics have focused on the cost that the CAP imposes on consumers through high food prices. They have emphasized that spending half of the European Union's budget on the agricultural sector prevented funding other European policies, such as research and defense. Critics have ridiculed the role of Western Europe as a scientific and political power, and pointed out that the CAP, originally the cement of the European Community, now acts against European integration.

Even those who agree that farmers must be supported acknowledge that the CAP policy instruments are inappropriate and, in spite of recent reforms, still lead to the production of large quantities of low-quality products that are disposed with high costs on the world market. This creates conflicts with other exporting countries, and the subsidized exports inhibit the growth of the developing world by competing unfairly with local producers. In addition, the CAP arrangements disproportionately benefit a small number of producers (half of the direct payments go to only 7 percent of the beneficiaries). That is, the CAP has questionable distributional impacts in addition to a poor record in terms of economic efficiency. Finally, critics point out the negative environmental record of a policy that encourages the use of pesticides and fertilizers.

There are several reasons why a policy so widely criticized from an economic standpoint can survive for decades. A major obstacle to reform is the large rents that have capitalized on asset prices (land, production rights, and implicit premium rights) and have drawn into the sector large amounts of resources that are difficult to value outside the sector (machinery and human capital). A significant reform therefore involves large losses in patrimony for a group of agents, raising social acceptance issues. Another reason lies in the particular decisionmaking procedure and the financing of the CAP, which lead to a situation where an individual country supports costly and inefficient instruments because that country reaps a disproportionate share of the benefits while the cost is shared by all. Other reasons include the overrepresentation of farmers compared with their actual weight in the population; the fact that farmers are still a swing vote in countries with tight elections, such as France and Germany; and the efficiency of farm lobbies in a few influential countries.

However, it is often underestimated that, in many European Union countries, there is a strong willingness to support the farm sector in the public opinion. The CAP would not have persisted so long under the sole pressure of the farm lobby. Many European Union citizens have seen the CAP as a success story that made it possible to maintain small farms and avoid congestion in cities, while eradicating the ghost of food scarcity. This idyllic vision is certainly flawed by a lack of information and the propaganda of producer organizations, but there has been a genuine social preference for supporting farmers. Times are nevertheless changing. There are reasons to believe that the CAP will experience a dramatic change in the coming years. Several incentives for a significant reform are now converging:

- The costs for the taxpayers, which have been reasonably well accepted in the past, now seem out of proportion with the benefits of the CAP to several key contributors to the European Union budget, including Germany. The enlargement of the European Union is likely to increase the bill beyond acceptability.
- The international framework imposes new constraints on the definition of the policy instruments.
- The poor record of the CAP on the environment is becoming more visible. There are now direct costs for some other industries (nitrates have made tap water unfit to drink in many areas, and have led to the closure of some tourist resorts in Brittany, France, for example).
- Recent food scandals, such as Bovine spongiform encephalopathy, have shed new light on the actual nature of agricultural production for urban citizens. Both the perception of the CAP and the implicit support of the population for the cause of the farm lobby are changing dramatically. This aspect should not be

underestimated. It might be the driving force of a deep reform of the CAP in the near future.

In July 2002, the European Commission carried out a mid-term review of the CAP and put forward a proposal that appeared to many observers as surprisingly ambitious. The main innovations of the proposal are the radical degree of decoupling of direct payments. Not only would these payments be grouped into a single premium, based on historical references and independent of both production and inputs, but the payments would be conditional on cross-compliance with environmental, animal welfare, and food quality criteria. A compulsory system of dynamic modulation would help strengthen rural development by transferring funds from the first to the second pillar of the CAP. There would be a long-term set-aside obligation oriented on a nonrotational basis, with necessary land management requirements as part of cross-compliance for direct payments. All these proposals are quite radical, and depart significantly from the present situation, where the second pillar has not translated into a large budget shift, and where its funding (modulation) is an option only for national governments.

The future of the Commission's proposal is uncertain. The October 2002 Franco-German compromise, which led to a freeze of budget expenditures at their 2006 level until 2013, might delay significant reform of the CAP prior to 2006. However, it is likely that future reforms will follow the general guidelines set by the Commission's proposal. Changes like those suggested by the Commission would dramatically increase the market orientation of the CAP and remove any incentive for producing for subsidies or for intervention. The decoupling would contribute to environmental integration by removing production-specific incentives. The reorientation of the support to reward farmers for their environmental, food safety and quality, or animal welfare services matches a long-term trend in the aspirations of European Union taxpayers, who want to see some positive externalities for their money. Such changes would ease the European Union's position in international trade talks, the European Union being presently quite isolated, and help the CAP to adjust to future trade agreements.

Appendix Table 4–1

Selected Institutional Prices in the European Union

Commodity	2001/2002	2006 (under unreformed Agenda 2000)
Cereals (intervention price)	101 €/ton	101 €/ton (+ 344.5 €/ton for durum wheat in traditional areas and 138.9 €/ton in other areas)
Rice	298 €/ton	298 €/ton
Sugarbeets (basic price)	48 €/ton	
Olive oil (target price)	3,838 €/ton	
Milk (target price)	309.8 €/ton	257.2 €/ton
Skim milk powder (intervention price)	2,055 €/ton	1,747 €/ton (–15 percent stepwise, starting in 2005)
Butter (intervention price)	3,282 €/ton	2,790 €/ton (–15 percent stepwise, starting in 2005)
Beef (intervention price for R3 beef carcass)	3,013 €/ton, replaced by a safety net of 1,560 €/ton in July 2002	1,560 €/ton
Pig meat (basic price)	1,509 €/ton	1,509 €/ton
Sheep meat (basic price)	5,401 €/ton	

Note: Figures are rounded.

Source: European Commission, OECD.

Appendix Table 4–2

Area and Per Head Payment Rates in the European Union

Commodity	2001/2002	2006 (scheduled under Agenda 2000)
Cereals (including corn silage)	63 €/t (times the regional reference yield)	63 €/t (times the regional yield)
Oilseeds	72.4 €/t (times the regional reference yield)	63 €/t (starting in 2002/2003)
Protein crops	72.5 €/t (times the regional reference yield)	72.5 €/t
Set-aside payment	63.0 €/t (times the regional reference yield)	63 €/t (times the regional reference yield)
Potato starch	178.3€/t (minimum price) 110 €/t (compensation)	178.3 €/ton (minimum price) 110.5 €/ton (compensation)
Silage grass	63.0 €/t (times the regional reference yield)	63.0 €/ton (times the regional reference yield)
Beef		
Suckle cow premium	182 €/head	200 €/h (starting in 2002)
Special beef premium		
Bull	185 €/head	210 €/h (starting in 2002)
Steer	136 €/head	150 €/h (starting in 2002)
Extensification premium stocking density		
Less than 2 LU/há	33 €/head	Replaced by 100 € if less than 1.4
Less than 1.6 LU/ha	66 €/head	LU/ha, or 80 € if less than 1.4 and 40 € if less than 1.8
Slaughter premium	53 €/head	
Adult bovines	33 €/head	80 €/h (starting in 2002)
Calves		50€/head (starting in 2002)
Milk (direct aid)	0	17.24 €/ton of milk quota
Ewe premium (additional ewe premium in less favored areas)	Based on basic price 5.9 to 6.6 €/head	

Note: An example of a reference regional yield is France, with 5.9 ton/hectare.

Source: European Commission, OECD.

Appendix Table 4–3

Importance of the Two "Pillars" in the European Union's Budget under Agenda 2000

(Billions of euros)

Item	2000	2001	2002	2003	2004	2005	2006	Total
Total CAP	40.92	42.80	43.90	43.77	42.76	41.93	41.66	297.74
Markets	36.62	38.48	39.57	39.43	38.41	37.57	37.29	267.37
Rural development	4.30	4.32	4.33	4.34	4.35	4.36	4.37	30.37

Source: FEOGA budget.

Appendix Table 4–4

Budget Expenditure per Type of Measure, 2000

(Millions of euros)

Product	Expenditure	Product	Expenditure
Arable crops		*Tobacco*	
Export refunds	824	Export refunds	0
Storage	464	Total	989
Area payment	13,156	*Other*	
Total	16,663	Total	350
Sugar		*Dairy*	
Export refunds	1,439	Export refunds	1,671
Storage	312	Storage	201
Total	1,910	Disposal	449
Olive oil		Total	2,544
Production aid	2,177	*Beef*	
Total	2,210	Export refunds	661
Fiber crops		Direct payments	2,928
Cotton	855	Total	4,540
Total	991	*Sheep and goat*	
Fodder		Total	1,736
Dried fodder	313	*Pork, eggs, poultry*	
Total	381	Export refunds: pork	262
Fruits and vegetables		Export refunds: poultry	73
Export refunds	46	Export refunds: eggs	13
Intervention	1,507	Intervention: pork	92
Total	1,551	Total	435
Wine			
Export refunds	21		
Distillation	253		
Other intervention	491		
Total	765		

Source: European Commission.

Appendix Table 4–5

Share of Budget Expenditures by Sector before and after the Common Agricultural Policy Reform

(Percent)

Product	1993	2000
Arable crops	30.7	41.2
Sugar	6.3	4.7
Olive oil	7.0	5.5
Fodder	1.5	0.9
Fiber	2.5	2.5
Fruits and vegetables	4.8	3.8
Wine	4.4	1.9
Tobacco	3.4	2.4
Other crops	0.7	0.9
Dairy	15.1	6.3
Beef	11.5	11.2
Sheep and goats	5.2	4.3
Pigs, poultry, eggs	1.4	1.1
Other animals	0.6	0
Agrienvironmental and rural development measures (guarantee section only)	1	10.3
Total agricultural expenses, guarantee section of EAGGF (millions of euros)	34,590.5	40,466.7
Storage costs (percent)	16	2
Direct payments (percent)	0	63
Export subsidies (percent)	29	1

Source: OECD.

Appendix Table 4–6

Producer Support Estimate by Commodity

(Percent)

	European Union			OECD
Commodity	**1986–88**	**1999–2001**	**2001**	**2001**
Wheat	52	48	44	36
Maize	52	40	37	29
Other grains	56	54	50	39
Rice	55	24	43	81
Oilseeds	59	39	40	28
Sugar	60	52	46	45
Milk	57	44	40	45
Beef	59	84	91	36
Sheep meat	70	61	72	55
Pig meat	7	25	20	16
Poultry	14	43	46	16
Eggs	14	11	8	10
All commodities	42	36	35	31

Source: OECD.

Appendix Table 4–7

European Union Export Subsidies, Notifications to the World Trade Organization, and Ceilings, 2000

Product	Outlay (millions of euros)	Ceiling for year (millions of euros)	Fulfillment (percent)	Quantity (thousands of tons)	Ceiling for year (thousands of tons)	Fulfillment (percent)
Wheat and flour	509.3	1,493.2	34	15,606	15,630	100
Coarse grains	7,030.2	1,158.6	63	18,379	11,412	161
Rice	26.4	40.4	65	140	139	101
Rapeseed	0	30.3	0	0	108	0
Olive oil	0	59.4	0	0	120	0
Sugar (after deduction of ACP imports)	470.1	545.9	86	971	1,330	73
Butter	333.4	1,036.7	32	194	417	46
Skim milk powder	337.8	301.9	112	417	285	146
Cheese	253.8	392.1	60	305	342	89
Other milk products	905.4	763.1	119	1,104	1,004	110
Beef	726.1	1,387.4	52	766	885	87
Pig meat	243.0	210.8	115	694	463	150
Poultry meat	75.1	99.8	75	318	316	101
Eggs	14.1	47.1	30	101	104	96
Wine	26.2	42.8	61	2,387	2,414	99
Fruits and vegetables (fresh)	37.2	57.8	64	873	787	111
Fruits and vegetables (processed)	5.5	9.1	60	108	150	72
Tobacco	0	51.4	0	0	127	0
Alcohol	218.6	105.1	208	1,998	1,198	167
Incorporated products	719.5	475.4	151			

Source: Notifications to the WTO.

Appendix Table 4–8

Average European Union Tariffs for Agricultural and Food Products, 2000

(Average percent)

Type of tariff	Tariff
Bound	
Nonweighted	17.9
Trade weighted	16.8
Applied	
Nonweighted	11.5
Trade weighted	9.9

Note: Bound tariffs are computed using the Geneva List submitted to the WTO. Tariff equivalents are converted into ad valorem by INRA on the basis of a four-year average unit value at the HS-8 level.

Source: Applied tariffs from INRA's TARAGRO database (based on TARIC).

Appendix Table 4–9

Average European Union Tariffs by Sector, 2000

(Bound tariffs, nonweighted average)

Code HS-2	Product	Average ad valorem equivalent of bound tariff (percent)	Value of imports (millions of euros)
01	Live animals	13	4,344
02	Meat	30	17,505
04	Dairy products	46	16,402
05	Products of animal origin	1	1,617
06	Trees, plants, bulbs	5	5,903
07	Vegetables	13	11,220
08	Dried and fresh fruits	12	16,848
09	Tea and coffee	2	6,673
10	Cereals	34	6,783
11	Mill products	19	1,413
12	Oil and oilseeds	2	7,581
13	Resins	2	940
14	Bamboo, raphia	0	171
15	Animal and vegetal fat	6	6,328
16	Meat preparations	21	6,707
17	Sugar	21	4,993
18	Cocoa and chocolate	14	6,378
19	Cereal preparations	20	7,887
20	Fruit and vegetable preparations	25	10,606
21	Other preparations	12	6,925
22	Drinks and liquor	6	16,764
23	By-products of food industry	14	10,446
24	Tobacco	29	7,695

Note: Conversion of tariff equivalents into ad valorem is performed by INRA on the basis of a four-year average unit value at the HS-8 level.

Source: Author's calculations using the Geneva List (WTO) and Comext.

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Chapter 5

Sanitary and Phytosanitary Requirements in Agricultural Trade

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This chapter explores two important and interrelated perspectives for a concrete research agenda that addresses issues and methodologies to evaluate the effects of sanitary and phytosanitary (SPS) requirements on agricultural trade. One deals with the extension of the trade agreement, and the other considers possible changes in trade patterns between developed and developing countries.

SPS measures are designed to protect living beings, such as humans, animals, and plants, and have been increasingly important for international trade of food (agricultural and livestock products). Such measures aim to impede the dissemination of pests or diseases and to ensure food safety for consumers. Due to the complexities of SPS management in a fully integrated world trade system, however, it became necessary to regulate SPS requirements in multilateral trade.

The definition of these regulations has not facilitated agricultural trade liberalization as expected. In principle, the regulations are delineated to facilitate production and exchange, reduce transaction costs, and guarantee quality. However, there have been conflicts between domestic food regulations and the trade system. In addition, it has been observed that regulations may also work, by design or circumstance, to restrain competition (Maskus, Otsuki, and Wilson 2000).

Concurrent with a reduction in tariff and quantitative restrictions on agricultural trade through the Uruguay Round of the General Agreement on Tariffs and Trade (GATT), there has been increasing concern that SPS measures are taking their place as trade barriers (Walker 1999; Miranda 2001). The SPS Agreement of the World Trade Organization (WTO) was meant to distinguish between two functions—protection and protectionism—and to impede the use of the latter.

Despite having been developed and implemented in a multilateral trade framework, the topic has gained interest in regional trade negotiations, such as the Free Trade Area of the Americas (FTAA). An important aspect that must be dealt with in the FTAA negotiations is whether the Sanitary and Phytosanitary Agreement of the WTO favors trade for developed countries to a greater extent than for developing countries, as has been explored in the literature. Although there seems to be evidence that there are disparities between developing and developed countries with respect to the ability (and willingness) to comply with the WTO/SPS Agreement, the issue deserves further evaluation.

There is an increasing need to assess and understand the nature of current trade problems, how they are related to national and multilateral regulatory policies and instruments, and whether there is a need to improve the cohesion between global and national regulatory frameworks. Therefore, the organization of a research agenda to identify major issues and methodological approaches to evaluate the effects of SPS measures on agricultural trade is important not only for national policymakers, but mostly for international institutions to understand current developments and plan for the future.

THE AGREEMENT ON SANITARY AND PHYTOSANITARY MEASURES

The SPS Agreement of the WTO resulted from the upsurge of an impressive number of trade disputes, particularly between developed countries, that could not be resolved under the existing GATT Standards Code or through the prevailing dispute settlement procedures. Concerns were expressed about the effectiveness of these arrangements to prevent the use of technical measures as barriers to trade, since they were not developed for that purpose (Victor 2000).

In fact, although the GATT has provided disciplines for national food safety and animal and plant health protection measures, which affect trade, since its creation in 1948, it contained an exception (Article XX (b)) that became the basis for the SPS Agreement. This exception allowed the implementation of SPS measures, as long as these did not unjustifiably discriminate between countries where the same conditions prevailed or were not designed to be a disguised restriction on trade. This provision allowed, however, more restrictive requirements on imports than those required for the same goods in the domestic context, if the measures were intended to protect human, animal, or plant health (Griffin 2000).

During the Uruguay Round of the GATT, the SPS Agreement was established to address the increasing debate about how standards were being used in international trade of food and agricultural products. It went into force for most members of the WTO on January 1, 1995. Its Article 14 presented provisions that allowed least developed members to delay implementation for five years (Griffin 2000).

As presented by Roberts (1998), the SPS Agreement established international rules on how member countries should apply SPS measures. The Agreement recognizes the right of countries to protect themselves from SPS risks. However, it distinguishes this protection from protectionism, defined as trade barriers over and above what is required to meet the desired level of protection. The SPS Agreement covers all measures whose purpose is to protect human or animal health from food-borne risks, human health from animal or plant-carried diseases, and animals and plants from pests or diseases, regardless of whether these are technical requirements.

There are two general provisions to be followed under the SPS Agreement: (i) the principle of nondiscrimination, as described in Article 2.3 of the Agreement, and (ii) the principle of scientific justification, presented in Article 2.2. The first is equivalent to the GATT basic principle of the most favored nation (MFN). It establishes that a measure shall not discriminate against or between trading partners where identical or similar conditions prevail, or when these are more than necessary to reach its goal of sanitary and phytosanitary protection. According to the second principle, SPS measures cannot be maintained without sufficient scientific evidence (Article 2.2).

The SPS Agreement also contains a number of instruments that can be used to achieve its goal and sustain the general principles, which are discussed below.

Risk Assessment

The SPS Agreement commits members to apply a measure only when it is supported by a risk assessment, such that scientific justification is provided to sustain that the measure required is necessary to assure the required level of protection, as stipulated in Articles 5.1–5.3. It is important to observe, however, that a risk assessment is a necessary but not sufficient condition for an SPS measure to be in conformity with the Agreement.

In order to comply with the nondiscrimination provision, a measure must also be the least restrictive to trade among all the available alternatives that provide a desired protection level. Article 5.5 states that each member is obliged to avoid arbitrary or unjustifiable distinctions in the levels of protection considered to be appropriate, if these distinctions would result in a disguised restriction on international trade, in order to achieve the objective of consistency in the application of SPS measures (WTO 1994; Roberts 1998).

Article 5.7 allows members to adopt temporary measures based on available pertinent information to mitigate unfamiliar risks while collecting additional information that would permit an objective risk assessment and reevaluation of the temporary risk management measure (WTO 1994; Roberts 1998).

Harmonization

Harmonization may be one of the most important tools used in the SPS Agreement to achieve its objectives. Before its establishment, various SPS measures were already subject to harmonization by international organizations. The most important of such organizations are the Codex Alimentarius (Codex) for food safety measures, the International Organization of Epizootics (OIE) for animal health measures, and the International Plant Protection Convention (IPPC) for plant health measures.

Under the Agreement, member countries are encouraged to base their SPS measures on international standards (if they exist) promulgated by the Codex, OIE, and IPPC (Article 3.1). They may choose, however, to design their own measures and to provide their own scientific evidence. In this case, the country is required to produce its own risk assessment and assure that the measure is nondiscriminatory (Article 3.3). When the SPS measure conforms to an internationally agreed standard, the risk assessment obligation is fulfilled and the measure is considered nondiscriminatory. Therefore, it is important to observe that although the international standards are not mandatory, their use automatically grants immunity from legal proceedings under WTO law.

The importance of harmonization has been related, in great part, to the frequent complaints presented by exporters about divergent SPS measures that substantially increase the transaction costs of trade.

Equivalence

Article 4 of the SPS Agreement encourages the use of equivalence and mutual recognition accords. The Agreement recognizes that different measures are equivalent if they can yield the same level of SPS protection. Therefore, a country must allow imports from an exporting nation with different SPS measures from its own if the exporter demonstrates that it provides the level of protection required by the importer.

It has been considered that strict harmonization is not always desirable in economic terms. In general, members have different capabilities of setting and enforcing different types of measures and the outcome of the regulatory process is more important than its form. Equivalence has assumed great importance since it can provide market access without requiring actual harmonization, and protect a member's rights to employ measures to safeguard human, animal, or plant health.

Regionalization

Article 6 describes the regionalization instrument of the SPS Agreement, which recognizes that pest or disease-free areas are largely determined by geographic and other ecological conditions, and not by political boundaries, such that they may be part of one country, several countries, or all countries. Import protocols must therefore be based on a risk assessment that evaluates the claims by exporting countries that certain regions are free of quarantine diseases or pests, or that the prevalence of quarantine pests and diseases is low (GATT 1994; Roberts 1998).

This is appropriate when a country can demonstrate that if not all of its territory, at least some regions are free from a hazard, such that SPS measures that are intended to block imports of products from the whole country can be misleading. In this circumstance, the measure may be circumvented, while the introduction of the hazard in the importing country will still be impeded (Victor 2000).

Transparency and Notifications

The lack of transparency has been one of the major problems of several SPS measures, considering that it is not only costly, but also extremely time consuming for the private and public sectors to learn and keep an updated review of all SPS measures of their foreign trade partners. If the measures change frequently, the costs of exports subject to SPS measures increase, and this may become an easy way to practice disguised protectionism. More generally, when information about the SPS measures adopted by member countries is difficult to obtain, it becomes difficult, if not impossible, to distinguish legitimate from illegitimate protection. This can be aggravated if the measures' relations to scientific evidence are also not clearly specified.

The SPS Agreement outlines the necessary infrastructure to stimulate transparency. It includes a notification procedure through which members are obliged to divulge any change in their SPS regulations, including new measures or modification of existing ones, whenever they differ from an international standard and if they have the potential to affect trade. Once notified, the WTO Secretariat is responsible for circulating the notification to other WTO members. The countries are obliged to establish a notification point, which becomes responsible for notifying future changes in SPS measures, following the procedure described above. Therefore, governments are required to submit the notification in advance of the implementation of a proposed new regulation, to provide trading partners an opportunity to comment. In addition, all member countries must establish and maintain enquiry points that can handle requests for information about the countries' SPS measures.

SPS Committee

The effectiveness of the stated provisions requires adequate mechanisms and organizational structure to ensure the implementation and effectiveness of the SPS Agreement. For that purpose, a Committee on Sanitary and Phytosanitary Measures (SPS Committee) was created to deal with the establishment and control of SPS measures. The Committee includes representatives of all member countries and meets three to four times a year. Members take the opportunity to gather information about their trading partners' SPS measures and try to solve disagreements bilaterally, avoiding the formalities involved in the dispute settlement system.

Dispute Settlement and Specific Trade Concerns

To initiate a dispute settlement, a member requests consultation with another member concerning the trade issue. If this consultation does not lead to a solution, the member requests the establishment of a dispute panel. The panel investigates the complaint and reports on the trade conflict. Dispute can also be settled informally, in order to avoid the complex procedures of the settlement system. Disagreements are presented and discussed at the regular meetings of the SPS Committee, denominated Specific Trade Concerns (STC), which commonly lead to informal agreements.

Complaints that cannot be solved informally are filed with the Dispute Settlement Body, which establishes a panel to investigate and report whether the SPS measure is in conformity with the SPS Agreement. The panel's report can be challenged at the Appellate Body, which consists of experts in international law. Appellate Body decisions are final and must be implemented; otherwise, punitive actions may follow.

ASSESSMENT OF THE SANITARY AND PHYTOSANITARY AGREEMENT

This section presents an overview of issues in the literature to compose a research agenda for SPS concerns.

Instruments and Objectives

The first studies that focused on the SPS Agreement were mostly related to its effectiveness in organizing and harmonizing rules on human, animal, and plant health and other SPS issues. The Agreement's principles have been discussed together with the benefits and difficulties of their implementation. The benefits provided by the establishment of the Agreement have been evaluated, with particular emphasis on equivalence and harmonization. The major restrictions to its implementation have been related to risk assessment procedures.

Victor (2000) indicates that an examination of the effects of the SPS Agreement on measures employed by various countries must focus on two basic outcomes: an appraisal of how international standards are established, and the exceptions that allow a country to deviate from the international standards. He stresses that all the disputes involving the SPS Agreement have focused on how to interpret the exceptions. However, lack of information is still a critical restriction on the implementation of the SPS Agreement.

The execution of the SPS Agreement has been recognized as a difficult task, particularly for developing countries. In fact, one provision of the SPS is the commitment by members to facilitate access to technical assistance for developing countries, either through the relevant international organizations or bilaterally (Article 9). Walker (1999) comments that assistance in the form of risk assessment training or loans to developing countries has been provided. However, there is no evidence of the implementation of any systematic or comprehensive approach to assist developing countries to understand or proceed with structural changes required in this process.

Notifications should assure transparency in the adoption of SPS Agreement measures. There have been many problems, however, in their implementation and evaluation processes. One of the major restrictions described in the literature is that to comply with the notification procedure, members need to maintain a well-trained staff to continuously analyze whether trade is affected by the measures introduced by their partners, while also informing the WTO of relevant changes implemented by the country. Although fundamental, this is difficult to implement in most developing countries, particularly due to cost.

In addition, there are indications that countries tend to underreport notifications. They notify only changes that are expected to impact trade and tend to consider it unnecessary to notify the WTO of a regulation change when it is believed to only affect trade with partners that have been informed of the new regulation.

Various studies have presented classification procedures for the impact of SPS measures on trade, and others suggest analytical frameworks to assess their effects. However, few of the applied studies have been successful in determining a framework of economic analysis to assess the trade impact of SPS regulations.

Henson and others (1999) classify trade impacts of SPS measures in three groups: (i) the measure can prohibit trade by imposing a ban or by increasing costs of production and marketing, sometimes to prohibitive levels; (ii) measures can divert trade from one trading partner to another by establishing regulations that discriminate across potential suppliers; and (iii) measures can reduce overall trade by increasing costs or raising barriers for all potential suppliers.

An alternative approach for evaluating the effects of the SPS Agreement on agricultural trade is through evaluation of the process and issues related to the three complaints that have undergone the full WTO dispute settlement process: (i) the complaints by the United States and Canada about the European Union's ban on hormone-treated beef imports; (ii) the complaint by Canada about the import ban on salmon into Australia; and (iii) the complaint by the United States about Japanese fruit varietal testing import procedures. There is a vast literature related to the hormone case, including the WTO Panel and Appellate Body reports. The literature related to the salmon case and the Japanese ban on imports of fruits is limited to a few studies (Victor 2000).

Other consultations presented to the WTO based on the SPS Agreement's provisions and other accords have not been detailed in the literature. Table 5–1 presents a summary of all cases, based on documents obtained from the WTO homepage.

Developing Country Problems

Although analysis of the trade effects of SPS measures has most frequently focused on developed country cases, several authors, including Henson and others (1999), have suggested that SPS measures have greater effects in developing countries. This would reflect the relative importance of agricultural and food products in the exports of developing countries, and their lower financial and technical ability to comply with the SPS requirements.

It seems clear that while the international community has tried to overcome trade-distorting effects through the SPS, there are reasons why the Agreement might negatively affect the pattern of trade between developed and developing countries. Comparative advantage, interpreted as lower production costs associated with input efficiency, does not explain the new patterns. To implement, harmonize, or even accept equivalence of SPS requirements, costs will tend to increase, and there is no regulation to keep them from reaching levels sufficiently high to exclude developing countries' exports from importing markets.

Hoekman and Mavroidis (2000) and Jensen (2002) describe problems faced by developing countries within the legal procedures of the SPS Agreement. Filing a complaint about the SPS Agreement requires identification of a violation of a specific commitment. For that purpose, information is a critical factor and may be undersupplied in developing countries. Private enterprises must provide information about market access problems, and they may not fully understand the importance of this procedure. This is particularly true if the market is too small to make it worthwhile to spend time and money to convince the national government to bring the case to the WTO.

It may also be the case that the solution promised by the dispute settlement process is out of touch with the commercial situation in developing countries. A process frequently lasts two to three years before a possibly favorable decision by a panel or the Appellate Body will bring about changes in regulations. For a producer or exporter, the loss in the meantime may be so high that it would be wiser to search for alternative market outlets (Jensen 2002).

The Agreement also has considerable implementation costs. In fact, developing countries have criticized the procedures by which international standards are negotiated and agreed at OIE, Codex, and IPPC, claiming that they have failed to account for their needs and special circumstances (Henson and others 1999).

Henson and others (1999) evaluate 10 case studies based on questionnaires applied to countries to identify the relative importance of several factors with respect to the ability to satisfy SPS requirements in exports of agricultural and food products to the European Union. The most important factors were "insufficient access to technical and scientific expertise" and "incompatibility of SPS requirements with domestic production/marketing methods." Less important factors were "poor awareness of SPS requirements within agricultural and food industry" and "poor access to information on SPS requirements." These results were interpreted as an indication that although developing countries are aware of the prevailing SPS requirements to export to the European Union countries, they lack the required resources.

Table 5–1

Disputes or Requests for Consultations Involving Sanitary and Phytosanitary Measures, 1995–2002

Date	Complainer	Complainee	Dispute	Status
October 1995	Canada	Australia	Prohibition of imports of untreated fresh, chilled, or frozen salmon from Canada.	DSB adopted the report of the compliance panel.
November 1995	Canada	Korea	Request for consultation by Canada regarding certain laws and regulations of the Republic of Korea concerning bottled water.	Settlement
November 1995	United States	Australia	Prohibition of the import of salmonids.	Settlement
January 1996	United States	European Community	Request for consultations regarding the Council Directive Prohibiting the Use in Livestock Farming of Certain Substances Having a Hormonal Action and related measures, which restrict or prohibit imports of meat and meat products from the United States and other members of the WTO.	DSB adopted Appellate Body and Panel report, as modified by the Appellate Body.
May 1996	United States	Korea	Request for consultations regarding the requirements of the Republic of Korea for importing agricultural products including, but not limited to, testing, inspection, incubation, sorting, fumigation, and product specifications, including all amendments, revisions, and new measures adopted since the request for consultations of 4 April 1995 (WT/DS3/1). These measures impose requirements with respect to imports of agricultural products.	Pending consultations
July 1996	Canada	European Community	These measures adversely affect importing livestock and meat from livestock.	DSB adopted Appellate Body and Panel report, as modified by the Appellate Body.

Table 5–1 *(continued)*

Disputes or Requests for Consultations Involving Sanitary and Phytosanitary Measures, 1995–2002

Date	Complainer	Complainee	Dispute	Status
April 1997	United States	Japan	Request for consultations regarding the prohibition by Japan on imports of agricultural products. (Refers to those for which Japan requires quarantine treatment. Japan prohibits imports of each variety of that product until the quarantine treatment has been tested for that variety, although the treatment has proven effective with respect to other varieties of the same product.)	DSB adopted Appellate Body and Panel report, as modified by the Appellate Body.
July 1997	European Community	India	Request for consultations concerning quantitative restrictions maintained by India on imports of a large number of agricultural, textile, and industrial products.	Settlement
August 1997	European Community	United States	Requests for consultations concerning the ban on imports of poultry and poultry products.	Pending consultations
May 1998	Switzerland	Slovak Republic	Concerning Slovak regulations on imports of dairy products and the transit of cattle.	Pending consultations
June 1998	Canada	European Community	The Decree prohibits, among other things, the manufacture, processing, import, placing on the domestic market, possession for sale, offering, sale, or transfer on any grounds all varieties of asbestos fibers and any product containing asbestos fibers.	DSB adopted Appellate Body and Panel report, as modified by the Appellate Body.
June 1998	India	European Community	The measures introduced through this new Regulation will restrict the number of importers of rice from India, and will have a limiting effect on the export of rice from India to the European Community.	Pending consultations

(Continued on next page.)

Table 5–1 *(continued)*

Disputes or Requests for Consultations Involving Sanitary and Phytosanitary Measures, 1995–2002

Date	Complainer	Complainee	Dispute	Status
June 1998	Canada	European Community	Request for consultation about measures that adversely affect the import into the European Community of wood from conifers originating in Canada.	Pending consultations
September 1998	Canada	United States	Requests for consultations regarding certain measures imposed by South Dakota and other states prohibiting entry or transit to Canadian trucks carrying cattle, swine, and grain.	Pending consultations
July 2000	United States	Mexico	Request for consultations with respect to various measures affecting trade in live swine exported from the United States.	Pending consultations
September 2000	Thailand	Egypt	Requests for consultations regarding the prohibition imposed by the Arab Republic of Egypt on imports of canned tuna with soybean oil from the Kingdom of Thailand.	Pending consultations
September 2001	Ecuador	Turkey	This request is in respect to certain import procedures for fresh fruits and, in particular, bananas.	Settlement
March 2002	United States	Japan	Request for consultations about restrictions imposed by Japan on imports of apples from the United States.	Active panel
May 2002	Hungary	Turkey	Consultations with respect to restrictions imposed by Turkey on imports of pet food from Hungary.	Pending consultations
October 2002	Philippines	Australia	Consultations regarding certain measures affecting imports of fresh fruits and vegetables, including bananas.	Pending consultations
October 2002	Philippines	Australia	Consultations regarding certain measures affecting imports of fresh pineapple fruit.	Pending consultations

Source: Official documents from the WTO Dispute Settlement Board.

Another indicator used to evaluate the adoption and participation level of countries in the SPS Agreement is the establishment of enquiry points and national notification agencies by member countries. Only few developing countries have implemented these requirements (Henson and others 1999).

The participation of developing countries in the SPS Agreement was also evaluated by the attendance at SPS Committee meetings in Geneva. Statistics from the meetings show that this participation has been very low. In addition, an important issue for some members is not only the attendance at the meetings, but the ability to understand and contribute to discussions. Based on this evidence, Henson and others (1999) conclude that to date developing countries have not actively participated in the SPS Agreement.

Implementation costs have restricted developing countries from participating in the Agreement and fully exploiting its advantages. The costs of implementing deep regulatory reforms that include setting up the required public infrastructure to assure effective participation in the SPS Agreement are substantial. These include expenses for structuring new public agencies and educating personnel. In addition, financing overseas representations; building domestic human, technical, and financial capacity to back the representations; and providing input on how to develop new standards and requirements (Jensen 2002). The high costs of these requirements have limited the intensity of developing countries' participation in the SPS Agreement, since these countries lack resources in general and public resources are particularly limited.

Another issue that has been of concern for developing countries is that exporters bear the costs of the procedures required under the SPS Agreement. Separate certification is needed in cases where mandatory product specifications differ between countries, even when countries rely on common international standards. Duplication of effort associated with separate conformity assessment procedures is costly, and effectively excludes producers from some markets. A study conducted by the OECD in 1996 shows that differing standards and technical regulations, combined with the cost of testing and compliance of certification, varied between 2 and 10 percent of overall production costs (Hufbauer, Kotschwar, and Wilson 1999).

Knowledge about the SPS Agreement and its benefits is not always widespread among private enterprises (nor among governments) in developing countries. Therefore, an important challenge is not only to improve communication among members about SPS issues, but also to assure that the private sector participates in the SPS implementation procedures.

All the aspects discussed above lead to a clear conclusion, which is similar to those presented by other authors, including Henson and Loader (2001) and Jensen (2002). That is, to summarize, SPS measures have become a major factor influencing the ability of developing countries to exploit export opportunities for agricultural and food products in developed country markets.

Trade Effects

A literature review on the effort conducted to quantify the trade effects of SPS measures has shown that it is difficult to present conclusive results. Josling (1997) presents important reasons why the assessment of trade effects of SPS standards poses problems for trade policy analysts. He stresses the differences between the trade effects of traditional trade barriers and the effects of SPS measures. He makes the following points on the latter:

(i) there is a need of a considerably greater amount of information, including detailed knowledge of the regulations themselves, besides the process by which companies or individuals meet those regulations and the implications of not complying with the rules; (ii) it requires the definition of a framework of economic analysis that is not only suitable to the available technical information, but also simple and easy to understand, while comprehensive enough to allow a satisfactory answer to a range of questions; and (iii) the analytical framework must include a classification of the policy instruments in order to identify their main characteristics. It must also provide means to place empirical data for calculation of the trade and welfare effects of SPS/TBT trade impediments.

The only known institutional attempt to systematically identify technical barriers has been the United Nations Committee on Trade and Development (UNCTAD) Trade Control Measure (TCM) database. In addition to technical barriers, the database records the use of other nontariff barriers (NTBs), such as quotas, licensing measures, price controls, and monopolistic practices. The shortcomings of this database are recognized as the lack of information on health and safety regulations in most European Union countries (Ndayisenga and Kinsey 1994).

Several approaches have been used to provide the basis for econometric estimates of NTBs. These approaches can be characterized as being based on stylized or formal versions of the Heckscher-Ohlin, Helpman-Krugman, and gravity models of international trade. Essentially, all of these approaches attempt to measure NTBs, either by regarding residuals from the estimated regressions as representing NTBs or by using various dummy variables.

Roberts, Josling, and Orden (1999) consider that an important restriction is that, in general, the impacts of these measures can only be captured indirectly, through additional costs incurred by producers or traders to attend the requirements. These authors add that to the extent that these regulations affect production functions and consumption decisions, the import demand and export supply curves shift as these are imposed or rescinded, increasing the complexity of the analytical context.

Miranda (2001) evaluates nontariff barriers—mainly technical and sanitary—on quantities and prices of Brazilian beef exports, employing quantitative procedures. The author uses a reduced-form model built to explain external sales of the products. Regressions were estimated in order to identify the influence of the main domestic supply and demand variables, as well as international demand factors on the exports. The residuals of those models were analyzed to identify the outliers that could reflect impacts of sanitary and other exogenous events not measured by the explanatory variables. Since abnormal residuals were found that could be related to relevant events, the intervention models were adjusted to obtain impact estimates directly on prices and quantities and establish the intervention influence pattern. A detailed description of beef export markets and its determinants was necessary to implement this kind of analysis. Besides the literature review, questionnaires were applied to beef exporting industries.

The results obtained by Miranda (2001) show that a great part of external sales volume and price variations are due to fundamental market variables. She indicates that data regionalization for the foot and mouth disease circuits accepted by OIE could generate more informative results on the effects of those events since regions considered free from foot and mouth disease are less affected than those that are not recognized as free from the disease.

Related to the idea that standards and technical regulations can restrict competition in the local economy by raising costs to foreign suppliers, Ganslandt and Markusen (2001) suggest approaches to formally model standards and technical regulations governing trade in applied general equilibrium models with real data. The main advantage of a computable general equilibrium framework is indicated as its ability to assess the cross-sector impacts of regulations on outputs, prices, employment, and trade, along with meaningful computations of economic welfare. Computable general equilibrium models may also be developed to handle alternative market structures, demand specifications, and policy interventions in a flexible manner, both for single countries and multiple countries.

Maskus, Otsuki, and Wilson (2000), referring to the work conducted by Ganslandt and Markusen (2001), indicate that the disadvantages of computable general equilibrium models lie in the need to conduct the analysis at aggregate levels, making it difficult to translate specific regulations.

Price wedge analysis relies on the idea that NTBs can be measured in terms of their impact on the domestic price in comparison with a reference price. The main use of this method is to provide a tariff equivalent. The tariff equivalent is estimated by calculating the price wedge between the imported good and the comparable product in the domestic market. The correct measure would be to compare the price that would prevail without the NTB with the price that would prevail domestically in the presence of an NTB if the price paid to suppliers were to remain unchanged (Deardorff and Stern 1998). The tariff equivalent of a regulation can also be measured as a residue when the price difference is corrected for tariff, handling, and transportation costs and for product quality differences (Beghin and Bureau 2001).

Gravity models are an interesting option for quantifying NTB effects, considering the foregone trade that cannot be explained by tariffs. According to Beghin and Bureau (2001), a typical approach is to analyze the residuals in economic regressions of trade flows on the various determinants of trade. Gravity models have long been used to estimate the home bias or the border effect in trade, a part of it reflecting national regulations that hamper trade.

Risk assessment approaches, coupled with cost-benefit calculations, can indirectly contribute to measure the effect of regulations, and therefore of NTBs. These assessments indicate what should be considered as trade barriers based on the effect of regulations on economic welfare (Beghin and Bureau 2001). For example, when SPS regulations aim to correct market failures, it is often difficult to identify the protectionist component of the regulation. An example presented by Beghin and Bureau (2001) is the case of a standard (or its enforcement) that only raises costs (for example, through delays in inspection or fees). This is considered inefficient for consumer protection and classified as an NTB.

In other cases, comparing the costs of compliance with the gains associated with the reduction of an externality—related to the prevention of contamination or pest infestation, for example—can help unravel the efficiency and protectionist effects of a regulation. By decomposing the welfare effects, it is possible to assess the welfare loss associated with a measure whose costs exceed its benefits. When the benefits are negligible, this approach provides a sufficient test of trade distortion. Its main limitation is the high uncertainty surrounding the risk levels and economic consequences. In the case of SPS measures, for example, it requires determining the probability of contamination or of spreading a disease or pest, together with the associated cost.

The analysis carried out by the U.S. Department of Agriculture in the case of the trade policy with Mexico on avocados considered the following factors: evaluation of pest risk; definition of measures that help reduce the risk of spreading pests at a low albeit nonzero level; and the combination of these assessments with a comprehensive evaluation of the potential costs and benefits, including the impact on consumers. The economic assessment of a partial ban was tested against various probabilities of pest infestation, and it showed that the U.S. import ban resulted in large transfers to U.S. producers through higher domestic than foreign prices, to avoid the relatively small potential costs of a pest infestation.

UNCTAD refers to the inventory approach as a procedure to quantify nontariff barriers. It provides an estimate of the portion of trade that is subject to NTBs or the frequency with which they are applied to specific sectors or countries. The required data are collected by tariff line and by the nature of the measure associated with the trade barrier.

Beghin and Bureau (2001) consider that this approach can be used to assess the importance of domestic regulations in both a quantitative and qualitative perspective. According to these authors, three information sources can be used: (i) data on regulations, such as the number of regulations that can be used to construct various statistical indicators or proxy variables; (ii) data on frequency of product detention (for example, in the United States, available data on product detentions at the border, reasons for the detention, and frequency); and (iii) data on complaints presented by industries against discriminatory regulatory practices, together with notifications to international bodies about such practices. About the practical validity of this method, Beghin and Bureau (2001) affirm that other standards would not be expected to have similar effects, and that the number of standards is a poor proxy for the trade restrictiveness of the whole regulatory set. There are also limitations caused by uneven country reporting and by nonuniform coverage of measures across countries.

Inventory-based methods do not effectively provide a quantification of the impact of regulations on trade per se, but they can provide useful indications on the importance of the problem, and on which sectors and countries NTBs are more likely to be found.

The Free Trade Area of the Americas Case

Implementation of the SPS Agreement has not been easy, as Stanton (1999) points out. The author extends the difficulties to the context of the Americas. The WTO/SPS subcommittee has been searching for means to assure that countries understand and implement the provisions of the Agreement. Some observers considered that observer status, which is restricted to member countries, could be extended to international or regional organizations that could work directly with members (Walker 1999).

According to Walker (1999), within the FTAA negotiation process, the SPS working group has been included on the Agriculture Committee. To date, commercial and not agricultural subjects have driven the Agriculture Committee, increasing concerns that SPS will not be treated on a strictly scientific basis, but rather as a potential barrier to trade. The author considers, however, that if policymakers are well intentioned and aware of these problems, the FTAA could become an excellent opportunity to reinforce the SPS Agreement and explore hemispheric initiatives to better implement disciplines such as transparency and equivalence. Equivalence may be more important in this context than harmonization because resources and technological restrictions could limit the advantages of harmonization.

Within the Americas, with the exception of Cuba, all countries are members of the WTO, and thereby agree with the SPS Agreement. Countries cannot arbitrarily ignore or refuse to import products, and must evaluate the entry of those products based on the articles of the SPS Agreements. In any case, to avoid the introduction of unwanted diseases and pests, countries need to modernize their national agricultural health and food safety systems.

According to Walker (1999), considering that the Agreement acknowledges that developing country members may face particular difficulties in complying with the SPS measures, members agreed to facilitate the provision of such assistance, which can be in the form of risk assessment training or loans to developing countries. However, there is scarce evidence of systematic efforts to assist developing countries in understanding or making the required structural changes in order to benefit from the SPS Agreement.

"The SPS Agreement assumes that certain basic conditions exist across countries within their national agricultural health and food safety system." (Walker 1999) According to the author, within many countries these minimum requirements are loosely defined or nonexistent, allowing for political decisions to override scientifically based assessments.

Walker (1999) maintains that governments must carry out certain nondelegate functions, such as setting regulations based on laws that define standards and procedures, establishing sanctions and enforcing compliance, and carrying out official government representation at international organizations, such as the WTO and Codex. Beyond these nondelegate functions, public and private sector partnerships are necessary, and are already underway in some countries.

Counternotification—an instrument that entrepreneurs and representatives of private and public institutions can use to argue against a rule or notification filed by another country or group of countries whenever it is considered to negatively affect its trade relations—has been the subject of much discussion within the Agricultural Group of the FTAA. The purpose of counternotification is to increase the transparency of the SPS measure in a regional context. It is expected to become an effective way for developing countries and lower-income countries defend their interests. Its major advantages are lower costs, less bureaucracy, better logistics, higher politics, and technical and scientific support between the countries of the Americas. Although it has not been commonly used under the SPS Agreement, it is a right established under the WTO: "Any Member which has reason to believe that another Member has not adequately met its notification obligation may raise the matter with the Member concerned. If the matter is not satisfactorily resolved it may make a counternotification to the Council for Trade in Goods, for consideration by the working party set up under paragraph 5, simultaneously informing the Member concerned." (*http://www.wto.org/english/docs_e/legal_e/08-17_e.htm*).

Finally, regionalization is certainly an important instrument, but to maintain some SPS requirements on a regional basis, the financial and technical resources required are beyond the means of some developing countries. Maintenance of an updated information system on a regional basis may also be a constraint to successful implementation of the process. Regionalization and equivalence are instruments that, despite some limitations, increase the potential of a regional agreement, such as the FTAA.

AGRICULTURAL TRADE BETWEEN WESTERN HEMISPHERE COUNTRIES

This section evaluates the importance of SPS measures for trade between Western Hemisphere countries. The information used for the analysis is based on documentation on notifications and STCs of the WTO Committee on Sanitary and Phytosanitary Measures.[1]

Notifications and Harmonization

Notifications are a useful indicator for evaluating progress toward increasing transparency induced by the SPS Agreement. The G/SPS/GEN documents of notifications presented by member countries were used as a data source for this analysis. The data refer to the period from January 1995 to December 2001.

The total number of notifications presented by Western Hemisphere countries in this period amounted to 1,441. For the analysis, these were restricted to those affecting trade between Western Hemisphere countries, including a total of 1,248 notifications. The analysis included all 34 Western Hemisphere countries, although many of these (47 percent) did not present any notification that affected trade between Western Hemisphere countries.

The notifications were organized by country, product category, and the objective explicit in the documentation. In order to obtain more details, products were aggregated into eight categories: meat, fruits and vegetables, dairy, wood, fishery, agriculture and livestock, chemical products, and others. Notifications were organized considering objectives such as food safety, plant health, animal health, human health, and territorial protection, as well as the various combinations of these objectives, as they appeared in the WTO documentation.

Number of Notifications

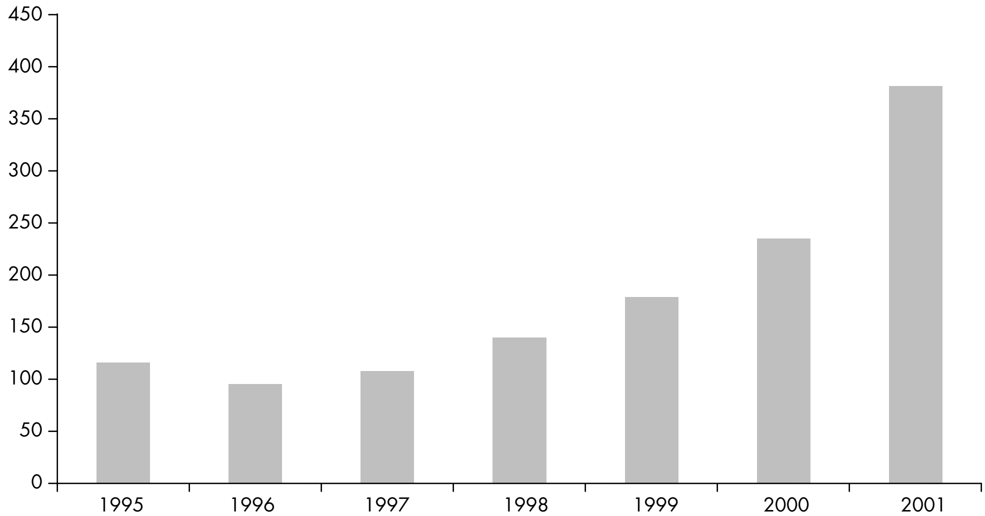
In aggregate terms, the number of SPS notifications made by Western Hemisphere countries followed an increasing trend, starting in 1995 (Figure 5–1). The United States presented most of the notifications. The total number of notifications issued by the United States was lower than that presented by any other Western Hemisphere country only in the first year following the WTO SPS Agreement. In 1995, Mexico represented 76 percent of the total number of notifications, but its participation was much lower in the years that followed.

The trend in SPS notifications might reflect members' increasing awareness of the advantages of using such procedures and of the structure of the WTO. In addition, since the United States was responsible for most of the notifications in the latter years shown in Figure 5–1, growing concern about public health in developed countries might explain the increasing trend. Countries had to deal with problems such as Bovine spongiform encephalopathy disease and foot and mouth disease, among others.

[1] The UNCTAD database, TRAINS, which is the only nontariff measures database available, was also investigated. However, since it apparently represents a selection of WTO notifications based on a criterion for which a clear specification could not be determined, it seemed more appropriate to work with all the available information on SPS measures and regulations that could be gathered at the WTO.

Figure 5–1

Sanitary and Phytosanitary Notifications Issued by Western Hemisphere Countries to the World Trade Organization, 1995–2001



Source: Authors' calculations based on WTO data.

Most countries (53 percent) issued fewer than 10 notifications during the period. It must be stressed that the importance attributed to the SPS Agreement may be directly related to the country's performance as an exporter (or importer) of agricultural and food products. However, it is also true that the notification procedure should be particularly appealing for most of the developing countries in the Western Hemisphere, although not for all of them, whose exports are mainly based on agricultural and food products. Therefore, when harmonization is interesting for the countries' exports, but they do not show an active participation in the notification procedure, this may be an indication that the restrictions have been greater than the advantages associated with the SPS Agreement.

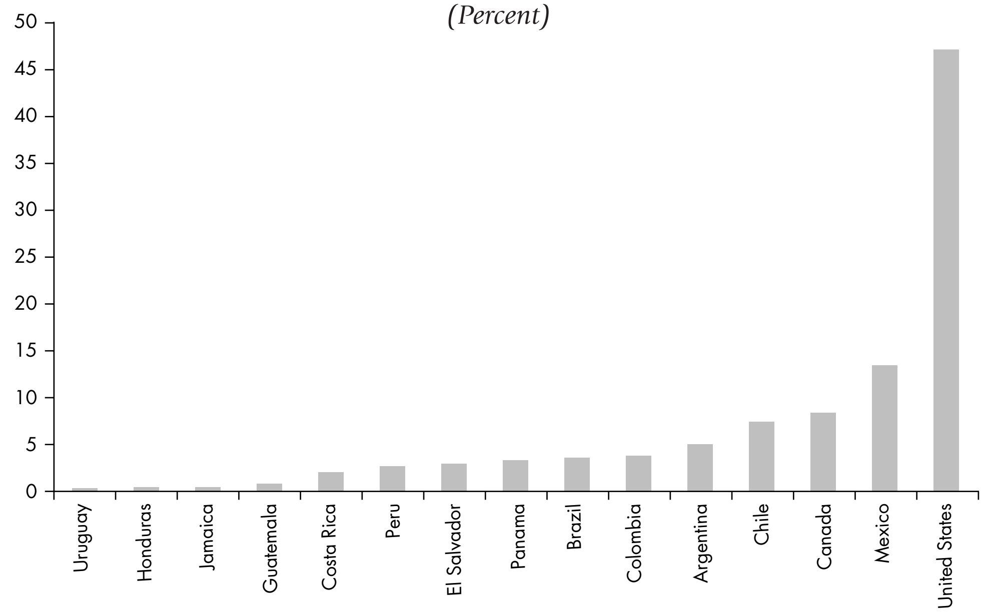
In order to present a picture of the SPS notification framework for countries in the Western Hemisphere, Figure 5–2 shows the 15 countries that presented more than 10 notifications during 1995–2001. No more than five countries accumulated more than 80 percent of all notifications. The United States shows the highest percentage, followed by Mexico, Canada, Chile, and Argentina. The United States alone represents 47 percent, and the remaining 14 countries account for 34 percent of all the notifications (Figure 5–2). Policymakers should be concerned if notifications increase only for a limited number of countries because this might undermine potential positive effects of the SPS Agreement in terms of harmonization.

There is no pattern in the number of notifications presented by individual countries over time, except for the United States, which maintained an increasing trend (Figure 5–3). This seems to indicate that most countries were motivated to present notifications

Figure 5–2

Notifications Issued by Selected Western Hemisphere Countries, 1995–2001

(Percent)

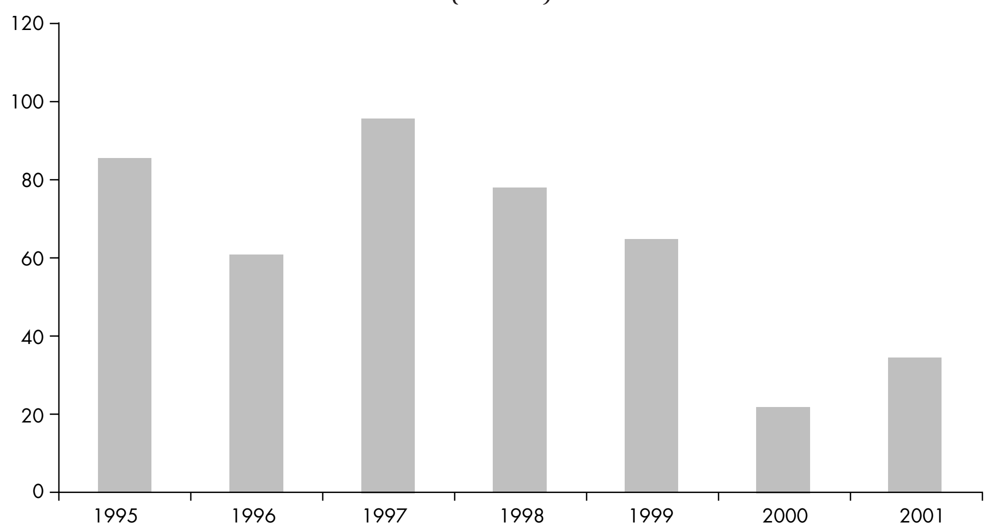


Source: WTO/SPS notifications.

