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U.S. Agriculture and the Free Trade Area of the Americas

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Abstract

The Free Trade Area of the Americas (FTAA), a free trade area under negotiation among the United States and 33 countries in the Western Hemisphere, will progressively liberalize trade and investment in the region. It is scheduled to become effective by the end of 2005. The FTAA will lead to a 6-percent increase in annual U.S. agricultural exports to the Hemisphere and a 3-percent increase in annual U.S. agricultural imports from the Hemisphere. The FTAA will increase annual U.S. agricultural exports and imports worldwide by about $1 billion each. The expansion of U.S. agricultural trade due to the FTAA will result from both the direct effect of trade liberalization and the indirect effect of accelerated economic growth in increasing agricultural demand in the Western Hemisphere. The FTAA complements the multilateral negotiations in the Doha Development Agenda, which have a broader agenda for agricultural reform.

Keywords: Free Trade Area of the Americas, regional integration, preferential trade arrangements, WTO, sanitary and phytosanitary, tariffs, foreign direct investment, environment.

Contributors

Mary E. Burfisher (editor), H. Christine Bolling, Joseph Cooper, Jason Donovan, Mark Gehlhar, Paul Gibson, Stephen Haley, Robert Johansson, William Kost, Barry Krissoff, John Link, Mark Peters, Daniel Pick, Gregory Pompelli, Donna Roberts, Sherman Robinson, David Skully, Karen Thierfelder, Constanza Valdes, John Wainio, and Steven Zahniser.

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Executive Summary

The Free Trade Area of the Americas (FTAA) is a free trade area currently under negotiation among the United States and 33 countries in the Western Hemisphere. Its objective is to progressively liberalize trade and investment in the region. Negotiations on the FTAA began in 1998 and are to conclude in 2005, with the agreement scheduled to come into force by the end of that year. These are the implications of the FTAA for U.S. agriculture:

The FTAA will increase annual U.S. global agricultural exports and imports by about $1 billion each. Elimination of tariffs on intra-regional trade in agriculture and manufacturing will increase annual U.S. agricultural exports to other countries in the Western Hemisphere by $1.4 billion (6 percent) and annual imports from the 33 countries by about $900 million (3 percent). The increased U.S. trade with Western Hemisphere countries will lead to small adjustments in U.S. trade with the rest of the world.

Agricultural trade in the Western Hemisphere will increase by $4 billion (6 percent). Agriculture will account for about 20 percent of trade expansion in the Hemisphere due to the FTAA, proportionally larger than its current 9-percent share of merchandise trade and a reflection that current agricultural tariffs are higher than manufacturing tariffs in many Western Hemisphere countries, including the United States.

Trade liberalization of both agricultural and manufacturing goods in the FTAA will increase the welfare (consumer purchasing power) of the Western Hemisphere by $63 billion annually. Free trade will allow a more efficient allocation of productive resources in the region, and can stimulate productivity gains and economic growth in developing countries. The expansion of U.S. agricultural trade due to the FTAA will result from both the direct effect of trade liberalization and the indirect effect of accelerated economic growth on increasing agricultural demand in the Western Hemisphere.

The FTAA will have small effects on U.S. agricultural production because trade with the Western Hemisphere accounts for only a small share of aggregate output, and U.S. tariffs are already low. Production changes in most of the commodity categories analyzed in this report will be less than 1 percent. U.S. export growth will lead to small increases in production of rice, oilseeds, oils and fats, and dairy products. U.S. sugar production could decline significantly, depending on how the domestic support program may be modified in response to increased sugar imports from other Western Hemisphere countries. The decline in U.S. orange juice production will be reduced if U.S. demand for domestic, not-from-concentrate orange juice continues to grow.

The FTAA will add to the benefits that trade liberalization already completed in the Western Hemisphere has had for U.S. agriculture. The impacts of trade reform have been greatest for U.S. agricultural exports to Mexico, which instituted a far-reaching set of unilateral trade reforms before it joined the North American Free Trade Agreement (NAFTA). In 1999, U.S. agricultural exports to Mexico were 2.5 times ($3 billion) higher than they would have been in the absence of these trade reforms. NAFTA alone accounted for 20 percent of U.S. agricultural exports to Mexico during 1994-99. Many U.S. exports have benefited from Mexican trade liberalization, including wheat, rice, beef, and pork. The effects of reform have not been as important to U.S. agricultural trade with Canada, perhaps because trade barriers between the two countries were already low, and some agricultural products were excluded from trade liberalization. MERCOSUR's influence on U.S. agricultural exports has been mixed: it

has increased U.S. exports of beef, rice, and other commodities to the common market but has diverted some U.S. trade, most notably wheat exports to Brazil.