Figure 5–3

Notifications Issued by Selected Western Hemisphere Countries, Excluding the United States, 1995–2001

(Percent)



Source: WTO/SPS notifications.

only as part of their regulatory review to comply with the new rules under the SPS Agreement. After that, it seems that most of the developing countries in this study had no further incentives to keep up with the notification procedure. In developed countries, such as the United States, there was increasing concern about food safety. Besides other reasons discussed above, the increased awareness can also be associated with food contamination by E. coli. This induced the development of a control system for the production process, denominated Hazard Analysis Control of Critical Points, which was disseminated and adopted all over the world.

Notification Pattern by Income Group

The pattern of notifications was also evaluated by aggregating countries by income group (based on the World Bank's criteria). High-income countries (the United States and Canada) generally notify changes in legislation. In fact, a high correlation would be expected between the degree of the economy's import volumes of food and agricultural products and the number of notifications. Countries with lower imports may adopt SPS measures that are not systematically notified.

A change in the relative participation of high-income countries and the others can be verified between the first four years (1995–98) of the SPS's enforcement and the last three years evaluated in this analysis (1999–2001), as shown in Figure 5–4. During the first period, the high-income group had relatively low participation, averaging 26 percent. During the second period, however, the relative participation of these countries increased to 70 percent.

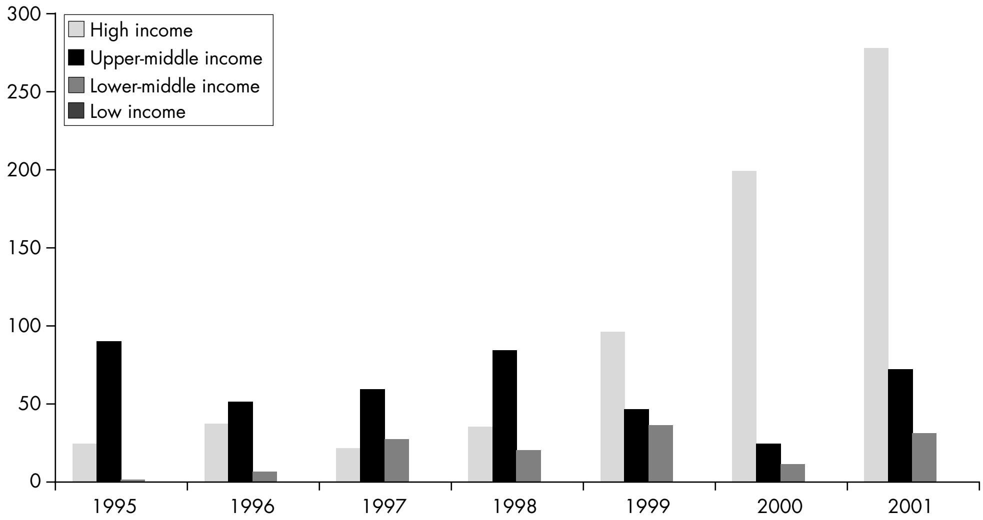
There are several factors that might explain this pattern. It is important to stress that despite the purpose of SPS measures to find the proper balance between consumer protection and protectionism, in several instances, it has not been easy to draw a line separating these objectives. This happens when there is no consensus on the state of scientific development, or when consumer confidence is weakened by previous experiences. Countries have declared different protection objectives either because they take into account uncertainty with respect to risks or because consumers distrust scientific evidence. When this is the case, countries tend to apply the precautionary principle, but then it becomes easier for lobbies and administrations to use regulations that are stricter than necessary. The cost of conforming to the new rules may be substantially increased for developing countries, which apparently inhibits their participation in the Agreement.

Two major factors might explain the increased cost: increased concern in high-income countries that the SPS Agreement tends to lower food standards, and the concentration of food scares in the second period. The latter included food contamination due to bacteria, like E. coli and salmonella; food-transferred diseases, like mad cow disease; and food contaminated with dioxin. The upper-middle-income group of countries had lower participation in the second period; the group's average decreased from 62 percent in the first period to 18 percent in the second. Although most of the countries that compose the group also confronted problems, particularly with Bovine spongiform encephalopathy, they were not net importers from countries that could become a source of contamination of the national herd or food.

Although the lower-middle-income countries had greater participation in the second period (22 percent compared with 11 percent in the first period), the group remained marginal, and the increase was probably related to higher relative participation

Figure 5–4

Notifications Issued by Western Hemisphere Countries by Income Group, 1995–2001



Source: WTO/SPS notifications.

of the upper-middle-income countries in the second period. The participation of low-income countries was nil during the entire period (1995–2001).

Objectives

The distribution of explicit objectives of SPS measures notified by Western Hemisphere countries to the WTO shows that food safety was cited in 41 percent of the notifications (Figure 5–5). This was followed by plant health (19 percent), animal health (15 percent), territorial protection (6 percent), and human health (6 percent), in terms of specific objectives. There are also 11 combinations of objectives indicated in a lower percentage of the notifications. This is further evidence that developed countries' issues prevail in forums on international standards and regulations. Currently, food safety is certainly of more concern for developed than for developing countries, which are more concerned about food security problems.

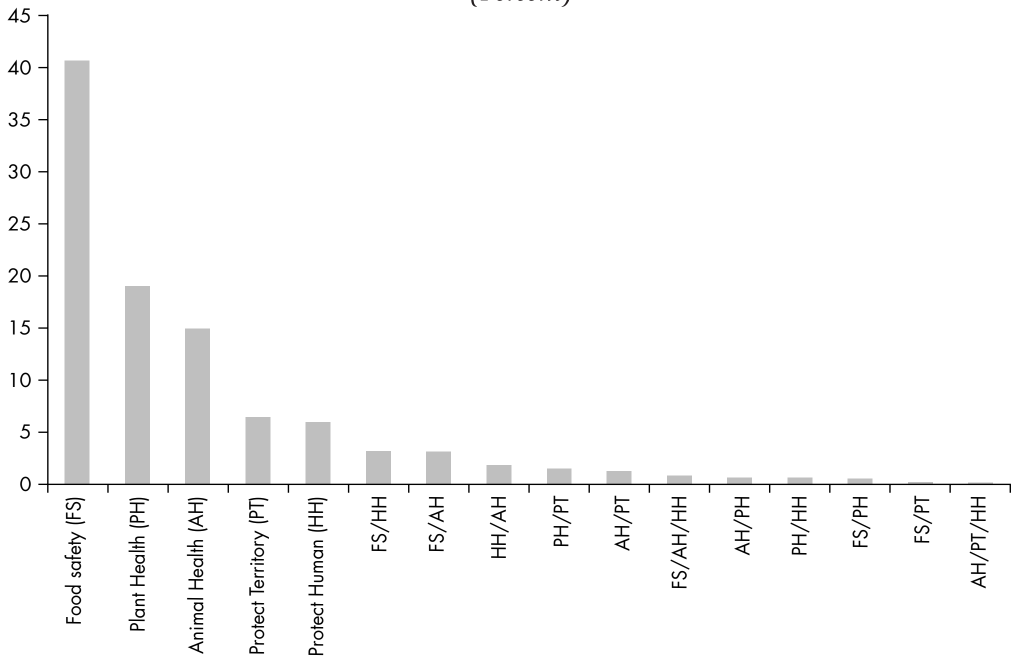
Pattern by Product Category

Agriculture and livestock products had the highest frequency of notifications (29 percent of the total), as shown in Table 5–2. This high percentage and the high frequency associated with meat (19 percent) are certainly related to food scares generated by Bovine spongiform encephalopathy, together with foot and mouth disease problems faced by several countries in the Western Hemisphere.

Figure 5–5

Sanitary and Phytosanitary World Trade Organization Notifications Issued by Western Hemisphere Countries, Classified by Objective, 1995–2001

(Percent)



Source: Selected WTO notifications.

Chemicals were ranked second in number of notifications filed by American countries. Twenty-six percent of the notifications indicated changes in measures concerning the nature of the product or sampling procedures. Revision of the maximum level allowed for residuals possibly was a major factor in this high percentage.

It must also be stressed that the relative importance of this category is possibly related to increasing concern about human health and environmental protection. Society has been much more aware of food quality issues, demanding higher standards, followed by rapid growth in organized groups defending consumer rights, particularly in developed countries. The same applies to environmental protection and people's desire to prevent potentially negative effects due to intensive use of chemical products, such as herbicides and pesticides, in agriculture.

Cross Analysis: Products and Objectives

For the high-income countries, the product category with the highest number of notifications filed (218 of 689) was chemicals related to food safety issues (Table 5–3). Agriculture and livestock is second in terms of number of notifications filed (124 of 689), which are also related to food safety issues.

Table 5–2

Notifications Presented to the World Trade Organization by Western Hemisphere Countries by Product Category, 1995–2001

Country	Fruits and vegetables	Meat	Dairy	Fisheries	Wood	Agriculture/ livestock[a]	Chemical[b]	Other[c]	Total
United States	80	79	2	7	9	150	254	5	586
Mexico	32	51	1	3	7	51	1	20	166
Canada	16	3	3	2	0	41	37	1	103
Chile	19	27	3	2	0	20	2	18	91
Argentina	10	19	0	1	1	25	0	5	61
Colombia	8	4	2	2	0	19	11	0	46
Brazil	13	1	1	0	2	14	9	3	43
Panama	0	19	2	2	0	11	0	6	40
El Salvador	3	11	3	0	0	4	12	2	35
Peru	7	18	0	0	0	6	1	0	32
Costa Rica	2	3	0	0	0	11	0	8	24
Others[d]	7	6	0	0	0	7	0	1	21
Total	197	241	17	19	19	359	327	69	1,248
Percent	15.8	19.3	1.4	1.5	1.5	28.8	26.2	5.5	

[a] Agriculture and livestock includes all product indications that did not explicitly refer to any of the other product categories used for this classification. Agriculture, for instance, was created to represent most of the grains, excludes any specific reference to fruit and vegetables, and includes references to unidentified plants, vegetable propagation material, and flowers, among others. Livestock includes mostly live animals.

[b] Chemicals include all agricultural inputs and chemical substances in food.

[c] Others refers to products that were not considered to compose any of the defined categories, either related to plants or animals. Some common examples: animal semen, water, and beverages.

[d] Represents all countries in the Western Hemisphere that have not presented at least 10 notifications through the 1995–2001 period.

Source: Authors' calculations based on WTO notifications.

Table 5–3

Regulatory Objectives of Measures Notified to the World Trade Organization by High-Income Countries by Product Category, 1995–2001

Category	Food safety	Plant health	Animal health	Human health	Territorial protection	Combined	Total
Agriculture/cattle	124	22	22	2	2	19	191
Chemical	218	5	10	20	16	22	291
Meat	43	0	29	1	2	7	82
Fruits and vegetables	69	23	0	2	0	2	96
Dairy	5	0	0	0	0	0	5
Fisheries	8	0	0	1	0	0	9
Wood	0	9	0	0	0	0	9
Other	6	0	0	0	0	0	6
Total	473	59	61	26	20	50	689

Source: WTO notifications.

Within the developing countries, including the high-middle and low-middle-income countries, the emphasis is slightly different. Although agriculture and livestock had a lot of notifications (92 of 561), they were mostly related to plant health concerns and not food safety (Table 5–4). Products in the meat category received the second-highest number of notifications (87 of 561), due to animal health concerns, rather than food safety.

Specific Trade Concerns

Results of the STC negotiations have been systematically summarized and documented at SPS committee meetings since March 1999. The WTO has documented revisions of the summaries as G/SPS/GEN/204/Rev.1 (November 2000) and G/SPS/GEN/204/Rev.2 (February 2002), which are used as a data source for this analysis.

The STC documentation has become an important instrument for assessing informal complaints between WTO members with respect to the SPS measures. In general, complaints are raised by a country against another country's SPS measure. The SPS Committee attempts to solve these STCs between the involved parties without going through a formal dispute settlement process.

Member countries continuously update their STC status. The issues are divided into those concerned with food safety, animal health, plant health, and others. It is also important to emphasize that only a few of the complaints have been resolved, as reported to the SPS Committee.

There are several cases of contentious issues expressed as STCs involving Western Hemisphere countries. In its second revision, updated in February 2002, member countries had raised 105 STCs. Table 5–5 shows the number of times a Western Hemisphere

Table 5–4

Regulatory Objectives of Measures Notified to the World Trade Organization by Western Hemisphere High-Middle and Low-Middle-Income Countries, by Product Category, 1995–2001

Category	Food safety	Plant health	Animal health	Human health	Territorial protection	Combined	Total
Agriculture/cattle	5	92	5	5	22	39	168
Chemical	8	5	2	9	1	11	36
Meat	6	0	87	18	5	45	161
Fruits and vegetables	2	68	0	1	24	6	101
Dairy	4	0	3	3	0	2	12
Fisheries	0	0	3	3	2	2	10
Wood	0	7	0	0	2	1	10
Other	10	6	25	9	4	9	63
Total	35	178	125	48	60	115	561

Source: WTO notifications.

country appears as a complainant on an STC. (More than one country can appear in an STC, so that the sum in Table 5–5 is greater than 105.) The United States has been the most active country, raising questions about SPS measures in the form of notifications or rules imposed by other countries, participating in 34 STCs.

Argentina, Chile, Canada, and Brazil have also raised several STCs at the SPS Committee's meetings. Although some of these countries (such as Brazil and Argentina) have not filed a large number of notifications, for transparency purposes, they must participate and try to solve conflicts with trading partners through STC discussions.

Table 5–6 shows the number of claims presented by member countries indicating that a Western Hemisphere country's SPS measure may threaten other countries' trade. The United States has filed the most complaints related to Western Hemisphere trade, raising 11 STCs involving only the Americas.

STC - An Evaluation by Issue

The largest number of concerns exposed by STCs were about animal health and zoonosis (38 of 105), followed by plant health (37 of 105) and food safety (27 of 105). There were also three cases presented as "other concerns." The 37 issues concerned with animal health and zoonosis comprised 12 cases related to Bovine spongiform encephalopathy; 12 related to foot and mouth disease; and 13 classified as other issues concerning animal health. An evaluation of the 37 STCs indicated that they are of high relative importance to countries in the Western Hemisphere, where countries, either as complainant or complainer, raised 25 STCs (66 percent).

The United States and Argentina had the most participation, either as complainer or complainant, with 10 instances each. Six STCs affected trade only between Western Hemisphere countries (Table 5–7). Concern about beef prevailed among the cases, with

Table 5–5

Claims by Western Hemisphere Countries on Trade Issues Related to Sanitary and Phytosanitary Specific Trade Concerns, 2000–02

Complainant[a]	Claims involving only Western Hemisphere countries (a)	Claims involving other countries (b)	Total claims (a) + (b)	Percentage of total claims (105)
Argentina	5	21	26	24.8
Bolivia		2	2	1.9
Brazil	1	12	13	12.4
Canada		15	15	14.3
Chile	3	12	15	14.3
Colombia		3	3	2.9
El Salvador				0
Honduras				0
Mexico		4	4	3.8
Panama				0
Paraguay		1	1	0.9
Peru		3	3	2.9
United States	4	30	34	32.4
Uruguay	1	7	8	6.7
Venezuela				0

[a] Complainant is the country that files a specific trade concern against another country's (Complainer) rule or notification. It includes not only when the country raises the STC but also when it supports another country's action. An STC can also evolve against a restrictive measure that has not been subject to a notification; if there are arguments to sustain that there is a threat for safety issues.

Source: G/SPS/GEN/204/Rev.2.

two issues involving foot and mouth disease and one related to Bovine spongiform encephalopathy.

However, contrary to what has been observed in the notifications, in the STC, the United States and Canada have not participated as much as some key developing countries, such as Argentina, Brazil, Mexico, Paraguay, Uruguay, and Chile. In fact, with respect to STCs on animal health, Mercosur dominated in terms of the number of issues raised (although only Argentina, Brazil, and Uruguay participated).

The relatively low number of STCs on food safety might be due to the intensity of the United States and Canada's participation in notifications, given their greater availability of highly trained technical and legal personnel to support and subsidize actions in that context (Table 5–8).

An analysis of the STCs concerned with plant health indicates that in 57 percent of the cases (21 of 37), Western Hemisphere trade was affected by this issue. There were seven STCs in which the United States had a high level of participation, appearing as the party that raised the issue in four instances, and as the affected party in two of these (Table 5–9). Western Hemisphere countries raised the three cases indicated

Table 5–6

Frequency of Western Hemisphere Countries Raising Specific Trade Concerns, 2000–02

Complainant[a]	Specific trade concerns involving only Western Hemisphere countries	Specific trade concerns involving other countries	Total specific trade concerns	Percentage of total world specific trade concerns (105)
Argentina	0	4	4	3.8
Bolivia	1	0	1	0.9
Brazil	2	2	4	3.8
Canada	2	3	5	4.8
Chile	2	3	5	4.8
Colombia	0	0	0	0
El Salvador	2	1	3	2.9
Honduras	2	1	3	2.9
Mexico	1	1	2	1.9
Panama	1	2	3	2.9
Paraguay	0	0	0	0
Peru	0	0	0	0
United States	3	8	11	10.5
Uruguay	0	0	0	0
Venezuela	2	1	3	2.9

[a] Complainant is the country that enters in SPS Committee with a specific trade concern against another country's (Complainer) rule or notification. It includes not only when the country raises the STC but also when it supports another country's action.

Source: G/SPS/GEN/204/Rev.2.

as "other concerns." The United States was responsible for two of these and Argentina for one.

CONCLUSIONS

The WTO SPS Agreement has been considered an important evolution in international trade rules and disciplines for agricultural and food products. There are strong indications, however, that after six years in existence, its basic aim and principles have not been fully accomplished.

It seems difficult to evaluate whether the multilateral negotiation is the most efficient forum to consolidate the intended process. This Agreement provides the discipline for the use of SPS measures. However, the adoption and implementation of provisions have been clearly unequal between member countries.

It is possible to illustrate, however, the advantages of using the FTAA negotiations to improve the functioning of the SPS Agreement. The regulatory framework of the SPS Agreement could easily be adapted from a multilateral to a regional context. Although

Table 5–7

Specific Trade Concerns with Animal Health and Zoonoses Reported to the Sanitary and Phytosanitary Committee Involving Western Hemisphere Countries

Complainer	Complainant	Dates raised	Product	Solution
Canada	Brazil	March 2001	Beef (Bovine spongiform encephalopathy)	Suspension lifted in February 2001
Chile	Argentina	October 2001	Beef (foot and mouth disease)	
Mexico	Argentina	July 1999	Beef (foot and mouth disease)	
Bolivia	Chile	November 2000 March 2001 July 2001	Poultry meat	Agreement on a protocol and progress reported
El Salvador	Uruguay	November 1999 November 2000	Meat and dairy	Issue resolved
Venezuela	United States	July 1997 July 2001	Avian influenza	

Source: WTO STC Committee report.

Table 5–8

Specific Trade Concerns with Food Safety Reported to the Sanitary and Phytosanitary Committee Involving Western Hemisphere Countries

Complainer	Complainant	Dates raised	Product
Chile, El Salvador, Honduras, others	United States	October 1996 March 1997 July 2001	Poultry

Source: WTO STC Committee report.

there is no reason to believe that the gains would necessarily be higher in the FTAA compared with a multilateral negotiation, it seems easier to reduce some of the current constraints in the FTAA, like diffusion of information and technical assistance for risk assessment equivalence or harmonization.

It is clear by now that information, which is a fundamental asset of the SPS Agreement, has also been responsible for most of its limitations. General functioning of the Agreement depends on gathering and analyzing information about international stan-

Table 5–9

Specific Trade Concerns with Plant Health Reported to the Sanitary and Phytosanitary Committee Involving Western Hemisphere Countries

Complainer	Complainant	Dates raised	Product	Solution
Brazil	United States	March 1997 July 2001	Wheat	Import of certain classes of wheat allowed as of early 2001.
Chile	United States	March 1997 July 2001	Wheat and Fruit	Restrictions on wheat removed in October 1997. Import access granted for certain fruits; consultation on other fruits continuing.
Honduras	United States	March 1997 July 2001	Rice	Honduras lifted its restrictions in 1997, and the U.S. considers the concern resolved.
Panama	United States	March 1997 July 2001	Rice	Imports restrictions removed in 1997, concern resolved.
United States	Argentina	November 1999 June 2000 July 2001	Citrus fruit	Favorable conclusion reported in June 2000. New concerns raised in October 2001.
United States	Chile	October 1997	Actions taken by local government	
Venezuela	Argentina	March 2001 July 2001 October 2001	Garlic and potato	

Source: WTO STC Committee report.

dards and measures introduced by current and potential trading partners, together with their respective risk assessment procedures. It is important to determine whether individual country measures are based on risk assessment and if these measures are nondiscriminating. Therefore, the establishment of an efficient database system that is easy to access is fundamental.

In fact, the WTO SPS Agreement required enquiry points in each country for these purposes. Therefore, it seems necessary to improve the enquiry points in order to make them more dynamic and effective. If they could work properly at least within the Western Hemisphere countries, this would substantially improve transparency and reduce a great part of the costs that are currently associated with the system for all countries.

Another important aspect that can be approached within the FTAA negotiations is an official mechanism to validate a notification. The mechanism could become an internationally accepted standard if all the members agree with it; if they do not, they would be obliged to explain the reason. This could avoid the use of standards higher than required for assuring the necessary level of protection.

It seems appropriate to implement formal mechanisms for dealing with comments and making sure the respondent, in the face of a complaint, does not ignore it. When an importing country does not take comments into account for any reason, the country should be obliged to present a formal explanation of the reason.

Counternotifications, for example, are expected to improve transparency in the application of SPS measures within the FTAA countries. A well-planned implementation strategy for this instrument has been considered fundamental for its effectiveness, which would be expressed by its capacity to expose and solve SPS conflicts.

There are several articles of the SPS Agreement that remain ambiguous and open to interpretation, which is done by the Panels and the Appellate Body in the WTO system. It would be helpful to have a regional forum to provide interpretation to improve implementation within Western Hemisphere countries.

Regionalism could also be explored in a more restricted environmental and geographical context, such as the FTAA. Many of the problems that developing countries experience with the SPS Agreement are related to the lack of financial and human resources necessary to follow, understand, and comment on developments in the regulatory frameworks of their trading partners. This seems to result from the fact that the SPS Agreement was negotiated mostly between developed countries. Many developing countries have signed the Agreement, possibly for political purposes, without having been an active party in the negotiating process. As the process evolved, they became increasingly aware of difficulties in accomplishing the disciplines. It is necessary to consider means to facilitate a more effective participation of these countries, such that the Agreement's instruments can be properly used and its provisions can be fully accomplished by all member countries.

It is also important to stress that the practical difficulties of implementing SPS standards are by no means limited to developing countries alone, although this is not the focus of the present work. Several papers on the subject affirm that reducing trade barriers and employing greater discipline have induced a search for alternatives, and that SPS measures have been used as substitutes for these measures. It seems appropriate, however, to conduct a quantitative study to evaluate whether the products and product categories that have been subject to a greater number of regulatory changes are correlated with those that became less regulated by tariffs and other quantitative restrictions. In addition, an evaluation of the relation between these variables and the status of the country, as an exporter or as an importer, could provide more subsidies to evaluate the effects of SPS measures on trade.

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Chapter 6

Biotechnology Issues in Western Hemisphere Trade in Agriculture

James D. Gaisford and William A. Kerr

The ability to map and utilize the information that is contained in genetic material represents one of the most significant scientific advances of all time. It is the basis for major technological changes and a pillar—along with the widespread use of computers and the ability to share information embodied in the Internet—of the knowledge economy that most developed countries have embraced as the foundation of their future prosperity. As with any major technological change, as well as bringing benefits, it creates new uncertainties. For example, agricultural biotechnology may represent risks to health and the environment. Given the degree of uncertainty surrounding a wide range of biotechnology's facets, individual societies have chosen to address these uncertainties at different paces and in their own ways. As a result, considerable regulatory differences among countries can potentially inhibit international trade and cause trade tensions.

Agricultural applications of biotechnology entail wide-ranging release of genetic material into the environment and distribution through the food system. As a result, new domestic regulatory regimes relating to environmental diversity and food safety have had to be discussed and, where deemed necessary, implemented. This has led to differing rates of licensing for genetically modified (GM) products among countries and a plethora of regulatory principles. In turn, this has created a range of trade tensions where some countries license GM production while others do not. The latter may wish to restrict the import of GM products while those that have licensed them for domestic production and consumption want access for their products in international markets.

International trade problems pertaining to products of agricultural biotechnology are further exacerbated by the effects of rapid technological change on the farm sector and differing levels of technical capacity among countries. In some aspects, biotechnology mirrors previous major technological changes in agriculture over the last century—mechanization, applied chemistry (fertilizer, herbicides, and pesticides), and genetics—in that it is labor saving. This means the need for fewer farmers. In developed countries, much of the existing agricultural policy, including trade policy, has been put in place to slow down the pace of the technologically-induced exit of farmers.

In the international context, managing agricultural biotechnology may require considerable technical capability, particularly if importers require proof of GM-free status or credible labeling of GM imports. In particular, it may be difficult for developing countries to prove that their exports do not contain GM material even if they do not license the use of biotechnology. This is because they may not have the technical capacity to prevent unlicensed production. As a result, access to traditional export markets may be at risk. Furthermore, credible labeling requires sophisticated monitoring and testing capability and may require the ability to segregate GM from non-GM products through the entire food supply chain, from the suppliers of genetic materials through on-farm production, marketing, processing, transportation, distribution, and finally to the consumer's plate. Such segregation is a major challenge for developed countries and may be beyond the technical capability of many developing countries, thus putting their existing exports at risk.

These are the major challenges that face those charged with designing international regulatory regimes dealing with agricultural biotechnology. International trade regimes need to be structured to allow countries to deal with the uncertainty pertaining to food safety and the environment without unduly inhibiting international commerce. The trade regime must resist capture by traditional protectionist interests in agriculture and ensure that countries with less technical capacity are not excluded from the international marketplace. These are the issues confronting the World Trade Organization (WTO) as well as existing regional trade organizations, such as the European Union, the North American Free Trade Agreement (NAFTA), and others.

Biotechnology is likely to pose particularly contentious issues for potential Free Trade Area of the Americas (FTAA) members. The United States, Canada, and Argentina are major trading nations and important producers of GM foods, while Brazil and some other Latin American and Caribbean countries have strong trade ties to the European Union, which does not license GM products. The stakes will be high because of the importance of the agricultural sector in some potential FTAA countries and the wide range of technical capacity exhibited by countries in the Western Hemisphere.

TRADE ISSUES IN AGRICULTURAL BIOTECHNOLOGY

The literature on agricultural trade in biotechnology covers a number of topics, including: (i) trade provisions dealing with biotechnology; (ii) regulatory issues; (iii) consumer concerns; (iv) labeling, traceability, and segregation; and (v) protection of intellectual property.

Trade Provisions

Major trade agreements such as the WTO, NAFTA, and Mercosur predate the widespread commercialization of GM agricultural crops. As a result, there are few direct provisions in existing trade agreements that deal with the products of biotechnology. For example, in the WTO and its ancillary agreements, explicit mention of biotechnology is only made in the Agreement on Trade-Related Aspects of Intellectual Property (TRIPS). As a result, what has been agreed upon in existing trade agreements may not be applicable to the change in circumstances arising from the commercialization of GM products (Perdikis, Kerr, and Hobbs 2001). In response, there have been calls for the renegotiation of existing trade agreements to accommodate concerns that have been raised regarding biotechnology (Kerr 1999). As yet, little progress has been made. The result has been, to some extent, an international regulatory vacuum pertaining to biotechnology products. However, a number of contenders have moved to fill the vacuum or at least stake out some of the territory.

According to Phillips and Kerr (2002), there are currently seven international bodies vying to coordinate and regulate the safety of biotechnology products. They represent a progression from institutions that are largely science-based—the International Plant Protection Convention, the International Office of Epizootics, and the *Codex Alimentarius* Commission—to ones that have broader objectives, such as trade facilitation, environmental protection, and other social and political goals—the Organisation for Economic Co-operation and Development (OECD), regional initiatives, the WTO, and the Biosafety Protocol. A detailed description of the initiatives of each of these organizations can be found in Gaisford and Kerr (2002). As yet, neither a harmonized approach to international regulation nor a hierarchy of organizations has emerged. In short, there appears to be no generally accepted model on which to base biotechnology provisions in a new trade agreement such as the FTAA.

Regulatory Issues

The major international regulatory problems surrounding biotechnology relate to how production and processing methods are treated in international trade agreements. Objections to biotechnology are often based on ethical concerns or reasons relating to risks to the environment, and do not pertain to the direct risk associated with consumption. These are objections to the production and processing methods used in producing the food.

A basic principle of the WTO is nondiscrimination. As a result, all "like products" are to be treated the same regardless of the production and processing methods used in their manufacture (Isaac, Phillipson, and Kerr 2002). Although nondiscrimination is the baseline, there are exceptions whereby countries may legitimately violate the principle of nondiscrimination in order to meet domestic concerns or goals. The relevant WTO rules dealing with GM crops are those associated with food safety, environmental protection, and technical barriers to trade.

The WTO's Agreement on the Application of Sanitary and Phytosanitary (SPS) Measures allows countries to violate the nondiscrimination principle in cases when there is a risk to human, animal, or plant health from imports. Before imposing a measure, however, a country must demonstrate that there is a scientific basis for the trade measure and that it has conducted a risk assessment. Many of the risks associated with biotechnology are speculative. According to Isaac (2002, p. 130), speculative risks "lack experience, data, a causal-consequence mechanism and an accepted analytical method for assessment. They are logical possibilities. They are irrefutable, but untestable as well," and, hence, will not pass the scientific/risk criteria of the SPS. If there is no health risk, then the WTO-administered Agreement on Technical Barriers to Trade (TBT) is the appropriate venue to seek an exemption from the nondiscrimination principle for biotechnology. For example, the TBT allows countries to put in place labeling requirements on imports if the final good is affected—if it is no longer a like product. In the case of biotechnology, the question is whether the final GM good is no longer like its non-GM counterpart. (Is GM lettuce not like non-GM lettuce?) If they are like products, it means that the WTO has no means to satisfy demands related to the consumers' right to know about the production and processing methods used to produce the products imported into their markets (Isaac, Phillipson, and Kerr 2002).

Biotechnology and Consumers

Biotechnology can generate (negative) *public goods* as well as *private goods*. Consumers may object to either the private or public good, or both. In the international trade context, it is important to note that those asking for protection in the case of biotechnology are most frequently consumers and not traditional producer vested interests. In the economic model underlying the WTO, consumers are always considered winners in liberal trade regimes (that is, the removal of trade barriers lowers prices, meaning consumers are better off). The WTO, hence, only sees producers asking for protection. The trade model that is the basis for the WTO approach, however, makes some strong assumptions regarding the information available to consumers. When consumers no longer have perfect costless information, as is the case with GM foods (Hobbs and Plunkett 2000), then consumers are no longer unambiguous winners from a liberal trade regime and trade liberalization is no longer unambiguously welfare enhancing (Gaisford and Lau 2000; Isaac, Phillipson, and Kerr 2002).

Some governments, particularly in the European Union, have been faced with strong political pressure to slow or stop the domestic licensing of GM products and prohibit or regulate their import into European Union markets. The WTO has no mechanism to allow the imposition of trade barriers directly in response to consumer or environmental groups asking for protection (Perdikis, Kerr, and Hobbs 2001). As a result, countries have been putting in place national regimes for trade in biotechnology products because no multilateral solution has been agreed.

Labeling, Traceability, and Segregation in International Supply Chains

Countries that wish to inhibit the import of GM products on the basis of consumer concerns—*consumers' right to know*—in the face of incomplete or asymmetric information have two choices for barriers to trade. They can impose an import ban, as is currently the case in the European Union, or they can require the labeling of imports. Gaisford and Chui-Ha (2000) show conclusively that a labeling policy is superior to an import ban on the basis of national welfare.

One of the common misconceptions is that only GM products will have to be labeled. In fact, if GM products must be labeled, it means that those attempting to sell products without a GM label are claiming that their products are GM-free. After all, the whole reason for having a labeling system is to provide consumers with a choice between consuming GM and non-GM foods, and consumers will be far more interested in the credibility of non-GM claims than they will be about GM claims. This is because consumers willing to eat GM foods will not care if foods labeled as GM are "tainted" or "polluted" with non-GM products. On the other hand, those not wishing to consume GM foods will care if the products they consume contain GM material (Isaac, Phillipson, and Kerr 2002).

The verification of labeling claims in international food supply chains requires considerable resources (Hobbs 2000). In the case of non-GM products, ensuring that products are not tainted with GM products would likely require that GM and non-GM products be segregated all along the international supply chain. The infrastructure that is used to move many food products internationally was not designed for segregation of products. As a result, the cost of segregation rises considerably as the degree of purity required rises. The cost of guaranteeing a product to be 95 percent GM free is much less than being able to guarantee a purity level of 99 percent.

Labeling, traceability, and segregation are difficult problems for developed country food chains. The low technical capacity of many developing country supply chains and regulatory regimes may make it impossible for them to satisfy import labeling requirements, meaning that their products could be shut out of import markets. This could threaten the viability of their agricultural sectors and their long-term development prospects (Gaisford and others 2001).

Intellectual Property Issues

It is likely that a trade agreement within the Western Hemisphere will have to deal with important intellectual property issues pertaining to biotechnology, in addition to the direct trade issues that have already been examined.

Development and application of new technologies and new products have always been central to development of the agricultural sector. The revolution in biotechnology, however, poses new issues because it is largely a private sector initiative and the innovations directly concern life forms. Developing countries, while having agreed to protect foreign intellectual property in the WTO's TRIPS Agreement, have done so reluctantly (Gaisford and Kerr 2002). In part, this is because they produce so little of it. Developed countries, by contrast, see the protection of intellectual property as essential to their transition to knowledge economies and hence their future relative prosperity.

Developing countries have been particularly worried about the additional cost of pharmaceuticals and seeds, given their large numbers of poor consumers and impoverished farmers. Of course, these are the areas where research in biotechnology is concentrated. Firms investing in biotechnology are unlikely to turn their attention to crops suitable for tropical agriculture unless they can recover their investments. The TRIPS Agreement allows retaliatory duties to be imposed on the exports of a country that fails to protect intellectual property rights. However, Yampoin and Kerr (1998) show that the threat of trade sanctions in the TRIPS Agreement is unlikely to be sufficient to induce developing countries to protect intellectual property rights. The result is that while developing countries will have enacted legislation to protect intellectual property rights, enforcement is likely to be lax.

The United States is likely to push to close perceived loopholes in both the FTAA and WTO negotiations so that its bioscience multinationals will have greater assurance that their investments in GM organisms will be protected. Developing countries in the Western Hemisphere may be inclined to resist such a reduction in access to technology. In view of the problems with the TRIPS Agreement, governments and bioscience firms in developed countries might well consider new strategies that could bring developing countries on board for the protection of intellectual property. As the efficacy of the TRIPS *stick* seems in doubt, a strategy of *carrot*-based trade concessions might be considered in the context of the FTAA negotiations. Unless developing countries can be convinced that protecting intellectual property in biotechnology is in their interests, the profitability of investing in biotechnology will be reduced and the full potential of the technology for both developed and developing countries will not be realized. Thus, it would be desirable for an FTAA to chart new, mutually beneficial ground.

ECONOMIC ASSESSMENT OF TRADE EFFECTS OF BIOTECHNOLOGY

The issues surrounding biotechnology have the potential to profoundly affect trade flows in agricultural and processed food products. To provide the basis for an economic assessment of the potential trade impact of biotechnology, it is useful to begin with an examination of direct consumption issues and then proceed to an analysis of indirect consumer issues pertaining to the environment as well as issues concerning agricultural producers. With these building blocks, problems facing importing and exporting countries can be analyzed, and issues related to regional trade agreements can be explored.

Direct Consumer Concerns—A Problem of Hidden Product Attributes

Genetic modification is a product attribute that some consumers may care about in terms of their own direct consumption. There are several reasons why consumers might prefer to avoid direct consumption of GM products. For some, long-term food safety is a concern. While current scientific evidence may suggest substantive equivalence between GM foods that have been granted regulatory approval and corresponding non-GM foods, information on new products is inherently incomplete. Although not all consumers will wish to shun some or all GM foods, the behavior of those who prefer not to consume such foods at present is not necessarily unreasonable, irrational, or uninformed.

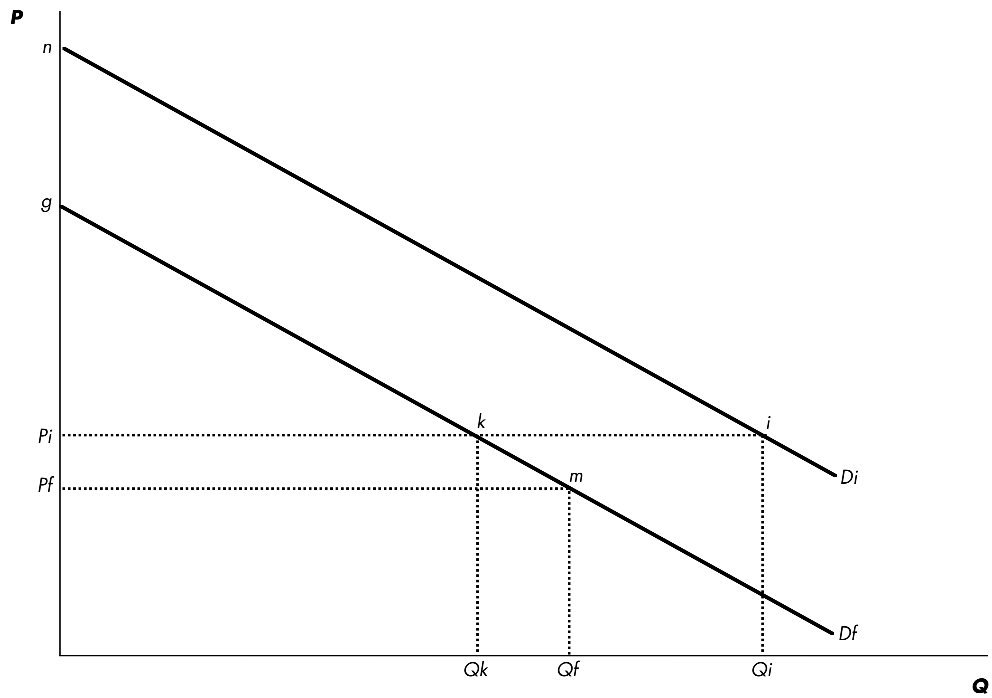
In addition to long-term health concerns, there are other reasons that individuals may wish to avoid directly consuming GM foods. For example, some consumers may have broad ethical concerns over meddling with nature, or more specific religious sensibilities (Gaisford and Kerr 2002). Furthermore, on the basis of environmental or animal welfare concerns, individuals may sometimes (but not always) prefer to avoid consuming what is perceived by them to be a tainted product.

Regardless of whether consumers care, product attributes involving genetic modification will be hidden in the absence of a labeling system involving verifiable segregation and traceability. Consider the situation where an input-trait GM product is introduced, but some consumers would prefer to avoid consuming it. In the absence of effective labeling, the available information will only sustain a single, blended market between the GM and non-GM varieties giving rise to a so-called pooling equilibrium. It is well known that such hidden type or adverse selection problems tend to generate markets that are dominated by an inefficient proportion of low-quality products or "lemons" (Akerlof 1970), a proposition that can be extended to pooling equilibria involving GM foods and non-GM foods (Gaisford and others 2001).

Consumers will be aware that some of the food on the market is genetically modified and there will be a downward shift in demand as concerned consumers will be less willing to pay for a product they consider inferior. In Figure 6–1, demand declines from *Di* to *Df*. Consequently, the decline in perceived quality gives rise to loss of consumer surplus equal to area *n-i-k-g*. In other words, concerned consumers would suffer an ad-

Figure 6–1

The Impact of Biotechnology on Consumers



verse quality effect of *n-i-k-g* dollars (Gaisford and others 2001). Consumers also experience a favorable reduction in price as producers reap cost savings due to insect resistance, herbicide tolerance, and other factors. In Figure 6–1, the price falls from *Pi* to *Pf*, giving rise to a gain in consumer surplus equal to *Pi-k-m-Pf*. This represents a beneficial price effect from the introduction of biotechnology. Either effect could dominate, meaning that consumers as a group could be better or worse off.

In principle, a labeling system that effectively segregates GM and non-GM supply chains would lead to separate markets and a so-called separating equilibrium. Even from the consumer standpoint, however, labeling is not a panacea. Those consumers who have a sufficiently strong antipathy to the GM product that they continue to consume the non-GM product will be worse off under the labeling regime than they were initially because of the price increase and the decline in purity. Ironically, those consumers who view the GM and non-GM variety as perfect substitutes may gain even more with, rather than without, labeling because less of the GM product is likely to be demanded, so that the price would typically be lower. Some consumers with a weak antipathy to the GM product may, nevertheless, choose to consume that variety under the labeling regime because the price is lower than that of the non-GM product. With high segregation costs and/or weak consumer antipathy, labeling may be inferior to not labeling. In other circumstances, labeling will be superior.

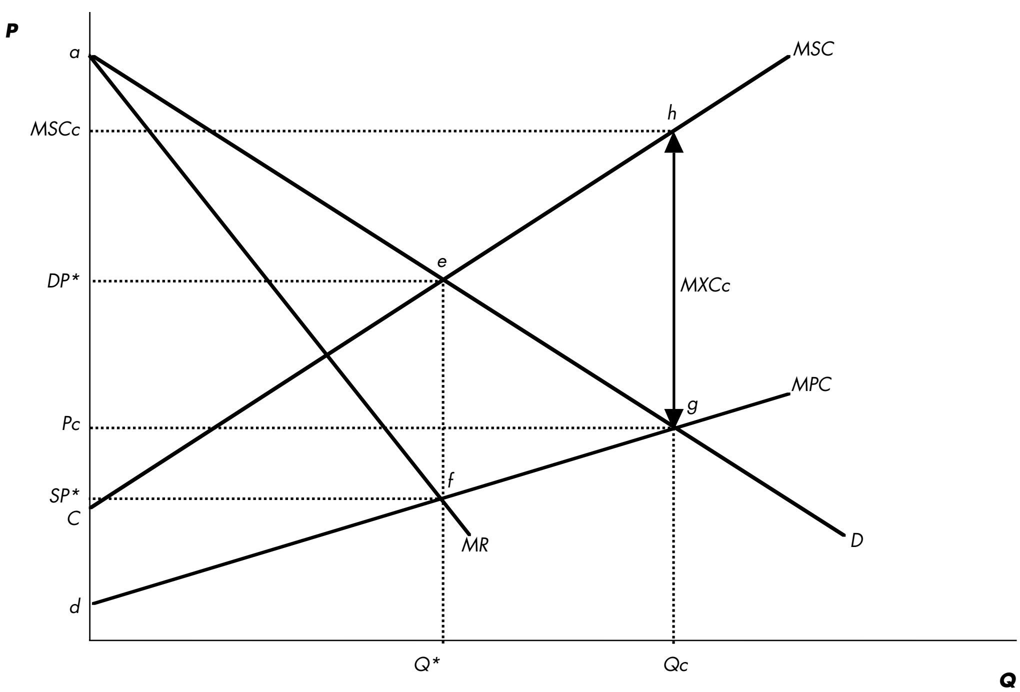
Environmental Concerns—Negative Public Goods

Another area of indirect consumer concerns might arise concurrently with direct consumer concerns. These concerns pertain to the indirect public good consumption associated with releasing GM organisms into the environment. Possible environmental effects cover a wide spectrum, from specific adverse effects, say on Monarch butterflies, to broader concerns with respect to biodiversity. Often there is incomplete information with respect to environmental side effects of the use of GM inputs.

In many cases, the costs associated with environmental damage or risk from GM production are borne externally by society as a whole rather than internally by individual private producers. Such damage or risk to the environment can be seen as a negative public good. It is nonrivalrous in the sense that everyone "consumes" the environment and it is nonexcludable in that there is no escape. Thus, in Figure 6–2, which represents the input market for a particular GM seed, the social costs of GM seed sales exceed the private costs by external costs, which reflect the environmental costs aggregated across all individuals. More specifically, the *MPC* curve reflects the marginal private costs of producing GM seed. The marginal social cost curve, *MSC*, includes the marginal external costs associated with environmental release as well as the marginal private costs. The demand curve, *D*, provides the relevant measure of marginal social benefit to farm-level producers.

Figure 6–2

External Environmental Costs



The efficient level of output is Q^*, which equates the marginal social costs and benefits of GM production. If the GM seed were supplied competitively such that price was equated with marginal cost, *Q*c units of the GM product would be sold at price *P*c because the external costs are not borne by the producers. Such a competitive equilibrium would not be efficient because the marginal social benefit, *P*c, would be less than the marginal social cost, *MSC*c, due to the marginal external cost, *MXC*c. The government could introduce a corrective measure, such as a Pigouvian tax (named after the economist Pigou), to restore efficiency. A tax on production set equal to the difference between DP^* and SP^* would lead to market output Q^*, consumer or demand price DP^*, and producer or supply price SP^*.

In reality, of course, the market for GM seed is not likely to be competitive. Suppose that Figure 6–2 represents a particular GM variety that is protected by a patent and supplied by a single bioscience firm. Since such a firm has market power, it will restrict output to the point where marginal private cost, *MPC*, is equal to marginal revenue, *MR*. As shown in Figure 6–2, the firm reduces output to exactly the efficient output, Q^*, and the monopoly price is DP^*, which is equal to the marginal social cost. Of course, the situation in Figure 6–2 is unusual; in general, the monopoly level of sales of the GM seed will differ from the efficient level. The important point is that the environmental and market-power distortions work in opposite directions so that there is no automatic presumption that the GM seed will be overused relative to the efficient level.

It is also important to emphasize that a GM crop variety would not necessarily be overproduced relative to the competing, non-GM variety even if all markets were competitive. Certain GM varieties may frequently have smaller adverse effects on the environment than their non-GM counterparts. For example, even if a pest-resistant GM crop poses some environmental risks (for example, to Monarch butterflies), the damage to the environment may be less than that which would arise from greater use of pesticides with the non-GM crop. In the absence of corrective measures such as Pigouvian taxes on either the GM seed or the pesticide, the GM crop would be underproduced relative to the non-GM crop.

Producer Issues

Biotechnology poses producer as well as consumer issues. Concentration in input markets obviously has consequences for downstream producers at the farm level. The benefits of cost savings associated with GM inputs will be at least partially offset by higher prices for those inputs. Furthermore, contractual arrangements typically tie farms much more closely to suppliers. Of course, farm-level producers are by no means uniform in their entrepreneurial capability to successfully adopt new innovations in biotechnology. Consequently, the introduction of a new GM crop is likely to generate significant intramarginal profits and thus new producer surplus for those farms that are most able to adopt the new technology. Those firms that are least able to adapt will be best off sticking with the old technology and, even so, they may undergo economic stress.

Biotechnology has the potential to affect the geographic and, thus, international distribution of production for some agricultural products. To the extent that genetic modification adapts organisms to various climates and soils, producers may face emerging competition from new locales and even additional countries.

Potential Importers of Biotechnology Products

Here we consider the import options of an economic entity such as the European Union, where GM production is not currently approved and where a significant proportion of the population would prefer to avoid the GM variety if other things were equal. These import options include unrestricted access, a labeling regime that also allows access to both the GM and non-GM varieties, a partial import embargo where access is permitted only for certified non-GM products, and a full import embargo.

If the European Union permits unrestricted access, a pooling equilibrium will result because at least some imports will be genetically modified. Those consumers with an antipathy for the GM product will experience an adverse quality effect, which is equal to the loss of *a-i-j-c* euros in Figure 6–3. Meanwhile, the reduction in price from *Pi* to *Pf* generates a beneficial price effect for consumers, which is equal to *Pi-j-f-Pf*, and an adverse price effect for producers, which is equal to *Pi-k-g-Pf*. Thus, there is a beneficial net effect from lower prices of *k-j-f-g* euros. In principle, the beneficial net price effect could be larger than the adverse quality effect, but in Figure 6–3 the reverse is true, implying an overall loss to society under the unrestricted access regime.

By contrast, suppose that the European Union responds to the introduction of the GM product with a full import embargo. While the economic welfare of the European Union would decline, it might decline by less than under the unrestricted access regime. Indeed, the loss from the full import embargo would be less than that from unrestricted access whenever *a-e-z-c* exceeds *g-z-f*, as is clearly the case in Figure 6–3.

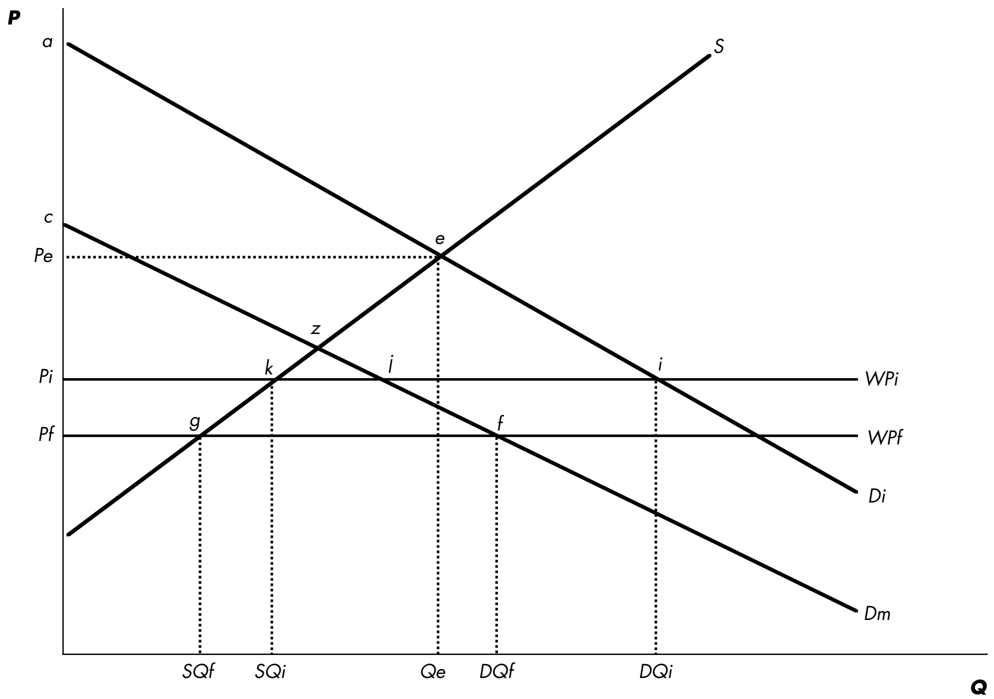
Even if circumstances arise such that a full embargo would be better than unrestricted access, it is virtually never the policy option that maximizes the economic welfare of the European Union. For example, consider a partial embargo where certified non-GM imports continue to enter the European Union. Although certification is likely to be costly for exporting countries and, thus, the price is likely to exceed rather than equal *Pi*, such imports may be available at a price below *Pe*. In this case, certified imports would allow the European Union to avoid part of the loss associated with a full embargo without any adverse consequences in terms of perceived product quality.

If the European Union permitted labeled GM imports in addition to certified non-GM imports, it would typically be better off. Since some European Union consumers would switch to the cheap GM imports, the demand on the non-GM side of the market would decline, likely leading to a lower price for the non-GM product. The lower price for the non-GM product would generate gains in consumer surplus that would exceed the losses to domestic producer surplus because the European Union is on an import basis where consumption exceeds production. Meanwhile, all those European Union consumers that perceive the GM and non-GM products to be perfect substitutes and some of those with only a weak preference for the non-GM products would switch to the labeled GM imports, which remain cheaper than the non-GM food. Since these consumers would switch notwithstanding the reduced non-GM price, they would be better off than under the partial embargo.

In terms of European Union economic welfare, labeling typically dominates a partial embargo and the latter virtually always dominates a full embargo. However, unambiguous comparisons with unrestricted access are not possible. We have seen that there is no unambiguous ranking between unrestricted access and a full embargo. Similarly, unrestricted access might be better or worse than either a partial embargo or labeling in terms of overall economic welfare, depending on the circumstances (Gaisford and Kerr 2002).

Figure 6–3

A Pooling Equilibrium in International Trade



Conundrums for Exporting Countries

Although only the United States is a clear hub of biotechnological innovation within the Western Hemisphere, other countries in the hemisphere are important net exporters of agricultural products and virtually all countries are exporters of some agricultural products. Governments in noninnovating exporting countries face difficult policy choices given that biotechnology products might be excluded from, or at least face strong resistance in, some potentially important import markets such as the European Union. This is true even if the exporting country faces little consumer protest within its own market, as is often the case in the Western Hemisphere.

If the costs associated with supply-chain segregation, product certification, and labeling were minimal, governments could move quickly but judiciously on approving GM crops without serious repercussions. The market could simply be left to its own devices and individual farms could choose whether to produce for the GM or non-GM stream. In the GM stream, cost savings would be available, while in the non-GM stream higher prices would be available on non-GM markets. Farmers would then choose depending on their entrepreneurial capabilities and the characteristics of their location, soil, and climate. As it is, however, the segregation and certification requirements of non-GM importing countries are likely to be onerous, and may even be impossible to meet for non-GM producers in countries where GM products are approved. Consequently, non-GM producers in a country that elects to stay GM free may have a significant export advantage over competitors from countries where GM products are readily approved.

Regional Trade Agreements and External Trade Diversion

A new regional trade agreement such as an FTAA may endeavor to create an open internal trading regime for agricultural products in general and products of biotechnology in particular. If this is the case, members who had been pursuing a "go-slow" policy on approving GM production and imports may face trade diversion problems.

Consider an example for a particular crop. Suppose that country *A* has approved production of a GM variety, which it consumes domestically and exports to Asia. Meanwhile, in country *B* neither production nor imports of the GM variety have been approved in spite of the fact that there is little consumer resistance. Country *B* continues to produce the non-GM variety, which it consumes domestically and exports to Europe. The price of the GM variety is cheaper due to the cost savings available to producers. Clearly, the ban on GM imports in country *B* is necessary because most consumers in *B* would prefer to buy the cheaper GM variety.

Now suppose that countries *A* and *B* decide to form a regional trade agreement. One strategy would be to leave the regulation of GM imports as well as production in strictly national hands and not attempt to reap the possible gains from cooperation and coordination on biotechnology. However, if the trade agreement succeeds in establishing an open regime for all products, country *B*'s exports to Europe may be at risk. Even if country *B* continues to produce only the non-GM variety, the mere possibility of imports from *A* under an open border may result in the closure of the European market or at least high certification costs. Country *B* may well expect such trade diversion and, as a result, strongly resist incorporating an open trading regime into the regional trade agreement even though it faces only modest consumer resistance to GM foods in its own domestic market.

BIOTECHNOLOGY IN THE WESTERN HEMISPHERE

As yet, the production of licensed GM crops takes place in relatively few countries. In 2001, four principal countries grew 99 percent of global transgenic crop area. Three of those countries are in the Western Hemisphere—the United States, Argentina, and Canada. The United States grew 35.7 million hectares, which comprised 68 percent of the global total. Argentina grew 11.8 million hectares (22 percent of the global total), and Canada grew 3.2 million hectares (6 percent) (James 2001). The balance was grown in 10 other countries, of which only Mexico and Uruguay are in the Western Hemisphere. It should be noted that these are only officially reported figures. Transgenic crops may be being produced in a number of countries illegally—most notably Brazil (de Kathen 2000).

It should be noted that all of the countries where commercial production of transgenic crops currently takes place have temperate climates or large temperate areas. Tropical products or varieties of temperate crops suitable to the tropics have yet to be licensed. Soybeans account for 58 percent of the global acreage, maize (corn) 23 percent, cotton 12 percent, canola (rapeseed) 6 percent, and the other crops less than 1 percent in total.

Herbicide tolerant crops account for 74 percent of the acreage, insect resistant crops (Bt) for 19 percent, stacked herbicide tolerant-Bt crops for 7 percent, and all the other traits (for example, viral resistance, nutrition, and delayed ripening) for less than 1 percent combined.

The major crops—soybean, maize, cotton, and canola—are largely temperate crops and are grown to varying degrees in the Western Hemisphere, primarily in the United States, Canada, and Argentina. Maize is an important crop in Mexico, but existing GM varieties are not particularly suitable to agronomic conditions in Mexico.

Clearly, however, these are major traded commodities. As yet, there is little segregation of GM and non-GM crops for export. The level of international trade in these products has heightened the urgency of the debate over the establishment of transparent trade rules. Any GM production that enters the international market could potentially arrive in any of the importing countries. Up to 177 countries import some quantities of genetically modified crops (Phillips and Kerr 2002).

It seems clear that as yet there has been little resistance to GM imports in developing countries, including those in the Western Hemisphere. As a result, for the most part, the question of GMs has not made it onto the trade agenda for imports. This does not mean that some consumers, in particular wealthy consumers (Gray, McNaughton, and Stovin 2001) in developing Western Hemisphere countries, have not expressed concern pertaining to GM products; it only means that these concerns have not been translated into trade policy initiatives.

Although to date the GM crops that have been widely commercialized have either been of little relevance to Western Hemisphere developing countries or easily adopted by producers (for example, soybeans in Argentina), there is a wide range of new GM crops in various stages of research, development, and licensing. New GM crops may raise the profile of the biotechnology issues on trade policy agendas in the Western Hemisphere. The new crops may have applicability in countries and/or products that have not had significant concerns previously. If these are major export crops, export dependent countries (for example, some exporters of sugar, coffee, and bananas) may find their ability to export threatened, particularly if the European Union or another GM-sensitive importer is a major customer. This will raise questions relating to licensing and worries about contamination from imports from countries that choose to produce GM varieties of the same crop. Import embargoes might have to be contemplated.

Policy on Biotechnology

With the United States, Argentina, and Canada being the foremost licensers of GM crops globally, a significant proportion of the crop area available for current GM technologies is already committed to GM technology. As the decision to use GM technology is generally perceived as being irreversible (Gray and Hobbs 2001), the production of GM crops in the Western Hemisphere is a fact of life. Given that developed countries such as Canada and the United States have made the knowledge economy a central pillar of their economic prosperity policy, they will support open access for biotechnology products. Argentina can also be expected to take a strong open access position, given its heavy adoption of GM products.

The position of other Western Hemisphere countries is less clear. This is largely because their positions on domestic licensing are not yet fully developed. The first major international expression of concern regarding biotechnology was during the negotiations surrounding the Convention on Biological Diversity, which was adopted in 1992. The Convention calls for the development and implementation of means to control and manage risks resulting from GM organisms (Article 8 g) and alien organisms (Article 8 h) (de Kathen 2000). Before the conclusion of the Convention, genetically modified crops had been released in Belize, Chile, the Dominican Republic, El Salvador, and Bolivia (de Kathen 2000).

According to Artunduaga-Silas (2000, p. 24), among Latin American and Caribbean countries, "(…) two classifications can be made: those with existing legislation and those without. Countries without specific legislation include the Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Nicaragua, Panama, Venezuela and the majority of Caribbean countries."

Even with legislation in place, the capacity to meet all of the criteria of the Convention on Biological Diversity may simply not exist in many countries in Latin America and the Caribbean (Artunduaga-Silas 2000). Brazil has not licensed the production of GM crops. Being one of the largest producers of non-GM soybeans, Brazil has benefited from access to European Union markets that are effectively closed to the United States and Argentina (which have licensed GM soybeans), its major competitors. Brazilian maize has also benefited from access to the European Union market due to its GM-free status.

Brazil also provides an example of the difficulties countries will have in attempting to maintain their GM-free status. It is common knowledge that there is considerable smuggling of GM seed into Brazil from Argentina and that illegal production of GM soybeans is taking place. The Brazilian government has had neither the political will to police the industry nor the capacity to do so. As a result, it is only a matter of time before Brazil's GM-free status is challenged by the European Union and its exports threatened. The failure to license GM crops in Brazil has not deterred research efforts in the area of agri-biotechnology. More than 1,000 field tests with transgenic plants have been approved. A wide range of GM crops are considered at the pre-commercialization stage—corn, soybean, cotton, eucalyptus, sugarcane, tobacco, potatoes, sweet corn, and papaya. If Brazil becomes a producer of GM crops, then all of the major economies in the Western Hemisphere would be GM producers and it would be difficult for smaller countries to effectively oppose an open market for GM products in the Western Hemisphere. A more complete discussion of the existing regulatory frameworks for biotechnology in Western Hemisphere countries, as well as Mercosur and NAFTA, can be found in Gaisford and Kerr (2002).

WHAT IS AT STAKE IN A WESTERN HEMISPHERE TRADE AGREEMENT?

Determining what is at stake in a Western Hemisphere trade agreement in the case of biotechnology is complex. While the issues are relatively straightforward, empirical assessments are problematic. This is largely because the future direction of GM crop development cannot be determined at this point in time, particularly for crops that are important export crops for Latin American and Caribbean countries but are not important production crops in the United States and Canada. This is because currently most GM research is centered on crops that can be produced in the United States and Canada.

The United States and Canada risk little in a Western Hemisphere trade agreement. Their approval processes for GM products are working well and there is little resistance to GM crops among consumers. The problem comes for Latin American and Caribbean countries that may want the right to restrict imports of GM products.

A country may wish to ban imports of GM seed to protect its export markets. In other words, it may wish to maintain its GM-free status to ensure continued access to markets closed to GM products, or countries that are likely to have relatively strict labeling regimes for GM imports. In the latter case, if a country's technical capacity to monitor GM products is low, then it may find it easier to ban GM imports than to control them once inside the country. Gaisford and Kerr (2002) provide a brief discussion of the potential size of the trade flow effects of choosing to license GM crops throughout the hemisphere.

FRAMEWORK FOR BIOTECHNOLOGY IN THE FREE TRADE AREA OF THE AMERICAS

There are both direct trade issue and indirect trade-related intellectual property issues raised by biotechnology that should be addressed in the negotiations leading toward an FTAA. Bioscience firms in the United States and other developed countries, including Canada, it appears, were taken somewhat unawares by the threat of trade barriers to GM foods. The reassessments of their investment strategies in the wake of the controversy over trade barriers suggest, for example, that they did not fully understand the limits of the WTO's Agreement on SPS measures when they did their planning. Similarly, bioscience firms may also have overestimated the degree of intellectual property protection provided by the TRIPS. While the United States and Canada can be expected to take up the cause of the bioscience firms, it is vital that the provisions of an FTAA pertaining to biotechnology balance the interests of the Latin American and Caribbean Countries so as to be effective in the long run.

Biotechnology and Trade Provisions

An FTAA should ideally seek to establish an open, transparent internal production and trading regime for all agricultural products, including products of biotechnology. Mechanisms should be put in place to expedite regulatory cooperation and coordination with respect to biotechnology. Information should be shared efficiently by domestic regulatory agencies to minimize red tape and avoid unwarranted delays in approving the production and import of GM products. This is not to say that all countries should adopt the same criteria for approval or find the same risk levels acceptable. Minor variations across countries in lists of approved GM products are thus to be expected.

Import embargoes as well as production bans on specific GM products on environmental or health grounds are allowable under the WTO's SPS Agreement and/or the Biosafety Protocol, which has been negotiated but not yet ratified, to govern some aspects of trade in biotechnology products (Isaac, Phillipson, and Kerr 2002). Unfortunately, the scientific risk assessment procedures of the SPS and the precautionary principle of the Biosafety Protocol do not appear to be mutually consistent. Furthermore, neither the precautionary principle nor the scientific risk assessment is wholly satisfactory in dealing with biotechnology. On the one hand, when a new GM product is introduced, a situation of incomplete information prevails and the objective probabilities that are presupposed by a scientific risk assessment are not yet known. On the other hand, the precautionary principle seems wide open to capture by protectionist interests and could permanently stifle trade. The FTAA should seek to find a workable compromise (Gaisford and Kerr 2002).

The FTAA negotiations might allow production bans and import embargoes on GM products to protect access to sensitive export markets, such as the European Union. While there are few crops other than soybeans where there appears to be much risk of such trade diversion at present, this problem could become more acute in the future as genetic modifications of tropical crops are introduced.

It is certainly possible that some countries in the Western Hemisphere may ultimately decide to engage in mandatory or voluntary labeling of some or all GM foods. Provided that the benefits demonstrably exceed the costs (for example, of supply-chain segregation), this appears consistent with the existing TBT Agreement under the WTO, and it should remain explicitly permissible under the FTAA as well. Nevertheless, the language in the TBT on this issue is vague, and explicitly requiring costs and benefits to be weighed in an FTAA would improve transparency and reduce the risks for those wishing to invest in biotechnology.

Biotechnology and Intellectual Property Protection

A general problem with the existing TRIPS is that it is simply not in the interest of developing countries to vigorously enforce intellectual property rights. This arises not only because the producer benefits from intellectual property protection accrue almost entirely in developed countries, but also because many new products and processes are focused on consumption or utilization in developed countries. Developing countries would have a greater incentive to protect intellectual property if the resultant products were more appropriate to their needs and conditions (Diwan and Rodrik 1991). This would seem to require cooperation to promote capacity building in the development and enforcement of intellectual property in developing countries.

In some circumstances, lower intellectual property payments in developing countries might lead to reduced piracy and ease the nonenforcement problem. Market conditions are conducive to such pricing whenever the elasticity of demand is lower in developing than developed countries because per capita incomes are lower and/or the GM crop is less applicable to local conditions. Such an agreement would not only be useful in the context of the products of biotechnology, it would also help mitigate other problems, such as the fiasco in Africa over the pricing of pharmaceuticals to combat AIDS. Any adjustment in the duration of intellectual property protection in developing countries that would also redress the net benefits of intellectual property protection would likely have to await changes to the TRIPS itself in the WTO negotiations. It would also be useful for an FTAA to provide greater clarification in terms of patents on life forms (Gaisford and Kerr 2002).

CONCLUSIONS

Biotechnology holds great long-term promise for the agricultural sectors of Latin American and Caribbean countries. To date, however, most GM crops have been designed for temperate climates. In the FTAA negotiations, the Latin American and Caribbean countries should seek to ensure that their farmers get access to existing biotechnology on terms no less advantageous than those in the United States and Canada. More importantly, the Latin American and Caribbean countries should make sure that an FTAA provides a framework that promotes the development of biotechnologies that are appropriate for their local conditions.

At present, there seem to be few areas where Latin American and Caribbean countries need to be concerned about the loss of sensitive export markets, especially those in the European Union, if they adopt a more open stance to GM production and imports under an FTAA. In any event, having farmers closer to the cutting edge of technology seems more likely to be a winning development strategy than does postponing adoption to preserve markets in most cases. In adopting more open markets for products of biotechnology, however, the Latin American and Caribbean countries should demand similar concessions from the United States on products such as sugar. Furthermore, Latin American and Caribbean countries should probably insist on the prerogative to label some or all GM foods so that they can respond to consumer concerns, should they arise in the future.

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Chapter 7

The U.S.-Central American Free Trade Agreement: Main Effects on Agricultural Products

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This chapter assesses the implications of several major U.S. legislative and executive actions on the issues of importance in negotiating the U.S.-Central American Free Trade Agreement (U.S.-CAFTA). The chapter looks briefly at the political interest groups that dominate U.S. domestic and international trade policy in agriculture, examines the legislation that will shape the U.S. positions in the trade negotiations, and assesses the implications of these measures for the possible integration of U.S. and Central American markets for agricultural products.

Under the United States Constitution, the authority to deal with international trade rests with the Congress. The authority to negotiate trade agreements is delegated to the executive branch by congressional action, but the rules that accompany the delegation of authority generally reflect the same political pressures underlying domestic and international policy in agriculture. The Congress also largely determines agricultural policy in the United States. Thus, the same political forces that influence domestic agricultural policy are dominant in congressional actions regarding agricultural trade.

In the United States, a number of key commodity groups, two general farm organizations, and their allies in the processing and exporting industries heavily influence agricultural policy. In the U.S. system, the crucial decisionmaking groups in the Congress related to agricultural issues are the Committee on Agriculture of the House of Representatives, and the Senate Committee on Agriculture and Forestry. These two committees consist of individuals mostly representing states or congressional districts where agricultural interests are important. Members of these committees are heavily supported and lobbied by the commodity groups and their allies.

Some commodity groups have great political influence. Two of the most influential groups are the alliance of sugar and sweetener producers (including corn growers) and sugar processors, and the organizations of dairy producers. Their strong influence is partly due to the location of the industries and partly due to their willingness to spend substantial amounts of money to support or oppose individual political candidates.

It should be noted that the commodity groups and their allies are groups whose economic base is in domestic production and exports. Consumer groups have little or no influence in agricultural support and trade policy, but the agricultural industry has made a truce with environmental groups so that current agricultural policies contain a substantial element of environmental protection.

During 2002, the U.S. Congress passed two major pieces of legislation that will have a significant impact on the ongoing and pending trade negotiations in the World Trade Organization (WTO), the Free Trade Area of the Americas (FTAA), and CAFTA. They are the 2002 Farm Bill and the U.S. Trade Promotion Authority, which provides the executive branch with the authority to engage in trade negotiations and the legislative rules needed to approve trade agreements after they are negotiated. In addition, in July 2002 U.S. trade negotiators presented the U.S. proposals for modalities to be used in the Doha Round of agricultural negotiations already underway in Geneva. This chapter analyzes each of these three policy documents and discusses their probable impact on the negotiations for a U.S.-CAFTA.

THE 2002 U.S. FARM BILL

The passage of the 2002 Farm Bill brought unprecedented criticism from countries around the world. Most objected that the new Farm Bill would increase trade distortions in international markets. The European Union and Japan, whose domestic subsidies are even higher than those in the United States, accused the United States of hypocrisy for advocating increased dependence on world markets for their farmers while further isolating U.S. producers from world markets.

There are two questions to be addressed in evaluating the impact of the Farm Bill on international trade and trade agreements. First, what are the effects of the bill on the output of supported products in the United States and the consequent impact on world prices of the supported commodities? Second, how can a system of free trade exist among countries whose producers (of the same commodity) have drastically different levels of prices and incomes due to government subsidies?

There has been a good deal of discussion as to whether the 2002 farm program is more damaging to other countries than the policy that preceded it, but this is an irrelevant issue. The 2002 Farm Bill is the established U.S. policy for the present and for the immediate future when trade negotiations are likely to take place. Therefore, the relevant issue is what the new policy will imply for the next few years, for the trade negotiations and for the integration of agriculture under U.S.-CAFTA.

It is not quite accurate to say that the U.S. farm program isolates the United States from world markets. For most commodities, it isolates the income of U.S. producers of supported commodities from world markets, but apart from sugar, tobacco, and dairy products, U.S. consumers purchase their food supplies at world market prices, except for tariffs on imported items. In addition, it should be noted that U.S. farm programs cover relatively few commodities, primarily field crops that are sold on world markets in bulk, unprocessed form.

This does not mean that the U.S. support programs do not have an adverse impact on the world prices of the supported commodities. That effect comes primarily from the effects of the U.S. program on the output of the supported commodities and the fact that under the marketing loan system, the supported commodities flow unimpeded into international markets at the prevailing world price without government support.

Gardner (2002) estimates the agricultural output and price effects of the 2002 Farm Bill. He concludes that the output effects are relatively small, resulting in a reduction of about 6 percent in world prices compared with the situation if there were no loan program. Economic Research Service (ERS) researchers estimate price effects of 1.5 to 4 percent for grain and soybeans, and up to 10 percent for cotton (USDA 2002). A new ERS study (Westcott, Young, and Price 2002) suggests that the 2002 Farm Bill has little or no impact beyond that of the 1996 FAIR Act, which was widely lauded when it was passed. Both Gardner and the ERS study suggest that greater land retirement under increased conservation funding may completely offset the output effects of higher loan rates.

Oxfam has issued a stinging report on the adverse impact of U.S. cotton subsidies on world cotton prices, and the adverse impact of lower cotton prices on cotton farmers in Africa. Using price estimates from a model developed by the International Cotton Advisory Committee, Oxfam (2002) shows that the U.S. support program for cotton reduced world prices for cotton by 3 cents/pound in 1999/2000, 6 cents/pound in 2000/01, and 11 cents/pound in 2001/02. It should be noted that all of these years were under the 1996 FAIR Act and not the 2002 Farm Bill. However, under the 2002 Farm Bill, the area planted to cotton in 2002 fell by a significant amount.

The section of the Farm Bill dealing with export competition is unlikely to present any serious threat to the Central American Common Market (CACM) countries. They are not generally in competition with the United States in third-country markets, and the U.S. programs for export credit and food aid rarely involve commodities of major export interest to the CACM countries.

Despite the fact that the 2002 Farm Bill is estimated to have little effect on the world price of most supported commodities, it still presents great difficulties to negotiators of a free trade agreement. It is highly unlikely that the Doha Round of WTO negotiations will bring about elimination of trade-distorting domestic subsidies in Organisation for Economic Co-operation and Development (OECD) countries. Therefore, regional agreement negotiators will have to deal with the huge differences in subsidy levels between producers of the same commodities in different countries. If the aim of free trade agreements is to foster integration of agricultural markets in the region, certainly one of the greatest barriers to successful integration is the generous subsidies paid to favored producers of selected commodities in the United States.

Trade Promotion Authority

After several unsuccessful tries and months of difficult negotiations, the Congress finally passed the U.S. Trade Promotion Authority, previously called "fast track," and the President signed the new negotiating authority on August 6, 2002. This was the first time since the authority expired in 1994 that the executive branch has had trade negotiating authority and the ability to have a trade agreement that is negotiated under the special fast track rules.

The fast track authority means that the Congress must consider any trade agreement as a whole and must vote the entire agreement up or down without amendment. It also requires the Congress to act on any trade agreement legislation within a specified period after it is submitted, which limits the period that the Congress has to debate the agreement. In return for the special legislative rules that limit the ability of individual members of Congress to amend an agreement, special rules are set for the executive branch in terms of consultation with Congress during the negotiations and in preparation of implementing legislation. The new Trade Promotion Authority passed the House of Representatives by a single vote along partisan lines, with virtually every Democrat in the House voting against it. The Senate Finance Committee insisted that a partisan bill could not pass and added a key feature, which is the Trade Adjustment Act (TAA). This provides for federal payments to workers who are shown to be displaced by imports. It includes compensation, training, and a subsidy to provide health insurance for unemployed workers. The Republicans initially resisted the addition of the TAA to the fast track legislation, but after long negotiations, the White House agreed to accept the Senate provisions for the TAA.

The compromise bill that emerged from the House-Senate conference omitted some of the worst features of the two versions of the bill. For instance, it omitted the Dayton-Craig amendment in the Senate bill, which would have prevented any agreement that changed U.S. trade remedy laws from enjoying fast track treatment.

The final bill places many limits on trade negotiators. A special Congressional Oversight Group is authorized to oversee the negotiations. It consists of the chairman and ranking member of the House Ways and Means Committee and three other members of that committee. It also includes the chairman and ranking member of the Senate Finance Committee plus three others from that committee, and the chairman and ranking member of any committee that would have jurisdiction over laws affected by the trade agreement. This means that the oversight group will have, among others, the chairmen and ranking members of the House Agricultural Committee and the Senate Committee on Agriculture and Forestry.

The Congressional Oversight Group will be accredited as part of the U.S. trade negotiating team, giving the group access to all documents and discussions. In addition, the U.S. Trade Representative (USTR) is required to develop written guidelines to facilitate the flow of information between the USTR and the Oversight Group.

There are additional special consultation rules for agricultural products. The bill defines import-sensitive agricultural products as all products for which tariff rate quotas (TRQs) are in place and all products on which tariffs were reduced by the minimum amount (15 percent) in the Uruguay Round Agricultural Agreement. For all import-sensitive agricultural products, the USTR is required to consult with the Committee on Agriculture of the House and the Committee on Agriculture and Forestry of the Senate as to which products it would be appropriate to agree to negotiate further tariff cuts. The International Trade Commission (ITC) is then required to assess the effects of further liberalization on industry. Finally, the USTR is required to inform the two agricultural committees about the products for which it intends to seek liberalization and the reasons for such tariff liberalization.

As a result of the Trade Promotion Authority's definition of sensitive products, a large number of tariff lines for agricultural products are subject to the special rules. The TRQs cover beef, tobacco, cotton, peanuts, sugar, and dairy products. These products with TRQs cover 24 percent of U.S. tariff lines (Gibson and others 2001). In addition, products classified as sensitive because they received minimum cuts in the Uruguay Round amounted to another 184 tariff lines.

The bill also sets out negotiating objectives for the various sectors. In agriculture, it calls for obtaining competitive opportunities for U.S. agricultural products in foreign markets equivalent to the opportunities that foreign exports have in U.S. markets.

For import-sensitive crops subject to tariff reduction, the bill mandates that these reductions allow for "reasonable adjustment periods." It also calls for the elimination of subsidies that distort agricultural markets or that create market-depressing surpluses. This comes from the same Congress that only a few months earlier passed the 2002 Farm Bill, which includes new and higher subsidies for producers of U.S. program crops that will certainly add to the distortions in agricultural markets for these products.

The U.S. negotiating objectives in agriculture include eliminating practices that adversely affect perishable or cyclical products, and the development of an improved import relief mechanism for perishable or cyclical crops. The negotiating objectives also include preservation of the U.S. export credit program and food aid program.

In general, the Trade Promotion Authority includes many provisions to protect the interests of producers of import-sensitive products. It requires consultation with the Congress before negotiations can begin on sensitive products, and it will give the affected commodity groups ample warning and plenty of time to rally opposition to any tariff reductions being considered on their products.

In early September 2002, the USTR requested that the ITC determine the potential impact of completely removing tariffs on all the sensitive products imported from the 33 Western Hemisphere countries and the potential effect of eliminating or cutting in half the tariffs on sensitive products from all countries. The ITC promised that the analysis would be completed by mid-November 2002, but said the results would be classified.

Import Protection for U.S. Farm Products

U.S. trade negotiators like to point to the fact that the United States has the lowest average tariff rate for agricultural products of any major agricultural producing country, with an average tariff rate of 12 percent. However, this relatively low figure masks some high levels of border protection for some important products. It is useful to review the history of U.S. border protection for agricultural products in order to understand the current forms and levels of border protection.

As mentioned in the section on U.S. support programs, the U.S. government began supporting internal commodity prices in the 1930s. In order to raise internal prices above low world commodity prices, it was necessary to put border protection in place to prevent low-cost imports from undercutting domestic prices. When the rules for the General Agreement on Tariffs and Trade (GATT) were written in 1947, the United States insisted that agriculture be exempt from the general rules prohibiting the use of import quotas. Instead, the rules for agriculture said that import controls could be used for agricultural products if there were domestic production controls on the product in question.

The United States also insisted that the GATT rules for agriculture allow the use of export subsidies, since it was recognized that it would be impossible to compete in export markets without export subsidies if domestic price support programs maintained the internal price of the product above the world price.

In the 1950s, the United States demanded that it be granted a GATT waiver that would allow it to use import quotas for agricultural products that had price supports regardless of whether they had domestic production controls. The United States threatened to withdraw from the GATT if the waiver was not granted, so the other GATT members agreed to the waiver. The commodities covered by this waiver came to be known as the Section 22 commodities after the U.S. law that authorized the quotas. Using the Section 22 authority, the United States applied import quotas to sugar, wheat, cotton, tobacco, peanuts, and dairy products. Two major export crops, corn and rice, did not use the import quotas because there were no significant imports of these products into the domestic market of a low-cost producer.

In addition to the Section 22 commodities, starting in 1964 the United States had a law that required export restraints by beef exporters to the U.S. market. The beef restraints, like the Section 22 quotas, were allocated to exporters on a historical basis.

The Section 22 quota on wheat was abandoned as a result of the U.S.-Canada Free Trade Agreement. This was one of the features that Canada insisted on as part of the agricultural agreement. U.S. wheat growers strongly opposed abandoning the Section 22 authority on wheat, but it was agreed to by the U.S. administration and approved as part of the U.S.-Canada Free Trade Agreement. The remainder of the import quotas persisted until the end of the Uruguay Round.

One of the major results of the Uruguay Round was the conversion of all nontariff barriers to tariffs. This converted all the import quotas and export restraints into tariffs, many of which were very high. In order to ensure some market access for these products, each country was required to establish TRQs of at least 3 percent of domestic consumption of the product or current imports, whichever was greatest. As a result, the United States established TRQs covering some 24 percent of agricultural tariff lines. The tariff level for in-quota quantities is fairly low for most products, but the over-quota tariff levels are set at levels intended to prohibit imports, and except in rare cases they do so.

In the Uruguay Round, the tariff-cutting formula was designed to allow countries to protect their sensitive agricultural products. Countries were required to reduce tariffs by an average of 36 percent with a minimum reduction of 15 percent on each tariff. To protect sensitive products, countries cut tariffs by large percentages on products with already low tariffs and on products not considered import sensitive. For sensitive products, they reduced tariffs by the minimum amount.

Apart from the products covered by the TRQs, U.S. tariffs on most agricultural products are relatively low by world standards. However, tariffs on some import-sensitive products are at levels intended to provide protection for the products concerned. These include orange juice, melons, some fresh vegetables, and some fruits.

The U.S. WTO Agricultural Proposal

On July 24, 2002, the United States presented its proposal for the modalities for agricultural reform under the agricultural negotiations of the Doha Round. The proposal closely followed the earlier submission on agriculture made in May 2000; thus, with few exceptions, it contained few surprises.

The United States proposed that in the area of export competition all direct export subsidies be phased out over a period of five years. The United States agreed that export credit rules need to spell out acceptable practices insofar as subsidized credits are concerned. While the United States maintained that food aid programs remain outside the WTO discipline, it instead called for increased reporting of food aid activities to the WTO to strengthen the market displacement analysis in the international bodies that monitor food aid. The United States proposed prohibiting export trading monopolies. In addition, it proposed that any special financial privileges granted to state trading enterprises be ended, and that state trading enterprises be subject to greater transparency in the WTO.

The U.S. proposal regarding market access is quite bold. It recommended that tariffs be reduced by a formula that would cut high tariffs more than low tariffs, leave no tariff above 25 percent, and agree to a date when all tariffs on agricultural products will be eliminated. It was recommended that for products with TRQs, all in-quota tariffs be abolished and the TRQs be increased by 20 percent. In cases where the TRQs are administered by a government agency, the United States proposed that some part of the imports be allocated to nongovernmental entities, and that the allocation to nongovernmental entities be increased over time.

While the United States proposed that the special agricultural safeguard established in the Uruguay Round be eliminated, it also recognized that there is a need for an improved safeguard mechanism for seasonal and perishable products.

The rules on trade-distorting domestic support, according to the U.S. proposal, should be drastically changed. First, the so-called "blue box" should be abolished, leaving only two categories of domestic subsidies, trade distorting and non-trade distorting.

Rather than basing cuts in domestic subsidies on a historical base, the United States proposed that the limits on trade-distorting domestic subsidies be set as a percentage of total agricultural gross national product (GNP). It proposed a level of 5 percent of agricultural GNP as the ceiling after the five-year adjustment period. The United States also suggested that a date be set by which all trade-distorting domestic subsidies would be eliminated.

The United States proposed several measures of special and differential treatment for developing countries, including that a share of the expanded TRQs be allocated to developing countries. The United States also proposed that developing countries be allowed to use export taxes on agricultural products, while such measures would be prohibited for all other countries. Finally, the United States proposed that specific support programs oriented toward subsistence, resource-poor, and low-income farmers in developing countries be identified and exempt from spending limits.

In general, the U.S. proposal is aimed at the European Union, Japan, and a few other countries that have very large domestic subsidies relative to their agricultural output and very high tariffs on some products even after the reductions made in the Uruguay Round. Incidentally, the U.S. proposal would also have a significant impact on U.S. policies. It would require the United States to reduce spending on trade-distorting domestic subsidies by half from the levels provided in the 2002 Farm Bill. The proposal to expand TRQs by 20 percent, if adopted, would probably force changes in two of the most politically sensitive domestic programs—dairy products and sugar.

It remains to be seen how U.S. commodity groups will react to the U.S. proposal if it becomes a serious model for the modalities. It is questionable whether some commodity groups are interested in giving up their domestic subsidies and their high border protection to achieve a more level playing field across all countries and all commodities. It is clear that the European Union and Japan will oppose the U.S. proposal for both market access and domestic support. It is not clear how developing countries will react. Many would gain substantially better access under the U.S. proposal, but some developing countries have very high tariffs, and many Latin American countries have TRQs on a number of products.

If the U.S. proposal on market access were to be accepted, it would put a number of U.S. support programs in jeopardy. The U.S. sugar and dairy programs could not survive if the maximum tariffs were cut to 25 percent, and they could not survive a 20 percent increase in TRQs. It is possible that the United States is depending on the European Union and Japan to prevent an agreement on access rules that would render U.S. programs inoperative.

THE POTENTIAL EFFECTS OF THE U.S. WTO AGRICULTURAL PROPOSAL ON THE U.S.-CAFTA

The U.S. proposal to the WTO for the modalities for agriculture in the Doha Round offers positive directions for the U.S.-CAFTA. The suggested 20 percent increase in the TRQs to be allocated to developing countries opens the path for TRQ reform, and the suggested maximum tariff of 25 percent for agricultural products would make most of the U.S. TRQs inoperative.

The U.S. WTO proposal also opens the way for an improved program of agricultural safeguards. Apparently the safeguard in the U.S.-Chile Free Trade Agreement (FTA) is the model that the United States wants to use for all subsequent agreements.

Whatever the outcome of the WTO negotiations, they will not approach a free trade agreement. Even if the U.S. WTO proposal were adopted, the U.S.-CAFTA would still give the participants a significant preference in the U.S. market.

U.S. Import Restrictions and U.S.-CACM Free Trade Agreement

Although the United States has one of the lowest average tariffs for agricultural products, that low average masks substantial import barriers. These are shown in the profiles on import restrictions in Table 7–1.

The United States, along with the European Union and Japan, has a large number of TRQs with high over-quota tariffs designed to prevent imports of more than the quota. In many cases, these over-quota tariffs are mega-tariffs of more than 100 percent.

In the U.S. tariff profile, there is a large proportion of non-ad valorem tariffs, which are generally more protective, especially when prices are low. In addition, although the United States has a substantial number of tariff lines with zero tariffs, a significant number of agricultural tariffs are greater than 15 percent. Many of these are on products where Central American countries may have a comparative advantage.

Looking at the export patterns of the Central American countries, it is clear that U.S. protection adversely affects them. The export of products—including sugar, beef, and tobacco products—under TRQs in the United States is important to some or all of the Central American countries. Beyond these products, a number of important fruits, vegetables, melons, and juices are on the U.S. list of sensitive products.

The U.S. list of sensitive products, as defined by the Trade Promotion Authority, covers 184 tariff lines in addition to the several hundred tariff lines covered by TRQs. Of special interest to CACM countries are products such as fresh and chilled tomatoes, head lettuce and other lettuce, carrots, cucumbers, peppers, sweet corn, watermelons, cantaloupes, citrus juices, apricots, and peaches. It is not possible at this time to predict how the U.S. negotiators will respond to requests for liberalization of these products on the sensitive list, but the fact that the products had enough political support to be on the

Table 7–1

Agricultural Trade Restrictions in Selected Western Hemisphere Countries, 2000

Country	Number of tariff lines		Tariff rates (percent)							Number of tariff rate quotas
	Ad valorem	Non-ad valorem	0	0–15	15–30	30–50	Greater than 50	Mean	Maximum	
United States	989	747	372	1,083	181	59	61	11.4	350	376
Costa Rica	1,138		238	796		64	40	13.5	162	73
Guatemala	811	60	206	215	388			9.2	20	31
Honduras	889			425	426	13	5	11.5	55	0
Nicaragua	889		197	636	18	18	7	7.3	76.7	17
El Salvador	837	25	217	217	429	49		11.2	40	37

Source: Jank, Fuchsloch, and Kutas (2002, Appendix A, Table 1).

sensitive list implies that U.S. producers of those products will exert considerable pressure to continue their protection.

The countries negotiating with the United States on improved access for their agricultural products face a dilemma when dealing with the products having TRQs. The U.S. TRQ system allows the exporting country to receive the quota rent and, thus, countries want to be able to export more sugar or dairy products to the higher-priced U.S. internal market. In the case of both dairy products and sugar, if the TRQs were substantially enlarged, the support program that the TRQs protect could not be sustained in its present form. Thus, the internal price of the products concerned would fall to the world price and the preferential access advantage would disappear. This problem arises in all preferential agreements and has caused some countries to decide that quota rents from preferential agreements are more important than greater market access.

In addition to TRQs and tariffs, the United States has a substantial number of sanitary and phytosanitary (SPS) rules that limit trade. Currently, it is impossible for other countries to export poultry products to the United States because of SPS regulations, and SPS regulations limit access to the U.S. market for fresh or chilled beef.

The United States also has a number of technical barriers to trade that impede trade in agricultural products. These technical barriers include marketing orders that when applied to domestic production also apply to imports, limiting the size or other characteristics that products must meet in order to enter the United States.

It is unlikely that the United States will agree to waive any of the technical barriers to trade or SPS restrictions. U.S. consumers and producers will support the continuation of rules designed to maintain food safety and/or quality. Therefore, it would be best to strive for some kind of arrangement that can simplify and speed up SPS approvals for exports to the United States.

It is clear that the negotiators for the CACM countries face a formidable task. Their interests in greater access will focus on either products that are protected by TRQs or products that are on the sensitive products list. In both cases the problem is not only improving CACM countries' access, but also setting a precedent for the FTAA negotiations.

Country Interests and Issues in U.S.-CAFTA

In examining an individual country's interests and possible issues, it is assumed that they will largely be driven by the country's economic interests in possible trade gains with the United States. Another factor is concerns about protecting domestic agricultural industries, especially against the effects of U.S. policies that provide U.S. producers with subsidies and protection that create unequal competitive advantage. The following six questions need to be answered for each country and aggregated for the five countries to see what might be addressed in a regional trade agreement:

- To what extent do U.S. subsidy programs for key commodities have an impact on exports of Central American countries by depressing prices for their export commodities or crowding them out of world markets?
- To what extent do U.S. subsidies create potential problems for Central American producers by producing unfair competition in domestic markets in the absence of border protection?

- What other U.S. policies related to export competition may adversely affect Central American producers either in their domestic market or in third-country markets?
- What are the effects of U.S. TRQs on Central American exports to the United States?
- Which products from Central America are on the list of sensitive products specified in the Trade Promotion Authority beyond the products having TRQs?
- What are the sensitive products for the Central American countries, and do U.S. policies raise special concerns for these products?

This examination considers the trade patterns for each country's exports to the United States and the extent to which they might change or improve if U.S. tariffs were reduced or TRQs increased or eliminated. In four of the five CACM countries, agricultural imports are controlled in part by TRQs. It is assumed that these TRQs are evidence of import sensitivity for the products concerned. A key question is: What might happen if those TRQs were relaxed or abandoned? This issue will be examined in two regards. First, would U.S. exports of the products be likely to substantially increase if the TRQs were relaxed or eliminated? Second, are any of the sensitive products in the CACM countries products for which the United States has significant support programs?

Costa Rica

The list of sensitive products for Costa Rica includes several products protected by TRQs. The list includes pork, poultry, dairy products, beef, rice, corn (maize), beans, sugar, and tobacco. Several products on this list are products that have generous domestic support programs in the United States, including sugar, tobacco, dairy products, rice, and corn. However, the current U.S. support programs for dairy, tobacco, and sugar maintain domestic prices above world prices and therefore preclude exports without export subsidies, and the United States has no export subsidy rights except for modest rights for dairy products. Thus, the U.S. support program for these products would appear to offer little threat to producers in Costa Rica if the TRQs were phased out.

Heavy subsidies to U.S. rice and corn producers, combined with the U.S. program of marketing loans on these products, clearly provide a competitive advantage for U.S. producers that could threaten small producers of maize and rice in Costa Rica.

The situation is quite different for maize than for rice. Costa Rica has little domestic maize production and therefore is almost totally dependent on imports. Phasing out tariffs and quotas on maize would benefit livestock and poultry producers and other consumers of maize without creating significant adjustment problems for domestic producers in Costa Rica. Rice imports account for only 22 percent of domestic supplies. Therefore, the substantial domestic rice production industry could be put under severe pressure by eliminating the tariffs and quotas on rice so that subsidized U.S. production could flow freely into the market.

A similar situation might exist for beans. About one-third of bean supplies are from domestic production. If the new subsidies on edible beans in the United States bring a significant increase in output and result in lower market prices, the domestic producers in Costa Rica could face significant problems if trade is fully liberalized.

The pattern of U.S. exports to Costa Rica includes some of the Costa Rican sensitive products, namely corn and paddy rice. Wheat, apples, and grapes are also high on the U.S. list of agricultural exports to Costa Rica. Beans, which are not on the list of U.S.

exports to Costa Rica, might present a new threat to Costa Rican producers if the new U.S. support program with its accompanying marketing loans results in significant increases in output and exports.

Poultry products, which are on the list of sensitive products for Costa Rica and several other countries, present an interesting case of how SPS regulations can distort trade. The U.S. domestic market has a significant preference for white meat, so poultry producers in the United States must find an export market for their excess production of dark meat. Many countries would be willing to accept U.S. exports of dark meat if their local producers could export white meat to the higher-priced U.S. market. However, current SPS rules prohibit poultry meat imports into the United States. As long as this disparity in market access continues, it will be difficult to convince smaller countries with limited markets to drop their import controls on U.S. poultry products.

The United States is a major market for Costa Rican agricultural exports. Costa Rica's top 10 agricultural exports account for 74 percent of Costa Rica's agricultural exports, and exports of those 10 products to the United States account for 77 percent of agricultural exports. The top 10 agricultural exports do not include sugar or beef, major exports that are heavily dependent on the U.S. market.

Surprisingly, only two of the top 10 Costa Rican agricultural exports face substantial tariffs in the U.S. market. They are food preparations n.e.s. (not elsewhere specified), which are controlled by TRQs on sugar-related products, and fresh melons, which still have a significant tariff.

Costa Rican exports of sugar, beef, and tobacco products to the United States clearly are constrained by TRQs on those products. The TRQ on beef is a holdover from the time when the United States was a significant net importer of beef. Now the United States is a net exporter of beef and receives major imports of beef from Canada outside the TRQs. The recent U.S.-Chile FTA gives Chile immediate access to the U.S. market for a significant quantity of beef and completely phases out the quotas and tariffs on beef over time. It should be possible for Costa Rica, which already has some access under the beef TRQ, to negotiate increases in that quota and its eventual elimination.

TRQs on tobacco and sugar present different problems. The U.S. sweetener industry has already said it will vigorously oppose any relaxation of the U.S. sugar quotas in regional FTAs. It insists that sugar TRQs can only be dealt with on a global basis. The industry will monitor the U.S.-CAFTA negotiations both for what is done for sugar, and for the precedent it might set for the FTAA. The political power of the sweetener industry is shown by its apparent success in forcing the U.S. government to renegotiate the section on sugar in the North American Free Trade Agreement (NAFTA), imposing quotas on the entry of Mexican sugar and forestalling the duty-free entry of significant quantities of Mexican sugar.

TRQs on tobacco pose a similar problem. U.S. producers have great political power to protect their program, which can only be sustained by import controls and domestic production controls. Politically, tobacco producers are unlikely to get a buyout of the quotas and as generous a payments program as peanut producers enjoyed because it is politically unacceptable to spend large sums of public money to support production of a product considered to be injurious to public health. Thus, relaxation of TRQs on tobacco is unlikely.

Based on the pattern of trade between the United States and Costa Rica, it appears that the U.S. Farm Bill will have only a limited impact on Costa Rica's trade. Clearly higher levels of support for program crops in the United States will increase the huge disparity between subsidies to producers in the United States and Costa Rica. This is probably most important for rice, where the U.S. programs will give U.S. producers an advantage in world markets and over the local producers of those crops.

The continuing U.S. export programs seem unlikely to adversely affect Costa Rican trade interests. The U.S. export credit program generally is not used for products of significant export interest to Costa Rica. In any event, it is highly likely that the export credit program will come under new international rules as a result of the Doha Round.

The new law that will require country of origin labeling beginning in 2004 is unlikely to have an adverse effect on Costa Rican exports to the United States. U.S. livestock producers who promoted the law hope to gain an advantage over Canadian beef and pork exported to the United States under the U.S.-Canada Free Trade Agreement. It is likely that Costa Rican beef exported to the United States is in processed form and thus would not be subject to labeling.

The U.S. Trade Promotion Authority will affect Costa Rica's export interests to the extent that special emphasis on the handling of sensitive products impedes the ability of the U.S. negotiators to make realistic concessions on products on that list. The special rules will change the political dynamics of negotiations on these products, but it is not possible to predict exactly how this will affect the outcome of negotiations.

El Salvador

The U.S. subsidy programs may create problems for El Salvador. El Salvador has a number of sensitive products that are protected by TRQs and some additional sensitive products that are protected by relatively high tariffs. The products that are protected by TRQs include beef, dairy products, yellow corn, vegetable oils, sugar, and tobacco. In addition, officials view polished rice, white corn, poultry, and local varieties of beans as sensitive products where significant imports could threaten the survival of local producers or processors.

The potential problem seems most acute for maize. El Salvador uses about one million tons of maize per year, with about 40 percent imported and 60 percent produced locally. Thus, unlimited imports of heavily subsidized U.S. maize could have an adverse effect on a significant sector of Salvadoran agricultural production. The implications of this can be seen in the actions of small maize producers in Mexico, who are staging violent protests against the elimination of tariffs on U.S. maize.

The problem is similar for rice. About 40 percent of the rice consumed in El Salvador is produced domestically and 60 percent is imported, primarily from the United States. If U.S. subsidized rice is allowed to enter duty free, it could create major adjustment problems for domestic rice producers.

The situation for beans is less clear. First, it is not clear what the impact of the new subsidies for beans in the 2002 Farm Bill will be on production or prices. Second, it is not clear whether U.S. production would be a close substitute for domestic varieties.

The possibility of achieving substantially lower prices for maize and rice offers significant possible gains to consumers of those products. This in turn implies lower prices and a better competitive position for poultry, pork, dairy, and beef producers at a time when competition in those products will increase. In addition, since rice is consumed by lower-income consumers, lowering internal prices would have important welfare benefits.

El Salvador is one of the Central American countries that are less dependent on the U.S. market for its agricultural exports. Although El Salvador's agricultural exports are highly concentrated in a few products, with the top 10 accounting for 81 percent of agricultural exports, the U.S. market accounts for only 29 percent of those exports.

El Salvador's two major agricultural exports are coffee and sugar. The United States is an important market for both, but the TRQ for sugar clearly limits sugar exports to the United States. The United States is the major market for undenatured ethyl alcohol, vegetables, nuts, and unrooted cuttings. U.S. TRQs on dairy products prevent the export of specialty cheeses to the large immigrant population of Salvadorans in the United States.

El Salvador is one of the top 30 markets for U.S. agricultural exports. The major agricultural imports from the United States are maize, wheat, paddy rice, oil cake, apples, and grapes. Despite El Salvador's TRQs, U.S. exports to El Salvador are significant, and U.S. exporters hope to expand them if trade is liberalized.

The U.S. Farm Bill is unlikely to have additional adverse effects on El Salvador's trade interests beyond those already coming from earlier U.S. agricultural policy. U.S. TRQs that limit sugar exports to the United States are long-standing. Additional domestic subsidies to the producers of corn, rice, cotton, and peanuts seem unlikely to produce additional downward pressure on world prices, so the major impact will be the widening of already huge disparities between the producers of commodities in the United States and El Salvador.

U.S. export promotion programs seem unlikely to adversely affect Salvadoran trade interests because U.S. programs do not generally involve commodities that are of export interest to El Salvador. And unless it is requested by importers in El Salvador, U.S. export credit is unlikely to be used.

Guatemala

Guatemala's list of sensitive products as expressed by its TRQs contains many of the same products as other Central American countries and some that are unique to Guatemala. The TRQs cover maize, rice, sugar, tobacco, and dairy products. In addition, there are TRQs on wheat, apples, pears, grapes, raisins, sorghum, soy meal, and oil.

As is the case for several other Central American countries, Guatemala has substantial domestic production of maize. Domestic production provides for 75 percent of consumption, and imports account for only a quarter of consumption. Thus, if trade in maize is totally liberalized, maize producers in Guatemala will be subject to major downward price pressure from the import of subsidized U.S. maize.

A similar situation might arise for rice. There is significant domestic production, which accounts for more than 40 percent of consumption. Liberalizing rice imports could mean major adjustment problems for local producers.

The situation for wheat is somewhat puzzling, since Guatemala has no domestic production of significance. Therefore, the reason for the existence of the TRQ on wheat is not clear.

The export competition aspects of the U.S. policy appear to provide no major distortions in the markets for Guatemalan exports, since Guatemala's farm product exports are less dependent on U.S. markets compared with the other CACM countries. Guatemala's top 10 agricultural exports account for 78 percent of its agricultural exports, but only about 35 percent of the country's top 10 exports go to the United States. Exports to the United States account for 39 percent of all Guatemalan agricultural exports.

Guatemalan exports to the United States are limited by TRQs on sugar and tobacco products and by a significant tariff on melons. However, a number of major exports face no significant barriers in the U.S. market, including flowers, unrooted cuttings, fresh or chilled peas, and vegetables. For a number of products, the United States is the dominant export market, but tariffs are not a factor limiting access to the U.S. market.

Two of Guatemala's top 10 agricultural exports face TRQs in the U.S. market—sugar and tobacco products. In addition, one of the top exports is fresh melon, which faces a significant tariff. Beyond these barriers, there are no significant tariff barriers for the major Guatemalan agricultural exports to the U.S. market.

It is highly unlikely that U.S. export promotion activities will distort markets for Guatemalan agricultural products. There is a possibility that, if requested, the United States might grant export credit for cotton purchases by Guatemala, but this will be limited in the future by whatever is agreed upon in the WTO on export credits.

Honduras

Honduras is the only country in Central America that has no TRQs. Domestic agricultural producers are protected only by ordinary ad valorem tariffs. In the case of rice, the tariff on milled rice is much higher than on rough rice, which means that the rather large rice imports, which constitute a major source of rice consumed, are in the form of paddy rice. Domestic rice production is insignificant, so the differential tariff protects the domestic rice milling industry, not rice producers.

Honduras imports about 30 percent of the maize available in the country. Border protection is in the form of a tariff, which is significant in terms of protecting domestic producers. Thus, maize producers in Honduras will be subject to considerable adjustment pressures if the tariffs on U.S. maize are removed and maize is allowed to enter without duties.

Except for the tariffs on maize, Honduras apparently has adjusted to the competition from subsidized U.S. production in several commodities. Since the 2002 Farm Bill did not add significantly to the output incentive for most supported commodities, it appears that maize is the only product where competition from imports is likely to create major pressure on domestic producers.

There is little likelihood that the U.S. export programs will impede agricultural exports from Honduras. The U.S. programs apply primarily to commodities that Honduras imports, not to exports to the United States or third-country markets. Agricultural exports from Honduras are heavily concentrated in a few products. Coffee and bananas account for 74 percent of all agricultural exports and the United States is the destination for more than half of the coffee and more than 80 percent of banana exports. In addition, the U.S. market is the destination for more than 90 percent of the fresh melons, and the major market for some tobacco products. Honduras also exports sugar and beef to the U.S. market, but the exports of those products to the U.S. market account for only about one-third of the total exports of those products. Thus, tobacco, beef, and sugar TRQs in the United States are limiting exports from Honduras to the United States.

Based on the trade patterns in agricultural products between the United States and Honduras, it appears that the 2002 Farm Bill will have little adverse impact beyond that already experienced under previous legislation. Of course, higher subsidies for U.S. producers will widen the already great disparity between the United States and Honduras for producers of crops such as maize.

The new law requiring country of origin labeling is unlikely to create difficulties for the country's exports. It is likely that beef exports from Honduras are used in processed form and would not require major record keeping. Country of origin labeling on melons and fruit already exists in most retail outlets and should create no new problems.

The U.S. Trade Promotion Authority will adversely affect agricultural export interests in Honduras only to the extent that it causes U.S. negotiators to be more protective of those products labeled sensitive.

Nicaragua

Nicaragua has a short list of products with TRQs, including a number of commodities for which the United States has significant subsidies. These include maize, rough and milled rice, sorghum, vegetable oil, beans, beef, poultry, milk products, and sugar.

In addition to TRQs, Nicaragua has some hefty tariffs on maize, sorghum, and rice. There is a 50 percent tariff on milled rice and a slightly lower tariff on paddy rice, but the difference is enough to make imports almost entirely paddy rice. Thus, rice tariffs are designed to protect both the significant domestic production of rice and the domestic rice millers. Even so, about one-third of the rice is imported, and if subsidized U.S. rice is allowed into the country duty free, it will put significant pressure on domestic producers and rice millers. The same is true for maize. Nicaragua produces about 85 percent of the maize used in the country. Local maize producers could come under severe pressure from subsidized U.S. maize production if trade is completely liberalized.

Nicaragua is the only Central American country that is not among the top 30 export markets for U.S. farm products. Even so, it is an important market and one where the United States would like to expand its agricultural exports. U.S. export programs are unlikely to create any competition for agricultural exports from Nicaragua, either in Nicaragua or in third-country markets.

Nicaragua is the least dependent on the U.S. market for its agricultural exports of any Central American country. Less than one-fourth of Nicaragua's top 10 agricultural exports go to the United States, and only 27 percent of all agricultural exports go to the United States. Major exports to the United States are coffee, beef, sugar, bananas, and cigars. Of course, all of these except coffee and bananas have limited access to the U.S. market because of U.S. TRQs.

Based on trade patterns between the United States and Nicaragua, the major effect of the U.S. Farm Bill will be to widen the already large disparity between producers of a number of key commodities in the two countries. This includes both maize and rice, where dropping import protection could put significant pressure on Nicaraguan producers and create significant agricultural adjustment problems.

U.S. export promotion programs are unlikely to create problems or competition for Nicaraguan exports. They are primarily focused on products that Nicaragua imports, not on those it exports.

The new country of origin labeling requirement is unlikely to create problems for Nicaraguan exports. Beef exports are likely to be used in processed form and not subject to substantial record keeping. For melons and fruits, country of origin labeling is already in effect for most products.

The U.S. Trade Promotion Authority will create problems to the extent that it makes it more difficult for U.S. negotiators to relax TRQs and tariffs on sensitive products. Given the fact that Nicaragua's exports are heavily concentrated in the so-called sensitive products, the way in which these are handled will have a major impact on the ability of Nicaraguan producers to benefit from a free trade agreement.

Taking a Regional View

Since the proposed FTA is for the region, it is important to look at the extent to which individual country interests are similar and where they might diverge. Where country interests are similar, it will be easy to get agreement on a common position and negotiating objectives. Where country interests differ, it will be necessary to achieve a common compromise position.

Country interests in improved access to the U.S. market appear to be relatively uniform. For all countries, the TRQs on beef and sugar limit exports of products for which Central American countries are low-cost producers. For some countries, the U.S. TRQs on tobacco products and dairy products also block the possibility of expanding exports.

All of the Central American countries would benefit from eliminating U.S. tariffs on fruits, vegetables, and melons. They also would benefit from the elimination of seasonal tariffs designed to protect U.S. producers during the U.S. production period.

Finally, most of the countries in Central America would benefit substantially if the current SPS barriers to their exports to the United States were removed. This would need to be done in a way that would allow the Central American exporters to meet U.S. SPS rules more easily and rapidly, but would not relax the SPS rules.

On the import side, all of the Central American countries, except for Costa Rica in the case of maize, have an interest in protecting their rice and maize producers from highly subsidized U.S. rice and maize. Costa Rica has the problem with rice. All of the countries have an interest in protecting their poultry producers unless they have access to the U.S. market for chicken parts.

The new U.S. requirements for country of origin labeling should not pose any problems for Central American exporters. Imported fruits and melons are already labeled and no significant record keeping would be involved, since none of the Central American exports would be trying to qualify as U.S. production.

Dealing with the United States in Agricultural Trade Negotiations

Several issues should be kept in mind in negotiations with the United States on agricultural trade because the unique political and economic system in the United States shapes both domestic agricultural legislation and agricultural trade policy. There are six main points.

First, countries should not assume that by granting improved access to their markets for nonagricultural goods and services, they would get improved access to U.S. markets for agricultural products. U.S. farm groups strongly resist trade-offs between sectors, and will only support giving more access to U.S. markets if they see some sectors of U.S. agriculture gaining greater access. This is the reason that U.S. agricultural groups strongly oppose an FTA with Australia, where they see increased competition at home and few opportunities for expanded exports to Australia.

Second, countries should look for products where concessions will gain important allies among U.S. commodity groups. For instance, offering to relax controls on wheat imports will gain support from an important commodity group. The relaxation of import controls on grapes and apples would also gain support.

Third, countries should look carefully at recent FTAs to see what the U.S. negotiators were hoping to gain and what they have judged to be politically feasible and economically important. For instance, the United States refused to agree to forgo the use of export subsidies in the NAFTA agreement with Mexico, but has such a clause in the U.S.-Chile FTA. In the U.S.-Chile agreement, the United States gave Chile significant access to the U.S. market for beef. This implies that U.S. negotiators have concluded that TRQs on beef can be enlarged or abandoned because the Canadians now have access. The U.S.-Chile agreement contains a new safeguard mechanism that the United States has said will be a model for subsequent agreements. Can that safeguard arrangement deal with the Central American concerns about being flooded with imports that will adversely affect local markets for sensitive products?

Fourth, countries should insist on reciprocity. If the United States, as expected, refuses to increase access for sugar and dairy products under the TRQ system, the Central American countries should insist on the same logic and treatment for some of their sensitive products, such as rice and maize.

Fifth, countries should make use of the huge disparities in subsidies to producers. Countries should look at the possibility of maintaining some protection against highly subsidized crops until there is some parity in levels of subsidies and protection. The U.S.-Canada agreement had a feature of this type that gave the Canadians protection against some U.S. exports.

Sixth, countries should make decisions on their own timetable. The United States has substantial resources of people and domestic political linkages already in place. Countries should not allow the U.S. timetable to rush decisionmaking to the point where it is not possible to get regional consensus and local consultations to bolster positions. Both the Doha Round and the FTAA are unlikely to stay on schedule, so rushing to complete a U.S.-CAFTA before these others are done is unnecessary.

Barriers to Economic Integration via Free Trade Agreements

Even if there is a comprehensive free trade agreement between the United States and the Central American countries, a number of other issues will determine the extent of true economic integration of agriculture. One should observe the experience of other free trade agreements, such as the U.S.-Canada agreement, the European Union's Common Agricultural Policy, and Mercosur. The key issues are the following:

- Agricultural policies and policy instruments
- The level of subsidies and protection
- Exchange rate instability
- The potential effects of liberalization
- The ability to adjust to trade liberalization
- The level of political commitment.

Agricultural Policies

Despite the existence of a free trade agreement and highly integrated economies, the U.S.-Canada agreement has not resulted in substantial integration of agricultural markets for many products. The two countries have markedly different policies and policy instruments for wheat, poultry, and dairy products. The use of marketing boards in Canada has been a constant source of frustration for U.S. producers and, as a result, there has been constant political friction between the two countries.

Policy differences between the United States and Mexico for products such as maize and sugar have prevented the integration of markets for those products. The European Union recognized from the beginning that it could not integrate its agricultural markets without a common agricultural policy and common policy instruments. Thus, European countries gave up national sovereignty over agricultural policy in order to achieve an integrated market. This has not occurred in any of the U.S. free trade agreements.