Regional agreements, multilateral reforms, and preferences have already lowered trade barriers in the Western Hemisphere, but high tariffs remain on some products. The average, post-Uruguay Round Most-Favored-Nation (MFN) bound tariff of FTAA members in 2001 was about 40 percent, well below the global average bound rate of over 60 percent. Applied MFN tariff rates in the Western Hemisphere average 13 percent. The FTAA is expected to take reductions from the MFN applied rates rather than bound rates. Applied rates are generally highest on meats, dairy products, sugar and sugar-containing products, and vegetable oils, and relatively low for wheat, most oilseeds, fibers, and live plants and animals. The average tariff applied to U.S. agricultural exports to the Western Hemisphere is 13 percent. Most U.S. tariffs on agricultural imports from the Hemisphere are already very low or zero, with over 80 percent of U.S. imports from the region already qualifying for duty-free treatment in 2001.

The FTAA will expand the potential market for U.S. FDI in processed foods. If the agreement includes investment provisions, these could extend protections for U.S. investments to more countries in the region. However, foreign direct investment (FDI) is influenced by other factors as well, particularly prospects for economic growth, a favorable business climate, and economic and political stability.

Effects of the FTAA on U.S. agri-environment will be small. The agreement will have a small impact on U.S. agricultural production and thus will yield small benefits in terms of soil erosion and water pollution from nitrogen and small environmental costs in terms of air pollution from nitrogen and soil depreciation.

Sanitary and phytosanitary issues in the FTAA mirror those in the WTO. Debate on sanitary and phytosanitary (SPS) matters in the FTAA has focused on facilitating the implementation of current World Trade Organization (WTO) SPS obligations in the Western Hemisphere. A concern of developing country exporters is their ability to meet increasing demands for food safety in developed countries. These exporters may need technical assistance to effectively implement the WTO SPS agreement.

Doha Development Agenda and FTAA are reinforcing strategies for trade liberalization. The United States and other FTAA members are simultaneously pursuing agricultural policy reform in the Doha Development Agenda, the multilateral negotiations underway at the WTO. Despite the reforms achieved in the Uruguay Round, global agricultural markets are still highly distorted. The Western Hemisphere's role as a net global agricultural exporter gives FTAA members an important stake in further multilateral reform, and the region's relatively low dependence on policies that distort trade suggests that it will benefit from global reform. Furthermore, successful multilateral negotiations on a broader agenda for agricultural reform will complement reform in the FTAA, which is focused on market access.

U.S. Agriculture and the Free Trade Area of the Americas

Overview

Mary E. Burfisher

Introduction

Thirty-four countries in the Western Hemisphere participated in the Summit of the Americas in Miami, Florida, in December 1994 and committed themselves to create a Free Trade Area of the Americas (FTAA). Negotiations on the FTAA began in 1998 in Miami, and they are continuing in Puebla, Mexico. Negotiations are scheduled to conclude in early 2005.[1] The pact, scheduled to enter into effect by the end of that year, will create a Hemisphere-wide free trade area encompassing 830 million people and a combined GDP of $13 trillion.

The objective of the FTAA negotiations is to reach agreement on the progressive liberalization of trade and investment in the Western Hemisphere. Trade ministers have agreed that all tariffs are subject to negotiation. The FTAA will be a free trade area, meaning that it will liberalize trade among its members but will allow each member to maintain its independent trade policies with respect to the rest of the world (see box on membership, process, and timetable).

The FTAA will be introduced into a region that has historically pursued a strategy of trade liberalization through regional trade preferences. About 20 preferential trade arrangements are already in effect in the Western Hemisphere, nearly 40 more agreements provide preferences for specific sectors, and other trade agreements are under negotiation or are proposed.[2] Some agreements date back nearly four decades and have been reinvigorated in the recent wave of regionalism in the Western Hemisphere; however, most have been implemented since the early 1990s. The resulting network of overlapping memberships in trade agreements within the Western Hemisphere will be consolidated in the FTAA.