Level of Subsidies

Differences in levels of agricultural subsidies represent a major barrier to the integration of agricultural markets. This is one of the factors that prevent the integration of the market for maize between the United States and Mexico. There is no question that the newly enacted U.S. Farm Bill, with its higher subsidies for producers of program crops, will prevent real integration of agricultural markets. These subsidies override the idea of comparative advantage and fair competition.

Exchange Rate Fluctuations

The European Union found that it could not achieve complete integration of agricultural markets until it achieved stable exchange rates between member countries. Until that time they had to resort to "green currencies" to allow products to move between countries. The slow decline of the Canadian dollar against the U.S. dollar has been a major source of friction between the two countries over wheat and beef exports to the United States and the ongoing soft-wood lumber friction. In the mid-1990s, the Mexican economic crisis and consequent devaluation created serious problems and led to special import restrictions on some agricultural products.

Potential Effects of Liberalization

There are major differences in the effects of trade liberalization in different countries. One important factor is the size of the economy. Additional imports of agricultural products into the U.S. economy will have far less impact on markets in the United States than would similar quantities of additional imports in small countries. The impact is also affected by the price and income elasticity for the product involved. For instance, the impact of increased imports of melons in the U.S. market would be small because they have relatively elastic demand and high income elasticity. On the other hand, it is likely that the price and income elasticities of rice and maize in Central American countries is quite low, so that higher imports would put significant downward pressure on local prices.

Ability to Adjust to Liberalization

There is no question that trade agreements and trade liberalization produce winners and losers in all of the countries involved. And each country differs in its economic and political ability to adjust to gains and losses.

The ability of the countries to adjust to trade liberalization depends on a number of factors. One is the general health of the economy, especially labor markets. In countries where displaced farm workers can find alternative employment easily, the adjustment process will be less difficult. In countries where there is high unemployment, especially in rural areas, adjustment is more difficult.

The political issue of adjustment is not necessarily related to the economic difficulties of adjustment. In the United States, the resistance to trade liberalization is so strong that it was necessary to include trade adjustment assistance in order to pass the authorization for a negotiating authority. Most developing countries cannot afford policies such as the TAA; thus, they must face the political problems created by adjustment to trade liberalization without programs to compensate the losers.

Political Commitment

The achievement of true market integration requires major political commitment on the part of the countries concerned. Such commitment was clearly present in Europe, where economic integration was a method of preventing the conflicts that had plagued the continent for generations.

Political commitment for integrating agricultural markets was clearly lacking in the U.S.-Canada agreement. Canada was unwilling to give up its marketing boards and protection for some key agricultural products. And U.S. agricultural groups were (and still are) highly skeptical of real economic integration with low-cost competitors. The political commitment in the U.S.-Mexico agreement was greater, but not enough to override the objections and political power of the U.S. sugar and sweetener industry.

There are questions about U.S. political commitment to fully integrate agricultural markets via a U.S.-CAFTA. Although the U.S. agricultural industry would not see Central America as a major threat to its well being, the sugar and sweetener industry clearly will do everything in its political power to prevent integration. Unlike Europe, the United States does not have a compelling political need to achieve true market integration, and thus is likely to pursue free trade agreements without pursuing true integration.

Factors Likely to Affect U.S.-CACM Free Trade Negotiations

Agricultural groups in the United States, countries participating in the FTAA, and countries negotiating in the agricultural negotiations of the WTO will closely watch the U.S.-CACM negotiations for a free trade agreement. In many ways these various interested parties are likely to view the U.S.-CACM negotiations as an indicator of where the FTAA, and even parts of the WTO negotiations, may go. That means that U.S. negotiators and other interest groups that are concerned about other negotiations will not only be interested in the possible effects of a given arrangement on the CACM countries, but they also will be concerned about the effects on other countries if the precedents set in the CAFTA were applied more broadly.

Some of the same factors that are likely to influence the U.S. negotiations in the FTAA and the WTO will influence negotiations between the United States and the CACM for a free trade agreement. The factors include the following:

- U.S. economic and political interests and pressures
- The U.S. legislative framework related to agricultural and trade issues
- The U.S. position in other ongoing trade negotiations.

Unfortunately, no compelling economic and/or political interest in the United States supports a U.S.-CACM free trade agreement. This is especially true for the agricultural sector in the United States. Although they are unlikely to actively oppose a U.S.-CAFTA, as they might the FTAA, U.S. agricultural groups see little to gain in terms of opening new markets for their products in Central America. And they see some potential threats in opening the U.S. market to more agricultural trade from Central America.

There are several reasons for this attitude. First, the Central American markets are relatively open to U.S. agricultural exports already—four of the five Central American countries are among the top 30 export markets for U.S. agricultural products. Second, the CACM countries have relatively small populations and modest income levels. These factors combined suggest that the gains for U.S. agricultural exports will be modest. Jank, Fuchsloch, and Kutas (2002) suggest that the United States should trade greater access for nonagricultural exports in CACM for greater CACM access on agricultural products. However, U.S. agricultural interests have strongly opposed this trade-off in the past and there is no reason to believe they will do otherwise now. Simply, U.S. agricultural groups oppose agreements that do not offer some sectors of U.S. agriculture increased export possibilities.

U.S. Legislative Framework Related to Agricultural Trade

U.S.-CACM negotiations will be the first regional negotiations conducted within the context of the current U.S. legislative framework related to agricultural trade. Thus, members of Congress and their agricultural constituents will be watching to ensure that the U.S. negotiators adhere closely to the intent of the laws they developed to protect the various agricultural interests.

The Farm Bill

Despite the concerns other countries expressed about the 2002 U.S. Farm Bill, it will have severe direct effects on the countries of Central America. The new bill seems to have little effect on the output of the supported commodities and the trade aspects of the bill seem unlikely to create additional competition for Central American products in world or domestic markets. However, the additional subsidies for U.S. producers of program crops will widen the already large disparities between U.S. producers and producers of the same products in all developing countries.

Despite the fact that the 2002 Farm Bill is estimated to have little effect on the world price of most supported commodities, it still presents great difficulties to negotiators of a free trade agreement. It is highly unlikely that the Doha Round of WTO negotiations will bring about major reductions in the level of domestic subsidies in OECD countries. Therefore, regional agreement negotiators will have to deal with the huge differences in subsidy levels between producers of the same commodities in different countries. If the aim of free trade agreements is to foster integration in the region, certainly one of the greatest barriers to successful integration is the generous subsidies paid to favored producers of selected commodities in the United States.

The Trade Promotion Authority

The U.S. Trade Promotion Authority legislation that provided congressional authorization for the trade negotiations clearly raises some problems for CACM negotiators. The problems are related to the strong congressional defense of so-called sensitive commodities, the special treatment they receive in terms of congressional control and oversight, and the limits these are intended to put on U.S. negotiators. The list of sensitive products includes all products with TRQs in place, and a number of perishable products that are of export interest to CACM countries. The list and the relentless pressure from some of the protected commodity groups to continue their TRQs and protective tariffs will create difficulties for negotiators.

Given the fact that the U.S.-CACM agreement will be viewed as precedent-setting for subsequent agreements, the United States may attempt to carry out the Trade Promotion Authority mandate regarding the development of a workable and politically acceptable arrangement to deal with perishable and cyclical products. This seems to be important to U.S. producers of perishable products and might go a long way toward reducing their opposition to market liberalization. It is important that any such agreement be viewed as the framework for the much greater pressures likely to come from an FTAA.

The U.S. Position in Other Ongoing Trade Negotiations

The U.S.-CACM negotiations are beginning at a time when both sides are already fully engaged in two broader negotiations—the WTO and the FTAA. U.S. negotiators will be careful not to undercut their positions in other negotiations by provisions to which they agree in a regional free trade agreement. Conversely, U.S. negotiators may try to use the regional agreements to develop mechanisms of special interest to U.S. producers. For instance, the United States is likely to use the regional agreement to lay out a satisfactory safeguard agreement for perishables that could then be transferred to the WTO.

U.S. agricultural interests and negotiators will insist that some issues of major interest in the regional negotiations can only be handled on a global basis in the WTO negotiations. These will include the issues of limiting or reducing the use of trade-distorting domestic subsidies; limiting the use of some export competition measures, including export subsidies and export credit; and any changes in the treatment of commodities with TRQs.

Sugar and sweetener interests have already declared that they will strongly oppose any attempt to deal with or loosen sugar TRQs in regional agreements. They probably have the political power to block any regional agreement that loosens sugar TRQs. Tobacco interests will be equally opposed, and the dairy interests will be strongly opposed to opening dairy imports to Central American countries because it could be viewed as a precedent for the FTAA.

Negotiators of the U.S.-CAFTA agreement face a major dilemma. If they make it completely clear that certain issues are off the table in the U.S.-CACM negotiations, it is likely that the FTAA negotiations would be badly damaged or curtailed. However, if the United States agrees to consider certain issues, such as changes in TRQs, some of the most powerful, protectionist agricultural interests in the United States will make every effort to block approval of the agreement.

The handling of important and difficult issues in the CAFTA negotiations may well point the way for dealing with them in other agreements. The first issue is how the free trade agreements handle the problem of huge differences in the level of domestic subsidies to agricultural producers across countries. No one can claim there is a level playing field if U.S. rice producers receive subsidies that provide twice the returns that rice producers in other countries receive. A similar point can be made regarding all the U.S. supported commodities, especially cotton, corn, and wheat. For most Central American countries, corn (maize) and rice are sensitive commodities produced by small farmers who are likely to be vulnerable to intense, subsidized competition.

The second important and difficult issue is how the problem of sensitive products is handled. If sensitive products are all pulled out of the CAFTA negotiations, the results are bound to be modest. Therefore, the negotiators need to agree at an early stage as to how they will approach the issue of sensitive products that are a major concern to both sides.

Finally, expediting the process of SPS clearance into the U.S. market requires serious attention. One approach that warrants close examination is a regional clearance system that would reduce the cost of developing the facilities and controls necessary to satisfy U.S. requirements. No one should want to reduce the safety of food products entering the United States or any other country, but the time has passed when these requirements should be viewed as hurdles and barriers to reduce the flow of competing products into U.S. markets. More than any other exports, the United States should fight to avoid the use of food safety and other SPS issues as major trade barriers.

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Chapter 8

Effects of a Free Trade Area of the Americas on Sugar Markets

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This chapter addresses the current policy regimes toward sugar among Western Hemisphere countries, the sugar production and marketing situations under these policies, and the prospects for sugar trade liberalization under a Free Trade Area of the Americas (FTAA). The argument is presented that new policies will be required in many countries if sugar is to be included among commodities for which a regional free trade area results in fewer trade restrictions and reduced market distortions.

Achieving enhanced trade opportunities for sugar faces several conundrums. In the United States, which is the largest consumer market in the region, domestic producers have vigorously opposed any change to the support policies and import restrictions that sustain sugar prices well above levels in world markets. In the farm policy legislation of 2002, the sugar industry succeeded in tightening the provisions of the U.S. regime, although policies for most other supported crops have shifted away from high prices and supply controls, and toward replacing these market-intrusive instruments with direct government payments to farmers. There will continue to be pressure for change for sugar because the price support and quantitative import restrictions that have been the hallmarks of U.S. policy are becoming anomalous among its agricultural programs. Foreign access to the U.S. sugar market has been reduced dramatically during the past two decades to sustain domestic support. Low-tariff foreign access is now constrained not to fall below minimum quantity guarantees negotiated under international agreements. Pressure for greater market access is growing under the North American Free Trade Agreement (NAFTA), possibly in the Doha Round World Trade Organization (WTO) negotiations, and potentially under an FTAA, which could put further strain on the domestic support program.

It is not just in the United States that sugar is highly protected within the Western Hemisphere. Among other countries, there are wide divergences in production costs and the extent to which benefits are derived, or trade opportunities thwarted, by domestic policies or preferential access to foreign markets under the current sugar regimes. Any changes in sugar policy from the status quo toward more open trade will have significant distributional effects among FTAA countries as well as provide net efficiency and welfare gains. Given the degree to which protection and support have been built into existing production localities and marketing channels, reform of sugar policies to enhance regional trade opportunities provides a classic illustration of the dual (distributional and net) effects of freer trade.

This chapter reviews the current situation with respect to sugar production, marketing, and policies, and presents an argument for a new regionwide sugar regime. The new regime would have as its basic principle the integration of the sugar market. Prices would be freed up in the region to allow the sugar market to respond to supply and demand with trade flows unimpeded by border restrictions. The FTAA objective would be to achieve elimination of trade barriers in an adjustment period of no more than 10 or 15 years. Several empirical studies evaluating the impact of such a regime change are reviewed.

The chapter examines some transition, or possibly permanent, support policy options that would facilitate achievement of freer regional trade in sugar. It is argued that a shift toward direct payments to farmers may provide a useful adjustment mechanism. Such "cash-out" policies were implemented in the United States in 2002 to replace high internal prices and domestic production quotas for peanuts with direct payments to peanut producers and quota holders. Compensation was not extended to foreign producers who had access to the U.S. peanut market, but the recent change in policy will make it easier for the United States to negotiate relaxation of its import barriers. The recent policy change for peanuts is examined, and prospects for extending such changes to sugar producers adversely affected by freer regional trade in an FTAA are considered.

SUGAR PRODUCTION, CONSUMPTION, AND TRADE

Table 8–1 shows five-year averages of production, consumption, and trade of sugar by FTAA countries in 1995/96 to 1999/2000. Brazil, the United States, Mexico, Colombia, Argentina, and Guatemala are the largest sugar producers. Except for Guatemala, these countries are also large sugar consumers. Nine of the 28 countries are net sugar importers; the remaining countries are net exporters. Canada and the United States are the two largest importers. These two countries account for three-fourths of aggregate imports within the FTAA region, which total about 3.6 million metric tons of raw sugar. Brazil and Guatemala are the largest net exporters. Brazil alone accounts for exports of 13 million metric tons.

Among the importing countries, domestic production of sugar is only a small share (less than 20 percent) of domestic consumption in Canada, Haiti, Suriname, and Uruguay. Domestic production is a larger proportion of consumption (70 percent or more) in the United States, Chile, Ecuador, Peru, and Venezuela. The United States produces both cane sugar (primarily in Florida and Louisiana) and beet sugar (in four geographic regions: Upper Midwest, Great Lakes, Great Plains, and West). Beet sugar has recently accounted for somewhat more than half of total U.S. production. Since the late 1970s, high fructose corn sweeteners (HFCS) have displaced both cane and beet sugar as a source of about one-half of domestic U.S. caloric sweetener consumption. As this displacement has occurred, imports of sugar by the United States have fallen markedly from more than 4 million metric tons in the mid-1970s to less than 2 million metric tons in the late 1990s. The cost of sugar production varies widely among countries in the FTAA region. The best-known cost-of-production comparisons are constructed by LMC International. Costs among the importers tend to fall in the medium-to-high and high ranges, with U.S. production in Florida in the low-to-medium range.

Among the sugar exporting countries, the LMC International analysis suggests that Colombia, El Salvador, Guatemala, and South-Central Brazil are low-cost regional pro-

Table 8–1

Sugar Production, Consumption, and Trade and U.S. Tariff Rate Quotas, 1995/96 to 1999/2000

(Thousands of metric tons, raw value)

Region/country	Production	Domestic consumption	Net surplus production	U.S. tariff rate quota allocation (2001)
North America				
Canada	128	1,230	–1,102	0.0
Mexico	4,989	4,300	689	113.0
United States	7,260	8,913	–1,653	0.0
Total	12,377	14,443	–2,066	113.0
Caribbean				
Barbados	58	17	42	7.4
Dominican Republic	514	305	210	185.3
Haiti	10	84	–74	7.3
Jamaica	215	125	89	11.6
St. Kitts and Nevis	21	4	17	7.3
Trinidad and Tobago	103	84	19	7.4
Total	921	619	303	226.3
Central America				
Belize	113	14	99	11.6
Costa Rica	361	205	156	15.8
El Salvador	418	219	200	27.4
Guatemala	1,560	438	1,121	50.5
Honduras	250	224	26	10.5
Nicaragua	349	181	168	22.1
Panama	168	99	69	30.5
Total	3,219	1,380	1,839	168.4
South America				
Argentina	1,644	1,421	223	45.3
Bolivia	295	228	67	8.4
Brazil	16,490	8,720	7,770	152.7
Chile	495	691	–196	0
Colombia	2,155	1,333	821	25.3
Ecuador	356	390	–34	11.6
Guyana	271	32	239	12.6
Paraguay	125	115	11	7.3
Peru	617	896	–279	43.2
Suriname	1	14	–13	0
Uruguay	20	110	–90	7.3
Venezuela	580	752	–172	0
Total	23,049	14,702	8,347	313.7
Other countries				401.7
Grand total	39,567	31,144	8,423	1,223.1

Source: USDA.

ducers, while production costs in Costa Rica, Nicaragua, Bolivia, the coastal areas of Mexico, and Northeast Brazil are in the low-to-medium range. Brazil is the world's largest sugarcane producer and sugar exporter. It produces raw sugar in the Center-South region for as little as U.S. 6 cents/pound. Sugar production has increased in the Center-South and decreased in the Northeast over the last 10 years, with nearly 80 percent of Brazilian output now coming from the low-cost area. Brazil has invested heavily in ethanol fuel production based on sugarcane, and half or more of its cane acreage is used for this purpose. Thus, policies affecting the blends of ethanol and gasoline used as automotive fuels (now 24 percent ethanol) affect Brazil's production of sugar for edible consumption, and its supply of sugar to the world market is relatively elastic compared with countries in which sugarcane goes entirely into sugar production. Schmitz, Seale, and Buzzanell (2002) investigate the effects of a hypothetical increase in the ethanol/gasoline blend ratio in Brazil from 20 to 26 percent. They conclude that such a policy change would reduce Brazil's sugar exports by 8 to 33 percent, and raise world sugar prices by 2 to 4 percent.

In contrast to Brazil, which exports nearly half of its sugar production, the third-largest exporter in the region during 1995/96 to 1999/2000 was Mexico, which consumed more than 85 percent of its sugar output. Sugarcane is the fifth most important crop in Mexico measured by cultivated acreage, and up to one million people are employed full-time or part-time in the sugar sector. Yet with relatively high per capita consumption and demand increasing with population growth, Mexico was a net sugar importer during the early 1980s. Its somewhat troubled domestic sector has been marked by production of cane on small farms, relatively inefficient processing mills, and extensive government intervention, including state ownership of the mills (García Chávez and others 2002). Mexico began to produce an exportable surplus of sugar during the late 1980s, but again became a sugar importer in the early 1990s when the government-owned mills were privatized and import restrictions were eased. Mexico emerged as an exporter again later in the 1990s. This resulted from an increase in sugar production from an average of less than 3.5 million metric tons annually in the early 1990s to more than 5 million metric tons by 2000. Increased production was due to investments in modernization of production and processing, aided by renewal of import restrictions in 1993, devaluation of the Mexican peso in 1994/95, and price support guarantees in the domestic market at levels equivalent to the protected U.S. market. Many sugarcane mills accumulated substantial debts even as national production expanded. With low world prices for its sugar exports, except to the United States under preferential terms, the government again intervened in 2001 to take over nearly half of the sugarcane mills.

One market development that will affect the future balance between domestic sugar production and consumption in Mexico is the extent to which HFCS displaces sugar as a sweetener for industrial uses, as has occurred in the United States. HFCS utilization was negligible in Mexico before 1990 and remained less than 100,000 metric tons in 1996. In 1997, imports of HFCS from the U.S. jumped to more than 200,000 metric tons and domestic production of nearly 350,000 metric tons emerged for the first time (USDA 2002). HFCS imports and domestic production increased the total Mexican sweetener supply by more than 10 percent. Availability of HFCS has subsequently been dampened by policy interventions (see the discussion of NAFTA below), but the share of the market in Mexico that corn sweeteners will eventually hold has not been resolved. Unlike supported sugar prices, HFCS prices have moved up and down with world prices of corn and sugar. When world prices are low, HFCS becomes attractive as a sugar substitute.

An even more extreme contrast with Brazil among the FTAA sugar exporters arises in the Caribbean countries, which generally have high production costs. The Caribbean countries are net exporters of 303,000 metric tons of sugar. This is a relatively small amount compared with regional totals, but accounts for about one-third of Caribbean production. High-cost Caribbean producers protect their domestic sugar markets and remain net exporters because of preferential treatment received in other protected markets, particularly the United States and the European Union. Preferential access occurs under low-tariff, but limited-quantity, tariff rate quotas (TRQs) agreed to under the WTO Agreement on Agriculture. For the Caribbean, TRQ access to the U.S. market totaled 226,200 metric tons in 2001, nearly three-quarters of average Caribbean exports, as shown in Table 8–1. By contrast, the U.S. TRQ for Brazil (152,700 metric tons) was less than 3 percent of its export quantity. This contrast foreshadows that any substantive change in sugar policy regimes will have significant differential effects across FTAA countries.

U.S. SUGAR POLICIES

To achieve integration of the regional sugar market with substantial reduction or elimination of existing trade barriers will require changes in policy both among importing countries and by some exporters. Of the two largest importers, Canada, with its limited domestic sugar production, imposes few trade barriers on raw sugar imports. The United States produces most of its sugar internally and has long maintained domestic price supports and import restrictions. Herein, the focus is on four recent developments that have affected, or may soon influence, U.S. sugar policy. These are (i) the sugar provisions of the 1996 Farm Bill, the Federal Agriculture Improvement and Reform (FAIR) Act; (ii) revisions to sugar policy in the 2002 Farm Bill, the Farm Security and Rural Investment Act (FSRIA); (iii) agreements on sugar under NAFTA, along with ongoing disputes about the interpretation of those agreements; and (iv) sugar commitments under the Uruguay Round WTO agreements and possible further commitments under the current Doha Round negotiations.

The 1996 Federal Agricultural Improvement and Reform Act

The basic policy features of the 1996 FAIR Act for exported crops—such as wheat, feed grains, rice, and cotton—included decoupling direct government support payments from market prices and producers' planting decisions, eliminating annual acreage reduction (supply control) programs, and capping price-support loan rates at what seemed at the time to be low levels. Yet even when it was enacted, the FAIR Act did not put U.S. farm policy on a new strategic path to reform.[1] The path Congress took in the FAIR Act was

[1] Orden, Paarlberg, and Roe (1999) identify four reform strategies (cutout, squeeze out, cash-out, and buyout) depending on how fast the policy change occurs and whether past program beneficiaries receive compensation. The FAIR Act did not achieve a cutout, because permanent legislation was left in place and generous cash subsidies were provided to farmers in the short run. Just as clearly Congress was not advancing a squeeze out with the FAIR Act, because the generous new decoupled payments it authorized were much greater than expected, and so unencumbered by regulations and easy for farmers to obtain that voluntary program participation increased. The FAIR Act also failed to ensure a buyout of farm programs, because it maintained permanent legislation and a budget baseline for continued farm program spending.

instead a familiar one of heavy compensation through farm programs. Still, it represented a step toward less market intervention in many farm support programs, and potentially increased pressure for reform in sugar as well.

The FAIR Act kept sugar price-support loan rates fixed nominally at 18 cents/pound for raw cane sugar and 22.9 cents/pound for refined beet sugar. For most supported crops other than sugar, cash payments made when market prices are below loan rates (primarily loan deficiency payments) have replaced government commodity storage designed to keep market prices at higher levels. In contrast, the FAIR Act extended policies allowing sugar processors to forfeit their output to the U.S. Department of Agriculture (USDA) Commodity Credit Corporation (CCC) under nonrecourse loans. With such forfeitures but not loan deficiency payments as a policy instrument, the loan rates keep a floor under domestic market prices, so no immediate market liberalization was achieved.

Small changes in the sugar program were made; in particular, a 1 cent/pound forfeiture penalty was adopted and new provisions stipulated that if low-tariff TRQ sugar imports were to drop below 1.5 million tons, then CCC loans would revert to a recourse basis (that must be repaid). Recourse loans imply that domestic sugar prices would not be supported by the loan rate. The FAIR Act ended previous authority for the USDA to impose domestic marketing allotments to limit supply. It also eliminated the requirement that the sugar program operate to the extent possible at no net budget cost to the government, a change in legal status that technically created room for intrusive CCC expenditures or, in principle, for liberalizing direct payments. None of this was eminent at the time the FAIR Act became law. In 1995/96, agricultural prices were high and sugar imports were well in excess of the recourse loan trigger.

The 2002 U.S. Farm Security and Rural Investment Act

Since 1996, much of the reform promise of the FAIR Act has dissipated. Low prices for farm commodities that emerged in 1997 and lasted through 2001 brought increased annual appropriations for farm income support, new crop insurance subsidies, and ad hoc disaster relief expenditures. In 2002, Congress passed the FSRIA, replacing the FAIR Act one year before it was scheduled to expire. For exported commodities, the FSRIA extended the FAIR Act's decoupled payments and introduced additional countercyclical payments to be made on specified base acreage and yields when prices were below delineated target price levels. Farmers received payments and retained planting flexibility, and they were allowed to update their eligible base acreage (for both payments and yields, for countercyclical payments only). Most loan rates were adjusted slightly upward and new crops became eligible for loan rate support. Oilseeds became a base crop for payment purposes and the fiscal budget authorized for expenditures on agriculture rose substantially.[2]

For sugar, a policy crunch began in 2000 when domestic production plus the minimum imports to which the United States was committed internationally exceeded do-

[2] For a detailed comparison of the 1996 FAIR Act and the 2002 FSRIA, see ERS/USDA. A good summary of the main provisions of the FSRIA related to support programs, conservation, and trade is provided by Westcott, Young, and Price (2002). Orden (2003) provides a political economy assessment of enactment of the 2002 Farm Bill and summarizes its main features. See also Gardner (Chapter 3, this volume).

mestic consumption and private stock-building demand at the supported domestic prices. To sustain those prices, the CCC accumulated stocks and the USDA offered a "plow down" that exchanged CCC stockpiled sugar for destruction of some of the planted new sugar beet crop. The alternative adjustment mechanism of letting domestic sugar market prices fall below the loan rates was rejected by domestic producers. In the subsequent year, a payment-in-kind program was initiated to trade CCC stockpiled sugar for reduced beet planting, thus avoiding having to plow down another growing crop. Supply pressure on the sugar market eased, lessening political pressure for reform.

In the 2002 FSRIA, domestic producers succeeded in tightening the provisions of the sugar support policies. The loan rates were retained at the levels of the 1996 FAIR Act. The forfeiture penalty was eliminated, marketing assessments (adopted previously to provide a small amount of government revenue during a period of fiscal deficits) were ended, and interest rates on CCC loans were reduced, making the sugar program more lucrative for producers. More fundamentally, the new Farm Bill restipulated that the sugar program be operated to the extent possible at no net cost to the government. Authorization was continued for a payment-in-kind program and authority was restored to control supply through domestic marketing allotments if necessary, but only when annual sugar imports were less than 1.5 million tons.

The combination of the no-net-cost provision and constraint on use of domestic marketing allotments if imports exceeded the level set in the FSRIA was designed, in the words of the U.S. producers, to ensure that the USDA and the U.S. Trade Representative stood "shoulder to shoulder" with the domestic industry in opposing loosening of import restrictions. Together these provisions tie the hands of trade policy negotiators: imports of more than 1.5 million tons cannot be offset by restrictive domestic marketing allotments to sustain the supported price, while allowing imports to exceed this level would induce violation of the no-net-cost provision if CCC stockpiling were to result. Thus, the sugar program has to continue to be administered with tight import restraints, which sets the Farm Bill firmly against sugar trade liberalization.

The North American Free Trade Agreement

The agricultural trade negotiations for NAFTA were contentious. At their conclusion in 1992, all agricultural commodities were included under the long-run goal of eliminating barriers to trade between Mexico and the United States, but not with Canada. Elimination of agricultural trade barriers was to be accomplished over adjustment periods up to 15 years, with the most highly protected commodities in each country subject to the longest planned phase-out of protection. Sugar producers in the United States formed one of the most vehement groups of NAFTA opponents, while support of the Florida congressional delegation became crucial to passage of the required implementing legislation (Orden 1996). Complex adjustment period rules were first negotiated to delay the creation of a common market for sugar between Mexico and the United States. Then, as the trade agreement was brought to Congress by the new Clinton Administration, the rules for sugar were revised in a side letter detailing adjustment period commitments between the two countries. Two issues thus arise: the operative rules during the adjustment period to 2008, and the final agreement for bilateral elimination of sugar trade barriers.

Sweetener trade flows during the adjustment period have remained mired in conflict (Haley and Suarez 1999, 2002). As Mexican output has increased under protection and support of its sugar sector, differences in interpretation have emerged about the commitments in NAFTA versus the side letter regarding low-tariff Mexican access to the U.S. market under a TRQ. Mexico has taken various trade-restrictive steps on corn sweeteners (including anti-dumping duties, taxes on soft drinks produced with HFCS, and imposition of TRQs), basically arguing that the U.S. has not complied with its NAFTA commitments on sugar access. The U.S. has argued that Mexican barriers to HFCS imports and usage are themselves violations of the NAFTA accords. Meanwhile, the high U.S. tariffs on over-quota sugar imports (outside the TRQ) have fallen for Mexico under NAFTA: from 16 cents/pound for raw sugar in 1994 to 7.56 cents/pound effective January 1, 2003, with further declines scheduled and the over-quota tariffs to be eliminated completely in 2008.

With low world sugar prices since 1998 and falling tariffs, over-quota imports from Mexico have become feasible. The Mexican government has imposed restraint toward authorizing such sales, but over-quota imports are increasingly likely as the tariffs come down. In the interim, squabbling over the NAFTA provisions for bilateral sweetener trade continues to pit producers of U.S. corn sweeteners, seeking access to Mexico, against the U.S. sugar industry, seeking to restrain sugar imports, and the U.S. government against the government of Mexico. Rumors emerge regularly of a deal between the two countries that would set negotiated market access quantities for sugar and HFCS, but reaching a comprehensive bilateral agreement has been elusive.

While much of the U.S.-Mexico consultation and dispute over sugar has focused on short-term access questions, the common market that emerges in 2008 looms ever closer on the horizon. Once the tariff phase-out is complete, NAFTA and the side letter contain no explicit trade restraints between Mexico and the United States for domestically produced sugar or HFCS. In principle, if Mexican sugar production were to exceed domestic consumption at that time, the full excess could flow into the U.S. market. This inflow would butt up against the provisions of the 2002 U.S. Farm Bill, which is scheduled for renewal in 2007.

Uruguay Round Agreements and Doha Round Negotiations

The multilateral Uruguay Round Agreement on Agriculture guaranteed only minimal market access to the most protected agricultural markets worldwide under low-tariff TRQs, together with limited commitments to expand this access and reduce the high (usually prohibitive) over-quota tariffs through 2000. Sugar imports by the United States exceed the general TRQ minimum market access guarantee of 5 percent of domestic consumption. The U.S. made a commitment instead to a minimum TRQ sugar import level of 1.256 million short tons raw value. At the time, U.S. imports exceeded this level, so the U.S. commitment was not viewed as a significant trade liberalization step. The Uruguay Round Agreement also prohibits introduction of new export subsidies. This precludes the United States from adopting a European Union type of regime, both importing sugar under high domestic prices to meet its Uruguay Round commitment and selling domestically produced sugar at a lower world price with an export subsidy.[3] Under the Uruguay Round Agreement, the U.S. over-quota tariff on raw sugar has declined from a base value of 18.08

[3] For evaluations of sugar policies worldwide, see Schmitz and others (2002) and OECD (2002).

cents/pound to 15.36 cents/pound. This remains a prohibitive tariff even when the world price of raw sugar falls to 6 or 7 cents.

Unlike the U.S.-Mexico commitments in NAFTA, the Uruguay Round Agreement does not encompass a long-term schedule for full removal of agricultural trade barriers. Negotiations of further commitments to limit agricultural support and lower agricultural trade barriers are underway through the WTO Doha Round negotiations launched in November 2001. As long as over-quota tariffs are prohibitive, to effectively increase competition in the TRQ-protected markets requires more than an increase in the absolute quantities of trade subject to low duties—it requires that TRQs expand as a percentage of domestic consumption. Such increases in low-tariff TRQ access could put pressure on sugar support policies in the United States and other protected markets. For example, a 50 percent increase in the U.S. sugar TRQ would raise minimum imports to 1.884 million tons.

In July 2002, shortly after enacting the FSRIA with increased domestic subsidies and strengthened support for sugar, the United States tabled a proposal for new WTO multilateral commitments on agricultural trade. Only a small increase in TRQs (20 percent) was included in the U.S. proposal. However, the United States also proposed that all agricultural tariffs be reduced to no more than 25 percent within a five-year period, using the Swiss formula that brings high tariffs down faster than low tariffs. The U.S. proposal would bring the bound tariff applied to U.S. sugar imports down dramatically—from 195 percent including special safeguards, to around 22 percent (Tsigas and Boughner 2002). Such a dramatic tariff reduction, if enacted, would again butt up against the new U.S. Farm Bill.

SUGAR TRADE LIBERALIZATION UNDER A FREE TRADE AREA OF THE AMERICAS

One conundrum facing sugar policy in the FTAA, as well as in the WTO, is the pending head-on confrontation between regional or multilateral trade reform proposals and the intransigence around existing policies that continues to be written into U.S. farm program legislation. While there is no certainty that sugar trade liberalization will be included in an FTAA, this chapter asserts that such reform is a desirable policy outcome. This section examines some of the likely impacts of reform, adjustment programs that might facilitate reform, and obstacles to and the feasibility of such an outcome.

Three primary objectives of FTAA sugar market liberalization are the following:

- To create a sustainable long-run policy with greater market orientation, increased integration, and more open trade
- To free up prices to allow the integrated market to clear and set stock valuation in response to supply and demand
- To avoid outdated and costly interventions either through government involvement in purchases, forfeitures, stockholding, and stock disposal, or by resorting to government managed domestic marketing allotments or production quotas.

The basic argument for open-market policies is that they are efficient and welfare enhancing and consistent with the overall objective of broad trade liberalization under an FTAA. Sugar is an essentially homogeneous commodity for which several low and middle-income countries are low-cost producers. Thus, sugar is a prime candidate for policy reform to increase the trade opportunities of developing countries. Presumably developed countries would achieve compensating market access gains in other areas under a full free trade agreement. Another consideration is that the sugar policy reform issue is complicated in an FTAA by bifurcation among developing countries, with some countries being the beneficiaries of preferential market access under current policies and imposing domestic protection that would have to be reduced under a fully implemented FTAA reform.

A number of empirical studies shed light on the likely impacts of sugar market liberalization. In one benchmark study, Borrell and Pearce (1999) utilize a detailed multilateral model delineating 24 countries/regions and seven classes of sweeteners to examine the long-run price, trade, and welfare effects of full liberalization of world sugar markets. In their analysis, multilateral liberalization results in a 25 percent decline in the U.S. sugar price, while the world price rises by 38 percent. U.S. imports increase around 5 million metric tons annually with liberalization. Consumer gains are nearly $1.2 billion for the United States, while U.S. producer surplus falls by $0.7 billion, leaving a net estimated gain of $0.5 billion. Worldwide net gains are nearly $5.0 billion.

Haley (1998) constructs a more detailed U.S. model with separate short-run (processing capacity fixed) or long-run (processing capacity adjustable) supply functions for nine domestic regions; a complex, three-stage demand structure for six types of industrial sweetener users; and a two-stage demand structure for nonindustrial sweetener consumption. Foreign excess supply is compressed into an aggregated elastic upward-sloping function. For a unilateral liberalization by the United States, Haley also finds a domestic price decline of around 25 percent. His equations imply a fairly price-responsive (but still inelastic) demand structure. When the U.S. price falls, domestic production declines by 2.5 million tons (28 percent) in the long run. Demand expands nearly proportionately to the price decline, so imports rise by almost 5 million tons, causing the world price to nearly double. Haley estimates smaller consumer gains ($0.67 billion) and total producer losses ($0.64 billion) than do Borrell and Pearce for multilateral liberalization. He notes that the demand structure specified is the most obvious difference between his study and those indicating larger distributional and net effects from changes in sugar policy.

A third modeling study of the economic effects of the U.S. sugar program was conducted by GAO (2000). The study utilizes a global sugar model from Iowa State University, augmented to include domestic supply linkages to the corn, HFCS, and wheat markets, and to evaluate separate effects on domestic cane and beet producers, cane refiners, sugar beet processors, corn producers, and HFCS processors. GAO (2000) estimates that the sugar program added $1.5 billion in 1996 and $1.9 billion in 1998 to the costs of domestic sweetener users and consumers, while cane and beet producers received benefits of about $0.8 billion in 1996 and $1.0 billion in 1998. For unilateral U.S. liberalization, this study finds that domestic raw and refined sugar prices fall around 40 and 25 percent, respectively, while world prices rise 10 to 20 percent. With highly inelastic supply and demand assumptions, domestic harvested acreage falls by less than 5 percent, while imports rise by 1.1 to 1.6 million tons.

Two recent studies focus specifically on sugar trade liberalization within the FTAA region. Tsigas and Boughner (2002) utilize a modified Global Trade Analysis Project (GTAP) model to examine the effects of unilateral U.S. sugar trade liberalization in the

Americas. Their model includes nine regions but aggregates Central America and the Caribbean, precluding examination of differential effects among low and high-cost producers in these two areas. Tsigas and Boughner find that U.S. liberalization results in a decline in domestic sugar production, but the drop is moderated in their analysis by continuation of the U.S. loan rate support program. Wholesale U.S. consumer prices are not assumed to be supported in their model, and drop by 84 percent, with U.S. sugar imports doubling. Sugar exports to the U.S. increase for Mexico, Central America and the Caribbean, Brazil, and the rest of South America.

In a second paper evaluating FTAA sugar market liberalization, Haley (2002) uses the USDA's baseline projection model—which incorporates details on the U.S. and Mexican sugar and corn sweetener sectors—to examine four alternative trade scenarios that might arise from FTAA negotiations. In two scenarios, the United States is assumed to offer larger TRQs to FTAA countries, either doubling or quadrupling access for sugar from within the region, while holding access for other parts of the world at constant levels. In the second two scenarios, the United States is assumed to allow unlimited zero-tariff market access to FTAA countries. Results are considered for the four-year period 2009–12 under the assumption that Mexico has attained unlimited duty-free access to the U.S. market under NAFTA.

With FTAA sugar access expanded under TRQs, the U.S. can only maintain the baseline loan rate (at a net government cost) by utilizing a substantial payment-in-kind program and accumulating CCC sugar stocks that mostly offset the increased imports. Sugar production in the United States falls nearly 10 percent with a doubling of the FTAA sugar TRQs, and by nearly 25 percent with a quadrupling of FTAA imports. Sugar imports from Mexico are mostly unchanged as long as the U.S. loan rates are maintained. Alternatively, if the United States were to let loan rates fall to avoid CCC stock accumulations, Haley (2002) argues that U.S. market prices would drop during an adjustment period. This would force inefficient domestic sugar processing plants to close. Prices would rise again once those plants were out of business, as long as imports remain restricted by the new TRQ quantitative limits. By contrast, if the United States allows unlimited FTAA imports, then domestic prices are driven down to world price levels (plus a marketing margin). If the increased U.S. demand does not raise the benchmark world price (projected at 9 cents/pound), then U.S. production falls so low that one cannot be assured that any U.S. sugar production would remain save the production of niche sugars. If increased U.S. demand were to raise the world price by 2 cents/pound, then U.S production would also fall sharply (to one-third of the benchmark projection) but not be eliminated. Imports from Mexico also fall sharply under unlimited FTAA market access, since Mexico is not one of the lowest-cost producers in the region.

ADJUSTMENT ALTERNATIVES TO FACILITATE SUGAR MARKET REFORM

With possible FTAA reform of sugar markets having such substantial effects, the question arises whether adverse effects on producers can be moderated to facilitate a move toward trade liberalization. A variety of cash-out options can be constructed that make U.S. sugar policies more similar to those adopted for other supported crops. This section considers three possibilities: direct payments on all output, direct payments on a fixed volume of output, and fully decoupled payments. These three options parallel the historical development of the cash-out that has occurred for other crops, and each moves sugar policy in that direction. The first two options retain loan rates at their levels under the FSRIA, but eliminate CCC forfeitures and instead provide loan deficiency payments when market prices are lower. The third option goes further and eliminates payments tied explicitly to sugar production. This would entail lowering the sugar loan rates to levels below generally expected market-clearing prices. The loan rate mechanism (with forfeitures) would then provide a safety net against extreme price volatility but would usually not provide an incentive-distorting price floor.[4]

A policy of direct payments of the difference between the market price and a specified loan rate support price provides an open-ended producer subsidy when payments are made on all output. The price-induced distortions to resource use and the level of producer surplus in the sugar market are largely unchanged compared with the existing programs if the support prices are set at existing loan rate levels. The loan rate remains the incentive price for production, while the market clears at a lower price, reducing the consumer distortion of current policies. This is a "half shot" of reform, but allows consumption to increase and the market to clear, while producers continue to receive a supported price.

Such reform would realign U.S. policy to accommodate any market pressures arising from existing international commitments for sugar imports, and to accommodate international market access negotiations in the WTO or FTAA.[5] If border policies were unilaterally liberalized, while U.S. production remained at preliberalization levels because of the price supports for producers, the world price would rise less than with full unilateral trade liberalization. Using Haley's (1998) global equilibrium model, the effect would be for the world price to rise by about 3.5 cents/pound less. At the resulting lower world price, U.S. consumption (and hence imports) would increase by about 4 million tons (compared with an increase in imports of around 5 million tons under his free trade scenario with reduced U.S. production).

Compared with a minimal cash-out with guaranteed producer prices for all production, additional reform is achieved if direct payments are made only on a fixed quantity of output. If acreage and yield-enhancing decisions are separable and if the direct payments are made on a per acre basis, then the payments still provide an incentive to keep acreage in production, but not to apply inputs or adopt new technology to raise

[4] The economic costs of the U.S. sugar program have led to many earlier calls for policy alternatives, including calls specifically for a shift to direct payments—a "cash-out." Deficiency payments were one option examined by USDA at the behest of Congress when importation of Cuban sugar was barred in the early 1960s (USDA 1961). Schmitz (1984) discusses deficiency payments as one alternative to import restrictions and Sturgiss, Field, and Young (1990) argue that the United States could adopt less costly trade-neutral direct support policies. Krueger (1991) points out that sugar deficiency payments might have moderated the substitution of HFCS for sugar, then notes the irony of corn growers opposing a regime with such payments as creating "unfair competition." For a short period in 1977, when the sugar program had not been renewed because of high world sugar prices, the United States fell back on permanent legislation authorizing deficiency payments, but thereafter import protection through duties and subsequent import quotas was enacted. Krueger describes an unsuccessful endorsement of deficiency payments by the Sugar Users Group in 1978, while Jabara and Valdes (1993) note that the Reagan Administration was unable to attain congressional support to introduce a deficiency payments policy in 1987. Opponents of the sugar support program have since turned without success to arguing mostly for the more radical cutout alternative of an end to the sugar program without compensation.

[5] I have pointed out that a minimal cash-out proposal along this line need not involve any immediate change in U.S. border policies or import obligations. Thus, such a cash-out reform need not be subject to the frequent producer complaint that unilateral reform would expose U.S. producers to competition from subsidized production abroad, in what they tend to call the "dump world market" (Orden 2000).

yields at the margin. If the fixed level of output receiving the direct payment is the full amount of recent domestic supply, little production reform occurs initially, while consumer gains are achieved as above. Over time, if the quantity receiving support is restricted, less incentive is provided to expand production and processing capacity.

The most ambitious form of cash-out would make fixed payments to sugar producers that are not linked to continued production, by providing FAIR Act-style decoupled payments. With this full decoupling, production distortions would be reduced. The domestic market price would be the incentive price determining output levels, and land and other resources would flow to their best uses. If border policies were liberalized along with provision of decoupled payments, the production and consumption outcomes would be nearly equivalent to a free trade scenario, while incomes of producers would be sustained.

It is less costly to maintain producer welfare with decoupled payments than with payments that retain production distortions. Using Haley's (1998) results, an expenditure of at least $770 million is required to maintain producer revenue at its base level from the existing program. By contrast, to maintain only the producer surplus of sugar producers at the level they achieve under the existing programs requires an expenditure of $438 million.[6] Thus, fully decoupled payments are a less costly cash-out policy than direct payments tied to production levels. Put another way, using Haley's model, payment in the long run of more than about $500 million would overcompensate current sugar producers if fully decoupled payments are the cash-out policy, while payments of even twice as much might undercompensate those producers if the cash-out expenditures are tied fully to the level of domestic output.[7]

For sugar trade liberalization in an FTAA, it is not just in the United States that production adjustments in the sugar sector would occur. Two other sugar importers (Barbados and Venezuela) and seven regional sugar exporters (including low-cost producers Colombia, Costa Rica, El Salvador, and Guatemala, and low-to-medium cost producers Mexico and Nicaragua) also have TRQ restrictions under the WTO Agreements, while both Brazil and Mexico are subject to limits on the use of export subsidies (International Sugar Organization 1999). The WTO bound tariff commitment levels are generally high throughout the region, as shown in Table 8–2. Bound tariffs are 20 percent or less only among three countries that are importers but do not produce much sugar domestically (Canada, Haiti, and Suriname). Low-cost exporter Brazil and a number of other exporters maintain bound tariffs around 35–40 percent, but low-cost exporter El Salvador has a bound tariff level of 70 percent, and Colombia and Guatemala over 100 percent. Tariffs are also 100 percent or more for most of the high-cost Caribbean exporters.

The cash-out policies described above could also be applied in the other FTAA countries (importers and exporters) where the domestic and trade regimes for sugar have provided high levels of protection. However, few of these countries have utilized direct

[6] Haley (1998) also calculates a loss to fructose producers of $203 million, resulting in his total producer loss of $0.64 billion.
[7] Haley's (1998) base U.S. production under the sugar program is 8.96 million tons priced at $370/ton, for revenue of $3.30 billion. Under liberalization, output is priced at $283/ton, which would generate revenue of $2.53 billion if the initial production level were maintained. But recall that with cash-out payments still tied to production, the world price is lower than in Haley's liberalization scenario; thus deficiency payments based on the difference between the world price and a target price would be higher. In my calculations based on Haley, payments would increase by as much as $625 million ($70/ton x 8.96 million tons), making the cost of maintaining revenue as high as $1.4 billion annually.

Table 8–2

Refined Sugar Tariff Commitments under the World Trade Organization

(Percent)

Region/country	Tariff Base	Tariff Final	Ad valorem basis Base	Ad valorem basis Final	Reduction
North America					
Canada					
(Canadian CAN$/metric ton)	41.67	35.42	8	7	15.0
Mexico	173	156	173	156	9.8
United States (US$/metric ton)	420.50	357.40	106	90	15.0
Caribbean					
Barbados	*	122	*	122	*
Dominican Republic	*	40	*	40	*
Haiti	45	16	45	16	64.4
Jamaica	*	100	*	100	*
St. Kitts and Nevis	170	130	170	130	23.5
Trinidad and Tobago	*	100	*	100	*
Central America					
Belize	*	110	*	110	*
Costa Rica	55	45	55	45	18.2
El Salvador	92	70	92	70	23.9
Guatemala	178	160	178	160	10.1
Honduras	*	35	*	35	*
Nicaragua	120	100	120	100	16.7
Panama	*	*	*	*	*
South America					
Argentina	*	35	*	35	*
Bolivia	*	40	*	40	*
Brazil	85	35	55	35	36.4
Chile	35	31.5	35	32	10.0
Colombia	130	117	130	117	10.0
Ecuador	*	50	*	50	*
Guyana	*	100	*	100	*
Paraguay	*	35	*	35	*
Peru	130	68	130	68	47.7
Suriname	*	20	*	20	*
Uruguay	60	35	60	35	41.7
Venezuela	117	105	117	105	10.3

* Countries committed to a maximum tariff rate.

Source: International Sugar Organization.

payments to support the incomes of producers of other crops, so initiating direct sugar payments as compensation for lower trade barriers would represent an even more dramatic departure from their agricultural sector policy regimes. Many governments would not have the fiscal resources to implement such compensation schemes without international financial assistance.

U.S. Peanut Program Reform in 2002: A Template for Sugar?

Sugar trade liberalization has been tossed around conceptually but tossed out politically in the United States and elsewhere for at least half a century. Can a case be made for an FTAA at the start of the twenty-first century that a nexus of policy constraints has emerged such that liberalization is, or is looming as, a viable policy option? This would involve issues such as the amount of posturing incorporated in the industry position as reflected in the U.S. FSRIA of 2002. How much pressure will trade negotiators bring to bear against the existing sugar regime? How willing is the industry to adapt to change, particularly if it includes cash-out compensation payments?

With respect to these questions, there is one aspect of the 2002 FSRIA that warrants additional comment. In the 2002 law, a long-established regime for edible peanuts comprised of domestic price supports well above world levels and quotas on the production eligible for the domestic market was scrapped in favor of direct cash payments. This change in policy may hold promise as a template for similar reform in sugar.

Under the older U.S. peanut support program, domestic quota holders received preferential prices for peanuts supplied to the domestic market for edible uses, compared with prices received for peanuts (known as “additionals”) that went into processing (crushing into oil and meal) or were exported. TRQs restricted foreign access to the domestic edible market. Thus, the traditional peanut program created an income stream from higher prices reserved exclusively for those domestic and foreign producers and quota owners who had privileged access. Even domestic farmers without quotas were barred from producing peanuts for the domestic edible market but could produce peanuts as additionals.

The 1996 FAIR Act included some changes in the peanut program. It lowered the loan rate for quota peanuts for the domestic edible market from $678/ton to $610/ton, eliminated a price escalator that had previously pushed loan rates up with rising production costs, and partially relaxed geographic production restrictions.[8] It also eliminated a minimum national quota, allowing the USDA to set annual quota poundage eligible for the domestic market based on demand estimates. The annual effective quota poundage was subsequently reduced from 1.47 million tons for the 1995 crop year to 1.15 million tons in 1996. It averaged 1.24 million tons during 1996–2000, which was only 82 percent of the average effective quota of 1.52 million tons for pre-FAIR years 1993–95.

[8] The tight restriction on peanut production for the domestic edible market had only been relaxed slightly from the original supply control program of the 1930s through 2001. Until 1996, quota peanuts had to be grown in the county and state in which the quota had originally been assigned. Under the FAIR Act some quotas could be transferred (leased or permanently sold) across county lines within a state. This reform was phased into effect, until a maximum 40 percent of the state's quota was eligible to move across county lines. The largest shift of production has occurred in Texas, where nearly all of the allowed quota transfer has occurred from Central Texas to West Texas. Fewer transfers of quotas across county lines occurred in other states.

Despite the reduced quota, domestic peanut production remained nearly constant. The average national production for 1996–2000 was 1.82 million tons, or 99 percent of the average 1.85 million tons for 1993–95. As a result, under the FAIR Act, peanut producers were selling a relatively smaller proportion of their output at a lower quota support price for domestic consumption, and a relatively higher proportion of their peanuts at much lower prices in the additionals market.

One reason for the declining effective quota for the domestic edible market was the increased foreign access to the U.S. peanut market under international trade agreements to which the United States committed in the 1990s. Foreign access to the U.S. domestic market for peanuts increased from less than 4 percent of consumption prior to the 1993/94 marketing year to more than 10 percent by the 1999/2000 marketing year due to market access provisions of the WTO and NAFTA (Fletcher and Smith 2001). Moreover, the tariff rate for peanuts is scheduled to decline to zero for Mexico in 2008 under NAFTA, so imports are likely to rise. Other foreign producers also had incentives to seek additional access in trade negotiations as long as the price in the U.S. domestic market remained above the price in world markets, as it did under the peanut quota program.

In these circumstances, fundamental changes in the peanut program were made in the 2002 FSRIA. The quota-based dual market structure was replaced with a support program of direct payments that includes three basic components similar to other crops: a much reduced loan rate and related loan deficiency payments if market prices fall below the loan rate level, decoupled direct payments, and countercyclical payments. In addition, peanut quota holders are compensated for their loss of quota rights with direct payments.

The new peanut program is lucrative for both former quota holders and producers of peanuts once sold as additionals. The cash-out has an estimated cost of $4 billion over 10 years. Under the FSRIA, any peanut producer is eligible for a loan rate of $355/ton on all current production. Those who qualify as "historic producers" of quota or additional peanuts are also guaranteed a direct payment of $36/ton and a target price under the countercyclical payment program of $495/ton for the output from 85 percent of historic peanut acres and recent yields. Thus, for a traditional producer who continues to grow peanuts, the minimum average revenue is $474/ton on a level of production equal to recent output ((0.85)*($495) + (0.15)*$355 = $474).

Traditional peanut producers also attain planting flexibility. They can receive the direct payment and the countercyclical payment while growing another crop if that is deemed more profitable. If they grow peanuts, the new guaranteed revenue is much higher than what additional producers received in the past, when they were eligible for a loan rate of less than $200/ton. Former quota holders receive an additional payment of $220/ton for five years. Thus, for the next five years, total guaranteed revenue is $694/ton for a quota owner who continues to grow peanuts, compared with $610 under the FAIR Act. After five years, guaranteed revenue for a former quota holder falls below the previous guarantee, but the quota buyout of $220/ton for five years compares favorably with market prices for many sales of quota rights before the 2002 FSRIA was passed. Apparently these market prices included a discount for the possibility that the peanut quota program would not last forever.

There are a number of other political economy aspects to the cash-out enacted for peanuts in the United States in 2002. Rising imports and the potential for further trade liberalization were used as arguments to motivate the policy changes necessary to preserve the domestic industry. The preservation argument was central—the intent of the new peanut support policy is to sustain the domestic industry, not cause its demise. The future of the domestic industry cannot be guaranteed under the FSRIA because farmers can shift out of peanut production under planting flexibility, whereas under the earlier quota system peanuts had to be grown to attain the high domestic price. But domestic producers are well compensated for lower market prices under the FSRIA, and incentives for domestic peanut production have improved for the traditional growers of additionals and new entrants. Consumers also benefit from lower market price and their gains should exceed the costs of the new program they bear as taxpayers. By contrast, foreign producers who had attained TRQ access to the U.S. domestic market are disadvantaged by the change in policy. Unlike domestic producers, the foreign producers do not receive any payments as compensation for the lower U.S. domestic peanut prices. With lower prices, access to the U.S. market is of less value to foreign producers, but under the FSRIA, the United States is better positioned to liberalize peanut trade. This positioning is quite in contrast to the sugar policies enacted in 2002.

Obstacles to U.S. Sugar Policy Reform

It is noteworthy that U.S. sugar producers did not endorse a cash-out reform similar to peanuts in 2002, instead opting to tighten restrictions under their traditional price support program. The sugar producers faced the same government budget context as peanut producers, and could have sought to have some of the new money Congress made available for agricultural support used for sugar payments. Sugar potentially faces even more pressure than peanuts from imports under NAFTA, the WTO, or an FTAA. Sugar producers are widely held to be a more powerful lobby than peanut producers. Yet the sugar industry did not seek new cash-out payments under these circumstances. The industry clearly intends to hold on to its current support program for some time. This is sobering for prospects for sugar trade liberalization under an FTAA, because liberalization is unlikely to occur without being accompanied by some type of cash-out compensation for sugar producers in the United States.

One reason the U.S. sugar producers did not endorse a cash-out in 2002 lies in the domestic structure of the industry. Cane sugar is characterized by large production units, in Florida in particular, making payment limits per operating unit a political obstacle to adoption of direct support. Transparency is usually viewed as a desirable attribute of government policy, and direct cash payments are more transparent than the support delivered by maintaining high market prices. However, the transparency of direct payments is a liability to engineering a shift toward a cash-out in the case of sugar. Turning support toward direct payments makes explicit the concentration of benefits from sugar policies.

The sugar program benefits only 9,000 beet farmers and 1,000 cane farmers. Large cane farms average nearly 20 times as much acreage as the average beet farm (more than 3,000 acres versus less than 200) and two large corporations account for nearly 80 percent of the cane acreage in Florida. The concentration of benefits from the sugar program on these large entities provides reform advocates with a strong equity argument for change. But if direct payments are made proportional to output, and to both small and large producers without limitation, they detract from the appeal of a cash-out. Hence, a stalemate prevails on sugar policy, which leaves large producers attaining the benefits of support through high consumer prices.

A second obstacle to engineering a cash-out arises from federal budget rules. Programs with more political appeal than cashing out an archaic sugar policy continually make demands on the federal purse, and enthusiasm for tax cuts has not waned in the United States, although budget deficits have reemerged after a few years of surpluses. Congressional pay-as-you-go rules are still in place. Under these rules, any proposal assessed to increase budget outlays has to be offset through other revenue increases or budget cuts. This limits the room for adopting direct payments to sugar producers.

The prospective short-term cost of a sugar cash-out might not exceed that for the peanut policy reforms enacted in 2002. For each penny of payments per pound of sugar under a loan deficiency payment program, the cost is around $180 million, assuming payments on recent levels of output. The payment-in-kind program reduced sugar beet acreage by about 6 percent in 2001, which, all else constant, reduces total domestic sugar production by about 3 percent. Instead of constraining supply, if market prices had been allowed to fall below the loan rate with compensating cash payments, the program cost would have been between $150 million and $1 billion, depending on the short-run price responsiveness (elasticity) of demand. Marketing allotments and payment-in-kind programs were anticipated being in use for at least several years in 2002, implying that a cash-out would prove costly over this time period, but not necessarily more costly than the policies enacted for peanuts. In the longer term, the cost of a sugar cash-out could prove higher because of larger potential sugar imports, whereas the United States has been a net peanut exporter with its additionals production, and is likely to be an exporter under the FSRIA peanut program. The long-term cost of a sugar cash-out depends on uncertain supply and demand conditions in the future, as well as on future international trade agreements and on the demand and supply responses to lower prices.

In one respect, replacement of the FAIR Act by FSRIA imposes an additional budget burden on sugar reform. The FAIR Act decoupled corn producer payments from market prices. Under FAIR, a sugar cash-out reform that might lower demand for corn sweeteners, and hence corn prices, would not have been scored under budget rules as having a secondary cost associated with higher corn payments, but it would with the countercyclical payments under the FSRIA. The direct cost of the sugar payments becomes part of the budget calculations in both cases.

One argument that supporters of the current sugar program have used against reform has been that lowering sugar prices would result mainly in increased profits for large industrial sugar users, not lower prices for consumers. The argument is often brandished for rhetorical effect: it plays on an anti-corporate theme that has a constituency, and in the process neatly turns the argument away from the inequity of implicit taxation of consumers to benefit rich farmers and sugar corporations. Reform advocates have responded with rhetoric of their own, primarily the counterclaim that industries that use sweeteners are oriented toward the final customer and competitive. But even a competitive processing industry may benefit from reduced input costs. To the extent this occurs, it changes the distributional impacts of sugar policy reform compared with a simple consumer and producer surplus argument.

The most formidable obstacle to U.S. reform remains opposition from sugar producers and processors, who have been able to dominate the legislative outcomes, as shown in 2002. As long as the sugar industry views the existing program as advantageous and exposure to direct payments as undesirable, it will continue to marshal arguments against reform, including the arguments that the existing program provides market stability and has no budget cost; that liberalization by the United States would be unilateral disarmament in the face of European Union and other subsidies; and that lower prices benefit industrial users, not consumers. Reform advocates can counter such arguments, and a cash-out reform proposal is less abrasive than an abrupt cutout ending the sugar program without compensation. However, there is little in the history of cash-outs for other crops in the United States to suggest there will be movement along this path until at least some producers endorse such a change. Obstacles to enactment of direct compensation payments to sugar producers in other FTAA countries are also substantial.

CONCLUSION: IS SUGAR TRADE LIBERALIZATION POSSIBLE IN A FREE TRADE AREA OF THE AMERICAS?

This chapter has addressed the current policy regimes toward sugar among Western Hemisphere countries, the sugar production and marketing situations under these policies, and the prospects for sugar trade liberalization under an FTAA. Although there is no certainty that sugar trade liberalization will be included in an FTAA, the argument is presented that such reform is a desirable policy outcome because it raises efficiency and enhances welfare in a manner consistent with the overall objective of broad FTAA trade liberalization. Sugar is an essentially homogeneous commodity for which several FTAA low and middle-income countries are low-cost producers. The region has a net surplus of low-cost sugar output. Thus, sugar is a prime candidate for policy reform to increase the trade opportunities of developing countries.

To accommodate trade liberalization, it is likely that some form of compensation payments will be required. Within the United States, where much of the adjustment to lower prices would occur, the fundamental reform of the peanut program in 2002 provides a possible template for sugar reform as well, although the costs could be higher for sugar with trade liberalization in the long run. The highly concentrated structure of sugar production in the southern United States also presents a political obstacle to devising a direct payment compensation scheme. Thus, sugar market trade liberalization will require a significant commitment on the part of negotiating governments. Governments of other FTAA countries with protected sugar sectors will also face obstacles to implementing direct payments, but compensation mechanisms for high-cost producers in these countries may also need to be devised in order for sugar market liberalization to proceed. These compensation mechanisms should not lock in continued high-cost production, but compensation to offset distributional effects and allow net gains is consistent with the prescriptions of international trade theory.

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Chapter 9

The Free Trade Area of the Americas and Western Hemisphere Dairy Markets

Edith Depetris Guiguet

The world dairy market is relatively small but highly distorted as a result of protectionist policies implemented in the absence of international trade disciplines. Despite country commitments in the Uruguay Round Agreement on Agriculture (URAA), progress toward liberalization has been slow.

In the Western Hemisphere, Canada and the United States maintain dairy policies with complex mechanisms to support milk prices, control imports, and subsidize exports. Together with Mexico, they established the North American Free Trade Agreement (NAFTA) in 1994 to completely eliminate trade barriers by 2008. However, dairy trade liberalization was negotiated only between the United States and Mexico.

Most Latin American countries had import substitution policies until well into the 1980s, having formed regional free trade associations, such as the present Latin American Integration Association (ALADI). The initiative had limited success but served to promote bilateral agreements with preferential treatment for dairy trade. Some of them served as a basis for actual free trade areas, such as the Group of Three (Mexico, Colombia, and Venezuela), and customs unions, such as Mercosur (Argentina, Brazil, Paraguay, and Uruguay), the Andean Pact (Bolivia, Colombia, Ecuador, Peru, and Venezuela), and the Central American Common Market (El Salvador, Guatemala, Honduras, Nicaragua, and Costa Rica).

Regional agreements are praised for their capacity to improve resource allocation within the region and generate welfare gains for member countries; at the same time, they can divert trade from more efficient producers in the rest of the world. The debate persists on whether they serve as building blocks for multilateral trade liberalization or create fortresses that could be detrimental to the global trade system (Burfisher and Jones 1998). Notwithstanding the theoretical background, dairy trade within blocs has exhibited expansionary dynamics not comparable to those resulting from multilateral reform.

Although a new multilateral Round is proceeding, formal negotiations were launched in 1998 to create a Free Trade Area of the Americas (FTAA). It would extend regionalism to all Western Hemisphere countries except Cuba. Outcomes from both schemes are crucial for dairy markets, generating concerns and expectations among countries and market participants.

For South American low-cost producers and exporters, mainly Argentina and Uruguay, dairy trade liberalization represents a unique opportunity to increase market share. For those participants whose competitiveness derives from trade barriers and government protection, it is looked on with uncertainty. Although the final terms of the FTAA agreement are unknown, there is interest in investigating the dairy situation and potential scenarios under open regionalism.

This chapter reviews major characteristics of production and trade in the Western Hemisphere, concentrating on the two largest exporters and importers: NAFTA (Canada, the United States, and Mexico) and Argentina, Brazil, and Uruguay in Mercosur. Under the hypothesis that trade liberalization in the FTAA will have differential effects depending on each country's competitiveness, three indexes of competitive performance are calculated for four related dairy markets: skim milk powder, whole milk powder, butter, and cheese. Three sources of competitiveness are explored: productive efficiency, exchange rates, and dairy policies. Finally, the chapter discusses simulation outcomes under three FTAA liberalization scenarios.

DAIRY PRODUCTION AND TRADE IN WESTERN HEMISPHERE COUNTRIES[1]

Milk Production[2]

World milk production reached 584 million tons in 2001, with 84.5 percent cow milk, 11.8 percent buffalo milk, 0.15 percent sheep milk, 2.1 percent goat milk, and 0.4 percent camel milk. Cow milk increased from 470 million tons in 1991 to 493 million tons 10 years later.

Western Hemisphere countries produced 144 million tons, roughly 25 percent of world production, with an upward trend. NAFTA countries were the largest producers in the Western Hemisphere, with 92.6 million tons in 2001 and a 64 percent share, while Mercosur countries and Chile held a 30.7 percent share with 36.1 million tons. Andean Pact countries increased production to 10.8 million tons and a 7 percent share. Central America participated with 1.5 percent.

The United States is the largest individual producer with 75 million tons, followed by Brazil with 22.5 million tons, Argentina with 9.6 million tons, Mexico with 9.5 million tons, Canada with 8.1 million tons, and Colombia with 5.9 million tons. The remaining countries produce less than 2.2 million tons each.

Consumption and Self-Sufficiency Ratios[3]

Consumption of milk and dairy products is uneven across countries in the Western Hemisphere. Canada, the United States, Argentina, and Uruguay consume more than 230 kgs per person per year. Nicaragua consumes 37 kgs per person per year; Bolivia, 40 kgs; and Peru, 51 kgs.

Appendix Table 9–1 shows that self-sufficiency ratios for 2000 are more than 100 for the United States in butter, and for Argentina and Uruguay in butter and cheese. For

[1] For more detail, see Depetris Guiguet (2002).
[2] Data from FAOSTAT database.
[3] Self-sufficiency ratio = (local production/local consumption) * 100. A ratio greater than 100 indicates the country will export, and a ratio less than 100 indicates the country will import the commodity.

Canada, Chile, the Caribbean, and Andean Pact countries, the ratios are less than 100, indicating that local consumption is greater than local production.

International Trade

The participation of Western Hemisphere countries in world dairy markets is small compared with other regions, such as the European Union. Total Western Hemisphere exports in 2000 represented 9 percent of world volumes in skim milk powder and whole milk powder, 2.4 percent in butter, and 4 percent in cheese. The percentages were 7, 15, 6.6, and 10, respectively, for imports.

In blocs, NAFTA is by far the Western Hemisphere's largest exporter and importer of skim milk powder (78 and 52 percent, respectively), butter (29 and 82 percent), and cheese (54 and 85 percent). Mercosur leads in the share of whole milk powder exports (66 percent). NAFTA is a powerful and key player in the FTAA dairy integration process.

Trade Balance

Most Western Hemisphere blocs have deficits in their dairy trade balances, as shown in Appendix Table 9–2. This represents an opportunity for competitive exporters in the Western Hemisphere to expand their regional share if reduction of protectionism is negotiated in an FTAA agreement.

COMPETITIVE PERFORMANCE IN DAIRY MARKETS

Several indicators have been developed to evaluate competitive performance in international markets, each with advantages and limitations (see the Appendix).

One of the most popular indicators is Balassa's revealed comparative advantage (RCA) index (Balassa 1965). The RCA of a country for a particular good is the international market share for that good divided by the international market share for all goods. Often this fraction is multiplied by 100 for ease of presentation. An index of 110 for a particular industry (commodity) in a particular country would mean that its world market share is 10 percent higher than its total exports share, and thus the country has a comparative advantage (albeit small) in that industry (commodity). RCAs that are less than 100 indicate that the country has a comparative disadvantage.

The RCA has been criticized because it ignores the level of imports. An alternative measure is the net export index (NXI): exports minus imports divided by total trade in the commodity and multiplied by 100. An upper limit of 100 indicates that there are no imports, and a lower limit of –100 indicates that there are no exports.[4]

A relative trade advantage (RTA) index is calculated by subtracting the import relative advantage index from the export relative advantage index. A positive value indicates a competitive advantage and vice versa (Scott and Vollrath 1992).

[4] Another alternative for the net export index is to divide by Y_i (domestic production) instead of total trade (Traill and Gomes da Silva 1994).

Skim Milk Powder

NAFTA countries accounted for 54 percent of skim milk powder trade (exports plus imports) in the Western Hemisphere between 1998 and 2000. The RCA indexes in Appendix Table 9–3 show that none of the countries in the region is competitive. In 1991–2000, Canada's index moved with no clear trend; almost the same happened with the United States. It is likely that the United States will position itself as an exporter of skim milk powder because of the possibility of subsidizing its foreign sales under the URAA. Mexico, the world's largest importer of skim milk powder, shows an upper value of 14 (1997), which is obviously not competitive.

By contrast, in Appendix Table 9–4 the NXI values for NAFTA countries show positive net exports for Canada and the United States (again, the result of high import protection and mostly subsidized sales), and negative net exports for Mexico, a net importer.

Mercosur countries and Chile account for 19 percent of skim milk powder trade in the Western Hemisphere, with Argentina and Uruguay acting as net exporters, and Brazil and Chile as net importers. Paraguay, another net importer, has only a minor share of total trade.

Although RCA index levels are not directly comparable across different size countries, Uruguay ranks well above the group, showing strong competitiveness in this product. Argentina, with the exception of the year 1992, has shown significant improvement. According to the RCA index, the other countries in the region (Brazil, Chile, and Paraguay) are not competitive in this product.

The NXI for Argentina, and particularly for Uruguay, confirms they are net exporters of skim milk powder, whereas Brazil, Chile, and Paraguay are not only uncompetitive but net importers as well. The NXI for other countries in the Western Hemisphere (Andean, Central American except Costa Rica, and Caribbean countries) shows that none of them can be considered competitive.

The behavior of the skim milk powder RTA index in Appendix Table 9–5 closely resembles that of butter, showing the five typical Western Hemisphere dairy countries (Canada, the United States, Costa Rica, Argentina, and Uruguay) as having global competitive advantage (with positive RTA indexes). Uruguay and to a lesser extent Argentina exhibit much higher RTA values. This should not be surprising, since butter and skim milk powder can be considered by-products of the same output process, so production of one implies production of the other, in fixed proportions.

Whole Milk Powder

Whole milk powder is the second most important dairy product, ranked by total trade value (exports plus imports) in the Western Hemisphere, and it is the only one for which NAFTA countries do not rank first. They have a 17 percent share, after Mercosur and Chile (48 percent) and the Andean countries (20 percent).

The RCA index level for NAFTA countries is less than 100, indicating lack of competitiveness in this product, although Mexico shows significant improvement, growing from 5 in 1991 to 41 in 2000. The NXI tells a rather different story, indicating that the United States and Canada in some years are net exporters of this product. But again, as is the case for skim milk powder and butter, this cannot be taken as an indication of competitiveness, but rather as the result of mostly subsidized sales and tight import restrictions.

Whole milk powder is the main export dairy product of Argentina, and the high RCA index level shows its competitiveness. For Uruguay the RCA is even higher, with an upper value of 2,154. Both countries had significant improvement over the decade.

For Brazil, the largest Western Hemisphere importer, the RCA index level was always below 43 (and mostly below 10). Paraguay, on a smaller scale, is similar to Brazil. Chile shows an upward trend over the decade, indicating that the country is becoming competitive in this product. NXI values are positive in three years.

The Andean countries, with a 20 percent Western Hemisphere trade share, rank second to (but well below) Mercosur and Chile. Colombia and Bolivia exhibit significant improvement in the RCA index, as do some countries in Central America.

The RTA index for whole milk powder replicates the results for skim milk powder and butter. However, closer inspection reveals some differences among countries: the United States has positive indexes, but very close to zero, whereas Argentina and Uruguay have indexes well above zero.

Butter

The NAFTA countries are the single most important trading group in the butter sector, accounting for 61.2 percent of total trade in the hemisphere (exports plus imports). The RCA indexes show that the countries are not competitive in the butter sector. The NXI shows that Canada has positive figures for most of the period.

Mercosur countries had 22 percent of the Western Hemisphere's total butter trade. Uruguay and Argentina are significant exporters, with RCAs improving during 1991–2000. Uruguay is the only country in the Western Hemisphere that has a distinctive comparative advantage in the butter sector. Its competitiveness in butter derives from its concentration in exports of skim milk powder, which is a by-product of butter, whereas Argentina, for example, is basically an exporter of whole milk powder.

Brazil imports more than 20,000 tons of butter per year. It correspondingly shows low RCA indexes and its NXI is close to –100. The other two countries in the group, Chile and Paraguay, are both noncompetitive in butter, as indicated by the RCA and NXI.

According to the RTA index series, only five countries in the Western Hemisphere have global competitive advantage in butter: Canada, the United States (although not for 1998–2000), Argentina, Uruguay, and Costa Rica. Their RTA indexes are positive, but close to zero for Canada, Costa Rica, and, to a lesser extent, Argentina. The RTA index is consistently higher in the case of Uruguay, indicating that it is perhaps the only country that can be considered globally competitive in butter.

Cheese

Although the same measures are applied to the analysis of competitive performance for cheese and other dairy products, they differ in many ways. First, cheese is a more aggregated type of product, with many varieties and production processes. Butter and milk powders are much more homogeneous, and the production technology is basically the same for all countries where the dairy sector has at least an intermediate level of development.

Second, many types of cheeses are manufactured only for domestic consumption, and others, increasingly, are made for the export market (for example, cheddar, in some countries, or some types of hard cheeses), where they enter as an intermediate product that is sold for further processing.

> As a result, there are bidirectional flows in cheese (a country could be at the same time an exporter and an importer) as is the case with differentiated products, whereas for milk powders and butter, international trade flows are more unidirectional.

NAFTA countries are the most important in Western Hemisphere cheese trade. The average volume of exports plus imports for 1998–2000 is two times greater than the corresponding volume for all the other countries in the Western Hemisphere (67 percent of total trade in cheese).

The RCA, NXI, and RTA indexes for 1991–2000 show that none of the countries is competitive in cheese, although the trend seems to be improving for Canada and perhaps for the United States. Mexico is the least competitive of the group.

Mercosur countries rank second, but well behind NAFTA in cheese trade. The average sum of exports and imports for 1998–2000 was 13.6 percent of total Western Hemisphere cheese trade. The RCA, NXI, and RTA measures show that Uruguay has a clear comparative advantage, followed by Argentina. However, while the trend in RCA for Uruguay was improving (doubling in the period), in Argentina it was stagnant.

Among Andean countries, only Colombia in the last two years of the period could be considered as having global competitive advantage in cheese. Among the other Western Hemisphere countries, only Nicaragua was competitive in the cheese sector (no data are available for Costa Rica).

In summary, the indexes indicate that the most competitive performer in dairy trade in the Western Hemisphere is Uruguay. Argentina follows for some products. Canada and the United States also appear for some products and years, although their international competitiveness is seen mostly resulting from export subsidies and protectionist policies.

ELEMENTS OF COMPETITIVENESS

Trade liberalization strategies relate to the factors on which competitiveness relies. This study adopts the approach that Dunmore and others (1993) use to show that agricultural competitiveness at the national and international levels includes three basic elements simultaneously at work: (i) relative efficiency or comparative advantage, with the use of costs as basic indicators; (ii) exchange rates, as part of the macroeconomic environment; and (iii) policies, including domestic and foreign agricultural and trade policies. Policies alter the market signals sent to producers and consumers and, together with the exchange rate, "act to distort trade patterns that would naturally result from underlying differences in relative costs and efficiencies" (Dunmore and others 1993, pp. 31–33).

The following sections briefly review some basic characteristics of the three elements of dairy sector competitiveness in NAFTA and Mercosur (Argentina, Brazil, and Uruguay).

Table 9–1

Dairy Farms in Canada and the United States

Indicator	Canada 2000–01	Canada 1991–92	United States 2000	United States 1993
Number of dairy farms	19,363	31,200	97,560	159,450
Number of dairy cows (millions)	1.14	1.38	9.1	9.5
Cows per farm (average)	59	44	93	59

Source: For Canada, Canadian Dairy Commission (2002); for the United States, Bailey (2002b).

Milk Production in Canada, the United States, and Mexico[5]

Canada produced 8.17 million tons of milk in 2000–01, just 5 percent more than in 1991, as a result of the quantitative restrictions imposed by its dairy policy. Sixty percent of dairy production was used in manufacturing, with the largest quotas assigned to Quebec (47 percent), Ontario (31 percent), Western Provinces (17.5 percent), and Atlantic Provinces (4.4 percent).

The United States produced 75 million tons of milk in 2001, an 11 percent increase over 1991. Major producers were California (20 percent), the Upper Midwest (22 percent), and the northeastern states (17 percent). The most rapidly growing areas in 1990–2001 were the northern and southern mountain states (140 percent and 106 percent, respectively) and California (58 percent).

Mexico produced 9.5 million tons of milk, with the largest production in the states of Jalisco (17 percent), Coahuila (10 percent), Durango (10 percent), Chihuahua (8.5 percent), and others (54.5 percent).

Structure of Milk Production

The trend of concentrating production in larger farms continues in the NAFTA countries (Table 9–1).

In Canada, despite a 41 percent reduction in dairy farm numbers since 1991, average milk production per farm increased 69 percent. In the United States, 8 percent of farms with more than 200 cows supply 57 percent of production. At the other extreme, 48 percent of dairy farms with less than 50 cows each contribute 8.3 percent of output. Farm sizes are larger in the western states (on average 636 cows in California and 366 in Idaho) compared with Pennsylvania (58 cows) and Wisconsin (68 cows) (Bailey 2002b, p. 2).

Mexico has three production systems. In southern states, such as Veracruz, the systems are double purpose (beef and dairy) with low productivity and variable costs. In

[5] Production data are from FAOSTAT (2002), the Canadian Dairy Commission (2002), Manchester and Blayney (1997), and Bailey (2002b).

the central states, such as Jalisco, the small family farm system predominates, using some irrigation and purchased inputs. In the north, large operations are similar to those in the United States.

Productivity Indicators, Milk Prices, and Costs

Although differences exist among the three countries (Table 9–2), within-country regional differences are also important.

In Canada, producers' milk prices had a plus or minus 6 percent variation in British Columbia and New Brunswick (Bailey 2002a). In the United States, the all-class milk price was approximately US$0.35 in Florida and US$0.24 in Idaho. In Mexico, prices fell to US$0.19–0.20 after the 1994 devaluation and slowly recovered later.

Production costs are also higher in Canada, with variations across provinces. Van Biert (2001) reports costs in Alberta to be C$52.88 (about US$33.16) per hectoliter. However, budget data (revenues and expenses) from 88 Ontario dairy farms for the year 2001, considering only cash costs (direct dairy expenses, dairy share of crop expenses, and allocated indirect and overhead expenses) plus depreciation, indicate that costs average C$60.16/hl (about US$37.72/hl) (Canadian Dairy Commission 2002). Valued at market prices, milk quotas represented 41 percent of all assets, at an average of US$565,133 per farm, or US$5,434 per hectare.

There is also a wide range of costs for regions in the United States. Nubern (1998), for example, reports average total cash expenses of US$25.43/hectoliter for the Pacific southwest, US$30.52/hl for the Upper Midwest region, and US$32.44/hl for the northeast region. Data from a sample of 627 Wisconsin dairy farms for 2001 give an average cost of milk production (considering only cash expenses and depreciation) of US$29.03/hl (Frank and Vanderlin 2002).

Updated information on Mexican milk production costs was not available. However, productivity per cow on specialized farms was 30 percent lower than in the United States, with greater inputs and financial costs resulting in high costs of production (Hernández Laos and del Valle Rivera 2000, p. 44).

Table 9–2

Productivity and Milk Prices in Canada, Mexico, and the United States

Indicator	Canada	United States	Mexico
Average kgs milk/year/cow	9,242[a]	8.273	Range: 6,785 (Laguna) to 862 (Veracruz)
Average milk farmgate price, 2000(US$/liter)	0.35[b]	0.28	0.30

[a] Average of cows enrolled on official milk recording programs (CDC 2002).

[b] C$56.44/hl. The exchange rate is 1C$ = US$0.627 and 1hl = 227.3 pounds (Bailey 2002a, p. 4).

Source: For Canada, Canadian Dairy Commission (2002) and Bailey (2002a); for the United States, Bailey (2002a); and for Mexico, Hernández Laos and del Valle Rivera (2000) and Trejo and Hernandez (2000).

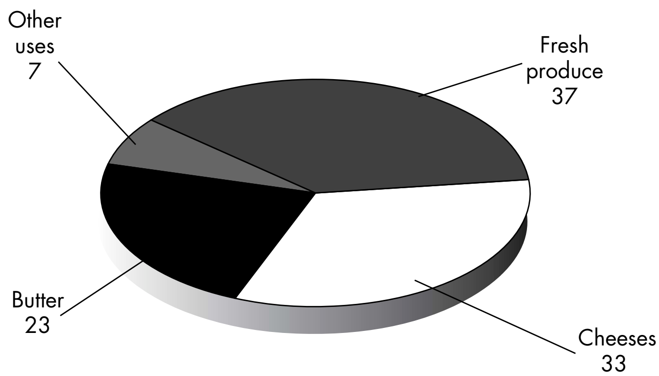
Marketing Channels and Product Mix

The fluid milk market absorbs approximately 40 percent of milk production in Canada, 37 percent in the United States, and 41 percent in Mexico. Industrial uses in Canada and the United States are shown in Figures 9–1 and 9–2.

In Mexico, milk production only satisfies 80 percent of consumption. Imports of condensed evaporated milk and milk powder go to LICONSA for social programs (75

Figure 9–1

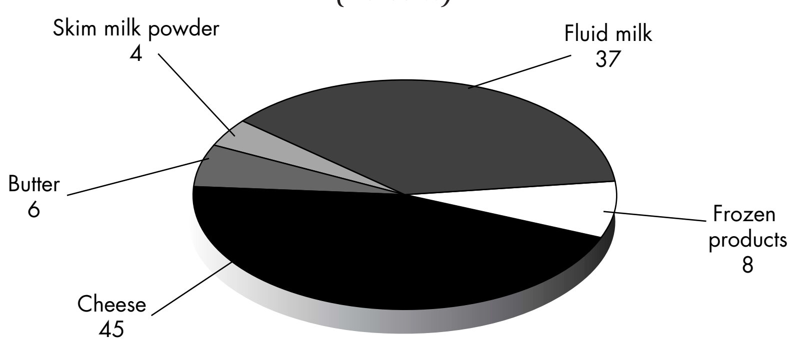
Industrial Uses of Milk in Canada, 2002
(Percent)



Source: Data from Canadian Dairy Commission (2002).

Figure 9–2

Industrial Uses of Milk in the United States, 1998
(Percent)



Source: Data from Nubern (1998).

percent) and the industry (25 percent). The manufacturing sector produces 135,000 tons of cheese, 18,000 tons of butter, and 140,000 tons of skim milk powder (Trejo and Hernandez 2000).

Industrial Structure

In Canada, the manufacturing sector is very concentrated. Although 1997 figures report 271 milk processing plants (156 industrial plants and 115 fluid processing operations), 36 percent of them belong to three firms producing 71percent of total output. Cooperatives control one-third of the milk delivered.

In the United States, cooperatives predominate in fluid milk processing, with supermarket chains and convenience stores retailing 66 percent of all sales. Cooperatives also manufacture 40 percent of natural cheese, 70 percent of cheddar, and 43 percent of American cheese types. Proprietary companies manufacture 74 percent of Italian varieties. There has been a reduction in the number of cheese production plants, with new, larger, and efficient plants in the West following lower milk costs, and older, smaller plants continuing production in traditional areas. Butter plants were reduced to 131 in 1992.

In Mexico, a large number of small local firms coexist with a few large multinationals. In 1993 there were 11,350 firms, of which 9,486 were manufacturing ice cream; 1,396, cheese, butter, and cream; 357, milk caramel; 17, evaporated and powdered milk; and 94, fluid milk. Of these, 97.6 percent were classified (1995) as microenterprises with 9 percent of the dairy sector's output value, 11 percent of the value added, and 50 percent of the employees. At the other end of the spectrum, 0.4 percent were large firms with 63 percent of production value, 62 percent of value added, and 26 percent of employees (Hernández Laos and del Valle Rivera 2000, pp. 67–68).

Industry Competitiveness

Barichello (1999) supports a previous study's conclusion that transportation, processing, and wholesale costs in Canada are on average comparable to similar operations in the United States. With raw milk costs being the largest single cost item in the dairy product chain, competitiveness depends on whether milk costs at the farm level are comparable. Depreciated exchange rates have meant that if a great deal of protection was removed from the sector, milk prices would drop and the Canadian industry would be quite competitive.

The U.S. dairy industry, in turn, is seen as an active exporter in a more liberalized environment. Petit (2002) makes this case based on the U.S. dairy industry's need to continue to dispose of structural surpluses; its highly trained workforce, innovative technology for processing high value-added products, strong institutional support in research and development, positive attitude toward risk taking, efficient plants with seasonally flat milk reception, reliability to deliver at an exact time, and prestigious brands; and the negotiation skills of multinational companies.

The only factors in Mexican industrial competitiveness are low labor costs and devaluated exchange rates (Hernández Laos and del Valle Rivera 2000).

Agriculture and Trade Policies

Dairy policy reform in Canada and the United States is a difficult business because it is one of the most protected industries, as shown by the 2002 OECD Producer Support Estimate (PSE) and Nominal Protection Coefficient (NPC) for milk, which are 55 percent and 2.18 percent in Canada and 46 percent and 1.74 percent in the United States.

Domestic support. Canada has a complex supply management system. The federal government manages an industrial quota for milk products that are moved across provinces or exported. The Canadian Dairy Commission sets a target price each year and operates a support price program based on a floor price for butter and skim milk powder.

The provinces set production targets or quotas for fluid milk consumed in their boundaries. Both quotas are finally assigned to producers. Originally, quotas were distributed at no cost, but now they are sold. As of 2000, the estimated quota value was C$18,000 per milk cow, about seven times more than the cow would cost at auction (cited in Stanbury 2002, p. 13). Since Quebec has 47 percent of the national quota, it adds some sensitive political issues to the problem. A dairy policy reform to eliminate quotas without government compensation would cause large losses to dairy farmers and political unrest, but compensation would cost taxpayers a tremendous amount, which would discourage cabinet members from dismantling the current system (Stanbury 2002, p. 17). Direct payments to dairy producers were to be eliminated in 2002, which is one reason why the target price was increased.

A new farm bill was enacted in the United States in 2002, with a cost between US$170–190 million over 10 years (Bailey 2002a, p. 13). Government intervention in the United States continues through the following: (i) Federal and State Milk Marketing Orders; (ii) the Dairy Price Support Program, which the new bill extended by five years, with a current support price of US$9.90 per 100 pounds of milk at 3.67 percent butterfat (US$22.5/hl); and (iii) the National Dairy Market Loss Payments Program, which provides a deficiency payment whenever market prices fall below a threshold level.

In Mexico, there was a policy change in the 1990s, which aimed to increase income for producers, increase production faster than the population growth rate, secure the supply of basic products, and correct trade balance deficits. The dairy sector benefited from a program to modernize production infrastructure, improve herd sanitation and genetics, liberalize milk and dairy product prices, as well as elaborate and implement quality standards to avoid unfair competition between products. Nonetheless, producers must still bear the high cost of credit, inferior quality inputs, and the high cost of water for irrigation (Lastra Marín 1999).

Market access. Efforts to keep domestic prices higher than international prices must include import controls. Under the URAA, the NAFTA countries agreed to convert import barriers to tariffs and tariff rate quotas (TRQs), reduce tariffs, prohibit nontariff barriers, and limit export subsidies.

Canada's World Trade Organization (WTO) schedule contained 11 dairy TRQs in 32 lines, while the United States had 18 in 96 lines. Canada's in-quota rates are ad valorem for some dairy products and specific for others, while the U.S. rates are ad valorem in cheese but specific in other dairy products. Over-quota tariffs are prohibitively high in Canada: 207.5 percent for skim milk powder, 250.6 percent for whole milk powder, 307.5 percent for butter, and 252.8 percent for cheeses (Shaw and Love 2001, p. 18). These high tariffs discourage additional imports. In the United States, over-quota tariffs range between 42 and 69 percent. In Canada in 2000, TRQs represented 3.2 percent of domestic consumption for butter and 5.2 percent for cheeses. In the United States, TRQs represented 3 percent of domestic consumption for butter and 5 percent for cheeses.

In Canada, the fill rate has been 100 percent for butter and cheese. Of a total of 87 dairy products, 38 had tariff peaks that were above 12 percent ad valorem. Of those, two were in the 30–99 percent range and 36 were in the 100–299 percent range (UNCTAD-WTO 2000). Tariff escalation on dairy products is also present. An independent government office administers TRQs. There is also an Import for Re-Export Program to import storable and tradable components of milk.

In the United States, nearly 56 percent of dairy products had peak tariffs. Tariff quotas for cheese are allocated through a system of licensing to historical or designated importers. For other dairy products, this is done on a first come-first served basis.

Mexico joined the General Agreement on Tariffs and Trade in 1986, reducing import barriers, but still keeping tariff quotas for dairy products, with specific country allocations. The government regulated skim milk powder imports and used auctions to assign contingents to the private sector. LICONSA imports skim milk powder and whole milk powder for social programs directed to schools and low-income families.

Mexico signed an agreement with the United States eliminating licensing requirements and allowing free annual imports of 40,000 tons of skim milk powder. Mexico established a 20 percent tariff for cheeses (40 percent for fresh cheese), which would gradually disappear by 2008. Mexico has signed bilateral agreements with other Latin American countries and the European Union, and maintains tariff escalations with a 38 percent bound rate for nonprocessed products and a 68 percent bound rate for processed products.

Export subsidies. Under the URAA, Canada agreed to reduce the volume and expenditure on dairy subsidies. In 1995, it replaced producer funded export assistance with a new system that allowed manufacturers to buy surplus milk at a discount price with the purpose of processing it for export. This was challenged by the United States and New Zealand as a violation of Canada's export subsidy commitments, and it was sustained by the WTO Compliance Panel.

U.S. export subsidies include the Dairy Export Incentive Program, export promotion activities, and concessional export credit programs.

The only program Mexico registered in the WTO was the Program of Temporary Imports to Produce Export Goods (PITEX). It allows duty-free imports for manufactured products that are later exported, taking advantage of the low labor cost. The Nestlé, Kraft, and Sigma firms use this program. Other assistance is derived from exceptions to applied import rights or credits by Banco Nacional de Comercio Exterior (BANCOMEXT) (CNCE 1999, p. 42).

Milk Production in Argentina, Brazil, and Uruguay

In Argentina, milk production increased from 6.1 million tons in 1991 to 10.6 million tons in 1999 (FAOSTAT 2002). Since then, the combination of low international prices, Brazilian devaluation, and a stagnant domestic economy has resulted in milk price decreases and output reduction. In 2002, there was a strong devaluation, and the relative profitability of dairy vis-à-vis other competing activities deteriorated. Milk production was expected to be around 8.5 million tons in 2002.

Milk production in Brazil consistently increased from 15.5 million tons in 1991 to 22.5 million tons in 2001. Quality also improved, with 64 percent currently under federal inspection. Despite dairy producers' apprehension about the effects of Mercosur, the sector has clearly developed.

In Uruguay, milk production increased to a peak of 1.48 million tons in 1999, and decreased to 1.42 million tons in 2001, with 70 percent delivered to industry. Of that, 26 percent goes to fluid milk processing; the remainder goes to production of other dairy products.

The Structure of Dairy Farming

In Argentina, dairy farming is concentrated mostly in three provinces: Buenos Aires, with 3,250 dairy farms, and Córdoba and Santa Fe, each with 4,500 dairy farms. The country has a total of 14,000 dairy farms, and about 2.2 million dairy cows, which is an average of 157 dairy cows per farm (approximately 120 milking cows). The farm size distribution is skewed: 42 percent of operations are farms producing less than 1,000 liters daily, contributing 16 percent of total output. At the other extreme, 6 percent are farms producing more than 3,000 liters per day, contributing 17 percent of output.

In Brazil in 2000, major producers were the states of Minas Gerais (29.7 percent of total production), Goiás (11.1 percent), Rio Grande do Sul (10.6 percent), and São Paulo (9.4 percent). Traditional dairy farming uses mainly cebu cattle and has a strong seasonal production pattern, relying mostly on pastures for feeding. The specialized dairy group, instead, uses Holstein breeds or Holstein crossbreeds, combining pastures with feed concentrates.

A total of 17.8 million milking cows produced 19.7 million tons of milk in 2000 (LeiteBrasil 2002). Teixeira Gomes (2000) reports that in 1999, 71 percent of milk came from 22.5 percent of farms with more than 200 liters daily, 22.7 percent of milk came from 37 percent of farms with 51–200 liters daily, and only 5.7 percent of production came from 40.4 percent of farms with less than 50 liters each.

Uruguay had 4,300 farms delivering milk to plants in 1999, which was 40 percent fewer than in 1985. Another 1,500 farms used their milk at the farm or sold it directly to consumers. Average production was 700 liters per farm per day, 230 liters more than in 1985. Fifty-two percent of dairy production was concentrated in a region near Montevideo, another 32 percent in the Litoral region, and the rest was scattered all over the country.

Productivity Indicators, Cost of Production, and Milk Prices

Productivity figures and technology depend on the model and the country, but again, within-country variations are extremely marked (Table 9–3).

Operating costs are lower in Uruguay, followed by Argentina and Brazil. When the opportunity costs of land, capital, and labor are added to the operating costs, the ranking of countries remains unchanged.

Devaluation in these countries in 2002 had a strong effect on their competitiveness. In Brazil, for example, Stock and Carneiro (2002) show that the cash cost of milk production is US$0.070/liter (the average for 18 production systems), with extremes of US$0.029 and US$0.106/liter. When depreciation and the opportunity cost of labor are included, the cost increases to an average of US$0.098/liter, with a range of US$0.073 to US$0.131/liter. When all relevant costs are included (long-run costs), the average cost is US$0.126/liter, with a range of US$0.097 to US$0.152/liter.

Table 9–3

Productivity and Costs in Argentina, Brazil, and Uruguay

Indicator	Argentina	Brazil	Uruguay
Use of feed concentrates (kgs/cow/year)	600–2,500	200–800	743–776
Liters milk/cow/year	4,000–7,300	1,500–3,300	3,800–4,500
Operating costs, 2001 (US$/liter)	0.13–0.165	0.162–0.233	0.098–0.115

Source: Ostrowski and Deblitz (2001), comparing modal dairy farms using the International Farm Comparison Network (IFCN) common methodology.

In Argentina, the situation is similar. For example, the cash cost of a dairy farm located in southeast Córdoba (in September 2002) was US$0.044/liter of milk production. Including depreciation, the cost went up to US$0.052/liter, and including all opportunity costs, the (long-run) cost was US$0.102/liter (Barrenechea and Bitar Tacchi 2002).

Uruguay has had a 172 percent devaluation in nominal terms since the beginning of 2001. According to OPyPA (2002), the cost of production of a representative dairy farm dropped from US$0.125/liter of milk production in August 2000 to US$0.082/liter in August 2002, a 34 percent decrease.

Therefore, the competitiveness of these countries in dollar terms is high compared with other countries in the Western Hemisphere or any country in the world. The question remains whether the current exchange rate is sustainable in the long run and whether the macroeconomic and institutional environment would support the development of an internationally competitive dairy sector.

Industrial Structure

The dairy manufacturing sector is heterogeneous in Argentina and Brazil.

In Argentina, two large firms, a cooperative (SanCor), and a proprietary firm (Mastellone Hnos.) processed more than 1.1 billion liters of milk each in 2001. A second group, composed of a cooperative (AUT/Milkaut), a multinational (Nestlé), and three national private firms (Molfino/La Paulina, Williner, and Verónica) processed between 300 and 475 million liters each. A third group has a large number of smaller firms, mostly in the cheese sector.

Operating costs in Argentina are higher than those of larger firms in Europe and Oceania. For example, the daily volume processed per employee, which is an indication of labor productivity, is 4,672 liters of milk in New Zealand, 3,965 in Australia, 2,394 in Holland, and 1,100 in Argentina (Galetto 2001).

In Brazil, a multinational (Nestlé) processed 1.4 billion liters of milk in 2001, followed by Parmalat with 941 million, and other firms such as Itambé (832 million), Elegé (782 million), and Leite Paulista (CCL-SP) (488 million). The remaining firms processed less than 247 million liters. There are 300 dairy cooperatives, but they will likely be concentrated in no more than nine central firms with 80 percent of their actual market share in the next 10 years (Pinazza and Alimandro 1999).

In Uruguay, one cooperative (CONAPROLE) accounts for 74 percent of milk processing, followed by Parmalat with 11 percent. Several small companies process the remaining 15 percent.

Marketing Channels and Product Mix

Industrial uses of milk and milk consumption in Argentina highlight the predominance of cheese, although whole milk powder is the main export product (Figures 9–3 and 9–4).

For Brazil, Figure 9–5 shows the importance of both formal and informal dairy production, and Figure 9–6 depicts the situation in Uruguay.

In the case of fluid milk, whereas in Argentina and Brazil a growing proportion of milk production is consumed as ultra high temperature (UHT), in Uruguay most of it (more than 95 percent) is pasteurized.

Agricultural and Trade Policies

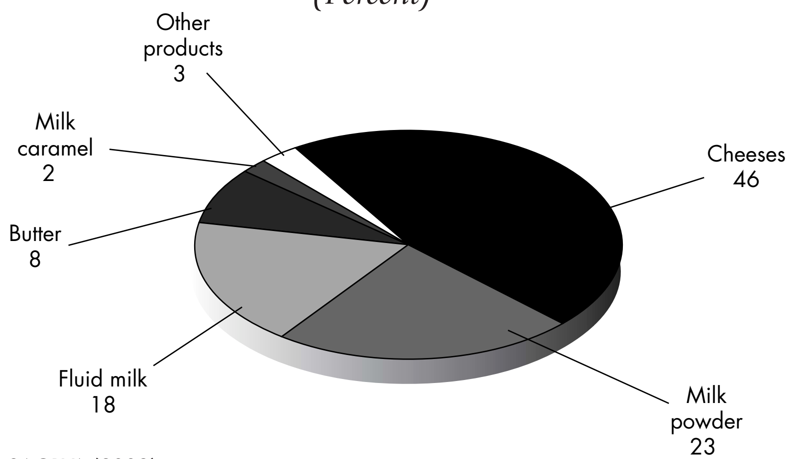
Before the 1990s, protectionist policies in the Mercosur countries kept barriers high to prevent dairy imports. International dairy trade was limited mostly to bilateral agreements in the ALADI system. With the implementation of Mercosur in 1995, intra-bloc dairy trade was immediately liberalized between Brazil and Argentina, but gradually until 2000 for Uruguay and Paraguay. A common external tariff was established for dairy products. However, disputes have arisen from time to time.

For example, in 1995, after several complaints, an import tax levied by Argentina was eliminated for Mercosur members and reinstated for non-Mercosur countries. The tax was challenged in the WTO and it was lowered to 0.5 percent in January 1998.

In 1997, Brazil imposed unilateral restrictions on dairy trade and an increase in the common external tariff for dairy products, and two southern states applied taxes to ultra

Figure 9–3

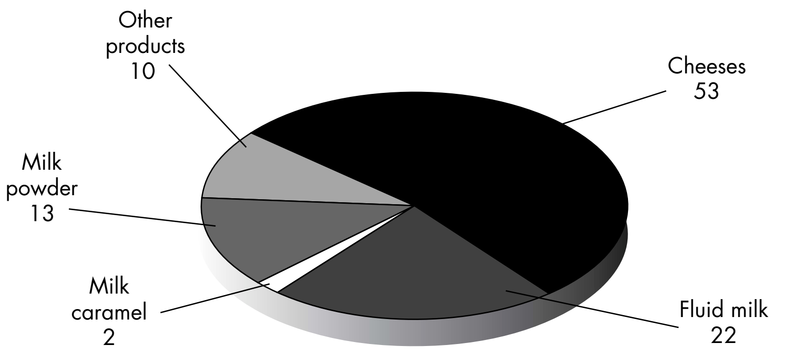
Uses of Milk in Argentina, 2000
(Percent)



Source: Data from SAGPYA (2002).

Figure 9–4

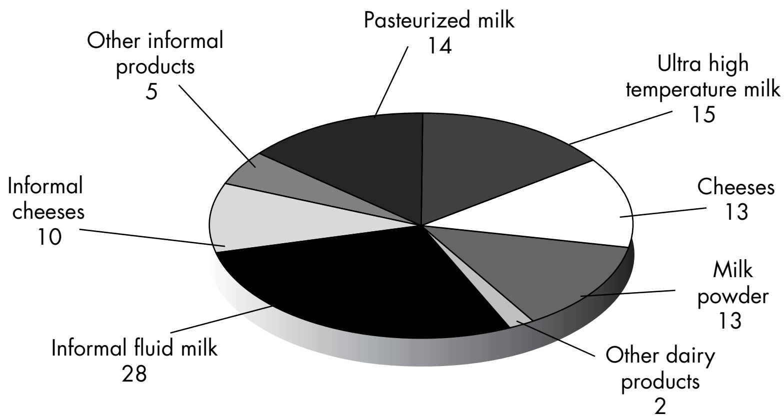
Consumption of Milk Equivalents in Argentina, 2000
(Percent)



Source: Data from SAGPYA (2002).

Figure 9–5

Formal and Informal Uses of Milk in Brazil, 2002
(Percent)



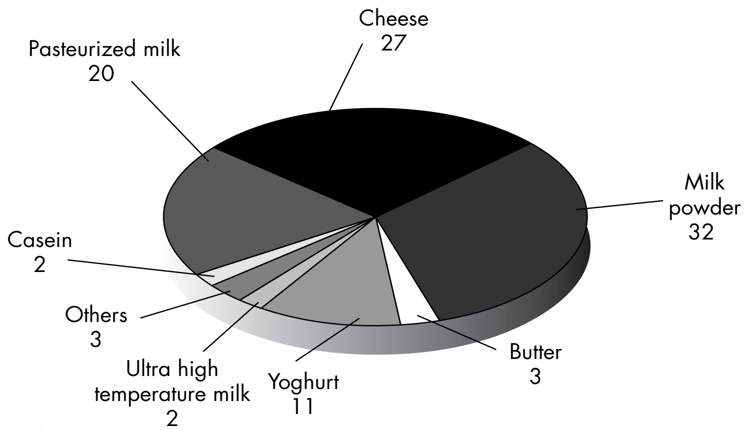
Source: Data from LeiteBrasil (2002).

high temperature milk imports. Argentine exporters have complained about Brazilian sanitary controls on destination, excessive and long processing for product inscription, discrimination between imported and domestic products, labeling requirements, and retaliatory conduct (CNCE 1999).

In 2000, the Brazilian government opened a dumping investigation against imports of fluid milk and milk powder from Argentina, Uruguay, New Zealand, and Austra-

Figure 9–6

Uses of Milk in Uruguay, 1998
(Percent)



Source: Peyrou (1998).

lia. After a provisional ruling, a price agreement was signed with Argentina and Uruguay for three years, establishing a minimum milk powder price of US$1,900/ton. If the U.S. Department of Agriculture reports prices below US$1,711/ton, then the price to be paid would be the export price times 1.11.

Mercosur's Chile and Bolivia Agreements

In summary, Argentina, Brazil, and Uruguay are low-cost milk producers with growth potential, particularly the first two. Since the raw material represents about 60–80 percent of manufacturing costs, it gives the countries a competitive edge for exports.

Mercosur countries have taken the dairy trade liberalization process a step further than the WTO and, in the absence of export subsidies, dairy product exports must rely on cost advantages to participate in world trade. Despite their differences in development, dairy sectors in Mercosur member countries expanded and benefited from integration. The present concern for an FTAA is the persistence of distortionary domestic and trade policies in other blocs, which would prevent fair competition.

EFFECTS OF AN FTAA

Since the modality and extent of an FTAA agreement are still not known, this section considers three scenarios.[6]

[6] This section includes only general results of the models. Detailed analysis is available from the author on request.

Scenario 1 - No Additional Dairy Trade Liberalization, Except from WTO Future Negotiations

In essence, this scenario would exclude the dairy sector from the FTAA agreement.

Several studies evaluate the impact of dairy trade liberalization in a multilateral environment. Cox and others (2000) simulate the regional impacts of extending the URAA on dairy commitments to 2005. Results suggest that dairy producers in low-cost exporting countries such as Argentina, Uruguay, and Chile in the Western Hemisphere and others (New Zealand and Australia) will gain the most. Dairy producers in the Western Hemisphere will lose the most, and the impact on the United States and Canada will be relatively small.

Zhu, Cox, and Chavas (2000) simulate a free trade scenario, recognizing that it is neither likely nor politically feasible in the next decade. They find that the effects are unevenly distributed across regions, with a modest decline in U.S. milk production and price. However, the U.S. price of butter would rise, cheese production would expand, and the country would become a net exporter. Butter and whole milk powder production would decrease and the United States would become a net importer of skim milk powder. Canada (and other regions as well) would be more affected, with sharp declines in milk prices but a reduction of only 0.8 percent in milk production, with producers made worse off by free trade. South American exporters would see milk price increases (17 percent) with a 6.7 percent increase in production. This would be accompanied by sharp increases in prices and exports of cheese, butter, and skim milk powder.

Shaw and Love (2001) estimate the impact of an effective increase in market access (multilaterally doubling all TRQs and halving applied tariff rates). Relative to 1999, the value of world cheese trade increases by 39 percent, butter trade by 37 percent, and milk powders by 14–25 percent. Imports increase in the European Union, the United States, and Japan, and exports increase from Australia, New Zealand, and Argentina. The gross value of dairy products increases by 9–11 percent in the latter, while falling marginally (1–2 percent) in the European Union and the United States.

Simulating the effects of halving the volume of subsidized exports by the European Union and the United States yields reduced exports and increased world prices. The European Union experiences the largest reduction in exports, while Australia, New Zealand, and Argentina increase their gross value of milk production by 7–15 percent and the gross value of dairy products by 8–18 percent. In the United States, exports of skim milk powder are the most affected.

Larivière and Meilke (1999) also simulate several scenarios. With free trade, world dairy product prices increase substantially, ranging from 14 percent for skim milk powder to 43 percent for cheese. For Canada and the European Union, free trade results in substantial losses in economic rents for milk producers, which are better off when the reform package does not compromise the current policy settings. The United States improves its competitive position as border measures are removed, with the butter and cheese sectors gaining more under partial trade liberalization.

A FAPRI-Missouri study (1997) considers four scenarios, including elimination of export subsidies and increased market access. Although the results present some variations, in all scenarios world dairy prices increase and trade in bulk dairy products decreases. The European Union and others counting on export subsidies lose market share to other exporters.

Thompson (2000) analyzes the impact of eliminating export subsidies in Canada and the United States, and finds that exports diminish in both countries. In the case of Canadian cheese, reduced subsidies are partially offset by unsubsidized exports due to falling internal prices and rising world prices. Canadian milk prices are 18 percent lower in 2005, compared with 1 percent in the United States, but still not enough to induce producers to fall short of milk production quotas, but only to reduce the quota rent value. For the United States, cheese exports decrease by only 5 percent, but export of skim milk powder decreases by 46 percent.

In summary, the studies largely agree that WTO advancement in dairy trade liberalization with reduced export subsidies and increased market access would benefit South American exporters. This scenario would have a small impact on the United States, while Canada would see lower milk prices and losses in economic rents for milk producers.

Scenario 2 - Immediate and Complete Dairy Trade Liberalization

The impact of eliminating all dairy trade barriers in the Western Hemisphere would depend on whether (i) there was no provision made for the elimination of distortionary policies, or (ii) those policies were removed at the same time as the liberalization were to proceed.

ALADI (2002) analyzes the impact on Mercosur of complete agricultural trade liberalization in an FTAA, assuming all tariff and nontariff barriers were removed. The objective was to identify sectors and products at risk of losing advantages obtained by previous trade agreements, potentially competing with commercial flows from or to Canada and the United States. The analysis differentiated those products in which the two countries do not have comparative advantage on one side, and in which their competitive advantage derives from protectionist policies on the other.

For the United States, the study selects 52 tariff items, 16 of them subject to TRQs, which include milk, butter, and other cheeses. For Canada, 34 products with potential deviation were identified.

If the United States and Canada do not eliminate their domestic support policies, subsidies, and credits to exports for dairy products, the major threat of trade deviation is for Brazilian imports of milk powder now coming from Argentina and Uruguay. This threat has the potential to erode the trade advantages of the Mercosur integration. Consequently, FTAA negotiations would require removal of those policies to avoid artificial competitiveness from protected countries that would negatively affect trade in dairy products in the bloc.

Waquil and Alvim (2001) analyze the effects of an FTAA and other scenarios on Mercosur's dairy sectors. Although it is not explicitly mentioned, they assume that dairy trade liberalization takes place without elimination of distortionary policies. The FTAA results in increases in dairy production in Brazil, the United States, and other South American countries, and reductions in Argentina, Canada, Mexico, and Central America. The producer surplus increases in Brazil, Canada, the United States, and other South American countries, and decreases in Argentina, Mexico, Central America, and the rest of the world. In terms of producer surplus, the best scenarios for Brazil are total liberalization and an FTAA (Waquil and Alvim 2001, p. 13). Although Argentine dairy producers lose in all scenarios, the least problematic would be an FTAA.

The authors recommend caution in extending negotiations with other blocs because of existing asymmetries, disparities, and trade barriers that cause distortions to international trade. They suggest paying attention to WTO disciplines and consolidating trade relations within Mercosur and with other South American countries to strengthen negotiating capacity.

In summary, the expected results of this scenario of immediate FTAA liberalization depend on the elimination of distortionary policies. Should this not occur, dairy exports, mainly from the United States and Canada, might take over some of the South America dairy flows, making both countries the most likely beneficiaries of the agreements. Nonsubsidizing exporters, such as Argentina and developing countries promoting their self-sufficiency in dairy production, would be the probable losers.

Scenario 3 - Multilateral Reforms

A new multilateral Round has just begun and will likely take several years until new commitments start being implemented. Meanwhile, an FTAA that is effective in 2005 could reinforce or accelerate the multilateral process in dairy trade liberalization.

Huff and Rude (2000) simulate multilateral trade liberalization through a comprehensive WTO agreement that is a virtual repeat of the last one, and an FTAA scenario with tariffs on all intrahemisphere trade reduced to zero. Each member's tariffs on third-country imports remain unchanged, with no attempt to harmonize external tariffs for trade outside the region. Dairy products are included in the model in the other processed food category.

The results indicate a very small expansion of agri-food output in NAFTA and the Andean Pact, and a larger one in Mercosur and the non-FTAA regions. Exports increase in all FTAA and non-FTAA regions. Imports increase for all regions (FTAA and non-FTAA) except Chile, where they fall slightly. Despite the positive impact of an FTAA with the inclusion of multilateral reforms, the authors conclude that it is probably unrealistic to expect certain agricultural tariffs to be reduced dramatically (Canadian and U.S. dairy tariffs, for example).

The impact of an FTAA in this scenario largely depends on the terms of the agreement. Dairy participants from Andean Pact, Mercosur, Central American and Caribbean countries have indicated their preference to have an FTAA as a "WTO plus" (FEPALE 2001), applying tariff reductions to products from countries with nondistortionary policies. Progressive liberalization in the Western Hemisphere would give low-cost exporters the possibility to expand sales in the short run but still allow protectionist countries to take some time (but at a faster pace than WTO negotiations) to adjust their policies to the freer environment. Special treatment for smaller and less developed members would contribute to compensate for existing asymmetries.

In summary, this scenario appears to be the most realistic one, allowing for parallel negotiations in an FTAA with some tariff reductions consistent with the rules and disciplines of the WTO. The literature reviewed foresees no radical changes in the present U.S. and Canadian dairy policies for some years, while South American producers continue requesting fair opportunities for their dairy sectors.

CONCLUSIONS AND RECOMMENDATIONS

As formal talks proceed toward an FTAA, questions arise about what might happen in dairy trade under various scenarios and what would be the negotiating positions of the participating countries.

The analysis has shown that South American dairy producers are very cost competitive, have been successful in liberalized Mercosur intra-bloc trade, and show potential to expand their market share in a freer trade environment. Trade model simulation results indicate that Mercosur dairy exporters will have welfare gains when developed countries reduce protectionism.

In contrast, NAFTA countries have not negotiated dairy trade liberalization as a bloc, but bilaterally, between the United States and Mexico. Immediate changes do not seem likely in the United States, in view of the support guaranteed by the new 2002 Farm Bill, or in Canada, given the economic and political intricacies of the dairy system.

There are a few caveats to the literature review on potential impacts of trade liberalization. It is important to keep in mind the diverse composition of each country's dairy sector and the difficulty in capturing the essence of such a great variety in the analysis. Even when results indicate gains or losses from liberalization, conclusions are based on averages. In each country, particularly developing countries, there are pronounced regional differences and there will always be winners and losers in every scenario. The question is which group will predominate.

The persistence of some nontariff barriers makes it difficult to objectively measure and capture their effects in the analysis. The uncertainty added by sudden political changes should also be taken into account when interpreting simulation results.

A controversial argument in negotiations is the maintenance of protectionist policies to defend the small, family dairy producers, which in developing countries are less commercially integrated. This argument requires further investigation, since the major beneficiaries of protectionism appear to be large commercial enterprises, well-organized politically active groups, and large producers with higher costs of production. Traditional labor-intensive operations with lower cash requirements and larger growth potential might benefit less, requiring other specific policies.

A relevant aspect that is not considered in the models or in this paper is firms' strategic position in other markets. Their capacity to better position themselves through joint ventures, acquisitions, and the like may mean that the barriers used in the analysis are somewhat redundant. Although the analysis has focused on gains and losses for countries or blocs, companies move where they see opportunities, functioning and making money in protective environments as well as in liberalized ones. This is particularly the case for multinational companies.

Given the differences in competitiveness, asymmetries in size, and level of development of Western Hemisphere countries, the establishment of an FTAA will require efforts to reconcile participants' interests and expectations. A good starting point appears to be the reaffirmation of WTO rules and disciplines as the basis for all future negotiations. Despite its sensitive nature, the inclusion of dairy trade in the FTAA would strengthen efforts to reduce protectionism in the Millennium Round. Incentives would increase if FTAA commitments and schedules allowed visible results in the short run.

Formation of a fair and effective FTAA bloc also requires tariff reductions to go hand in hand with simultaneous elimination of distortionary policies. Otherwise, the artificial competitiveness created by those policies would erode trade liberalization achievements in the component subregions.

APPENDIX. METHODOLOGY

The revealed comparative advantage (RCA) formula is expressed mathematically as follows:

(9A–1) $$RCA = (X_i/X_{iw})/(X_m/X_{mw}) \times 100$$

where X_i is the value of exports of commodity *i* from the country in question, X_{iw} is the value of exports of commodity *i* from all countries, X_m is the value of exports of all manufactured goods from the country in question, and X_{mw} is the value of exports of all manufactured goods from all countries.

Significant changes in RCA are defined—albeit arbitrarily—as follows: (i) when the RCA index in 1991 exceeded 100, and there was a change in its 2000 level of more than 50 percent; (ii) when the RCA index in 1991 was between 50 and 100, and when the change in its 2000 level was more than 100 percent (two times); and (iii) for those cases where the RCA level in 1991 was between 10 and 50, and the change was more than 200 percent (three times).

Pitts and Lagnevik (1998) argue that for the purpose of making comparisons of competitiveness between the same sector (say, cheese) in different countries (Western Hemisphere countries, for example), it is not appropriate to compare the level of an RCA index for the same industry (sector) across countries, since the absolute size of the index is affected by the size of the economy. However, if indexes are measured simultaneously for a number of countries, a valid approach could be to compare the trend over a period, to have an indicator of what is happening to the competitiveness of a particular product in a particular country, compared with others.

The formula for net export index (NX_i), where net exports are divided by the total value of trade (exports plus imports) of the commodity in question, is as follows:

(9A–2) $$NX_i = [(X_i - M_i) / (X_i + M_i)] \times 100$$

One problem with the NX_i is that it does not take into account the overall level of trade in that commodity. A country that is relatively self-sufficient, with a small exportable surplus and no imports, would have an index of 100 and therefore appear to be very competitive although it hardly trades at all.

The relative trade advantage (RTA) index is defined as follows (Vollrath 1991):

(9A–3) $$RTA_i = RXA_i - RMA_i.$$

Here RXA and RMA are relative export advantage and relative import advantage, respectively, and are defined as follows:

(9A–4) $$RXA_i = [(X_i/X_{iw})/(X^*_m/X^*_{mw})]/[(X^f_i/X_{iw})/(X^{f*}_m/X^*_{mw})]$$

which is the country's export share of good *i* (X_i/X_{iw}) divided by the country's export share of all goods excluding *i* (X^*_m/X^*_{mw}), all of them divided by the foreign export share of good *i* (X^f_i/X_{iw}) divided by the foreign export share of all goods excluding *i* (X^{f*}_m/X^*_{mw}). The relative import advantage (RMA) is defined as follows:

$$\text{RMA}_i = [(M_i/M_{iw})/(M^*_m/M^*_{mw})]/[(M^f_i/M_{iw})/(M^{f*}_m/\text{M}^*_{mw})]. \tag{9A–5}$$

This index makes a clear distinction between a specific commodity and all other commodities, and between a specific country and the rest of the world, thus eliminating country and commodity double counting. It also incorporates supply and demand effects. In addition, as stated by Vollrath (1991, p. 277), this index should be preferred to other theoretically sound indexes when working with low levels of commodity aggregation, as in this case.

These indicators are calculated using trade data for cheese, butter, skim milk powder, and whole milk powder for 1991–2000, for three countries in North America, seven in Central America, 16 in the Caribbean region, and 12 in South America. Total exports and imports were obtained from UNCTAD-WTO (2002), and dairy product imports and exports were obtained from FAOSTAT (FAO 2002).

Appendix Table 9–1

Milk Self-Sufficiency Ratios, 1996 and 2000

Country	Milk (excluding butter)		Butter and ghee		Cheese	
	1996	2000	1996	2000	1996	2000
Canada	103.7	99.7	112.4	91.2	97.5	97.1
United States	94.8	97.8	102.4	100.1	97.7	96.5
Mexico	80.0	78.7	64.4	31.2	85.7	73.4
Central America	81.2	79.8	66.1	39.9	85.8	77.6
Caribbean	52.7	52.9	50.6	47.7	48.8	39.6
Andean Group	90.1	90.9	89.9	76.9	97.6	92.9
Chile	90.5	94.6	69.3	85.0	89.8	90.9
Argentina	106.5	114.6	109.2	116.3	101.4	103.7
Brazil	89.6	93.2	84.4	84.6	49.8	73.5
Paraguay	88.1	93.4				
Uruguay	136.9	153.5	478.1	288.5	194.9	261.8

Source: Author's calculations based on data from the FAOSTAT database.

Appendix Table 9–2

Dairy Trade Balance, Average 1998–2000

(Metric tons)

Country or region	Cheese	Butter	Skim milk powder	Whole milk powder
NAFTA	–155,200	–46,320	4,408	–8,091
Canada	–705	2,049	33,985	–6,214
United States	–113,265	–16,771	88,903	26,807
Mexico	–41,230	–31,598	–118,480	–28,684
Mercosur	15,003	12,287	–736	–4,785
Argentina	14,897	6,575	20,269	112,124
Brazil	–14,578	–1,136	–37,793	–129,021
Paraguay	–763	–54	–159	–2,690
Uruguay	15,447	6,903	16,947	14,802
Chile	–4,032	–1,073	–9,195	293
Andean Pact	–12,076	–6,322	–23,395	–97,717
Central America	565	–3,436	–8,066	–37,065
Rest of the world	–29,566	–10,674	–71,406	–21,785

Source: Author's calculations based on data from the FAO database.

Appendix Table 9–3

Revealed Comparative Advantage Indexes, 1998–2000

	Cheese			Butter			Skim milk powder			Whole milk powder		
Country	1998	1999	2000	1998	1999	2000	1998	1999	2000	1998	1999	2000
Canada	22.16	20.43	16.19	19.13	16.63	9.37	51.91	50.37	31.68	6.32	3.18	1.48
United States	10.24	12.12	12.76	3.33	1.42	2.61	39.73	51.94	42.57	16.39	5.36	10.3
Mexico	0.63	0.22	0.36	1.07	1.34	0.22	2.15	1.21	1.56	21.13	43.23	41.12
Argentina	121.65	140.26	151.84	53.03	123.07	114.6	198.47	382.65	333.99	1,174.29	1,767.37	1,337.92
Brazil	1.21	0.86	0.23	0.53	0.34	0.7	1.1	1.46	0.07	7.35	0.79	2.0
Chile	5.32	10.15	13.46	2.91	2.35	4.09	1.7	0.72	0.9	148.01	162.11	43.44
Uruguay	862.55	1,124.33	1,265.29	1,330.31	1,748.41	853.77	2,475.48	3,044.8	1,906.22	1,681.87	2,154.28	2,068.66
Colombia	3.8	3.6	17.1	0.0	0.0	1.53	0.33	0.21	7.02	46.1	242.5	276.2
Ecuador	0.0	0.04	0.2	0.34	0.22	3.95	18.39	18.76	13.89	0.0	36.2	55.3
Belize	133.41	50.79	141.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Costa Rica				8.19	13.82	18.51	5.42	3.50	2.36	241.55	211.77	307.71
Honduras	14.6	29.5	32.6	34.45	119.73	418.45	3.27	19.14	13.2	0.0	1.7	75.8
Nicaragua	294.14	1,122.95	1,569.68	0.83	15.9	48.48	1.58	4.35	144.29	563.0	635.8	229.8
Panama	100.75	126.08	177.25	0.0	0.0	0.0	0.0	12.2	46.87	0.0	74.4	188.2

Source: Author's calculations based on data from the FAO database.

Appendix Table 9–4

Net Export Indexes

Country	Cheese			Butter			Skim milk powder			Whole milk powder		
	1998	1999	2000	1998	1999	2000	1998	1999	2000	1998	1999	2000
Canada	–6	–12	–27	62	33	–33	100	95	85	1	–44	–85
United States	–61	–61	–60	–71	–83	–63	80	84	84	70	32	63
Mexico	–97	–99	–99	–97	–97	–99	–99	–99	–99	–70	–31	–28
Argentina	49	41	45	5	99	97	91	99	100	98	100	100
Brazil	–96	–96	–99	–99	–99	–98	–99	–99	–100	–98	–100	–99
Chile	–79	–52	–61	–81	–74	–82	–99	–99	–99	7	49	–52
Uruguay	95	96	98	100	100	99	98	100	99	99	100	99
Colombia	–16	13	86	–100	–100	9	–100	–100	–86	–83	34	12
Ecuador	–100	–98	–90	–97	67	100	–85	–4	38	–100	–27	79
Belize	–65	–83	–68	–100	–100	–100	–100	–100	–100	–100	–100	–100
Costa Rica				–47	37	–2	63	–26	35	96	88	89
Honduras	–49	–71	–71	–81	–54	5	–99	–96	–97	–100	–100	–90
Nicaragua	38	76	82	–100	–97	–92	–100	–99	–83	–51	–61	–86
Panama	–52	–65	–64	–100	–100	–100	–100	–95	–87	–100	87	–67

Source: Author's calculations based on data from the FAO database.

Appendix Table 9–5

Relative Trade Advantage Indexes, 1998–2000

	Cheese			Butter			Skim milk powder			Whole milk powder		
Country	1998	1999	2000	1998	1999	2000	1998	1999	2000	1998	1999	2000
Canada	−0.07	−0.10	−0.19	0.14	0.08	−0.11	0.51	0.48	0.28	−0.01	−0.06	−0.21
United States	−0.21	−0.21	−0.19	−0.10	−0.07	−0.03	0.34	0.47	0.38	0.12	0.03	0.07
Mexico	−0.35	−0.41	−0.55	−0.64	−0.83	−0.81	−2.40	−2.23	−2.84	−1.01	−0.4	−0.41
Argentina	0.83	0.82	0.85	0.11	1.23	1.13	1.93	3.86	3.37	12.35	19.17	14.17
Brazil	−0.54	−0.42	−0.39	−0.68	−0.80	−0.80	−2.02	−2.48	−1.84	−7.91	−9.85	−8.19
Chile	−0.35	−0.26	−0.49	−0.20	−0.13	−0.37	−1.46	−1.59	−1.76	0.34	0.99	−1.18
Uruguay	8.60	11.34	12.85	13.47	17.73	8.55	25.19	31.19	19.32	17.07	21.96	21.01
Colombia	−0.01	0.0	0.15	−0.06	−0.03	0.00	−1.26	−1.14	−0.88	−3.80	0.97	−0.07
Ecuador	−0.02	−0.06	−0.05	−0.15	0.0	0.04	−1.18	−0.06	0.06	−2.41	−0.67	0.44
Belize	−2.14	−2.26	−2.11	−1.16	−1.21	−0.91	−0.62	−0.25	−0.32	−18.7	−11.19	−12.6
Costa Rica				−0.12	0.08	0.01	0.05	−0.02	0.01	2.36	1.97	2.89
Honduras	−0.16	−0.58	0.67	−1.74	−0.53	2.54	−3.71	−3.96	−3.53	−11.77	−19.2	−6.95
Nicaragua	2.39	10.94	15.45	−3.35	−2.64	−3.60	−5.58	−3.53	−3.84	−2.03	−2.38	−10.2
Panama	0.18	−0.28	−0.51	−0.66	−1.0	−1.63	−1.03	−0.73	−1.06	−1.67	−2.05	−0.97

Source: Author's calculations based on data from the FAO database.

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Chapter 10

The Free Trade Area of the Americas and the Food Industry in Brazil and the United States

Paulo F. Azevedo, Fabio R. Chaddad, and Elizabeth M.M.Q. Farina

Brazil and the United States are key players in world agricultural and food markets. The agri-food system in both countries is very large in absolute and relative terms. The countries are net exporters of agricultural and food products and major recipients of foreign direct investment in the food industry. In addition, U.S. food processors hold substantial investment positions abroad. In the 1990s, both countries were actively involved in the formation of regional trade blocs. The United States is a member of the North American Free Trade Agreement (NAFTA), while Brazil is a member of Mercosur. Recently, the two countries have been engaged in multilateral negotiations that might eventually create a free trade area from Alaska to Patagonia—the Free Trade Area of the Americas (FTAA). The objective of this chapter is to analyze the potential impacts of the FTAA on trade and foreign direct investment in the Brazilian and U.S. food industry.

In order to evaluate the impacts of the FTAA on Brazil-U.S. food industry bilateral trade and investment, the chapter provides a general description of the food industry in both countries and examines the size and economic importance of the food industry relative to the entire food system and the respective national economies. It examines industry structure, vertical coordination mechanisms, and diversification patterns in selected food industries, including grains, meat, dairy, coffee, sugar, and orange juice. The chapter analyzes bilateral trade flows and barriers to trade in both countries, focusing on agricultural and food products, and examines food industry foreign direct investment in both countries, including cross-border mergers and acquisitions. It concludes with a discussion of public policy implications related to the effects of the FTAA on the food industry in both countries.

THE FOOD INDUSTRY IN BRAZIL AND THE UNITED STATES

This section describes and compares food industry structures in Brazil and the United States, focusing on the size and economic importance of the food industry relative to the entire food system and the respective national economies. The variables used in the analysis and data sources are described in Azevedo, Chaddad, and Farina (2003).

Table 10–1

The Contribution of Food Manufacturing to the Food System in the United States and Brazil, 2000

Indicator	United States	Brazil
Value added (billions of dollars)		
Agriculture	82.0	46.4
Food processing	165.2	N/A
Tobacco manufacturing	20.0	N/A
Food and tobacco manufacturing[a]	185.2	54.8
Transportation	42.9	N/A
Retail and food service	494.1	54.9
Total food system	804.2	156.2
Share of value added (percent)		
Agriculture	10.2	29.7
Food processing	20.5	N/A
Tobacco manufacturing	2.5	N/A
Food and tobacco manufacturing[a]	23.0	35.1
Transportation	5.3	N/A
Retail and food service	61.4	35.2
Total food system	100.0	100.0
Food system/GDP	8.1	26.3

N/A Not available.

[a] Includes transportation costs incurred by manufacturing firms in Brazil.

Source: Harris and others (2002); Furtuoso and Gilhoto (2001).

Economic Importance of the Food Industry

The food industry is an important part of the Brazilian and U.S. national economies. Based on value added, the Brazilian food system (US$156 billion) was about one-fifth the size of the U.S. food system (US$804 billion) in 2000 (Table 10–1). The share of the Brazilian food system relative to the national economy, however, is far greater than in the United States. In 2000, the food system accounted for 8 percent of U.S. gross domestic product (GDP) and employed 12 percent of the U.S. labor force (Harris and others 2002). The Brazilian food system represented about 26 percent of Brazil's GDP.

The food processing industry is part of the food system described in Table 10–1. In the United States, this industry generated US$165 billion in value added in 2000, which represented 20 percent of the total value added generated by the entire food system and roughly 2 percent of GDP. By contrast, the share of the food industry in Brazil reached 35 percent of the total food system and 9 percent of GDP.[1] In absolute terms, it ac-

[1] However, the data are not directly comparable due to different measurement approaches. For details, see Azevedo, Chaddad, and Farina (2003).

counted for US$55 billion in 2000, roughly one-third of the value added by U.S. food manufacturing industries in the same year.

In addition to comparing the size of the food industry relative to the national economy and the food system, it is also important to compare it relative to the entire manufacturing sector. Manufacturing is the largest sector in the U.S. economy, currently accounting for approximately 20 percent of GDP. The food processing industry is the fourth-largest manufacturing industry group based on the North American Industry Classification System (NAICS) in terms of value added. It generated US$164 billion in value added in 1997, equivalent to 9 percent of total manufacturing value added (Table 10–2). In addition, food manufacturers employ 9 percent of the workers and generate 11 percent of the total value of shipments in the manufacturing sector.

Food industry activity in Brazil accounts for a larger share of total manufacturing activity than in the United States. There are approximately 17,000 food manufacturing firms in Brazil, which account for about 20 percent of total manufacturing value added and value of shipments (Table 10–2). Another important distinction between food manufacturing in Brazil and the United States concerns employment shares, respectively 18.5 and 8.7 percent in 1997. This difference reflects the economic importance of food manufacturing relative to the respective domestic manufacturing sectors, but also the technological level, particularly regarding the adoption of labor saving technologies. Value added per employee is US$111,000 in the United States compared with US$20,000 in Brazil. Differences in the adoption of labor saving technologies between the two countries re-

Table 10–2

The Size of the Manufacturing Industry in the United States and Brazil, 1997

Indicator	Food industry	Manufacturing total	Food industry/ manufacturing (percent)
United States			
Number of companies	21,958	316,952	6.9
Number of employees	1,466,956	16,805,127	8.7
Value added (billions of dollars)	163.68	1,825.69	9.0
Value of shipments (billions of dollars)	421.74	3,834.70	11.0
Brazil			
Number of companies	17,351	104,363	16.6
Number of employees	886,329	4,803,644	18.5
Value added (billions of dollars)	29.54	155.63	19.0
Value of shipments (billions of dollars)	71.63	353.25	20.3

Source: Census of Manufacturers (U.S. Census Bureau) and Annual Industrial Research (Brazilian Institute of Geography and Statistics).

sult from technology availability and relative prices, as wages tend to be lower in Brazil. Although several technologies coexist, Brazilian food manufacturers in general employ natural resources and labor more intensively (Moreira and Najberg 1998).

The Size of Food Processing Industries

The NAICS system distinguishes between nine food industry groups (by 4-digit code) in the U.S. food industry. Table 10–3 ranks these food industry groups by value of shipments. Meat product manufacturing is the largest food industry group, with a total shipment value of US$113 billion in 1997. Dairy product manufacturing is the second-largest food industry group, with US$59 billion in shipments. Other large food industry groups in

Table 10–3

Food Processing Industry Groups Ranked by Value of Shipments, United States and Brazil
(Billions of dollars)

Industry group	Value of shipments
United States (1997)	
Meat product manufacturing	112.98
Dairy product manufacturing	58.67
Grain and oilseed milling	52.08
Fruit and vegetable preserving and specialty food manufacturing	46.62
Bakeries and tortilla manufacturing	43.72
Animal food manufacturing	27.73
Sugar and confectionery product manufacturing	24.11
Seafood product preparation and packaging	6.92
Other food manufacturing	48.91
Total U.S. food industry	421.74
Brazil (2001)	
Dairy products	7.31
Coffee roasting and grain milling	6.46
Meat product manufacturing	6.12
Fats and oils	5.32
Wheat products	4.42
Sugar	3.96
Processed fruits and vegetables	2.85
Chocolates and confectionary	1.49
Fish processing	0.43
Others	2.72
Total Brazilian food industry	41.08

Source: U.S. Census of Manufacturers and Brazilian Food Industry Association (ABIA).

terms of value of shipments include grain and oilseed milling, fruit and vegetable preserving, and bakeries and tortilla manufacturing.

Table 10–3 also ranks Brazilian food industry groups by value of shipments using data collected by the Brazilian Food Industry Association (ABIA). Despite the fact that food industry groupings are different in Brazil and the United States, the data allow us to compare the relative sizes of food industry groups in both countries. Dairy processing is the largest food industry group in Brazil, with a total shipment value of US$7.3 billion, followed by coffee roasting and grain milling, with US$6.5 billion. Meat product manufacturing is the third-largest food industry group in Brazil, with US$6.1 billion in total value of shipments. This composition of the Brazilian food industry partially explains the relatively low value added by Brazilian food processors compared with their U.S. counterparts.

Geographic Location of Food Manufacturing Industries

Location is an important variable for competitiveness analysis because it is a major determinant of raw material costs, wages, availability of skilled labor, access to infrastructure, transportation costs, and agglomeration economies (Porter 1998). Although food industry establishments are located in all 50 U.S. states, 40 percent of all establishments are located in only five states (for data, see Azevedo, Chaddad, and Farina 2003). In addition, these five states employ 30 percent of all food industry workers and generate 31 percent of the total value of food industry shipments. U.S. food processing plants are concentrated in high-population states (California, New York, and Texas) and in states with significant agricultural activity (California, Illinois, Iowa, and Wisconsin).

Geographically more concentrated than in the United States, the Brazilian food industry is located mainly in the Southeast, which is the most populated region and the region with the highest per capita income. The Southeast region accounts for almost half of total food industry employment (for data, see Azevedo, Chaddad, and Farina 2003). Food industry geographical concentration is even higher when proxied by payroll, as the Southeast's share of the national total increases to almost 60 percent. In spite of geographic concentration, the food industry plays an important economic role in Brazil's less developed regions, particularly the Northeast and the Middle-West.

Azevedo, Chaddad, and Farina (2003) show an initial trend of geographical deconcentration in the Brazilian food industry until the 1990s, with the fall of the Southeast's share. In the early 1990s, the Brazilian economy was exposed to a competition shock, which eroded the competitiveness of some industrial sectors and regions. Many noncompetitive firms and jobs were lost mainly in the Northeastern and Northern regions (Azevedo and Toneto 2001). The increase in the Southeast's employment share in that period was therefore due to a relatively lower decrease in the number of plants and employees. The second half of the 1990s brought further geographical deconcentration, with a consistent fall in the Southeast's share and concomitant increases in the shares of the Middle-West and the South in food industry employment. Food industry employment growth has been remarkable in the Middle-West region, whose share increased from 3.5 percent in 1986 to 8.6 percent in 2000.

Connor and Schiek (1997) provide a useful categorization of food industries to explain the location of food processing establishments in the United States. Three location types are identified: supply-oriented, demand-oriented, and "footloose" industries.

Food industries are deemed supply oriented when agricultural input costs are large relative to total production costs. Consequently, supply-oriented industries tend to locate close to sources of agricultural commodities, such as in California, the Corn Belt, and the Upper Midwest. The second type of food industry is labeled demand oriented because finished product distribution costs comprise a high share of final product price. As a result, demand-oriented food industries tend to locate processing establishments near population centers along the U.S. East and West Coasts, for example. Connor and Schiek (1997) identify footloose industries with neither high input costs nor high product shipping costs dictating the location decision. Footloose industries tend to locate manufacturing plants around other established manufacturing industries due to agglomeration economies, tax incentives, or access to skilled human resources.

Connor and Schiek's (1997) classification also informs the analysis of food industry location in Brazil. The high concentration of food processing establishments in Southeastern Brazil, mainly in São Paulo State, is explained by the concurrence in that region of food consumption, agricultural production, and the most complex agglomeration of industrial activity. The recent relocation of food industry plants to the Middle-West results from supply-oriented industries following the growth of agricultural production in the Brazilian *cerrados* (highland areas covered by trees and shrubs). In sum, notwithstanding food industry concentration in the Southeast, the most dynamic and specialized region in food processing is the Middle-West. As the region further develops its infrastructure and transportation systems, this relocation will likely increase the competitiveness of Brazil's food industry.

Business Organization

Business organization is an important determinant of firms' strategic behavior, particularly regarding decisions about international trade and foreign direct investment (Dunning 1998). With regard to business organization, food industries in the United States and Brazil are quite different. The data presented in Azevedo, Chaddad, and Farina (2003) reveal that the corporate form of ownership dominates the U.S. food industry, with 70 percent of all food firms. Food corporations are responsible for about 90 percent of food industry employment and total value of shipments. The minority of food manufacturing firms is organized in noncorporate forms, including sole proprietorships (21 percent), partnerships (6 percent), and other noncorporate forms (3 percent). This particular characteristic is also observed in the Brazilian food industry, where corporations, particularly multinationals, are the majority among the largest food companies. Compared with U.S. food processors, which tend to be publicly traded corporations, Brazilian food companies are in general privately owned.

The largest companies in the U.S. food industry are very large, both in absolute terms and relative to others. According to Rogers (2001, p. 5), "the sector is best described by a big-small model, where extremely large firms control leading positions in most markets, and smaller companies, including startups, operate in a competitive fringe trying to serve a particular market niche or develop a new idea." Table 10–4 shows the largest food processors in the United States and Brazil ranked by 2001 revenues.

The majority of the largest U.S. food companies shown are corporations based in the United States. Large U.S. food processors are multinational in scope and hold substantial foreign asset investments. According to Connor and Schiek (1997), more than

Table 10–4

Revenue of the Top 30 Food Processing Companies in the United States and Brazil, 2001

	United States		Brazil	
Rank	Company	Revenue (millions of dollars)	Company	Revenue (millions of dollars)
1	Cargill	49,204	Bunge Alimentos[a,b]	2,592
2	Kraft Foods	33,875	Nestlé	2,515
3	ConAgra	27,194	Cargill	1,995
4	Archer Daniels Midland	20,051	Sadia[b,c]	1,606
5	Sara Lee	17,747	Perdigão[b]	1,249
6	Unilever BestFoods[d]	12,400	Coamo	695
7	Farmland Industries[e]	11,763	Parmalat Brasil[b]	601
8	Nestlé USA[f]	11,100	Seara[a,b]	576
9	Tyson Foods	10,751	Fleishmann Royal Nabisco[g]	517
10	H.J. Heinz	9,430	Kraft Lacta[g]	481
11	Kellogg	8,853	Danone	456
12	Dairy Farmers of America[e]	7,999	Frangosul	405
13	CHS Cooperatives[e]	7,875	Itambé[e]	373
14	General Mills	7,078	Cosan	369
15	Campbell Soup	6,664	Caramuru Óleos Vegetais	369
16	Dean Foods	6,230	Avipal[b]	367
17	Land O'Lakes[e]	5,973	Aurora[e]	349
18	Smithfield Foods	5,900	Citrosuco Paulista	345
19	Dole Food	4,688	Moinhos Cruzeiro do Sul	318
20	Hershey Foods	4,557	Chapecó[b]	308
21	Procter and Gamble[h]	4,140	Elegê[i]	304
22	Hormel Foods	4,124	Elma Chips	288
23	Interstate Bakeries	3,497	Warner Lambert	275
24	Earthgrains	2,582	Garoto[j]	270
25	William Wrigley, Jr.	2,430	Bianchini	267
26	McCormick	2,372	Granja Rezende[c]	262
27	Chiquita Brands	2,242	Braswey	262
28	California Dairies[e]	2,242	Fábrica Fortaleza	256
29	Pilgrim's Pride	2,215	Quaker	255
30	Corn Products International	1,887	J. Macedo	239
	Average revenue	9,902	Average revenue	625

[a] Controlled by Bunge Ltda.
[b] Listed company in the São Paulo Stock Exchange (Bovespa).
[c] Controlled by the Sadia group.
[d] U.S. food division of Unilever plc, a British-Dutch multinational with US$46.7 billion in total revenues.
[e] Farmer-owned cooperatives.
[f] U.S. division of Nestlé S.A., a Swiss food company with annual sales of US$57.2 billion.
[g] Controlled by Kraft Foods.
[h] Food division of Procter and Gamble Co., a consumer products company with US$39.2 billion in sales.
[i] Controlled by the Avipal group.
[j] Acquired by Nestlé in 2002. Transaction under review by the Brazilian Anti-Trust Agency.

Source: The 2002 Fortune 500, Exame Maiores e Melhores, and company annual reports.

12 percent of total U.S. food processors' assets are located abroad. Table 10–4 also shows that only two of the top 30 food manufacturing firms in the United States are multinational corporations based in other countries: Unilever and Nestlé. Foreign companies own less than 10 percent of total U.S. food processing assets.

The same pattern of coexistence of very large firms and smaller ones operating in a competitive fringe is also found in Brazil. However, food companies in Brazil tend to be much smaller in absolute and even relative terms than U.S. food processors. Whereas the size of the food industry is six times greater in the United States than in Brazil in terms of value of shipments (Table 10–2), the average size of the top 30 food processing companies in the United States is 16 times greater than in Brazil (Table 10–4). Another difference is the dominance of multinational corporations in the first positions of the Brazilian top food processors list. Among the top 10 food processing companies in Brazil, eight are multinational corporations.

It is also noteworthy that five agricultural cooperatives are ranked among the largest food companies in the United States, while only two cooperatives appear on the list of the top 30 Brazilian food companies. Agricultural cooperatives play an important economic role in the U.S. food system. According to U.S. Department of Agriculture statistics (USDA 2003), the nation's 3,229 agricultural cooperatives had combined membership of more than 3 million farmers, generated US$103 billion in aggregate sales, and accumulated US$48.5 billion in total assets in 2001.

Cooperatives also play an important role in the Brazilian food system. According to the Brazilian Cooperatives Organization (OCB 2003), there are 1,662 agricultural cooperatives in Brazil, several of them dedicated to food processing. Their share in food manufacturing industries, however, has been declining in recent years, as some large cooperatives have been take-over targets of acquisitive corporations. Cooperative financial performance suggests that this organizational form faces difficulties in competing with corporations in processed food markets.

MARKET CONCENTRATION, PRODUCT DIVERSIFICATION, AND VERTICAL COORDINATION IN SELECTED FOOD INDUSTRIES

In this section we discuss market concentration, product diversification, and vertical coordination for selected manufacturing industries, including grains, meat, dairy, coffee, orange juice, and sugar. The purpose of the analysis is to identify possible strategic movements that may be induced by the FTAA.

Table 10–5 shows Census of Manufacturers data on the number of firms, value of shipments, and concentration ratios for selected U.S. food industries in 1997. The data confirm Rogers' (2001) finding of increased market concentration in U.S. food manufacturing industries. Table 10–6 shows the use of marketing contracts, production contracts, and vertical integration for selected agricultural commodities in 1996 based on U.S. Department of Agriculture Economic Research Service (ERS) data. It is noteworthy that 45 percent of total farm output was marketed by means of nonmarket arrangements that year, up from 38 percent in 1990 (Martínez and Reed 1996).

Similar to the United States, market concentration in Brazil has been increasing since the early 1990s, but in general without negative effects on competition. As firms grow and consolidate, they benefit from several sources of scale and scope economies. In

Table 10–5

Number of Firms, Value of Shipments, and Concentration Ratios for Selected Food Industries in the United States, 1997

NAICS Code	Code description	Number of companies	Value of shipments (billions of dollars)	Four largest firms	20 largest firms
3112	Grain and oilseed milling	534	52.08	—	—
311211	Flour milling	254	8.00	48.4	79.2
311212	Rice milling	56	2.36	51.8	92.5
311221	Wet corn milling	30	8.46	71.7	99.8
311222	Soybean processing	43	14.04	79.6	99.5
311225	Fat and oil refining and blending	91	7.62	36.7	89.5
311230	Breakfast cereal manufacturing	48	9.10	82.9	99.2
3113	Sugar and confectionery products	1,556	24.11	—	—
311311	Sugarcane mills	34	1.46	56.6	94.3
311312	Cane sugar refining	12	3.21	98.7	100.0
311313	Beet sugar manufacturing	8	2.73	85.0	100.0
3114	Fruits and vegetable preserving	1,394	46.62	—	—
311411	Frozen fruit, juice, and vegetable manufacturing	177	9.55	34.3	70.6
3115	Dairy products	1,329	58.67	—	—
311511	Fluid milk manufacturing	402	22.00	21.3	50.5
311513	Cheese manufacturing	399	20.23	34.6	70.6
311514	Dry, condensed, and evaporated dairy product manufacturing	169	9.22	47.1	78.1
311520	Ice cream and frozen dessert manufacturing	409	5.86	32.3	71.1
3116	Meat product manufacturing	2,794	112.98	—	—
311611	Animal slaughtering (except poultry)	1,307	54.28	57.0	81.5
311612	Meat processed from carcasses	1,163	24.26	20.4	45.0
311615	Poultry processing	257	31.88	40.6	72.6
3119	Other food manufacturing	2,493	48.91	—	—
311920	Coffee and tea manufacturing	215	7.97	52.5	84.4

Source: 1997 Census of Manufacturers.

Table 10–6

Nonmarket Vertical Coordination Mechanisms in Agriculture, United States, 1996

(Percent)

Product	Production contracts[a]	Marketing contracts[b]	Ownership integration[c]	Total
Crops				
Feed grains	[d]	18	1	19
Hay	[d]	0	0	[d]
Food grains	[d]	14	1	15
Vegetables for fresh market	22	0	40	62
Vegetables for processing	97	0	2	99
Dry beans and peas	[d]	26	1	27
Potatoes	44	0	44	88
Citrus fruits	0	88	7	95
Other fruits and nuts	0	43	25	68
Sugar beets	99	0	1	100
Sugar cane	48	0	52	100
Cotton	[d]	35	1	36
Tobacco	9	[d]	2	11
Soybeans	0	17	[d]	17
Livestock				
Fed cattle	0	18	3	21
Sheep and lambs	0	7	14	21
Market hogs	30	[d]	11	41
Fluid-grade milk	[d]	94	0	94
Manufacturing-grade milk	0	89	[d]	89
Market eggs	37	2	58	97
Hatching eggs	74	0	26	100
Broilers	85	0	14	99
Turkeys	56	5	32	93
Total farm output[e]	10	27	8	45

[a] Resource-providing contracts entered into before production begins.

[b] A contract to market output that is already committed, including most contracts with marketing cooperatives and forward contracts specifying where the product is to be marketed and the pricing method.

[c] The same firm owns farms and other vertically related operations such as a hatchery, feed mill, processing plant, or packer-shipper.

[d] Less than 1 percent.

[e] The percentage of total farm output under contracts and ownership integration includes only the products listed in the tables.

Source: Harris and others (2002).

Table 10–7

Concentration Ratios for Selected Food Industries in Brazil
(Percent)

Industry	Concentration ratio
Flour milling (share in milling capacity, 1996)	33.8
Soybean processing (share in total capacity, 2000)	35.4
Fat and oil refining (share in total capacity, 2000)	48.0
Poultry slaughtering (share in total capacity, 2000)	32.3
Poultry exports (share in total exports, 2000)	80.0
Hog slaughtering (share in total capacity, 2000)	30.5
Pork exports (share in total exports, 2000)	64.3
Raw beef carcasses exports (share in total exports, 1999)	62.6
Processed beef products exports (share in total exports, 1999)	88.3
Milk processing (share in the formal market, 2000)	32.6
Milk processing (share in the total market, 2000)	19.9
Skim milk (share in production, 2002)	85.9
Condensed milk (share in production, 2002)	94.5
Dairy beverages (share in production, 2002)	84.9
Orange juice (share in crushing capacity, 2001)	72.8
Cane sugar refining (share in crushing capacity, 2000)	22.8

Note: Values are for the four largest firms.

Source: Brazilian Wheat Industry Association (ABITRIGO); Brazilian Oilseed Processing Industry Association (ABIOVE); Brazilian Poultry Processors and Exporters Association (ABEF); Brazilian Pork Processors and Exporters Association (ABIPECS); Brazilian Beef Industry Association (ABIEC); Farina and others (2000); SEAE, Ato de Concentração Nº 08012.006805/2001–29; FMC do Brasil; SEAE, Ato de Concentração nº 08012.005785/2001–79.

spite of industry consolidation, Brazilian firms are still much smaller than food manufacturing firms in the United States, which might be a competitive advantage for U.S. firms in the event of an FTAA. As a consequence, concentration ratios tend to be smaller in Brazil, with the exception of market segments that are subject to higher mobility barriers (Table 10–7).

Grain

Grain processing and marketing companies tend to be very large and diversified conglomerates that operate in multiple markets and several countries. As they usually deal with agricultural commodities traded worldwide, they require capabilities to operate on a global scale. These capabilities include grain origination, processing, and logistics in the main grain producing countries. Perhaps not surprisingly, the same grain processors that operate in the United States—such as Cargill, Bunge, and Archer Daniels Midland—are the leading grain companies in Brazil. These similarities notwithstanding, grain companies in the United States tend to be larger in absolute and relative terms. By contrast, the Brazilian grain industry presents several small firms that operate in informal or regional markets.

With the exception of fat and oil refining and blending, all U.S. grain industries exhibit concentration ratios (CR4) greater than 40 percent—a characteristic of oligopolies. For example, the four largest manufacturers control almost 83 percent of the breakfast cereal market and 79 percent of soybean processing (Table 10–5).

Heterogeneity is the most distinguishing feature in Brazilian grain and oilseed milling industries. Coexisting with huge processors, several of the 7,000 firms in the Brazilian grain industry are quite small, operating in regional and informal markets. The presence of informality is predominant in industries with low entry barriers, such as dry corn milling, and rice and beans packaging. On the other hand, the "big-small" model predominates in industries featuring high entry barriers, such as wet corn milling, soybean processing, breakfast cereal manufacturing, and bakery products. In these industries, large multinational firms have dominant market positions in Brazil, but coexist with a competitive fringe comprised of small companies.

Farmer-owned cooperatives are important players in grain industries in both the United States and Brazil. Agricultural cooperatives originate and market roughly 40 percent of all grains and soybeans in the United States, similar to the Brazilian case. A recent trend is for U.S. cooperatives to form strategic alliances with food companies, allowing capital constrained cooperatives to have access to downstream profits in the supply chain (Chaddad and Cook 2004). In addition, strategic alliances enable grain firms to combine complementary resources, such as cooperatives' grain originating and handling assets and large companies' global trade and logistics.

In addition to their large size, multinational grain companies are diversified across product markets in order to take advantage of economies of scale and scope. These grain companies usually specialize in nondifferentiated commodities, which allow them to exploit their competitive advantage in global trading and logistics. Firms that produce mainly final consumer products rely on product differentiation as a competitive strategy, making use of their marketing and branding competencies. Finally, smaller firms in Brazil are exploring their ability to segregate grains in order to preserve the identity of differentiated products, such as organic and nongenetically modified (or GMO free) soybeans. Because these companies operate on a smaller scale, they are able to dedicate storage and crushing facilities to segregate grains with specific quality attributes and thereby exploit fast-growing niche markets of identity-preserved products.[2]

Relative to other subsectors, grain supply chains tend to be less vertically coordinated, as the majority of grains are marketed by means of spot market transactions both in the United States and Brazil. Despite their relatively small importance in grain marketing, production contracts are increasingly used in identity-preserved supply chains such as high-oil corn and high-sucrose soybeans in the United States (Kalaitzandonakes and Maltsbarger 1998). Similar trends are observed in Brazil, particularly in the case of organic and nongenetically modified products. Given the operational difficulties of grain segregation in traditional storage systems in Brazil, firms that operate with this type of product—that is, differentiated but difficult to evaluate by simple inspection—

[2] See Azevedo, Chaddad, and Farina (2003) for details on the strategic positioning of firms.

tend to rely on contracts with producers or even quasi-vertical integration (Leonelli and Azevedo 2001).

Meat

With different industry structures and companies adopting different competitive strategies, the meat industry in Brazil and the United States will probably be particularly affected by the FTAA, both in terms of competition and market opportunities. In particular, Brazilian meat companies might be targets of U.S. firms that are expanding internationally, including Tyson Foods and Smithfield. As grain production expands into the Brazilian Middle-West region and consumption of domestic meat products increases, U.S. companies might be poised to take over the dominant meat businesses in Brazil, such as Sadia and Perdigão.

Despite the large number of firms (1,307), the U.S. meat industry is highly concentrated with a CR4 of 57 percent. It is interesting to note, however, that market concentration is less pronounced in meat processed from carcasses than in animal slaughtering (Table 10–5). By contrast, the Brazilian meat industry is less concentrated than in the United States in all its main branches: poultry, pork, and beef. The Brazilian meat market is competitive and dominated by domestic firms, the majority of which are controlled by diversified family groups. In both the poultry and hog slaughtering industries, the four leading firms account for about 30 percent of the market, followed by several medium and small firms (Table 10–7). In the beef industry, meat packers compete with informal slaughtering establishments, which account for approximately 40 percent of the Brazilian beef market (Azevedo and Bankuti 2002).

The Brazilian poultry, pork, and beef industries share a common feature: concentration ratios are significantly higher in export markets, with CR4s consistently above 60 percent (Table 10–7). Although concentration ratios in exports are large, they do not imply any degree of market power, as firms compete in highly competitive international markets. However, the difference in concentration ratios reflects higher mobility barriers for firms moving from domestic to export markets. In addition to the high product quality standards required in export markets, the necessary fixed costs and specialized resources are key factors that prevent the majority of Brazilian meat companies from participating in international marketing.

Similar to grain processors, meat product manufacturing companies tend to be diversified across markets. The exception is Brazilian beef packers, which are less diversified. These firms tend to specialize in beef slaughtering and, sometimes, integrate backward and forward in the production chain—for example, into cattle raising, leather manufacturing, and, less frequently, meat retailing.

Meat subsectors differ with respect to the vertical linkages between supply chain participants (Table 10–6). In the U.S. beef subsector, transactions between cattle ranchers, feedlots, and meat packers are carried out mostly in spot and auction markets, while 18 percent of fed cattle (cattle ready to be harvested) are marketed by means of marketing contracts. Vertical integration and production contracts are not common practices in the U.S. beef industry, but tightly coordinated beef supply chains are increasingly organized as strategic alliances (Lawrence, Schroeder, and Hayenga 2002). In sharp contrast to beef, the broiler, hog, and turkey subsectors rely more heavily on nonmarket vertical coordination mechanisms. The pork industry in both countries experienced significant changes in vertical coordination patterns in the 1990s, with a dramatic increase in the use of production contracts (Ferreira 1998; Martínez 2002).

Dairy Products

The U.S. and Brazilian dairy industries play important economic roles in terms of employment, number of firms, and total value of shipments. The dairy industry is comprised of several product groups—such as fluid milk, cheese, butter, condensed milk, and yogurt, among others. These dairy product markets demand distinct firm capabilities and present different entry barriers to market competitors. Consequently, concentration ratios vary markedly across dairy product markets in both countries.

Dairy product manufacturing is the second-largest food industry group in the United States. Industry structure varies across dairy markets, with higher concentration ratios in butter manufacturing and dry, condensed, and evaporated dairy products (Table 10–5). Different from other food industries in the United States, dairy companies are concentrated in narrow product lines (Blayney and Manchester 2000). For instance, in the dairy business, companies may deal only in cheese, yogurt, or premium ice cream.

Although much smaller than in the United States, the Brazilian dairy industry is the largest food sector in the country, with total shipment value of US$7.3 billion. The dairy industry in Brazil is heterogeneous and generally divided in three strategic groups (De Negri 1996): (i) differentiated dairy products, with capabilities in marketing and logistics of perishable goods; (ii) dairy commodities, demanding large-scale operations to minimize processing costs; and (iii) regional firms operating in the informal market, which represents 28 percent of total milk production in Brazil (Farina and others 2000).

Similar to the United States, concentration ratios vary across dairy product markets in Brazil. Firms in the first strategic group typically produce skim milk, condensed milk, and dairy beverages. In these markets, the four leading firms—all diversified multinational processors—control combined market shares in excess of 80 percent (Table 10–7). Other strategic groups produce fluid milk, cheese, and dairy-based desserts, and have low concentration ratios because they are small, informal firms operating in regional markets. Despite the presence of European dairy processors, most firms in the Brazilian dairy industry are family owned and operated.

The Brazilian dairy industry experienced dramatic structural changes—including deregulation, consolidation, and multinationalization—from the early 1980s through the 1990s (Farina 2002). The once dominant Brazilian cooperatives could not keep up with the new competition, and became easy prey for acquisitive multinational companies. Notwithstanding these structural changes, marketing contracts between producers and dairy processors are rare in Brazil because milk production is highly atomistic. In the United States, however, 94 percent of fluid-grade milk and 89 percent of manufacturing-grade milk is sold through marketing contracts between producers and processors, mainly to cooperatives, which handle 83 percent of U.S. milk (Table 10–6).

Coffee

The coffee industry is comprised of two distinct strategic groups—ground roasted coffee and instant coffee—that operate with completely different industry structure and competitive patterns. Although Brazil is the largest coffee producer in the world, multinational coffee processors dominate international coffee markets. Two U.S. coffee processors—Sara Lee and Kraft Foods—and Nestlé hold dominant positions in the Brazilian and U.S. domestic markets.

In 1997, the four largest coffee and tea manufacturing firms in the United States accounted for 53 percent of total industry shipments (Table 10–5). By contrast, the Brazilian ground roasted coffee industry is quite competitive, with more than 1,000 establishments in 2001. The coffee industry structure has experienced dramatic changes since the entry of Sara Lee in 1998. With a sharp increase in its market share, Sara Lee forced incumbent Brazilian firms to change their competitive strategies. Strategic efforts have been focused on horizontal differentiation based on coffee blends, sizes, and packaging. Different from the ground coffee market, the instant coffee industry is concentrated, with the four leading firms accounting for 75 percent of the market (Leme and Souza 2000). As these industry changes are already on course, we do not expect the FTAA to induce significant additional market developments.

Tightly coordinated supply chain management practices were introduced in the Brazilian coffee industry in the 1990s, particularly in the specialty coffee segment. Following coffee market deregulation in 1990, coffee processors gradually began to explore market segments that demand higher-quality coffee beans. Coffee processors therefore started to implement vertical coordination mechanisms—such as contracts with growers and quality signaling strategies—to assure the supply of coffee beans with the quality attributes required for their increasingly diversified product lines. By contrast, since the United States does not produce coffee beans, coffee processors depend on imports as a procurement strategy. Main coffee exporters to the United States include Brazil, Colombia, and Mexico.

Orange Juice

Together, Brazil and the United States are responsible for half of the world's total supply of oranges and 85 percent of orange juice processing capacity. More strikingly, orange production and processing is concentrated in just two states: Florida and São Paulo. Both industries compete globally in intermediary product markets, particularly in frozen concentrated orange juice (FCOJ). However, the industries are complementary, as Brazilian firms focus their activities in orange crushing and logistics while U.S. firms dominate ready-to-drink and not-from-concentrate juice markets.

The Brazilian orange juice industry is highly concentrated, with the four leading processors controlling almost 73 percent of total crushing capacity (Table 10–7). It is noteworthy that the industry has some features—homogeneous product, low price elasticity, and high concentration—that make tacit collusion likely. The four leading processors also control the entire bulk transportation system. Given that Brazilian exports are predominantly in FCOJ form and bulk transportation systems reduce costs by 15 percent of the final FCOJ price, these four processors also hold dominant positions in export markets.

According to Hodges and others (2001), there are presently 52 citrus processing plants in the state of Florida. Citrus juice products shipped by Florida processors were valued at US$3.5 billion in the 1999–2000 season. The two largest orange juice brands—Minute Maid (Coca-Cola Co.) and Tropicana (PepsiCo)—have a combined market share of more than 50 percent (Jacobs 1994). Citrus World, a marketing cooperative formed by citrus packinghouses in Florida, owns the third-largest orange juice brand—Florida's Natural.

The four leading companies in Brazil are also key players in the Florida industry, following acquisition of crushing plants during the 1990s. Brazilian firms do not compete directly with the largest U.S. orange juice brands, positioning as their suppliers of non-name brand orange juice. Counting on a reliable and efficient orange juice supply, beverage companies shifted their focus to their core business in order to fully exploit their marketing competencies—particularly in blends, branding, and distribution channels—and economies of scope in their beverage product line. As a consequence, the acquisition of U.S. citrus processing plants by Brazilian companies is part of the orange juice chain restructuring, which resulted in a more efficient form of organization (for details, see Azevedo, Chaddad, and Farina 2003).

According to Table 10–6, 95 percent of citrus fruits in the United States are transacted by means of nonmarket arrangements, particularly marketing contracts between growers and processors, including contracts with farmer-owned packinghouses. The degree of vertical integration was higher in the late 1980s. In part, the reduction in vertically integrated orange production and processing is associated with the acquisition of Florida crushing plants by Brazilian firms. The coexistence of marketing contracts and vertical integration is also observed in the Brazilian orange industry, with two remarkable differences relative to the United States: (i) the proportion of backward vertical integration into orange growing is greater among Brazilian processors; and (ii) marketing contracts are based on pound solids in Florida (a measure of the juice content of the fruit and hence directly related to processing efficiency) and on boxes delivered in Brazil. These distinct characteristics are interrelated and suggest that vertical coordination in the U.S. orange industry is more efficient than in the Brazilian counterpart (Fernandes 2003).

Sugar

With absolutely distinct market structures, the U.S. and Brazilian sugar industries are likely to be affected by trade liberalization that includes the removal of tariff and nontariff trade barriers. Brazil is the largest world producer of sugar and is arguably the cost leader. If the FTAA includes liberalization of the U.S. market, Brazilian sugar processors will benefit. This will probably occur through exports rather than foreign direct investment.

Sugar manufacturing industries are highly concentrated in the United States. The four largest sugarcane refiners have a combined market share of 99 percent, whereas the four largest sugarcane mills control almost 60 percent of the market. In addition, the CR4 in sugar beet manufacturing is 85 percent (Table 10–5). Compared with the U.S. industry structure, the Brazilian sugar industry is fragmented, with the four leading companies controlling 23 percent of the total sugar processing capacity (Table 10–7). Such industry structure is not conducive to horizontal coordination among sugar processors due to the impossibility of retaliation. In addition, as firms deal primarily with nondifferentiated products, price competition is the rule and cost leadership strategies predominate.

In Florida and Louisiana, where 85 percent of U.S. production is concentrated, sugarcane is delivered to local mills that convert it to raw sugar. Subsequently, refineries process raw sugar into the refined white sugar used by consumers. Sugarcane milling and refining tend to be vertically integrated operations owned by proprietary companies. In the Northern Plains, where sugar beet production is concentrated, no intermediate raw sugar is produced. Beet growers cooperatively own three processors that combined represent 31 percent of sugar beet processing capacity (Moss and Schmitz 2000).

Sugar subsectors exhibit a high degree of vertical coordination in the United States (Table 10–6). Ninety-nine percent of all sugar beets and 48 percent of total sugarcane production is marketed by means of production contracts. In addition, 52 percent of sugarcane production is vertically integrated between the growing and processing stages. Vertical integration is also the dominant mechanism of procurement by Brazilian sugar companies due to high site specificity. There is a trend, however, of increasing use of production contracts with independent sugarcane suppliers, especially in the state of São Paulo. Different from the United States, Brazilian sugar companies are in general diversified into ethanol production, which is used in Brazil as automobile fuel.

AGRI-FOOD PRODUCT TRADE FLOWS AND BARRIERS TO TRADE

Brazil and the United States are key partners in international trade. The United States accounts for approximately one-fourth of total Brazilian exports and one-fifth of total Brazilian imports. Brazil, in turn, is responsible for 1.5 percent of total U.S. exports and 1.3 percent of total U.S. imports. These figures, although different at a first sight, are strikingly similar when weighted by the economic size of each country, as U.S. GDP is approximately 17 times greater than Brazil's GDP.

However, this strong trade partnership is not shared by the food system and the food industry in particular. The economic importance of bilateral trade in food products is considerably lower than it is for other products, with the exception of Brazil's relatively high share of U.S. food imports. The main reason why each country does not have the other as an important destination of agri-food exports is that their main products are competitors rather than complements. As the food systems in both countries are highly competitive, they participate in international markets as net exporters; and when one country is significantly more competitive than the other, tariff and nontariff trade barriers are used to protect domestic production in the less competitive industry. In these cases, eventual implementation of the FTAA may impact the food system of both countries, provided that the trade agreement indeed eliminates or reduces trade barriers.

Agricultural and Food Product Trade Flows

The food system plays an important role in the balance of trade for both the United States and Brazil. The increasing U.S. trade deficit—US$470 billion in 2002—would be even higher without the US$9 billion surplus generated by the food system (Table 10–8). In the case of Brazil, the effect is not only positive, but also quite significant. Without the food system, the Brazilian US$12 billion trade surplus in 2002—the largest surplus recorded in nine years—would become a trade deficit (Table 10–9). In other words, Brazil and the United States are net exporters of agricultural and food products. Consequently, both countries have an interest in developing foreign markets in order to benefit from the revealed comparative advantage of their respective food systems.

Table 10–8

Agri-Food System Trade Flows, United States, 2001 and 2002

Product group	Exports (billions of dollars)		Imports (billions of dollars)		Trade balance (billions of dollars)		Average share in food trade, 2001–02 (percent)	
	2001	2002	2001	2002	2001	2002	Exports	Imports
Grain	22.920	23.625	4.896	5.316	18.024	18.310	43.00	11.60
Agriculture	15.013	15.789	1.038	1.041	13.976	14.749	28.50	2.40
Soybean	5.451	5.624	0.031	0.028	5.420	5.596	10.20	0.10
Corn	4.765	5.128	0.135	0.137	4.630	4.990	9.10	0.30
Wheat	3.382	3.632	0.282	0.266	3.100	3.366	6.50	0.60
Others	1.415	1.406	0.590	0.610	0.825	0.797	2.60	1.40
Food industry	7.908	7.836	3.859	4.275	4.049	3.561	14.50	9.30
First processing	7.256	7.172	2.435	2.704	4.821	4.468	13.30	5.90
Second processing	0.651	0.664	1.424	1.571	−0.773	−0.907	1.20	3.40
Meat	13.454	12.488	13.646	13.888	−0.192	−1.400	24.00	31.40
Beef and pork	7.244	6.775	4.499	4.512	2.745	2.263	12.90	10.30
Poultry	2.407	1.834	0.094	0.113	2.313	1.721	3.90	0.20
Fish and seafood	3.351	3.278	8.906	9.123	−5.555	−5.845	6.10	20.60
Others	0.453	0.601	0.148	0.141	0.305	0.461	1.00	0.30
Dairy	1.222	1.081	1.508	1.491	−0.286	−0.409	2.10	3.40
Coffee and tea	0.391	0.398	0.777	0.786	−0.386	−0.388	0.70	1.80
Sugar industry	1.407	1.200	2.728	3.047	−1.322	−1.847	2.40	6.60
Alcohol	0.127	0.072	0.178	0.170	−0.051	−0.098	0.20	0.40
Sugar	0.214	0.198	0.643	0.672	−0.429	−0.474	0.40	1.50
Chocolate	0.714	0.624	1.103	1.253	−0.389	−0.629	1.20	2.70
Nonchocolate confectionery	0.352	0.307	0.805	0.953	−0.452	−0.646	0.60	2.00

Table 10–8 *(continued)*

Agri-Food System Trade Flows, United States, 2001 and 2002

	Exports (billions of dollars)		Imports (billions of dollars)		Trade balance (billions of dollars)		Average share in food trade, 2001–02 (percent)	
Product group	**2001**	**2002**	**2001**	**2002**	**2001**	**2002**	**Exports**	**Imports**
Fruits and vegetables	6.961	7.098	10.103	10.807	–3.142	–3.708	13.00	23.80
Agriculture	4.223	4.344	6.918	7.284	–2.696	–2.940	7.90	16.20
Vegetables	1.675	1.772	2.728	2.798	–1.053	–1.026	3.20	6.30
Fresh fruit	2.548	2.572	4.190	4.486	–1.642	–1.914	4.70	9.90
Food industry	2.738	2.754	3.185	3.522	–0.447	–0.768	5.10	7.60
Nuts	1.244	1.442	1.020	1.131	0.224	0.311	2.50	2.50
Agriculture	1.047	1.224	0.947	1.056	0.100	0.168	2.10	2.30
Food industry	0.197	0.218	0.073	0.075	0.124	0.143	0.40	0.20
Others	6.714	6.620	8.135	8.431	–1.421	–1.810	12.30	18.90
Agriculture	3.850	3.733	6.262	6.343	–2.412	–2.610	7.00	14.40
Food industry	2.864	2.888	1.873	2.087	0.991	0.800	5.30	4.50
Agri-food system	54.314	53.953	42.814	44.896	11.500	9.057	100	100
Agriculture	24.524	25.488	15.941	16.510	8.583	8.978	46.20	37.00
Food industry	29.790	28.465	26.873	28.386	2.917	0.079	53.80	63.00
Total trade flow	731.026	693.257	1,141.959	1,163.549	–410.933	–470.291	7.60[a]	3.80[a]

[a] Share of the agri–food system in total exports and imports.

Source: U.S. International Trade Commission (USITC).

Table 10–9

Agri-Food System Trade Flows, Brazil, 2001 and 2002

Product group	Exports (billions of dollars) 2001	Exports (billions of dollars) 2002	Imports (billions of dollars) 2001	Imports (billions of dollars) 2002	Trade balance (billions of dollars) 2001	Trade balance (billions of dollars) 2002	Average share in food trade, 2001–02 (percent) Exports	Average share in food trade, 2001–02 (percent) Imports
Grain	6.071	6.482	1.762	1.745	4.309	4.738	38.90	48.80
Agriculture	5.379	5.531	1.353	1.332	4.025	4.199	33.80	37.30
Soybean	4.791	5.231	0.174	0.233	4.617	4.998	31.10	5.70
Corn	0.503	0.269	0.062	0.035	0.441	0.234	2.40	1.30
Wheat	0.000	0.000	0.872	0.879	–0.872	–0.879	0.00	24.40
Others	0.085	0.031	0.246	0.186	–0.160	–0.154	0.40	6.00
Food industry	0.692	0.951	0.409	0.413	0.284	0.538	5.10	11.40
First processing	0.472	0.724	0.063	0.086	0.409	0.638	3.70	2.10
Second processing	0.220	0.227	0.345	0.327	–0.125	–0.100	1.40	9.30
Meat	3.414	3.782	0.497	0.474	2.917	3.308	22.30	13.50
Beef	1.063	1.160	0.065	0.076	0.998	1.084	6.90	2.00
Pork	0.376	0.487	0.028	0.025	0.348	0.462	2.70	0.70
Poultry	1.454	1.508	0.005	0.010	1.450	1.497	9.20	0.20
Fish	0.091	0.091	0.263	0.220	–0.172	–0.129	0.60	6.70
Seafood	0.192	0.252	0.004	0.002	0.188	0.249	1.40	0.10
Others	0.238	0.285	0.133	0.140	0.105	0.144	1.60	3.80
Dairy	0.026	0.041	0.185	0.253	–0.159	–0.211	0.20	6.10
Coffee and tea	1.452	1.412	0.008	0.006	1.444	1.405	8.90	0.20
Coffee	1.417	1.385	0.002	0.002	1.415	1.383	8.70	0.10
Coffee beans	1.213	1.201	0.002	0.002	1.211	1.200	7.50	0.00
Instant coffee	0.205	0.183	0.000	0.001	0.204	0.183	1.20	0.00
Tea	0.035	0.027	0.006	0.004	0.029	0.023	0.20	0.10
Sugar industry	2.674	2.593	0.185	0.189	2.489	2.405	16.30	5.20
Alcohol	0.106	0.183	0.101	0.051	0.006	0.131	0.90	2.10
Sugar	2.279	2.104	0.000	0.000	2.279	2.104	13.60	0.00
Chocolate	0.174	0.207	0.061	0.123	0.113	0.083	1.20	2.60
Nonchocolate confectionery	0.115	0.100	0.023	0.014	0.092	0.087	0.70	0.50

Table 10–9 *(continued)*

Agri-Food System Trade Flows, Brazil, 2001 and 2002

Product group	Exports (billions of dollars)		Imports (billions of dollars)		Trade balance (billions of dollars)		Average share in food trade, 2001–02 (percent)	
	2001	2002	2001	2002	2001	2002	Exports	Imports
Vegetables and fruits	1.402	1.640	0.563	0.463	0.839	1.177	9.40	14.30
Agriculture	0.424	0.440	0.306	0.254	0.118	0.186	2.70	7.80
Vegetables	0.084	0.077	0.169	0.152	–0.085	–0.075	0.50	4.50
Fresh fruit	0.340	0.362	0.137	0.102	0.203	0.261	2.20	3.30
Food industry	0.978	1.200	0.257	0.209	0.721	0.991	6.80	6.50
Processed vegetables	0.042	0.036	0.104	0.089	–0.061	–0.053	0.20	2.70
Orange juice	0.868	1.080	0.001	0.002	0.868	1.078	6.00	0.00
Others	0.067	0.084	0.152	0.118	–0.085	–0.033	0.50	3.80
Nuts	0.125	0.122	0.029	0.021	0.096	0.101	0.80	0.70
Others	0.558	0.439	0.378	0.434	0.180	0.005	3.10	11.30
Agriculture	0.026	0.031	0.068	0.131	–0.042	–0.101	0.20	2.80
Food industry	0.532	0.408	0.309	0.302	0.223	0.106	2.90	8.50
Agri-food system	15.722	16.511	3.606	3.584	12.116	12.927	100.00	100.00
Agriculture	7.201	7.352	1.764	1.744	5.438	5.608	45.10	48.80
Food industry	8.521	9.159	1.842	1.840	6.678	7.319	54.90	51.20
Total trade flow	58.223	59.640	55.572	47.232	2.650	12.408	27.30[a]	7.00[a]
Basic products	15.342	16.952	6.777	6.891	8.565	10.061	27.40	13.30
Semi-manufactured	9.429	9.288	1.895	1.700	7.534	7.588	15.90	3.50
Manufactured	33.451	33.400	46.900	38.641	–13.449	–5.240	56.70	83.20

[a] Share of the agri–food system in total exports and imports.

Source: Secretaria de Comércio Exterior (SECEX/MDIC).

Notwithstanding its positive effect on the balance of trade, the U.S. food system is relatively less oriented toward international markets than the Brazilian counterpart. A similar characteristic observed in both countries is that manufactured food products account for more than half of total food system trade flows. It is noteworthy that Brazil—a country that typically enjoys comparative advantage induced by natural resources and cheap labor—exports processed food products in comparable proportion to the United States (Tables 10–8 and 10–9). The trade surplus of the Brazilian food system depends heavily on industries that Connor and Schiek (1997) identify as supply oriented, such as the grain, sugar, orange juice, and meat processing industries. These industries' competitive advantage is partially due to low costs of raw agricultural inputs made possible by a competitive agricultural sector.

For both Brazil and the United States, grain commodities are the main export food product group, which accounts for about 40 percent of total food system exports. The main difference is that the share of industrial grain product exports relative to total grain exports is much greater in the United States than in Brazil (Tables 10–8 and 10–9). Another remarkable difference is the high concentration of Brazilian exports in just one product—soybeans (both grain and meal). The soybean complex alone is responsible for one-third of total Brazilian food system exports. By contrast, U.S. grain exports are more diversified, with three main agricultural commodities—soybean, corn, and wheat—and several processed grain products.

Although grain products have a positive effect on the trade balance in both countries, the economic importance of food imports is quite distinct. While grain products are the major source of the U.S. food trade surplus, with relatively lower participation in imports, this product group is responsible for half of Brazilian food system imports. Brazil is a net importer of wheat and industrial grain products. The second food product group with trade balance significance for both countries is meat products, which account for more than 20 percent of U.S. and Brazilian food system exports. Meat products also represent a major share of total U.S. food imports, equivalent to 31 percent of total food imports.

In addition to grain and meat products, the sugar, coffee, and orange juice industries are also of great importance in Brazil's exports and trade surplus (Table 10–9). This is not the case in the United States, notwithstanding the fact that these industries hold relevant shares of total food industry employment and value of shipments (for data, see Azevedo, Chaddad, and Farina 2003).

In short, the main tradable agri-food products of Brazil and the United States are by and large competitors. Grain, meat, sugar, and orange juice are economically important industries in both countries, either in terms of domestic production or exports. This explains why bilateral trade of food products between Brazil and the United States is relatively small. A corollary is that negotiations regarding the removal of trade barriers in the context of the FTAA will probably be conflictive, especially in the cases of sugar and orange juice.

Bilateral Trade between the United States and Brazil

Brazil had a relatively large trade surplus with the United States, in excess of US$5 billion in 2002 (Table 10–10). Nevertheless, the food system plays a secondary role in bilateral

Table 10–10

Bilateral Trade Flows between the United States and Brazil

Product group	U.S. exports to Brazil (thousands of dollars)		Brazilian exports to the United States (thousands of dollars)		Trade balance (thousands of dollars)		Average share in food trade, 2001–02 (percent)	
	2001	2002	2001	2002	2001	2002	U.S. – Brazil	Brazil – U.S.
Grain	56,471	156,868	24,506	46,606	31,965	110,262	43.40	3.30
Agriculture	11,127	108,887	1,464	3,331	9,663	105,556	24.40	0.20
Soybean	25	67	1,242	662	–1,218	–595	0.00	0.10
Corn	793	5,945	173	1,409	620	4,536	1.40	0.10
Wheat	9,928	95,763	0	0	9,928	95,763	21.50	0.00
Others	381	7,111	48	1,260	332	5,851	1.50	0.10
Food industry	45,344	47,982	23,042	43,275	22,302	4,706	19.00	3.10
First processing	44,951	47,804	16,362	34,794	28,589	13,010	18.90	2.40
Second processing	393	178	6,681	8,481	–6,287	–8,304	0.10	0.70
Meat	22,367	18,585	302,767	394,519	–280,400	–375,934	8.30	32.80
Beef and pork	11,963	13,882	120,683	182,402	–108,720	–168,521	5.30	14.20
Poultry	1,735	1,014	0	0	1,735	1,014	0.60	0.00
Fish and seafood	7,714	3,313	155,488	199,340	–147,774	–196,027	2.20	16.70
Others	955	377	26,596	12,777	–25,641	–12,400	0.30	1.90
Dairy	8,355	5,846	379	1,656	7,977	4,190	2.90	0.10
Coffee and tea	933	830	43,994	39,843	–43,061	–39,013	0.40	3.90
Sugar industry	37,254	17,730	152,919	144,883	–115,665	–127,153	11.20	14.00
Alcohol	12,476	18	4,400	7,906	8,076	–7,888	2.50	0.60
Sugar	13,715	4,483	83,326	58,669	–69,611	–54,186	3.70	6.70
Chocolate	8,301	6,702	40,942	45,707	–32,640	–39,005	3.10	4.10
Nonchocolate confectionery	2,762	6,527	24,252	32,601	–21,490	–26,074	1.90	2.70

(Continued on next page.)

Table 10–10 *(continued)*

Bilateral Trade Flows between the United States and Brazil

Product group	U.S. exports to Brazil (thousands of dollars)		Brazilian exports to the United States (thousands of dollars)		Trade balance (thousands of dollars)		Average share in food trade, 2001–02 (percent)	
	2001	2002	2001	2002	2001	2002	U.S. – Brazil	Brazil – U.S.
Vegetables and fruits	18,820	18,943	309,079	378,688	–290,259	–359,745	7.70	32.30
Agriculture	8,019	11,219	181,135	229,081	–173,115	–217,861	3.90	19.30
Vegetables	5,967	9,321	1,304	1,363	4,663	7,958	3.10	0.10
Fresh fruit	2,052	1,898	179,831	227,717	–177,779	–225,819	0.80	19.20
Food industry	10,800	7,723	127,944	149,607	–117,144	–141,884	3.80	13.00
Nuts	2,812	1,428	94,849	85,050	–92,036	–83,622	0.90	8.50
Agriculture	2,625	1,364	88,754	80,655	–86,130	–79,291	0.80	8.00
Food industry	188	64	6,095	4,395	–5,907	–4,331	0.10	0.50
Others	65,276	58,989	51,871	55,348	13,404	3,641	25.30	5.00
Agriculture	28,954	25,025	6,960	15,445	21,994	9,580	11.00	1.10
Food industry	36,322	33,965	44,912	39,903	–8,590	–5,938	14.30	4.00
Agri-food system	212,289	279,220	980,365	1,146,593	–768,076	–867,373	100.00	100.00
Agriculture	51,658	147,325	322,307	368,354	–270,649	–221,029	40.50	32.50
Food industry	160,631	131,895	658,058	778,239	–497,427	–646,344	59.50	67.50
Total	12,898,998	10,285,795	14,189,602	15,354,008	–1,290,603	–5,068,214	2.10[a]	7.20[a]

[a] Share of the agri–food system in total trade between the U.S. and Brazil.

Source: USITC and SECEX/MDIC.

trade between the United States and Brazil (Tables 10–8, 10–9, and 10–10). In brief, both countries are key partners in international trade, but not in agri-food products.

Bilateral trade in food products between Brazil and the United States is based mainly on processed products, particularly in the case of Brazil's exports to the United States. The food industry share (67.5 percent) is more than twice the size of the agriculture share (32.5 percent) of Brazilian agri-food system exports to the United States. This is partially explained by the presence of nontariff barriers, such as sanitary and phytosanitary restrictions, which inhibit exports of fresh products to the United States.

Wheat imported by Brazilian mills accounted for more than one-third of U.S. food exports to Brazil in 2002. This was not a representative year, however, because the economic crisis in Argentina—traditionally the major wheat supplier to Brazil—overwhelmed exporters' credit capacity for international trade. In addition to wheat, U.S. exports to Brazil are diversified, including first-processed grains and several products classified as "others," such as flavoring extracts and syrups. With an equally diversified list of agri-food export products, Brazil's main exports to the United States are meat products—particularly processed beef, frozen shellfish, and other shellfish products—noncitrus fresh fruit, sugar, coffee, and nuts (Table 10–10).

The importance of the food system in Brazil-U.S. bilateral trade is below average for all sectors. The U.S. share of Brazilian food imports and exports, and the Brazilian share of U.S. total food exports are approximately one-third of the respective shares for all sectors. The exception is Brazil's share in U.S. total food imports, which at 2.6 percent is twice the average level (Table 10–11).

Bilateral trade flow analysis by product group reveals some striking results. The United States accounts for 70 percent of Brazil's total exports of nuts. In addition, the United States is responsible for almost 7 percent of Brazil's imports of nuts. The United States also plays an important role in Brazil's vegetable and fruit and meat product exports, with 23.1 and 10.4 percent of total Brazilian exports, respectively, in 2002 (Table 10–11). Disaggregated data analysis identifies some Brazilian products that are oriented toward U.S. markets, such as shellfish (shrimp) and fresh fruit. Although these are not important sectors in the Brazilian food system, they have been successful in developing export markets in the United States. Consequently, the FTAA may elevate these sectors among the most dynamic in the Brazilian food system.

Tariff and Nontariff Trade Barriers

Brazil and the United States use tariff and nontariff trade barriers in different ways. Whereas Brazil generally levies higher average tariffs, the United States imposes lower average tariffs but with higher standard deviation. Brazil predominantly uses ad valorem tariffs; the United States relies on other forms of protection against imports, including specific lump sum tariffs, quotas, and nontariff trade barriers, such as sanitary and phytosanitary restrictions and direct subsidies to domestic agricultural production. Consequently, the United States tends to be more open to international trade while heavily protecting selected industries against foreign competition.

Average tariff rates applied to agri-food industries—including tobacco and textiles—are higher than average tariff rates applied to all industries in both countries. However, tariff rates are on average more than three times higher in Brazil than in the United States. In addition, the standard deviation of agri-food industry tariff rates lev-

Table 10–11

Relevance of Bilateral Trade: Selected Product Groups in the United States and Brazil, 2001 and 2002

	Relevance of Brazil to U.S. trade flow (percent)				Relevance of the United States to Brazilian trade flow (percent)			
	Exports		Imports		Exports		Imports	
Product group	2001	2002	2001	2002	2001	2002	2001	2002
Grain	0.2	0.7	0.5	0.9	0.4	0.7	3.2	9.0
Meat	0.2	0.1	2.2	2.8	8.9	10.4	4.5	3.9
Dairy	0.7	0.5	0.0	0.1	1.5	4.0	4.5	2.3
Coffee and tea	0.2	0.2	5.7	5.1	3.0	2.8	12.4	13.3
Sugar industry	2.6	1.5	5.6	4.8	5.7	5.6	20.1	9.4
Vegetables and fruits	0.3	0.3	3.1	3.5	22.1	23.1	3.3	4.1
Nuts	0.2	0.1	9.3	7.5	75.7	70.0	9.7	6.9
Others	1.0	0.9	0.6	0.7	9.3	12.6	17.3	13.6
Agri-food system	0.4	0.5	2.3	2.6	6.2	6.9	5.9	7.8
Agriculture	0.2	0.6	2.0	2.2	4.5	5.0	2.9	8.4
Food industry	0.5	0.5	2.4	2.7	7.7	8.5	8.7	7.2
Total	1.8	1.5	1.2	1.3	24.4	25.7	23.2	21.8

Note: Values are the equivalent to bilateral exports or imports of selected product groups divided by the total exported or imported by each country.

Source: USITC and SECEX/MDIC.

ied in the United States is twice as high as in Brazil (Table 10–12). This suggests that U.S. tariff rates are selectively used to protect specific domestic industries. Indeed, the maximum tariff rate reaches 350 percent in the United States compared with 55 percent in Brazil. It is worth mentioning that both countries operate with average tariff rates below the world agriculture tariff rate, which averages 62 percent (Gibson and others 2001).

Table 10–12

Summary of Tariff Schedules for Brazil and the United States

	Brazil		United States	
Indicator	Total	Agri-food	Total	Agri-food
Number of items	9,408	1,165	10,311	2,102
Average tariff rate (percent)	28.8	34.4	5.6	10.1
Standard deviation	10.5	12.2	12.9	25.6
Maximum tariff rate (percent)	55.0	55.0	350.0	350.0
Minimum tariff rate (percent)	0	0	0	0

Source: FTAA Hemisferic Data in Jank and others (2001).

As Jank and others (2001, p. 115) point out, the U.S. strategy of "chirurgic protection impacts directly the main export products of the Brazilian agri-system." More specifically, U.S. barriers to trade impact Brazilian exports of sugar by means of quotas, orange juice by means of a specific lump sum tariff, and soybean oil by means of tariff escalation. Not surprisingly, Brazil represents a small share of U.S. imports and domestic consumption of sugar, orange juice, and processed grain products.

U.S. nontariff barriers affect mainly the Brazilian meat (beef, pork, and poultry) and fruits sectors. However, the trade flow analysis does not provide evidence that these nontariff trade barriers significantly affect trade between Brazil and the United States. Nontariff trade barriers restrain Brazilian exports of fresh but not processed meat. In addition, Brazil is particularly relevant in U.S. fresh fruit imports, indicating that nontariff barriers do not effectively deter Brazilian exports.

Finally, the analysis of trade flows does not indicate a significant effect of tariff escalation in U.S.-Brazil bilateral trade.[3] Both countries exchange mainly processed products, despite the fact that they are net exporters of agricultural commodities. In other words, tariff escalation does not significantly restrict value-added product trade between the United States and Brazil.

As to the potential effects of the FTAA on food industry trade, changes in the trends documented in this chapter depend on the complete elimination of trade barriers. Monteagudo and Watanuki (2003) estimate that tariff elimination would increase Brazilian and U.S. agricultural exports to the Western Hemisphere by 20 percent and 12 percent, respectively. Nevertheless, we do not expect significant changes in trade barriers in the sectors that would be particularly affected by tariff elimination, inasmuch as important Brazilian export products—such as sugar and orange juice—are important domestic products in the United States and receive "chirurgical protection" by means of quotas and specific lump sum tariffs. In addition, the FTAA will not significantly affect agri-food industry bilateral trade flows between the United States and Brazil because the other main products of each country compete in international markets. An eventual removal or reduction of tariff and nontariff trade barriers in the context of the FTAA would deeply affect the sugar, poultry meat, and orange juice industries in both countries. Consequently, conflictive negotiations between the United States and Brazil regarding market access for those products would probably ensue in the context of the FTAA.

FOREIGN DIRECT INVESTMENT AND INTERNATIONAL MERGERS AND ACQUISITIONS

This section analyzes the foreign direct investment (FDI) and international mergers and acquisitions in the Brazilian and U.S. food industries that occurred in the 1990s. FDI is defined as "the act of purchasing an asset and at the same time acquiring control of it" (Sodersten and Reed 1994, p. 501). Therefore, FDI is distinct from portfolio investment, which is motivated by the expected return on investment rather than control over assets.

[3] This conclusion is restricted to U.S.-Brazil bilateral trade. Monteagudo and Watanuki (2003) show that tariff elimination would benefit processed food exports more than primary agricultural goods.

In general, multinational companies use FDI to circumvent trade barriers, gain access to less expensive production resources, and tailor products to local tastes in foreign markets.

FDI may occur through the establishment of a new business enterprise ("greenfield" investment) or through investments in already established businesses by means of international mergers and acquisitions. According to Bolling, Neff, and Handy (1998), only 20 percent of FDI in the U.S. food industry is made through greenfield investment. Farina and Viegas (2002) observe that the most common strategy of multinational food companies entering the Brazilian food market is through mergers and acquisitions. As a result, the new entrant is able to adapt its products to local consumption habits and rapidly gain market share.

We use data from the U.S. Department of Commerce to analyze FDI in U.S. food industries, and data from the Brazilian Central Bank, which conducted censuses of foreign capital in 1995 and 2000, to analyze FDI in Brazil. For more details about the comparability of the data sources and variables used in the analysis, see Azevedo, Chaddad, and Farina (2003).

Foreign Direct Investment in U.S. Food Industries

Table 10–13 shows FDI in the U.S. food industry by foreign companies in 1990–2000. Total inward FDI in U.S. food industries reached almost US$24 billion in 2000, which is equivalent to 2 percent of total FDI in all industries and 5 percent of FDI in the manufacturing sector. The total stock of FDI in the United States has tripled since 1990, both in all industries and in the manufacturing sector. FDI's position in food manufacturing, however, grew 27 percent between 1990 and 1997 and then declined to the level of the early 1990s by 2000. When the data are broken down by subsectors, the beverages, bakery, and dairy sectors appear as the largest recipients of FDI among U.S. food manufacturing industries.

Table 10–13 also reveals that U.S. affiliates of foreign food processors generated US$47 billion in food product sales in the United States in 2000 after reaching a peak of US$54 billion in 1996. This represents 11 percent of the total value of shipments in the food industry. European companies, mostly from the United Kingdom, dominate FDI in the U.S. food industry, with more than 70 percent of total foreign company food sales (Bolling and Somwaru 2001). Japanese companies generated sales of US$5.3 billion in 1998, mostly by producing and marketing ethnic foods in the United States. Canadian multinationals generated U.S. revenues of US$4.6 billion in 1998, with investments concentrated in fruit juices and frozen foods. Among Latin American nations, only Mexican food companies have substantial investments in U.S. food industries. More recently, Brazilian companies have invested in Florida orange crushing plants.

Inward FDI in U.S. food industries occurs primarily through cross-border mergers and acquisitions. Food Institute data on mergers and acquisitions show that, after a flurry of transactions in the late 1990s, the number of food system mergers and acquisitions has declined since 2000 (for details, see Azevedo, Chaddad, and Farina 2003). Food industry transactions totaled 417 in 2002, the third-lowest amount recorded in the past 20 years. The merger wave observed in the 1990s has come to an end as acquiring firms focus on executing the deals made during the consolidation wave. The data reported in Azevedo, Chaddad, and Farina (2003) also show foreign acquisitions of U.S. firms by Canadian and other foreign firms. After reaching a peak of 63 cross-border transactions

Table 10–13

Foreign Direct Investment in the United States, 1990–2000

(Billions of dollars)

Industry	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Direct investment position											
All industries	394.91	419.11	423.13	467.41	480.67	535.55	598.02	681.84	778.42	955.73	1,214.25
All manufacturing	152.81	157.12	160.36	168.15	189.46	214.50	245.66	270.13	333.23	385.25	479.85
Food manufacturing	22.54	23.93	23.77	22.78	21.41	27.03	28.09	28.74	22.12	18.86	23.98
Grain mill	7.75	8.61	8.71	7.92	5.89	8.64	1.60	1.55	6.84	0.90	0.99
Bakery	0.93	0.92	2.14	2.12	1.74	1.63	0.67	0.66	1.47	5.81	6.22
Beverages	9.15	9.13	6.72	7.61	7.83	10.10	10.54	12.66	5.17	4.38	6.81
Meat	0.16	0.16	0.05	0.02	0.91	0.81	0.65	0.39	0.05	0.16	0.19
Dairy	1.10	1.32	1.27	0.82	0.68	0.63	0.59	1.15	1.42	1.17	2.42
Fruits and vegetables	0.47	0.57	0.50	0.52	0.57	0.51	7.72	6.32	0.89	0.94	0.89
Other foods	2.99	3.24	4.39	3.76	3.80	4.70	6.31	6.01	6.28	5.52	6.47
Sales											
Food manufacturing	44.99	44.26	46.80	45.77	46.77	49.23	53.99	48.44	49.82	46.56	47.39
Grain mill	N/A	N/A	11.99	11.58	11.74	12.39	6.48	9.56	9.20	7.05	7.11
Bakery	4.18	N/A	4.94	3.90	4.33	4.55	3.63	12.68	12.78	12.42	11.90
Beverages	6.16	13.37	14.02	6.65	6.83	7.18	7.89	N/A	N/A	N/A	N/A
Meat	0.88	N/A	1.50	1.32	1.38	1.80	3.43	3.01	2.30	1.56	1.88
Dairy	6.72	N/A	6.05	6.00	6.10	6.22	5.07	5.53	6.46	5.40	6.37
Fruits and vegetables	N/A	N/A	1.25	1.13	1.16	1.31	8.71	1.36	1.70	1.82	1.65
Other foods	16.32	N/A	9.05	15.18	15.24	15.81	18.78	13.26	14.01	14.49	14.73

N/A Not available.

Source: U.S. Department of Commerce, Bureau of Economic Analysis, Foreign Direct Investment in the United States.

in 2000, acquisitions of U.S. food firms by foreign companies decreased in subsequent years to 44 transactions recorded in 2002. In the last three years, the percentage of foreign acquisitions was around 10 percent of the total number of merger and acquisition transactions in the U.S. food business.

Foreign Direct Investment Abroad by U.S. Multinational Companies

Table 10–14 shows FDI abroad for U.S. companies in 1990–2000. FDI in foreign food manufacturing affiliates of U.S. firms reached almost US$36 billion in 2000. Outward FDI by food processors represents 10 percent of total FDI in all manufacturing industries. In addition, outward FDI is considerably higher than FDI by foreign firms in the U.S. food industry. FDI abroad by U.S. food processors more than doubled between 1990 and 2000 and surpassed inward FDI in 1993. Subsector data reveal that U.S. food processors have substantial direct investment positions abroad in the beverages, grain mill, bakery, and fruit and vegetable manufacturing industries. Interestingly, foreign affiliates of U.S. food processors are more effective at generating overseas revenues than exports. They generated estimated sales of US$94 billion in 2000, compared with US$30 billion generated by processed food exports.

Nearly 50 percent of the direct investment position held by U.S. food processors is located in the European Union (for data, see Azevedo, Chaddad, and Farina 2003). Outward food FDI into the European Union grew from US$3.7 billion in 1980 to US$16.3 billion in 2000. The European Union has been a magnet for U.S. FDI because it has affluent consumers with high incomes and relatively similar food tastes. In addition, tariffs for many food products are sufficiently high to make it more profitable for multinational companies to invest in processing facilities within the European Union than to export. Approximately 30 percent of U.S. FDI in food processing industries occurs in Canada and Mexico. NAFTA has encouraged both trade and FDI among participating countries, with exports and investment in Mexico doubling in the early 1990s (Bolling and Somwaru 2001).

The formation of Mercosur in the early 1990s has spurred FDI in the region and caused U.S. food processors to redirect their investments. U.S. FDI in Mercosur food industries tripled between 1990 and 1995, reaching a peak of US$4 billion in 1996. Since then the investment position of U.S. food companies in Mercosur has declined, both in nominal and relative terms, as a result of currency crisis and macroeconomic instability in the region. U.S. FDI in the Brazilian food industry followed a similar pattern and increased substantially in the early 1990s, reaching US$2.9 billion by 1996. Following currency devaluations and low national income growth rates, the direct investment position of U.S. food processors in Brazil decreased to US$1.6 billion in 2000, which represents 5 percent of their total outward FDI.

Foreign Direct Investment in Brazilian Food Industries

During the 1990s, Brazil increased its participation in the global economy as a result of structural changes and macroeconomic stability introduced by the Real Plan. Increased participation in the global economy is reflected both in the evolution of foreign trade and direct investment. Between 1996 and 2000, the flow of FDI into Brazil totaled US$113

Table 10–14

Foreign Direct Investment by Affiliates of U.S. Firms, 1990–2000

(Billions of dollars)

Industry	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Direct investment position											
All industries	430.52	467.84	502.06	564.28	612.89	699.02	795.20	871.32	1,000.70	1,173.12	1,293.43
All manufacturing	170.16	179.23	186.29	192.24	201.00	243.95	270.29	278.45	290.07	306.16	353.55
Food manufacturing	15.57	17.15	21.14	25.86	24.89	28.90	31.02	32.77	35.30	34.23	35.93
Grain mill and bakery	4.18	4.48	4.77	5.12	5.48	6.47	5.91	5.32	5.22	5.54	5.85
Beverages	3.08	4.34	5.79	8.11	8.59	8.76	10.42	12.03	15.39	12.94	13.40
Meat	0.51	0.30	0.31	0.33	0.37	0.49	0.71	1.53	1.63	1.25	1.20
Dairy	0.49	0.73	0.99	1.29	1.07	0.89	1.19	0.67	0.58	0.43	0.45
Fruits and vegetables	2.33	2.70	3.05	2.94	2.19	2.66	3.21	3.51	3.65	2.73	3.15
Other foods	4.99	4.60	6.24	8.07	7.18	9.63	9.59	9.71	8.85	11.33	11.88
Sales											
Food manufacturing	75.96	82.34	87.58	95.36	104.85	113.17	122.98	127.71	133.14	94.36	94.10
Grain mill and bakery	20.40	21.54	21.29	22.37	23.72	22.20	23.72	25.20	27.45	N/A	28.23
Beverages	18.51	19.83	21.94	25.25	34.13	36.96	35.54	39.19	42.13	N/A	N/A
Meat	1.46	1.80	N/A	N/A	3.18	4.98	4.19	N/A	N/A	N/A	N/A
Dairy	5.00	4.71	N/A	7.06	4.53	4.09	4.31	N/A	N/A	N/A	N/A
Fruits and vegetables	5.61	6.70	7.13	7.29	7.32	7.99	8.86	9.53	9.80	N/A	11.45
Other foods	24.98	27.76	29.88	N/A	31.97	36.94	46.37	43.44	42.54	N/A	25.26

N/A Not available.

Source: U.S. Department of Commerce, Bureau of Economic Analysis, U.S. Direct Investment Abroad.

billion, second only to China among developing nations. The 11,404 Brazilian affiliates of multinational companies employed 1.7 million workers and generated US$232 billion in sales in 2000 (Table 10–15). Their direct investment position in Brazil reached US$103 billion in 2000, up from US$42 billion in 1995. Between 1995 and 2000, exports by companies with foreign capital increased from US$22 to US$33 billion, equivalent to 60 percent of total Brazilian exports.

Table 10–15 also shows FDI data for the food and beverage industries. The direct investment position of food multinationals in Brazil increased from US$2.8 billion to US$4.6 billion between 1995 and 2000 in spite of successive currency devaluations that occurred in the late 1990s. FDI in the Brazilian food industry originates mainly from the United States, France, and Switzerland. Brazilian affiliates of multinational food companies generated 137,000 jobs, almost US$5 billion in exports, and sales of US$17 billion in 2000. Given the total value of food industry shipments in Brazil of US$58 billion (see Table 5 in Azevedo, Chaddad, and Farina 2003), the aggregate market share of foreign companies reached 30 percent in 2000.

Farina and Viegas (2002) investigate the increased flow of foreign direct investment in Brazil during the 1990s. They observe that many multinationals in the food industry have chosen Brazil as their headquarters location for investments in Mercosur. Brazil has become an attractive location for FDI in the food industry due to the following factors: (i) large domestic market; (ii) foreign companies' interest in using Brazil as a base for exports to other countries in the region; (iii) macroeconomic stability provided in the initial period of the Real Plan; (iv) high food consumption growth rates, particularly in value-added food products; (v) tax incentives; (vi) access to raw materials from a fast-growing and competitive agricultural sector; and (vii) low labor cost.

In addition to fostering FDI from developed nations, Mercosur caused an increase in trade and FDI among trade bloc participants, particularly between Argentina and Brazil. Total bilateral investment flows increased from US$2.2 billion in 1990–97 to US$6.9 billion in the late 1990s. Investments of Argentinean firms in Brazil reached US$5.4

Table 10–15

Foreign Direct Investment in Brazil, 1995 and 2000

Variable	1995	2000
Total (all sectors)		
Number of employees	1,447,385	1,709,555
Direct investment position (millions of dollars)	41,696	103,015
Sales (millions of dollars)	188,903	231,705
Exports (millions of dollars)	21,744	33,249
Food and beverages industry		
Number of employees	153,024	136,621
Direct investment position (millions of dollars)	2,828	4,619
Sales (millions of dollars)	16,709	17,186
Exports (millions of dollars)	2,313	4,952

Source: Brazilian Central Bank, Census of Foreign Capital.

billion, which was equivalent to 78 percent of total bilateral investment flows, between 1998 and 2000 (Bonelli 2000).

According to Farina and Viegas (2002), the main form of entry of FDI in Brazil is through cross-border mergers and acquisitions. Data collected by KPMG International on the number of mergers and acquisitions in Brazil show 2,335 transactions in all industrial sectors in 1992–2000. Foreign capital was present in 70 percent of these transactions. In 2000, 34 percent of total foreign capital that entered Brazil originated in the United States. During the same period, there were 309 merger and acquisition transactions in the food sector, which was 13 percent of the total. Foreign capital also dominates merger and acquisition operations in the food sector, with 60 percent of the total. Multinational companies from Argentina, the United States, and the European Union were among the major acquirers of Brazilian food assets in the late 1990s.

Increased merger and acquisition activity in the Brazilian food sector led to a concentration movement of capital and denationalization (Farina and Viegas 2002). The share of food manufacturing multinationals in the value of food shipments increased from 19 percent in 1996 to 30 percent in 2000. In 1994, the top 10 food companies in Brazil had a combined market share of 28 percent. Among these companies, five were multinational food processors. In 2001, the aggregate market share of the top 10 food companies slightly decreased to 26 percent, but the number of multinational companies increased to eight. These eight large multinational firms controlled approximately 20 percent of the Brazilian food market, up from 13 percent in 1994.

CONCLUSIONS AND PUBLIC POLICY RECOMMENDATIONS

This chapter has evaluated the potential effects of the eventual implementation of an FTAA on bilateral trade and FDI in Brazil and the United States, focusing on the food industry. The chapter presented an overview of food industry size and structure in both countries and discussed specific food industry subsectors, including grains, meat, dairy, coffee, sugar, and orange juice.

We expect FDI growth in Brazil as a result of the FTAA, as well as increased agricultural output and sophistication of food consumption habits. If the FTAA is approved, U.S. food processors will be better positioned to acquire food assets in Brazil relative to European companies. Our analysis suggests that the meat, dairy, and sugar industries in Brazil offer the most attractive investment opportunities for multinational food companies in Brazil. These industries are still fragmented and domestic companies are industry leaders. In addition, U.S. food processors may further consolidate their food and agribusiness positions in the Brazilian grain and coffee industries. Due to their smaller size and imperfect access to growth capital, and also because they do not control dominant positions in domestic markets, Brazilian food processors probably will not be active in FDI even if the FTAA is implemented. More likely, Brazilian companies will increase agri-food exports to the United States but not FDI.

In addition, we expect that the FTAA will foster interorganizational collaboration between U.S. and Brazilian firms in order to combine their complementary assets and competencies. Due to their large size, U.S. food companies are able to benefit from scale and scope economies and perform high-value-added activities. Large U.S. food processors have also developed global brand names and marketing expertise. Brazilian firms have access to lower labor and agricultural input costs. They have also developed organizational competencies for vertically coordinating the domestic agricultural production chain—including origination in the grain industry, backward vertical coordination in the poultry and pork industries, and bulk transportation systems in the orange juice industry. These complementary resources among firms create opportunities not only for increased FDI, but also for bilateral trade.

Public Policy Recommendations

Public policies are not always Pareto improving, as they frequently generate winners and losers. The effective removal of trade barriers in the context of the FTAA would foster trade flows, FDI, and specialization in the affected countries. Consequently, consumers would benefit from lower food prices and higher-quality products. Nevertheless, domestic production of certain food products—particularly sugar and orange juice in the United States and dairy products in Brazil—would be affected by increased foreign competition. Inasmuch as private interest groups are better organized than consumers, the complete removal of trade barriers is not likely to happen. Taking these issues into account, we proceed with general policy recommendations, focusing on the complementary features of U.S. and Brazilian agri-food industries and the expected positive effects for both countries in domestic and international markets. The general guiding principles are the following:

1. Assessment of complementary competencies among agri-food industry participants in order to identify potential opportunities for interorganizational collaboration—including strategic alliances, joint ventures, and cross-holdings—between U.S. and Brazilian companies.
2. Facilitation of service, resource, and capital flows between the two countries as a means to foster FDI and cross-border interorganizational collaboration. For example, facilitating human capital mobility would allow for the combination of complementary competencies and organizational learning between U.S. and Brazilian companies.
3. Definition of public standards related to food quality and marketing, in particular, for perishable products such as dairy, meat, and fruits and vegetables. A transition period may be necessary to allow gradual adaptation by Brazilian firms operating in a loose institutional environment. Public financing may also be necessary for smaller firms to make the necessary investments to comply with new public standards.
4. Adoption of private standards related to the procurement of raw or semi-processed materials by food processors and retailers may create demand for public policy regarding financing and contract enforcement.
5. Identification of policy alternatives for gradually redirecting the domestic production of noncompetitive industries toward alternative uses of factors of production, including labor, capital, and natural resources.
6. Examination of trade opportunities not harmful to existing domestic production, such as new agri-food products and import substitution from other countries.
7. Inclusion on the agenda for FTAA negotiations the use of anti-dumping as a trade barrier. Both Brazil and the United States have used anti-dumping mea-

sures to protect domestic industries in the context of Mercosur and NAFTA, respectively.

8. Recognition of federal income and price support programs in the United States—in addition to the chirurgical protection of some agricultural sectors by means of trade barriers—as a particularly contentious point in FTAA negotiations. Policymakers interested in the positive net gains of the FTAA will need to be creative in overcoming this potential "deal breaker."

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Chapter 11

Food Security and the World Trade Organization: A Typology of Countries

Eugenio Díaz-Bonilla, Marcelle Thomas, Sherman Robinson, and Andrea Cattaneo

An important debate in the World Trade Organization (WTO) negotiations is whether further liberalization of trade and agricultural policies may help or hinder food security in WTO member countries. The issue of food security and agricultural negotiations in the WTO has been raised in relation to both industrial and developing countries. Richer countries that are net food importers are preoccupied with maintaining an adequate ratio between total domestic food production and the level of trade needed to satisfy food requirements at the national level. Developing countries are concerned about whether the current Agreement on Agriculture may help or hinder important policy objectives, such as elimination of poverty and hunger (as cause and consequence of food insecurity), and whether further negotiations would improve the existing text or compromise the attainment of those objectives in poor countries. These various claims and circumstances suggest the need for differentiating among the approaches and status of countries in relation to food security in general and the WTO negotiations in particular.

Currently, the main categories of countries considered by the WTO include developed countries, developing countries, and within the latter, least developed countries (LDCs) and net food importing developing countries (NFIDCs). No formal definition of the first two categories exists; the selection process works through self-identification and negotiation with other members. A country can be considered developing under some WTO legal texts but not under others, depending on the negotiations among member countries. As of January 2002, the WTO recognizes 144 members and 32 observers. More than 80 percent of the members and 90 percent of the observers are developing countries or were republics of the former Soviet Union. LDCs are defined by the General Assembly of the United Nations by three criteria: low income, human resource weakness, and economic vulnerability measures (UNCTAD 2001). Currently, 30 of the 49 LDCs have become WTO members, and 11 have been WTO observers (within the observers, nine countries are in the process of accession). The 19 NFIDCs were selected through a procedure that takes place in the Committee on Agriculture of the WTO. Countries wanting to be considered in that category must present data showing that they are net food importing countries; the other WTO members accept (or not) the petition based on that evidence.

Within the WTO legal framework, these categories have legal implications. For the coming negotiations to consider in detail food security concerns under WTO rules, two issues need to be addressed. The first is the relevance of the current classification of countries with respect to their food security status. Of these categories, only the NFIDCs are defined with respect to a particular food security indicator (that is, net food imports), although, as we argue below, it may not be the most appropriate.

The second issue is whether the current legal texts, which define WTO commitments on the basis of these categories of countries, really address the issue of food security through that differential treatment. Both questions are related: if the categories are badly defined for capturing food security concerns, then it is unlikely that differential treatment under WTO rules will deal with those concerns in a meaningful way. But even if these categories capture the variety in the situations of food (in)security, the question of the adequacy of current and future WTO rules and commitments to treat these differences must still be answered.

This chapter contributes to the first issue of the adequate classification of countries as an input to the second and separate discussion on the specific rights and obligations under the WTO and their implications for food security.[1] A classification of countries is presented using various dimensions of food security and clustering methods. A methodological innovation is the application of the theory of "fuzzy sets" in conjunction with more traditional methods of cluster analysis.

FOOD SECURITY INDICATORS AT THE NATIONAL LEVEL

Food security can be analyzed at the global, national, regional, household, and individual levels. Since the World Food Conference of 1974, definitions of food security have moved from global and national levels to household and individual levels, where the problem of food security takes a concrete human dimension (Maxwell 1996). At the same time, it was recognized that poverty and lack of income opportunities, rather than food supply per se, have been the main obstacles to access to food (Sen 1981). The 1996 World Food Summit included several of these components when it asserted that "food security exists when all people, at all times, have physical and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life" (FAO 1996).

But availability and access are only preconditions for adequate utilization of food. Food availability and even access do not determine unequivocally the more substantive issue of malnutrition or nutrition insecurity at the individual level, where other factors—such as health, women's education, and women's relative status in society—appear central (Smith and Haddad 2000). This chapter acknowledges that the deeper issue of nutrition insecurity requires analyses at the household and individual levels. Nonetheless, it takes a national perspective (the level at which the negotiating categories are defined) and focuses mainly on food availability issues using consumption, production, and trade measures (Table 11–1).

[1] Several of the issues on the legal obligations in the WTO are discussed in Díaz-Bonilla, Thomas, and Robinson (2002) and Diaz-Bonilla and others (2002).

Table 11–1

Food Security Indicators

Indicator	Description	Units	Source
CALCAP	Calories per capita per day	Calories	FAOSTAT 1999
PROTCAP	Protein per capita per day	Protein	FAOSTAT 1999
PRODCAP[a]	Food production per capita: total annual food production multiplied by the 1989–91 world price in U.S. dollars divided by total population of the corresponding year.	US$	FAOSTAT 1999
EXPTOIMP[b]	Ratio of total exports, including services, to food imports.	Ratio	FAOSTAT (1999) and World Development Indicators, World Bank (2000)
NAGRPOP	Share of nonagricultural population.	Ratio	FAOSTAT (1999) and World Development Indicators, World Bank (2000)

[a] FAO's definition of food includes cereals, oils, livestock products, as well as fruits, pulses, roots and tubers, other vegetables, cocoa, and sugar. It captures better the combined contribution of calories, protein, and micronutrients than narrower definitions of food, particularly those based only on cereals.

[b] This variable is usually measured as food imports over total exports. The inverse is used so that higher (lower) values of this variable indicate more (less) food security similarly to the other variables.

Note: Each indicator value is the average of the last five years of available data, which for most of the countries is 1993–97.

Calories and Protein per Capita

Calories and protein per capita measure average consumption levels at the national level. While national averages have limitations as indicators of household and individual food and nutrition security, Smith and Haddad (2000) show that aggregate calories (which they label food availability) are important in explaining changes in malnutrition as defined by anthropometric measures of children. This cluster analysis uses indicators for both calories and protein, thus improving on a calories-only measure.

Food Production per Capita

Food production per capita is an indicator of the ability of countries to feed themselves through domestic production. It considers both the notions of insurance and national autonomy advocated by some developed countries, and the more pressing concerns of poverty and hunger in developing countries.

Ratio of Total Exports to Food Imports

The ratio of total exports to food imports is an indicator of access to food. It measures the ability of countries to finance their food imports out of total export revenues, which include merchandise and services, such as tourism. This variable, which has been used in early studies of food security (Valdès and Konandreas 1981), is a better indicator of food security than the net food trade measure (that is, food exports minus food imports) used to determine the NFIDC category in the WTO. Whether a country is a food importer or exporter does not reflect how much of its export revenues it must allocate to access food imports, and consequently how vulnerable it may be to changes in food prices and international food availability.

This indicator also highlights the broader role of trade and the possible impact of trade negotiations on food security, which is not only the availability of food in world markets, but also the generation of export income to finance imports. The important issue is whether the negotiations have caused total exports to increase by more than the food import bill. A country whose food import bill goes up may still be less vulnerable if at the same time its total exports increase by a larger amount.

Urban Population Share

The share of nonagricultural population highlights the possible distributive impact between rural and urban populations caused by changes in trade and agricultural policies. Several developing countries have indicated their concern that further liberalization of agricultural and trade policies may create problems for their large agricultural populations, where poverty is still concentrated (WTO 2000a, 2000b). But at the same time, it is important to notice the shift in the locus of poverty, food insecurity, and malnutrition from rural to urban areas over the past several decades in some countries and more recently in others (Haddad, Ruel, and Garrett 1999; Garrett and Ruel 2000). Among other issues, urbanization in developing countries is raising new questions on the impact of trade policies on food security. Trade protection for food products is equivalent to a tax on food consumption, with the proceeds of that tax transferred to food producers, while agricultural liberalization (if domestic markets operate adequately) should result in a reduction in the tax burden for food consumers. Similar profiles of trade protection (or trade liberalization) will have different implications for developing countries with important contingents of the urban poor affected by food insecurity, than for poor countries where a majority of the population affected by poverty and food insecurity live in rural areas and work in agricultural production. Thus, while a higher value of the first four indicators (consumption per capita of calories and protein, food production per capita, and total exports per unit of food imports) is associated with greater food security, the ratio of urban population is somewhat more ambiguous in its implications.

CLUSTER ANALYSIS: DATA AND METHODOLOGY

This analysis uses a data set of 167 countries, including 133 WTO members (94 percent of the total) and 23 WTO observers (75 percent of the total), as well as 44 LDCs (90 percent of the LDCs), and all 18 NFIDCs defined under WTO rules. Clustering methods are used to derive food security profiles for the 167 countries based on the five measures of food security described in Table 11–1 (see Appendix II in Díaz-Bonilla and others 2000).[2]

Cluster analysis is a form of data dimensionality reduction that compacts information from an entire population or sample into information about specific, smaller groups (Hair and others 1998; Cherkassky and Mulier 1998). Although cluster analysis can be characterized as descriptive, atheoretical, and noninferential, some statistical aspects must be addressed: whether the sample data represent the population, whether multicollinearity exists, and whether outliers can be identified (Hair and others 1998). In this study, the sample is close to the whole population, so representation is not an issue. The degree of multicollinearity between calories per capita and protein per capita is higher than between the other variables, giving more weight to the consumption indicator, a desirable condition given its relevance to food security (see Table 1 in Díaz-Bonilla and others 2000). Finally, cluster analysis is very sensitive to the presence of outliers, which may result from extreme values of some of the variables or a unique combination of them. In this application, those outliers are identified early in the analysis and treated separately.

Two main issues in cluster analysis are how to form clusters, and how many clusters to form. Clustering methods can be classified into two general categories, hierarchical and nonhierarchical, depending on the algorithms used to form the clusters. A main difference is that in hierarchical methods, once an object is allocated to a cluster, it remains there for the whole exercise, while nonhierarchical methods allow for reclassification of objects as clusters are formed. All methods try to maximize the differences between clusters relative to the variation within the clusters as they are formed.[3]

The hierarchical algorithm is used first to determine the number of clusters. The method also helps to identify outliers and provides the corresponding cluster centers (country average values of the five indicators). The k-means, a nonhierarchical method, uses the cluster centers and number of clusters, computed previously, to define the food security profiles for each group of countries. It improves on the hierarchical method because it allows countries to be rearranged between clusters as clusters are formed. The fuzzy analysis helps resolve any remaining ambiguity between the individual country profile and the general structure of its cluster. While the k-means algorithm is deterministic (that is, countries are either in a cluster or they are not), the fuzzy algorithm allows degrees of membership in different clusters. Fuzzy cluster analysis incorporates what is called event ambiguity, a form of uncertainty different from well-defined, unambiguous events than can be random (Yen and Langari 1999). Fuzzy analysis measures the degree to which an event occurs, not whether it occurs. In this exercise, each cluster can be viewed as an event category, and every country, depending on the value of its indicators, will be a member of each cluster to a different degree (a value between 0 and 1). A country is classified in the cluster in which it has a dominant degree of membership. But in some cases, countries may have significant degrees of membership in more than one cluster.

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[2] Selection of variables is crucial because the derived clusters would only reflect the structure of the data as defined by those variables. In other words, two countries that belong to the same cluster are considered similar only with respect to the variables selected, but they may well be very different in terms of other variables not considered.

[3] A more detailed description of the clustering methods and how they are applied to this exercise can be found in Appendix I in Díaz-Bonilla and others (2000). The hierarchical and k-means methods were run using SPSS; the fuzzy method was programmed in the General Algebraic Modeling System, GAMS (see Brooke and others 1998), by Andrea Cattaneo following Ross (1995).

The k-means method provides the distance but not the direction of each country variable from its cluster's center. Conceivably, two countries may have similar k-mean indicators of distance, with one country leaning toward a more food secure profile and the other leaning toward a food insecure one. The fuzzy approach clarifies these ambiguities by showing the degree of membership in the clusters.

In all three methods, variables are converted to z-scores (subtracting the mean and dividing by the standard deviation) to avoid giving more weight to any one variable because of its unit of measure.

Because no statistical inference exists in clustering, the correct number of clusters cannot be determined by objective criteria, although a number of approaches have been suggested. One of the most common procedures is to evaluate the changes in the agglomeration coefficient, a measure of homogeneity between countries of the same cluster, using a dendrogram computed by the hierarchical algorithm.[4] The number of clusters selected is 12. The analysis shows that a lower number of clusters would have resulted in large decreases of homogeneity among members of the same cluster, and that a higher number would not have significantly improved homogeneity within clusters, except among clusters of developed countries, which are not the focus of this study. The results identify two outliers, Thailand and New Zealand (Díaz-Bonilla and others 2000).

All three methods classified 129 countries (78 percent) into the same cluster. The remaining 36 countries have the same cluster membership in two out of three methods, and no country is classified differently by each of the three clustering methods. Of the 36 countries for which only two methods agreed, 21 (58 percent) are classified similarly by the hierarchical and k-means approaches, while the remaining 15 are classified similarly by the fuzzy and k-means methods.

Countries are allocated to one of the 12 clusters where at least two of the three methods classified them. The next section analyzes the 12 clusters and uses the results of the fuzzy analysis to help clarify two questions. First, for the countries not classified unanimously by all three methods, what is the level of ambiguity in membership, and the direction in which they are ambiguous? Second, for the countries for which the three methods agree, are there cases of ambiguity that may have implications for food security analysis (for instance, a food neutral country with nontrivial membership in food insecure clusters)?

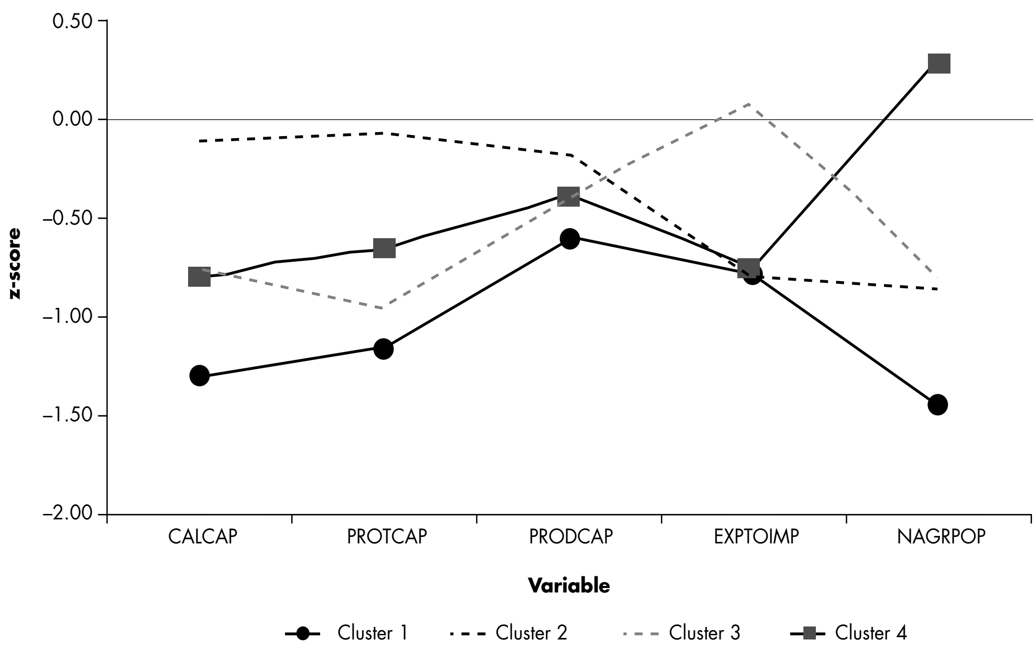
TYPOLOGY OF COUNTRIES

For each cluster identified by the cluster analysis, we computed average z-scores of the indicators and sorted the 12 clusters in ascending order by the average value of their indicators in three general categories of food security. In the first category, most of the food insecure clusters have centers for the variables falling below –0.5 (minus half a standard deviation from zero); Clusters 1 to 4 fall in this category (Figure 11–1). In the second

[4] A dendrogram is a chart that provides a graphical view of the agglomeration process and shows the increase of the agglomeration coefficient at each level of combination of clusters. At the start, when each country belongs to a separate cluster, the value of the coefficient is zero, and it increases as countries are combined in a smaller number of clusters (see Appendix III in Díaz-Bonilla and others 2000).

Figure 11–1

Food Insecure Groups



Source: Authors' calculations.

category, food neutral clusters have centers falling between –0.5 and +0.5 (plus or minus half a standard deviation around zero); Clusters 5 to 8 fall in this category (Figure 11–2). In the third category, food secure clusters have centers with values above +0.5 and include Clusters 9 to 12 (Figure 11–3).

Food Insecure Group

Cluster 1. Very Food Insecure Countries

Countries in Cluster 1 have the lowest levels of consumption measured in calories (1,983) and protein (49 grams) per capita, and the lowest food production per capita (US$82). Their food imports represent more than 20 percent of total export earnings, compared with the weighted average for the world, which is 6 percent. Thus, Cluster 1 countries are considered trade stressed. More than 75 percent of their population is rural (Table 11–2). This group includes 30 countries, all of which are LDCs, except Kenya, which the WTO classifies as an NFIDC. Most of the countries in this group are in Africa (23 countries). Twenty-one countries are WTO members and four are WTO observers (Table 11–3).

All three clustering methods include most of the countries in the same cluster. A few—Angola, Cambodia, Madagascar, Mali, Nepal, and Uganda—have a dominant de-

Table 11–2

Final Cluster Means

Cluster	CALCAP (calories)	PROTCAP (grams)	PRODCAP (US$)	EXPTOIMP ratio	Share of food imports to total exports (percent)	NAGRPOP ratio
1	1,982.9	48.6	81.8	4.9	20.4	0.23
2	2,229.2	58.8	117.6	5.3	19.0	0.71
3	2,244.6	52.6	120.3	14.1	7.1	0.41
4	2,581.5	70.8	157.2	4.8	20.8	0.39
5	2,602.3	66.5	210.4	11.3	8.8	0.75
6	2,672.9	72.8	124.1	19.8	5.0	0.41
7	2,976.1	82.7	135.1	9.1	11.0	0.82
8	2,827.7	78.4	233.3	25.6	3.9	0.83
9	3,231.3	100.1	254.2	18.6	5.4	0.88
10	3,271.8	97.7	304.2	35.9	2.8	0.93
11	3,303.7	103.3	520.6	17.7	5.7	0.93
12	3,374.1	107.5	923.9	32.7	3.1	0.93

Note: Share of food imports to total exports is the inverse of the indicator EXPTOIMP.

Source: Authors' calculations based on data from FAOSTAT (1999).

gree of membership in Cluster 3, which is also a food insecure cluster but has a lower burden of food imports (less trade stressed) than Cluster 1 (see the Appendix).

Cluster 2. Food Insecure Countries with an Urban Profile

Although Cluster 2 shows higher levels of consumption and production than Cluster 1, it is also consumption vulnerable and trade stressed. But these countries are less rural than those in other food vulnerable clusters, with more than 70 percent of the population classified as urban (Table 11–2). This raises the issue of urban food insecurity, which has its own special characteristics (see Garrett and Ruel 2000). Countries in Cluster 1 may be more concerned about food insecurity in the countryside and the impact of agricultural imports on poor agricultural producers. In countries with larger urban populations, and where conceivably an important percentage of poor and food insecure groups may be urban dwellers, policies aimed at agricultural trade protection have a clear trade-off: they may maintain higher incomes for poor producers, but they may also act as a tax on poor consumers (both effects depend on other policies and the interaction of markets and institutions).[5]

[5] The case of vulnerable rural groups that are net consumers of food must also be considered.

Among the 14 members of this cluster, two are LDCs and five are NFIDCs. Most members are Latin American countries or were republics of the former Soviet Union. Except for Tajikistan, all of the countries are either WTO members (11) or observers (2) (Table 11–3).

This cluster shows substantial convergence among the clustering methods; but for three countries—Botswana, the Dominican Republic, and Mongolia—the fuzzy clustering shows dominant membership in other clusters. For Botswana and Mongolia, the accumulated membership in food insecure clusters is dominant, so no ambiguity follows. The Dominican Republic has more than 40 percent membership in food neutral Clusters 5 and 6 against 43 percent in food insecure Cluster 2 (the Appendix). One reason for this ambiguity is that the Dominican Republic is the least trade stressed country in Cluster 2, with a food bill of about 7 percent of total exports (close to the average for the world and for developing countries). The Dominican Republic is considered an NFIDC in the WTO, but some of its food imports are linked to an expanding tourism industry, and may not necessarily reflect food security concerns. Still, this country has a total degree of membership in food insecure clusters of 54 percent, and therefore its classification is maintained.

Cluster 3. Food Insecure Countries with Consumption Vulnerability

Cluster 3 shares low consumption and production levels with Clusters 1 and 2 (2,245 calories and 53 grams of protein per capita per day), and a large rural population with Cluster 4 (around 60 percent). But the burden of the food bill, which is around 7 percent of total exports, is within the intermediate level (Table 11–2). This cluster can be characterized as consumption vulnerable but trade neutral (Figure 11–1). Four of the 17 countries in Cluster 3 are LDCs and two are NFIDCs. All are members or observers of the WTO, including eight developing countries in Africa, seven in Asia and the Pacific, and two in Latin America (Table 11–3). Three countries in the Cairns Group—Bolivia, Guatemala, and the Philippines—appear in this group.[6]

The majority of countries in this cluster are classified differently by at least two methods. For Bolivia, Côte d'Ivoire, Ghana, Guatemala, Papua New Guinea, Solomon Islands, and Sri Lanka, the ambiguity in classification is within the food insecure clusters and therefore does not lead to an ambiguity in their food insecure profile (the Appendix).

In the case of India, Namibia, the Philippines, and Vietnam, the fuzzy method gives them dominant membership in Cluster 6, a food neutral cluster. Except for the Philippines, these countries are all net food exporters and the incidence of the food bill on total exports (trade stress) is low for all of them: 4.5 percent for India, 5.3 percent for Vietnam, and about 6 percent for Namibia and the Philippines. These countries exemplify a possible policy dilemma. That is, because they are not trade stressed, they could expand food imports to improve their low levels of consumption; but at the same time, they would be concerned about the impact of additional food imports on their large poor agricultural populations. All in all, two out of three methods classify them as food

[6] The Cairns Group is a negotiating bloc of 17 agricultural exporting countries: Argentina, Australia, Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Fiji, Guatemala, Indonesia, Malaysia, New Zealand, Paraguay, the Philippines, South Africa, and Uruguay.

Table 11–3

Country Membership in Clusters 1 to 12

	Cluster	Description	Less developed countries	Net food importing developing countries	Others
Food insecure groups	1. (30)	WTO members	Angola, Bangladesh, Burkina Faso, Burundi, Central African Republic, Chad, Democratic Republic of Congo, Gambia, Guinea, Guinea-Bissau, Haiti, Madagascar, Malawi, Mali, Mozambique, Niger, Rwanda, Sierra Leone, United Republic of Tanzania, Uganda	Kenya	
		WTO observers	Cambodia, Ethiopia, Nepal, Yemen		
		Others	Afghanistan, Comoros, Eritrea, Liberia, Somalia		
	2. (14)	WTO members	Djibouti, Lesotho	Botswana, Cuba, Dominican Republic, Honduras, Peru	El Salvador, Georgia, Mongolia, Nicaragua
		WTO observers			Armenia, Azerbaijan
		Others			Tajikistan
	3. (17)	WTO members	Solomon Islands, Togo, Zambia	Côte d'Ivoire, Sri Lanka	Bolivia, Cameroon, Republic of Congo, Ghana, Guatemala, India, Namibia, Papua New Guinea, Philippines, Zimbabwe
		WTO observers	Laos		Vietnam
		Others			
	4 . (13)	WTO members	Benin, Mauritania, Senegal	Pakistan, Saint Lucia	Albania, Grenada, Saint Kitts and Nevis, Saint Vincent/Grenadines
		WTO observers	Sudan, Vanuatu		Seychelles
		Others	Kiribati		

Food neutral groups	5. (18)	WTO members		Jamaica, Trinidad and Tobago, Venezuela	Belize, Brazil, Colombia, Costa Rica, Ecuador, Fiji Islands, Guyana, Kyrgyzstan, Nigeria, Paraguay, Suriname, Swaziland
		WTO observers			Croatia, Macedonia (the Former Yug. Rep.), Uzbekistan
		Others			
	6. (5)	WTO members	Myanmar		Antigua and Barbuda, Gabon, Indonesia
		WTO observers			China
		Others			
	7 (14).	WTO members	Maldives	Barbados, Egypt, Mauritius, Morocco, Tunisia	Brunei Darussalam, Dominica, Estonia, Jordan, Kuwait, Macau, Mexico
		WTO observers	Cape Verde		Algeria, Lebanon, Russian Federation, Saudi Arabia
		Others			Bahamas, Islamic Republic of Iran, Libyan Arab Jamahiriya, Syrian Arab Republic
	8. (9)	WTO members			Bulgaria, Chile, Republic of Korea, Latvia, Malaysia, Republic of Moldova, Panama, Slovakia, South Africa
		WTO observers			
		Others			

(Continued on next page.)

Table 11–3 *(continued)*

Country Membership in Clusters 1 to 12

	Cluster	Description	Less developed countries	Net food importing developing countries	Others
Food secure groups	9 . (16)	WTO members			Czech Republic, Germany, Iceland, Israel, Japan, Lithuania, Malta, Poland, Portugal, Romania, Slovenia, Turkey, United Arab Emirates, United Kingdom
		WTO observers			Belarus, Kazakhstan
		Others			
	10. (9)	WTO members			Austria, China—Hong Kong SAR, Finland, Hungary, Norway, Sweden, Switzerland, United States
		WTO observers			Ukraine
		Others			
	11. (9)	WTO members			Argentina, Belgium-Luxembourg, Canada, France, Greece, Italy, Netherlands, Spain, Uruguay
		WTO observers			
		Others			
	12. (3)	WTO members			Australia, Denmark, Ireland
		WTO observers			
		Others			
	Outliers (2)	WTO members			New Zealand, Thailand

Source: Authors' classification based on results from the cluster analysis.

insecure (in this case, the hierarchical and k-means methods), and all four countries are retained in food insecure Cluster 3.

Cluster 4. Food Insecure Countries with Trade Stress

In contrast to Cluster 3, Cluster 4 has the opposite profile: higher consumption levels (2,581 calories and 71 grams of protein), but also a heavier trade burden with a food bill of almost 21 percent of total exports (Table 11–2). Cluster 4 has 13 members, including six LDCs and two NFIDCs.[7] All the countries except one, Kiribati, are WTO members or observers (Table 11–3). Although the inclusion of some larger countries in this group—such as Pakistan, Sudan, and Senegal—conforms to the notion of having intermediate consumption but being trade stressed, the classification of some small islands in the Caribbean and the Pacific in this group is less clear and has to be approached with caution. Some of these countries show important membership (from the fuzzy clustering results) in food neutral Clusters 5 to 7 (the Appendix). Another consideration is that agricultural production data may not be reliable and do not include fisheries, which for some of the islands may represent an important component of production. In addition, the tourism industry has an impact on the external food balance, and receipts from tourism services may not be properly reflected in balance of payments accounts. Finally, the distinction between rural and urban population may not be relevant for a small island.

Of the countries classified by only two methods, Albania shows the greatest levels of ambiguity. The fuzzy method places this country outside its general group of food insecure clusters, in Cluster 7, a food neutral group (the Appendix). Albania's profile combines relatively higher levels of consumption of calories and protein than the average for Cluster 4, with a substantial level of trade stress (see country data in Appendix II in Díaz-Bonilla and others 2000). That profile is similar to Cluster 7, where higher consumption is combined with borderline trade-stress value. Still, Albania's high trade vulnerability justifies its final classification in food insecure Cluster 4.

Food Neutral Clusters

Indicators of food neutral Clusters 5 to 8 have z-scores in the –0.5 to +0.5 range. Some values are above +0.5, such as consumption and urban population in Cluster 7, and trade ratios in Clusters 6 and 8 (Figure 11–2). All clusters in the group are urban, except Cluster 6, which includes China. All of the clusters show calorie and protein consumption and production per capita greater than Clusters 1, 2, and 3. The range is from 2,600 calories and 66 grams of protein in Cluster 5 to 2,976 calories and 83 grams in Cluster 7. Clusters 5 to 8 are less trade stressed than Clusters 1, 2, and 4, particularly Clusters 6 and 8, which have a food bill at or below 5 percent of total exports (Table 11–2).

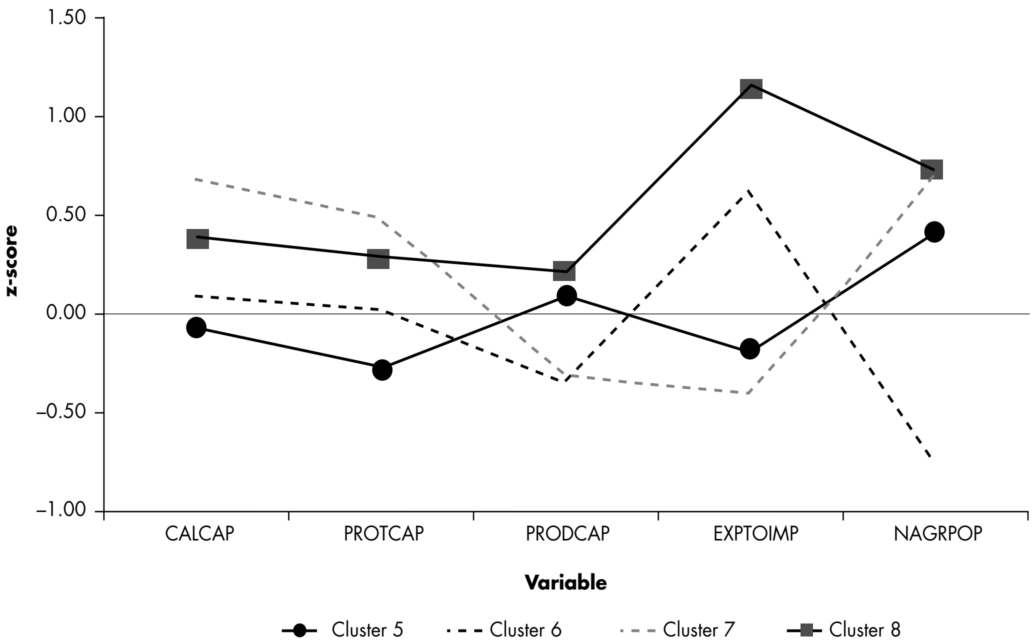
Cluster 5. Average Food Neutral Countries

In Cluster 5, average values for the five variables are close to the 0 level, the mean of the z-scores (Figure 11–2). The cluster includes three NFIDCs and five countries that are mem-

[7] In 2001, Senegal was classified as an LDC, and is counted as such in this classification instead of as an NFIDC.

Figure 11–2

Food Neutral Groups



Source: Authors' calculations.

bers of the Cairns Group (Brazil, Colombia, Costa Rica, Fiji, and Paraguay). All the countries are members or observers in the WTO (Table 11–3).

All 18 countries in this cluster are classified identically by all three methods, with the exception of Ecuador and Trinidad and Tobago. Although classified in different clusters by one of the methods, these two countries remain within the general group of food neutral countries. Although Kyrgyzstan, Swaziland, and Uzbekistan have some degree of membership in food insecure groups, they are classified unanimously by all three methods, and show more than 60 percent membership in food neutral clusters. The composition of Cluster 5 appears to reflect correctly intermediate levels of food security.

Cluster 6. Rural and Trade Secure Food Neutral Countries

Cluster 6 has levels of consumption of calories and protein slightly above average, is not trade stressed, and is rural. China is in Cluster 6, which clearly has the profile of a food neutral cluster. All the countries in this group are WTO members. Myanmar is the only LDC (Table 11–3). Indonesia is a member of the Cairns Group.

Fuzzy clustering classifies India as a food neutral country in Cluster 6, while the other two methods include India in Cluster 3, a food insecure cluster (the Appendix). India and China both have large shares of rural population and low food bills relative to total exports, but India's consumption and production indicators are similar to food insecure groups, while China has the consumption and production indicators of a food neutral profile. So India remains in Cluster 3. For the small number of remaining countries (Antigua and Barbuda, Gabon, Indonesia, and Myanmar), the fuzzy analysis confirms their inclusion in a food neutral cluster.

Cluster 7. Food Neutral Countries with High Consumption and Trade Stress

Cluster 7 includes 22 countries, of which two are LDCs and five are NFIDCs. Most of the countries are either developing or transition economies (Table 11–3). World Bank (2000) places four of the countries in the high-income category: the Bahamas, Brunei, Kuwait, and Macau. Relative to other food neutral clusters, Cluster 7 combines high consumption levels, similar to food secure clusters, but also a heavy incidence of the food bill.

The level of trade stress is an issue for some of the countries in this cluster. Although the food import bill for the group on average is around 11 percent of total exports, some countries have a high to very high food import bill. This is the case for Cape Verde and Maldives (both LDCs), Lebanon (neither an LDC nor an NFIDC), and Egypt (an NFIDC), Dominica, Jordan, and Algeria.

With such levels of trade stress, should these countries be considered food insecure rather than food neutral? Given their high levels of consumption of calories and protein, in some cases comparable to food secure countries, and that they are less rural, the clustering algorithms classify these trade stressed countries in Cluster 7 because the grouping depends on the combined variables. Clearly, if two groups of countries have similar levels of trade stress, the group with middle to lower consumption will be more vulnerable than the group with higher consumption. Among those countries with high trade stress, Cape Verde and Maldives, the two LDC countries, also have the largest membership in food insecure clusters (about 15 and 35 percent, respectively).

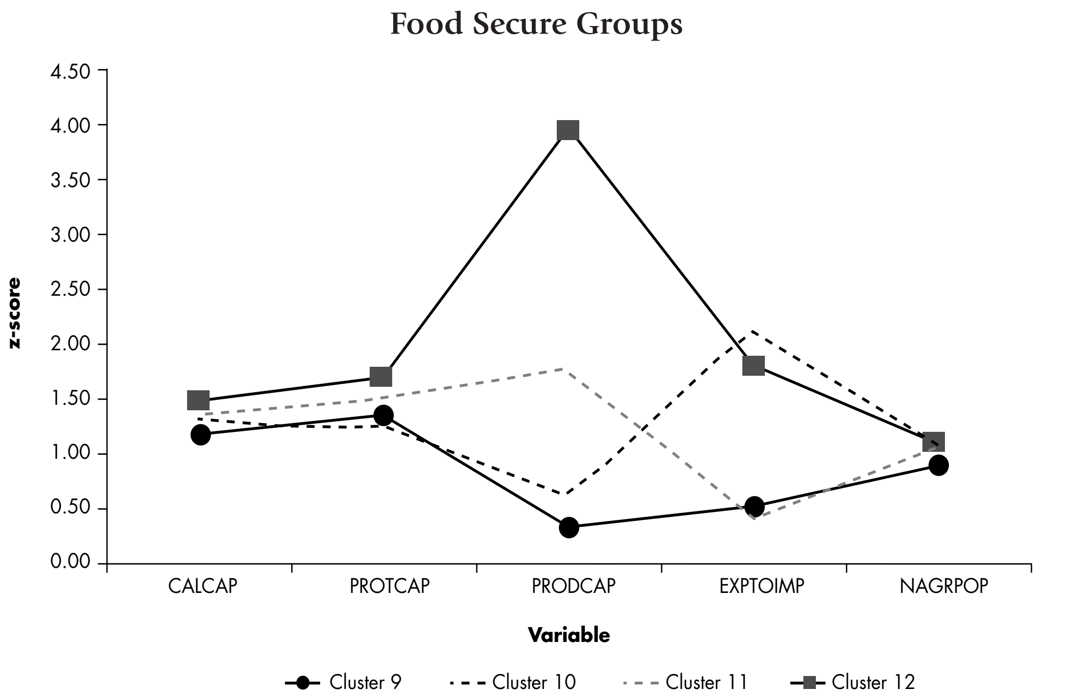
Cluster 8. Urban and Trade Secure Food Neutral Countries

Finally, among the food neutral clusters, Cluster 8 is the most food secure with higher levels for all indicators than Clusters 5, 6, and 7. In Cluster 8, all nine countries are members of the WTO; Chile, Malaysia, and South Africa belong to the Cairns Group; and Thailand, which is treated as an outlier because it has the lowest food import bill (less than 2 percent) but otherwise would be in Cluster 8, is also a member of the Cairns Group.

Food Secure Group: Clusters 9 to 12

Finally, Clusters 9 to 12 are food secure, with z-scores for most of the variables greater than +0.5, that is, consumption in excess of 3,200 calories and 97 grams of protein; production per capita above US$254; food import bills between 3 and 6 percent of total exports (that is, these countries are trade secure); and population that is greater than 88 percent urban (Figure 11–3). The main difference among these clusters is the level of production per capita, which ranges between US$254 for Cluster 9 and US$924 for Cluster 12 (Table 11–2). These groups have levels of consumption and production as well as a trade ratio for food imports that seem to provide more than enough margin to achieve food security under any likely event, domestic or international. The clusters are labeled food secure countries with intermediate production and trade indicators (Cluster 9); food secure coun-

Figure 11–3



Source: Authors' calculations.

tries with intermediate production (Cluster 10); food secure countries with intermediate trade indicators (Cluster 11); and very food secure countries (Cluster 12).

All industrial countries (considered in the category of high-income OECD countries by the World Bank) fall in food secure clusters, as well as some developing countries and former socialist countries, labeled middle-income countries by the World Bank. All European Union members are in food secure clusters, as well as all the applicants for future membership, except for Bulgaria, Latvia, Slovakia (all in Cluster 8, the more food secure of the food neutral clusters), and Estonia, which is in Cluster 7. Two industrial members, Australia and Canada, and two developing countries, Argentina and Uruguay, belong to the Cairns Group. New Zealand, which would be classified in Cluster 12 but was identified as an outlier because of its very high level of production per capita (US$1,589), is also a member of the Cairns Group. It is interesting to note that, considering Cluster 12 and New Zealand, the four very food secure countries are divided equally between the Cairns Group and the European Union (Table 11–3). These four food secure clusters appear to be robust in membership and profiles across clustering methods.

CONCLUSIONS

Based on the variables described in Table 11–1, identifying similarity in the food security profiles of groups of countries should allow for a more differentiated analysis of possible situations of food (in)security. It is also relevant for the grouping of countries in possible negotiating positions.

The results have implications for the two issues identified in the introduction: the usefulness of the categories currently utilized in the WTO to discuss food security concerns, and the relationship between the definition of appropriate grouping of food (in)secure countries and WTO commitments, both current and future. As mentioned, this chapter concentrates on the first issue, while the implications of the cluster analysis for the legal obligations in the WTO are discussed in a separate paper (Díaz-Bonilla and others 2002).

The main conclusion is that some of the categories used by the WTO appear inadequate to capture food security concerns. The most obvious case is the developing countries category. For some time there has been concern in the General Agreement on Tariffs and Trade and now in the WTO about the wide variety of countries that are self-identified as developing countries. Those concerns are borne out by this analysis, where developing countries appear scattered across all levels of food (in)security, except in the highest food secure level, Cluster 12. Another category with a weak correlation with food security indicators is that of NFIDCs: only 10 of the 18 countries in this group are classified in food insecure clusters.

Being a net food importer appears to be only a weak indicator of food vulnerability. Venezuela, for instance, a net food importer that is also a large oil exporter, has a food bill of around 5 percent of total exports, below the average for developing countries. Another oil exporting NFIDC is Trinidad and Tobago. In both cases, high levels of food imports only reflect the comparative advantage of their production structure. In addition, some countries may be net food importers because they have a dominant tourist industry. For example, Barbados has an income of US$7,000 per capita, the highest of all the NFIDCs. In any case, the seven NFIDCs considered here in the food neutral group (excluding Egypt) have food imports that represent about 9 percent of total exports, while for the food insecure NFIDCs (including Egypt), the average is greater than 16 percent.

Although being an NFIDC may not be a good indicator of serious food security problems, it does not mean that this category of countries should be dismissed. This classification, negotiated during the Uruguay Round, has implications under the Ministerial Decision on LDCs and NFIDCs, and constitutes an acquired right.[8] The current membership in NFIDCs does not have to be changed and it certainly remains valid for other goals of the Ministerial Decision separate from food security considerations. But addressing the latter concerns requires a more precise approach based on specific indicators, such as the ones suggested here.

By contrast, the LDC category mainly corresponds to countries suffering from food insecurity, although this issue is not explicit in its definition. Only three out of the 44 LDCs covered in this study are not in food insecure Clusters 1 to 4: Cape Verde, Maldives, and Myanmar. These countries have income per capita four to six times greater than the average for LDCs, which is US$235 (UNCTAD 2000). Still, Cape Verde and Maldives are two of the most trade stressed countries in Cluster 7, and have nontrivial (although not

[8] This issue was the subject of a special Ministerial Decision agreed during the Uruguay Round negotiations. It is called the "Decision on Measures Concerning the Possible Negative Effects of the Reform Program on Least-developed and Net Food-Importing Developing Countries" (GATT 1994, pp. 448–49).

dominant) membership in food insecure clusters. This analysis would exclude only Myanmar from the countries with clear food security problems.

However, some countries that are neither LDCs nor NFIDCs have a food security profile similar to the more vulnerable ones—for example, El Salvador, Georgia, Mongolia, and Nicaragua (all WTO members). Limiting the special and differential treatment related to food security problems only to LDCs or NFIDCs would leave them out.

For the WTO negotiations, the analysis presented here suggests that defining specific rights and obligations in the WTO using the category of LDCs appears an appropriate starting point, although food security issues are not part of the criteria for the definition of an LDC. A possible approach would be to consider for special treatment under food security provisions both LDCs as defined by the United Nations plus all other countries classified as food insecure according to some objective indicators, such as those used here. Without having to resort to formal cluster analysis, a more limited approach would be to use the consumption of calories and protein per capita as indicators of consumption vulnerability, and the food import bill as a percentage of all exports (merchandise and services) as an indicator of trade stress in order to identify the countries most at risk. Values of the indicators computed from an average of the last three to five years would yield z-scores below –0.5 (around 2,380 calories and 62 grams of protein per day per capita, and about 13 percent for the food import bill over total exports).[9] Countries would move in and out of the food insecure category so defined, depending on their performance.

Those food insecure countries would receive treatment similar to LDCs for rights and obligations related to domestic support and their own market access. And they would be considered for the food aid, financial support, and technical assistance envisaged in the Ministerial Decision on possible negative effects of the agricultural reform program on LDCs and NFIDCs. The issue of special access to other countries' markets for LDCs, and the additional benefits conferred on LDCs because of reasons other than food security, would still be limited only to the countries specified by the United Nations. The quantitative limits suggested would help differentiate developing countries that may need special treatment in terms of food security from those that do not.

It is also relevant to ask about the food security situation of the developed countries. Several developed countries have advanced the notion of food security as part of the multifunctionality of agriculture or, more generally, among nontrade concerns (Norway 1998). However, our typology confirms the common sense perception that all developed countries are food secure. The term food security appears to have a very different meaning in developed and developing countries. For policy implications and the agricultural negotiations, maintaining the same label for two altogether different situations only obscures the issues being negotiated. The discussion of food security should be limited to the vulnerability of developing countries.

[9] The corresponding values are computed using the mean and standard deviation of the population of 167 countries: 2,635 and 502, respectively, for calories per capita; 72 and 20 for grams of protein per capita; and 13 and 10 for the ratio of total exports to food imports.

Appendix

Degree of Membership in Fuzzy Clustering by Country

Country	1	2	3	4	5	6	7	8	9	10	11	12
Afghanistan	**0.9512**	0.0306	0.0075	0.0060	0.0014	0.0020	0.0005	0.0003	0.0002	0.0001	0.0001	0.0000
Albania	0.0151	0.0195	0.0503	0.1940	0.0946	0.0545	**0.4190**	0.0387	0.0737	0.0106	0.0277	0.0024
Algeria	0.0007	0.0010	0.0066	0.0085	0.0301	0.0042	**0.9362**	0.0047	0.0063	0.0006	0.0011	0.0001
Angola	0.2885	**0.6626**	0.0140	0.0134	0.0045	0.0127	0.0015	0.0014	0.0006	0.0004	0.0003	0.0001
Antigua and Barbuda	0.0237	0.0824	0.0428	0.2581	0.0455	**0.4928**	0.0229	0.0184	0.0075	0.0030	0.0023	0.0005
Argentina	0.0018	0.0030	0.0052	0.0060	0.0146	0.0105	0.0196	0.0701	0.0936	0.2343	**0.4495**	0.0919
Armenia	0.0077	0.0082	**0.8805**	0.0183	0.0613	0.0085	0.0082	0.0038	0.0019	0.0006	0.0007	0.0002
Australia	0.0020	0.0030	0.0036	0.0040	0.0065	0.0066	0.0071	0.0179	0.0177	0.0680	0.0352	**0.8285**
Austria	0.0002	0.0003	0.0005	0.0006	0.0014	0.0012	0.0025	0.0102	0.0207	**0.9371**	0.0218	0.0035
Azerbaijan	0.0009	0.0011	**0.9826**	0.0045	0.0082	0.0012	0.0008	0.0003	0.0002	0.0000	0.0001	0.0000
Bahamas	0.0049	0.0082	0.0999	0.0267	**0.5587**	0.0354	0.1560	0.0678	0.0305	0.0060	0.0052	0.0007
Bangladesh	**0.6648**	0.2422	0.0454	0.0282	0.0062	0.0094	0.0017	0.0011	0.0005	0.0002	0.0002	0.0001
Barbados	0.0008	0.0012	0.0058	0.0051	0.0334	0.0057	**0.8055**	0.0292	0.1018	0.0043	0.0069	0.0004
Belarus	0.0004	0.0008	0.0017	0.0021	0.0080	0.0052	0.0188	0.2847	**0.5221**	0.1266	0.0285	0.0011
Belgium-Luxembourg	0.0001	0.0001	0.0002	0.0002	0.0005	0.0003	0.0016	0.0017	0.0132	0.0033	**0.9781**	0.0007
Belize	0.0123	0.0223	0.0885	0.1122	**0.3822**	0.0842	0.1495	0.0768	0.0370	0.0108	0.0213	0.0029
Benin	0.0147	0.0290	0.0420	**0.8892**	0.0086	0.0126	0.0022	0.0009	0.0004	0.0001	0.0002	0.0000
Bolivia	0.0297	0.1016	**0.5582**	0.1316	0.0812	0.0801	0.0076	0.0061	0.0019	0.0008	0.0008	0.0002
Botswana	0.0215	0.0472	**0.4096**	0.3368	0.0856	0.0750	0.0132	0.0066	0.0027	0.0009	0.0009	0.0002
Brazil	0.0023	0.0047	0.0226	0.0202	**0.3998**	0.0368	0.2072	0.2290	0.0548	0.0092	0.0124	0.0010
Brunei Darussalam	0.0036	0.0063	0.0320	0.0186	0.1899	0.0352	**0.3338**	0.2171	0.1329	0.0180	0.0116	0.0011

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Appendix *(continued)*

Degree of Membership in Fuzzy Clustering by Country

Country	1	2	3	4	5	6	7	8	9	10	11	12
Bulgaria	0.0010	0.0019	0.0076	0.0063	0.0747	0.0134	0.0847	**0.6274**	0.1510	0.0154	0.0157	0.0009
Burkina Faso	**0.3277**	0.2321	0.0383	0.3133	0.0176	0.0470	0.0109	0.0056	0.0035	0.0016	0.0018	0.0005
Burundi	**0.9044**	0.0660	0.0072	0.0129	0.0023	0.0045	0.0010	0.0007	0.0004	0.0002	0.0002	0.0001
Cambodia	0.1507	**0.8410**	0.0023	0.0033	0.0006	0.0017	0.0002	0.0001	0.0001	0.0000	0.0000	0.0000
Cameroon	0.0347	**0.7751**	0.0333	0.0299	0.0138	0.1044	0.0029	0.0037	0.0011	0.0006	0.0004	0.0001
Canada	0.0014	0.0023	0.0040	0.0042	0.0111	0.0083	0.0139	0.0697	0.0756	**0.5734**	0.1752	0.0609
Cape Verde	0.0068	0.0093	0.0615	0.0715	0.1505	0.0279	**0.6203**	0.0204	0.0218	0.0036	0.0058	0.0006
Central African Republic	**0.7918**	0.1957	0.0036	0.0050	0.0009	0.0022	0.0003	0.0002	0.0001	0.0001	0.0001	0.0000
Chad	**0.8460**	0.1398	0.0034	0.0067	0.0009	0.0024	0.0003	0.0002	0.0001	0.0001	0.0001	0.0000
Chile	0.0001	0.0001	0.0003	0.0003	0.0027	0.0014	0.0014	**0.9899**	0.0022	0.0011	0.0003	0.0000
China	0.0114	0.0403	0.0203	0.2102	0.0369	**0.6164**	0.0276	0.0212	0.0086	0.0036	0.0029	0.0006
China, Hong Kong SAR	0.0047	0.0083	0.0141	0.0140	0.0363	0.0352	0.0605	0.2171	0.2121	**0.3535**	0.0376	0.0066
Colombia	0.0005	0.0013	0.0275	0.0047	**0.9479**	0.0095	0.0042	0.0032	0.0007	0.0002	0.0002	0.0000
Comoros	**0.9899**	0.0074	0.0010	0.0010	0.0002	0.0004	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000
Congo, Dem. Rep. of	**0.6339**	0.2758	0.0357	0.0234	0.0088	0.0148	0.0028	0.0023	0.0010	0.0006	0.0005	0.0002
Congo, Republic of	0.1022	**0.3892**	0.2962	0.0666	0.0470	0.0790	0.0079	0.0071	0.0024	0.0012	0.0009	0.0003
Costa Rica	0.0022	0.0048	0.0300	0.0205	**0.7619**	0.0409	0.0523	0.0681	0.0122	0.0032	0.0035	0.0004
Côte d'Ivoire	0.0389	0.2101	0.1381	**0.3087**	0.0663	0.2130	0.0119	0.0079	0.0026	0.0012	0.0010	0.0003
Croatia	0.0036	0.0081	0.0805	0.0161	**0.7394**	0.0481	0.0260	0.0632	0.0087	0.0035	0.0023	0.0004
Cuba	0.0066	0.0084	**0.8090**	0.0252	0.1195	0.0110	0.0122	0.0044	0.0021	0.0007	0.0008	0.0002

Czech Republic	0.0004	0.0007	0.0015	0.0016	0.0060	0.0040	0.0112	0.1510	0.2254	**0.5584**	0.0380	0.0018
Denmark	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0001	0.0001	0.0002	0.0003	0.0008	**0.9983**
Djibouti	0.0404	0.0392	**0.7569**	0.0395	0.0721	0.0235	0.0133	0.0080	0.0036	0.0016	0.0016	0.0004
Dominica	0.0036	0.0057	0.0239	0.0452	0.1216	0.0246	**0.6313**	0.0420	0.0677	0.0069	0.0261	0.0014
Dominican Republic	0.0173	0.0455	**0.4310**	0.0431	0.3006	0.1040	0.0198	0.0270	0.0060	0.0030	0.0021	0.0005
Ecuador	0.0080	0.0278	0.0513	0.0365	0.2170	**0.4526**	0.0312	0.1478	0.0136	0.0089	0.0042	0.0010
Egypt	0.0025	0.0038	0.0110	0.0306	0.0359	0.0164	**0.8251**	0.0184	0.0423	0.0041	0.0094	0.0006
El Salvador	0.0059	0.0114	**0.5807**	0.1500	0.1959	0.0312	0.0177	0.0043	0.0018	0.0005	0.0005	0.0001
Eritrea	**0.9263**	0.0503	0.0075	0.0085	0.0019	0.0034	0.0008	0.0006	0.0003	0.0002	0.0002	0.0001
Estonia	0.0027	0.0043	0.0203	0.0191	0.1122	0.0202	**0.3460**	0.1126	0.3075	0.0154	0.0381	0.0017
Ethiopia	**0.9731**	0.0203	0.0018	0.0028	0.0005	0.0010	0.0002	0.0001	0.0001	0.0000	0.0000	0.0000
Fiji Islands	0.0047	0.0108	0.0413	0.1777	**0.3326**	0.1347	0.2348	0.0389	0.0169	0.0032	0.0041	0.0004
Finland	0.0000	0.0001	0.0001	0.0001	0.0003	0.0003	0.0004	0.0047	0.0029	**0.9899**	0.0010	0.0002
France	0.0001	0.0001	0.0002	0.0003	0.0006	0.0004	0.0014	0.0019	0.0087	0.0055	**0.9776**	0.0032
Gabon	0.0035	0.0127	0.0142	0.0205	0.0406	**0.8275**	0.0141	0.0542	0.0071	0.0038	0.0015	0.0003
Gambia	**0.7156**	0.1815	0.0179	0.0641	0.0051	0.0110	0.0023	0.0012	0.0007	0.0003	0.0003	0.0001
Georgia	0.0019	0.0025	**0.8948**	0.0132	0.0752	0.0041	0.0054	0.0016	0.0008	0.0002	0.0003	0.0000
Germany	0.0002	0.0003	0.0008	0.0009	0.0034	0.0013	0.0157	0.0177	**0.8815**	0.0128	0.0648	0.0006
Ghana	0.0570	0.1885	0.1283	**0.4603**	0.0457	0.0984	0.0117	0.0057	0.0023	0.0010	0.0010	0.0002
Greece	0.0010	0.0014	0.0029	0.0040	0.0068	0.0037	0.0210	0.0113	0.0600	0.0134	**0.8663**	0.0083
Grenada	0.0028	0.0047	0.0067	**0.9676**	0.0053	0.0076	0.0035	0.0008	0.0005	0.0002	0.0002	0.0000
Guatemala	0.0182	0.0633	0.1544	**0.6822**	0.0268	0.0472	0.0043	0.0021	0.0008	0.0003	0.0003	0.0001
Guinea	**0.7281**	0.2072	0.0107	0.0382	0.0035	0.0087	0.0016	0.0009	0.0005	0.0003	0.0003	0.0001
Guinea-Bissau	**0.4606**	0.2294	0.0401	0.2102	0.0147	0.0293	0.0075	0.0036	0.0021	0.0010	0.0011	0.0003
Guyana	0.0005	0.0012	0.0201	0.0044	**0.9528**	0.0072	0.0059	0.0058	0.0012	0.0003	0.0003	0.0001

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Appendix *(continued)*

Degree of Membership in Fuzzy Clustering by Country

Country	1	2	3	4	5	6	7	8	9	10	11	12
Haiti	**0.9245**	0.0440	0.0142	0.0094	0.0025	0.0032	0.0009	0.0006	0.0003	0.0002	0.0002	0.0001
Honduras	0.0039	0.0088	**0.9179**	0.0332	0.0236	0.0092	0.0019	0.0009	0.0003	0.0001	0.0001	0.0000
Hungary	0.0005	0.0010	0.0016	0.0019	0.0052	0.0045	0.0083	0.0579	0.0562	**0.8037**	0.0531	0.0061
Iceland	0.0008	0.0013	0.0028	0.0034	0.0089	0.0055	0.0265	0.0484	**0.7545**	0.0756	0.0699	0.0024
India	0.0063	0.0564	0.0113	0.0184	0.0124	**0.8830**	0.0032	0.0061	0.0013	0.0009	0.0004	0.0001
Indonesia	0.0024	0.0087	0.0098	0.0223	0.0360	**0.8612**	0.0181	0.0322	0.0055	0.0024	0.0012	0.0002
Iran, Islamic Rep. of	0.0013	0.0024	0.0194	0.0286	0.3503	0.0169	**0.5543**	0.0146	0.0090	0.0012	0.0018	0.0002
Ireland	0.0004	0.0006	0.0008	0.0010	0.0015	0.0012	0.0019	0.0028	0.0040	0.0057	0.0177	**0.9623**
Israel	0.0001	0.0002	0.0004	0.0004	0.0015	0.0007	0.0060	0.0082	**0.9605**	0.0085	0.0133	0.0003
Italy	0.0002	0.0002	0.0005	0.0007	0.0016	0.0008	0.0061	0.0058	0.1122	0.0105	**0.8603**	0.0011
Jamaica	0.0001	0.0002	0.0073	0.0017	**0.9849**	0.0013	0.0035	0.0007	0.0002	0.0001	0.0001	0.0000
Japan	0.0014	0.0024	0.0084	0.0074	0.0426	0.0138	0.1590	0.1867	**0.5387**	0.0233	0.0153	0.0009
Jordan	0.0021	0.0032	0.0422	0.0203	0.3320	0.0123	**0.5524**	0.0165	0.0139	0.0019	0.0029	0.0003
Kazakhstan	0.0004	0.0008	0.0016	0.0023	0.0067	0.0054	0.0190	0.1226	**0.6862**	0.1223	0.0314	0.0012
Kenya	**0.6199**	0.3679	0.0030	0.0054	0.0008	0.0023	0.0003	0.0002	0.0001	0.0001	0.0000	0.0000
Kiribati	0.0052	0.0076	0.0120	**0.9441**	0.0095	0.0111	0.0071	0.0015	0.0010	0.0003	0.0004	0.0001
Korea, Republic of	0.0010	0.0021	0.0042	0.0043	0.0175	0.0154	0.0291	**0.6397**	0.1328	0.1419	0.0109	0.0012
Kuwait	0.0030	0.0048	0.0196	0.0156	0.0805	0.0221	**0.4057**	0.1167	0.2901	0.0214	0.0190	0.0014
Kyrgyzstan	0.0072	0.0119	0.2787	0.0885	**0.4959**	0.0388	0.0491	0.0172	0.0081	0.0019	0.0024	0.0003
Laos	0.0217	**0.9582**	0.0030	0.0056	0.0013	0.0088	0.0005	0.0005	0.0002	0.0001	0.0001	0.0000
Latvia	0.0004	0.0008	0.0024	0.0023	0.0159	0.0063	0.0245	**0.7944**	0.1329	0.0136	0.0062	0.0004
Lebanon	0.0041	0.0055	0.0252	0.0245	0.0916	0.0165	**0.5592**	0.0464	0.1382	0.0132	0.0726	0.0031

Lesotho	0.0158	0.0141	**0.8647**	0.0642	0.0239	0.0088	0.0051	0.0017	0.0009	0.0003	0.0003	0.0001
Liberia	**0.8292**	0.1386	0.0118	0.0108	0.0027	0.0048	0.0009	0.0006	0.0003	0.0002	0.0002	0.0001
Libyan Arab Jamahiriya	0.0012	0.0019	0.0091	0.0081	0.0488	0.0087	**0.8308**	0.0286	0.0515	0.0044	0.0063	0.0004
Lithuania	0.0004	0.0008	0.0021	0.0026	0.0110	0.0049	0.0323	0.1256	**0.7612**	0.0223	0.0360	0.0009
Macau	0.0061	0.0108	0.0652	0.0285	**0.3163**	0.0536	0.2599	0.1621	0.0712	0.0153	0.0097	0.0012
Macedonia (Former Yug. Rep.)	0.0038	0.0053	0.1280	0.0365	**0.6755**	0.0155	0.1048	0.0152	0.0099	0.0018	0.0033	0.0004
Madagascar	0.0322	**0.9641**	0.0008	0.0015	0.0003	0.0009	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000
Malawi	**0.9558**	0.0342	0.0021	0.0057	0.0005	0.0012	0.0002	0.0001	0.0001	0.0000	0.0000	0.0000
Malaysia	0.0004	0.0011	0.0019	0.0019	0.0100	0.0135	0.0068	**0.9418**	0.0101	0.0106	0.0016	0.0003
Maldives	0.0213	0.0247	0.1394	0.1677	0.1743	0.0562	**0.3035**	0.0392	0.0500	0.0084	0.0136	0.0016
Mali	0.3130	**0.3887**	0.0260	0.2188	0.0099	0.0332	0.0045	0.0027	0.0014	0.0007	0.0007	0.0002
Malta	0.0008	0.0012	0.0034	0.0038	0.0118	0.0050	0.0773	0.0341	**0.8096**	0.0201	0.0318	0.0011
Mauritania	0.0049	0.0073	0.0267	**0.8986**	0.0230	0.0170	0.0169	0.0027	0.0019	0.0004	0.0006	0.0001
Mauritius	0.0011	0.0019	0.0170	0.0101	0.3254	0.0117	**0.5888**	0.0256	0.0142	0.0018	0.0021	0.0002
Mexico	0.0011	0.0022	0.0063	0.0098	0.0524	0.0223	**0.4832**	0.2280	0.1741	0.0104	0.0096	0.0005
Moldova, Republic of	0.0015	0.0039	0.0080	0.0083	0.0511	0.0542	0.0192	**0.8142**	0.0201	0.0136	0.0051	0.0008
Mongolia	0.0370	0.0499	**0.5630**	0.0828	0.1574	0.0516	0.0229	0.0194	0.0081	0.0033	0.0036	0.0009
Morocco	0.0016	0.0027	0.0082	0.0260	0.0348	0.0166	**0.8640**	0.0156	0.0235	0.0024	0.0042	0.0003
Mozambique	**0.8812**	0.0800	0.0136	0.0120	0.0037	0.0057	0.0015	0.0011	0.0006	0.0003	0.0003	0.0001
Myanmar	0.0122	0.0457	0.0178	0.0664	0.0329	**0.7270**	0.0255	0.0437	0.0138	0.0093	0.0046	0.0011
Namibia	0.0412	0.2681	0.1044	0.1102	0.0697	**0.3686**	0.0113	0.0172	0.0044	0.0025	0.0019	0.0006
Nepal	0.2315	**0.5219**	0.0214	0.1497	0.0109	0.0504	0.0058	0.0039	0.0021	0.0011	0.0010	0.0003
Netherlands	0.0008	0.0011	0.0023	0.0027	0.0058	0.0030	0.0100	0.0122	0.0322	0.0172	**0.8847**	0.0281
Nicaragua	0.0048	0.0051	**0.9574**	0.0094	0.0160	0.0035	0.0020	0.0010	0.0004	0.0002	0.0002	0.0000
Niger	**0.8502**	0.1101	0.0067	0.0230	0.0022	0.0053	0.0010	0.0006	0.0004	0.0002	0.0002	0.0001

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Appendix *(continued)*

Degree of Membership in Fuzzy Clustering by Country

Country	1	2	3	4	5	6	7	8	9	10	11	12
Nigeria	0.0047	0.0141	0.0740	0.0923	**0.4956**	0.2452	0.0454	0.0204	0.0051	0.0015	0.0013	0.0002
Norway	0.0015	0.0027	0.0035	0.0038	0.0080	0.0096	0.0106	0.0510	0.0414	**0.8358**	0.0219	0.0100
Pakistan	0.0064	0.0177	0.0567	**0.8819**	0.0135	0.0195	0.0026	0.0010	0.0004	0.0001	0.0002	0.0000
Panama	0.0152	0.0406	0.0391	0.0325	0.0831	0.2101	0.0383	**0.3663**	0.0473	0.1037	0.0169	0.0070
Papua New Guinea	0.0210	**0.9646**	0.0020	0.0059	0.0009	0.0047	0.0003	0.0003	0.0001	0.0001	0.0001	0.0000
Paraguay	0.0157	0.0331	0.0847	0.1772	**0.2728**	0.1618	0.0965	0.0891	0.0364	0.0116	0.0182	0.0028
Peru	0.0000	0.0000	**0.9993**	0.0002	0.0003	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Philippines	0.0112	0.0666	0.1009	0.0551	0.0914	**0.6497**	0.0087	0.0118	0.0024	0.0012	0.0008	0.0002
Poland	0.0003	0.0005	0.0012	0.0019	0.0050	0.0027	0.0285	0.0225	**0.8247**	0.0140	0.0977	0.0009
Portugal	0.0015	0.0021	0.0047	0.0068	0.0134	0.0074	0.0752	0.0307	**0.4858**	0.0333	0.3347	0.0044
Romania	0.0002	0.0003	0.0008	0.0012	0.0041	0.0016	0.0356	0.0159	**0.9169**	0.0044	0.0188	0.0003
Russian Federation	0.0007	0.0012	0.0061	0.0056	0.0574	0.0070	**0.7082**	0.0587	0.1425	0.0044	0.0078	0.0004
Rwanda	**0.9260**	0.0500	0.0050	0.0124	0.0016	0.0032	0.0008	0.0005	0.0003	0.0001	0.0002	0.0001
Saint Kitts and Nevis	0.0018	0.0040	0.0036	**0.9771**	0.0029	0.0078	0.0017	0.0005	0.0003	0.0001	0.0001	0.0000
Saint Lucia	0.0149	0.0251	0.0404	**0.6321**	0.0656	0.0842	0.0895	0.0197	0.0169	0.0040	0.0067	0.0009
Saint Vincent/ Grenadines	0.0026	0.0047	0.0330	**0.9406**	0.0097	0.0062	0.0020	0.0006	0.0003	0.0001	0.0001	0.0000
Saudi Arabia	0.0026	0.0051	0.0282	0.0185	0.2888	0.0431	**0.3728**	0.1721	0.0552	0.0079	0.0052	0.0005
Senegal	0.0788	0.0836	0.0263	**0.7708**	0.0096	0.0220	0.0048	0.0019	0.0011	0.0004	0.0005	0.0001
Seychelles	0.0110	0.0217	0.1704	**0.5571**	0.1180	0.0753	0.0317	0.0083	0.0041	0.0011	0.0011	0.0002
Sierra Leone	**0.9074**	0.0551	0.0164	0.0133	0.0026	0.0034	0.0009	0.0005	0.0003	0.0001	0.0001	0.0000

Slovakia	0.0001	0.0001	0.0004	0.0004	0.0027	0.0012	0.0029	**0.9754**	0.0112	0.0044	0.0012	0.0001
Slovenia	0.0001	0.0002	0.0004	0.0004	0.0020	0.0008	0.0066	0.0168	**0.9527**	0.0072	0.0125	0.0002
Solomon Islands	0.0017	**0.9972**	0.0002	0.0004	0.0001	0.0004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Somalia	**0.8759**	0.0729	0.0187	0.0176	0.0044	0.0063	0.0017	0.0012	0.0006	0.0003	0.0004	0.0001
South Africa	0.0004	0.0009	0.0018	0.0017	0.0091	0.0098	0.0075	**0.9394**	0.0136	0.0138	0.0018	0.0003
Spain	0.0000	0.0000	0.0000	0.0001	0.0002	0.0001	0.0004	0.0005	0.0053	0.0008	**0.9924**	0.0001
Sri Lanka	0.0703	0.2356	**0.4579**	0.1245	0.0402	0.0584	0.0064	0.0040	0.0015	0.0006	0.0006	0.0001
Sudan	0.0153	0.0177	0.0239	**0.9128**	0.0096	0.0127	0.0046	0.0015	0.0010	0.0003	0.0004	0.0001
Suriname	0.0004	0.0007	0.0186	0.0047	**0.9568**	0.0029	0.0127	0.0020	0.0008	0.0002	0.0002	0.0000
Swaziland	0.0052	0.0153	0.2694	0.0927	**0.5008**	0.0912	0.0137	0.0079	0.0021	0.0007	0.0007	0.0001
Sweden	0.0001	0.0001	0.0002	0.0002	0.0005	0.0005	0.0009	0.0076	0.0094	**0.9781**	0.0023	0.0003
Switzerland	0.0001	0.0001	0.0002	0.0003	0.0008	0.0007	0.0014	0.0181	0.0126	**0.9625**	0.0028	0.0003
Syrian Arab Republic	0.0007	0.0012	0.0038	0.0075	0.0183	0.0060	**0.9000**	0.0133	0.0395	0.0025	0.0068	0.0003
Tajikistan	0.0021	0.0023	**0.9796**	0.0085	0.0048	0.0015	0.0007	0.0003	0.0001	0.0000	0.0000	0.0000
Tanzania, United Rep. of	**0.9751**	0.0227	0.0005	0.0011	0.0001	0.0003	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000
Togo	0.0655	**0.8281**	0.0263	0.0542	0.0052	0.0179	0.0013	0.0008	0.0003	0.0002	0.0001	0.0000
Trinidad and Tobago	0.0037	0.0070	0.1109	0.0199	**0.7307**	0.0314	0.0556	0.0280	0.0082	0.0023	0.0019	0.0003
Tunisia	0.0006	0.0011	0.0034	0.0058	0.0207	0.0080	**0.7822**	0.0381	0.1270	0.0048	0.0078	0.0003
Turkey	0.0016	0.0029	0.0046	0.0080	0.0150	0.0145	0.0540	0.0865	**0.4939**	0.1461	0.1674	0.0055
Uganda	0.0513	**0.9321**	0.0023	0.0086	0.0009	0.0040	0.0003	0.0002	0.0001	0.0001	0.0001	0.0000
Ukraine	0.0024	0.0050	0.0062	0.0065	0.0167	0.0258	0.0151	0.2099	0.0445	**0.6443**	0.0170	0.0065
United Arab Emirates	0.0008	0.0013	0.0035	0.0040	0.0128	0.0059	0.0860	0.0435	**0.7978**	0.0212	0.0222	0.0009
United Kingdom	0.0001	0.0001	0.0004	0.0004	0.0021	0.0007	0.0112	0.0131	**0.9619**	0.0037	0.0062	0.0001

(Continued on next page.)

Appendix *(continued)*

Degree of Membership in Fuzzy Clustering by Country

Country	1	2	3	4	5	6	7	8	9	10	11	12
United States	0.0015	0.0024	0.0034	0.0040	0.0079	0.0073	0.0125	0.0363	0.0621	**0.6484**	0.1250	0.0892
Uruguay	0.0061	0.0100	0.0214	0.0218	0.0612	0.0314	0.0580	0.1467	0.1312	0.0997	**0.3474**	0.0650
Uzbekistan	0.0057	0.0083	0.2411	0.1430	**0.4631**	0.0245	0.0946	0.0100	0.0064	0.0012	0.0019	0.0002
Vanuatu	0.0702	0.1446	0.0562	**0.4430**	0.0555	0.1494	0.0335	0.0211	0.0116	0.0056	0.0073	0.0020
Venezuela	0.0085	0.0214	0.1184	0.0292	**0.4808**	0.1315	0.0398	0.1399	0.0167	0.0087	0.0043	0.0009
Vietnam	0.0215	0.3339	0.0177	0.0600	0.0144	**0.5384**	0.0047	0.0058	0.0017	0.0010	0.0007	0.0002
Yemen	**0.4670**	0.1375	0.2288	0.1168	0.0195	0.0192	0.0056	0.0027	0.0014	0.0006	0.0006	0.0002
Zambia	0.0592	**0.8406**	0.0154	0.0204	0.0074	0.0490	0.0024	0.0031	0.0011	0.0008	0.0005	0.0002
Zimbabwe	0.0279	**0.8959**	0.0116	0.0143	0.0052	0.0408	0.0014	0.0017	0.0006	0.0004	0.0002	0.0001

Note: Dominant degrees of membership are in bold.

Source: Authors' calculations.

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