[1]The draft text of the FTAA is available to the public at www.ftaa-alca.org

[2]A compendium of trade agreements in the Western Hemisphere is maintained at www.sice.org/TRADEE.ASP

The United States has already entered free trade agreements with its major trade partners in the Western Hemisphere (see box on U.S. agricultural trade with the Western Hemisphere). In 1989, the United States implemented a free trade agreement with Canada. This was extended to include Mexico in 1994 in the North American Free Trade Agreement (NAFTA). The United States entered a bilateral free trade agreement with Chile in 2003 and is negotiating an agreement with five Central American countries. The United States, however, is an outsider to most regional trade agreements in the region. For example, the MERCOSUR (Mercado Comun del Sur) customs union of Argentina, Brazil, Paraguay, and Uruguay has liberalized trade among member countries, putting products of the United States and other nonmembers at a competitive disadvantage.

Over the past decade or so, the United States has pursued regional trade agreements as a complement to its efforts to achieve global agricultural trade liberalization in multilateral negotiations at the World Trade Organization (WTO). The global agricultural negotiations opened in March 2000, as required by the Uruguay Round's Agreement on Agriculture (URAA) and are continuing as part of the Doha Development Agenda initiated in late 2001. While the FTAA and the multilateral negotiations are both expected to conclude in early 2005, the two negotiations differ in their objectives and scope. The FTAA agriculture negotiations are expected to achieve deep reforms of tariffs and other impediments to trade and will address export subsidies used within the region. The WTO agriculture negotiations are more comprehensive in that they are addressing trade barriers, export subsidies, and domestic support, but market access reforms in the global initiative are not likely to be as deep as in the FTAA.

The regional and global context of the FTAA negotiations brings to the fore important questions for U.S. agriculture about the potential benefits from further engagement in regionalism in the Western Hemisphere.

In analyzing the potential effects of the FTAA on U.S. agriculture, this report focuses on three questions:

- *How has trade liberalization already achieved in the Western Hemisphere affected U.S. agriculture?*
- *Will the advance to the FTAA provide significant additional benefits for U.S. agriculture?*
- *What is the relationship between the FTAA and multilateral reform at the WTO?*

Membership, Process, and Timetable for the FTAA Negotiations

FTAA member countries: Antigua and Barbuda, Argentina, Bahamas, Barbados, Belize, Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Dominica, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, Trinidad and Tobago, United States, Uruguay, Venezuela.

Negotiations undertaken in nine separate groups: agriculture; market access; investment; services; government procurement; dispute settlement; intellectual property rights; subsidies, antidumping, and countervailing duties; competition policy.

Timeframe for negotiations:

- December 1994: FTAA initiated at the Miami Summit of the Americas
- June 1995-September 1998: Structure, scope, and organization of the negotiations determined
- September 1998: Negotiations initiated
- September 1998-November 1999: Annotated outlines of the FTAA agreement developed
- November 1999-April 2001: Draft text of the FTAA agreement developed
- April 2001-May 2002: Draft text consolidated and methods and modalities for market access negotiations established
- May 2002: Market access negotiations initiated
- December 15, 2002-February 15, 2003: Initial market access offers presented
- February 16, 2003-June 15, 2003: Requests for improvement in initial offers presented
- July 15, 2003-undetermined second date: Revised market access offers to be presented
- January 2005: Deadline to conclude negotiations
- December 2005: FTAA scheduled to enter into effect

U.S. Agricultural Trade With the Western Hemisphere, 2002

John Link

The United States is by far the world's largest agricultural trader (exports plus imports), and as the richest and most populous country in the Americas, it is also the region's largest market for agricultural products. Total agricultural trade (exports plus imports) between the United States and other countries of the Western Hemisphere is growing rapidly, increasing by 175 percent between 1993 and 2002. In terms of total value, U.S. agricultural imports from the region—$22.9 billion in 2002—are higher than U.S. exports to the region—$20.4 billion (see figures). In terms of shares of U.S. trade, however, the region is substantially more important as a source of imports for the United States than as a destination for U.S. exports. In 2002, about 55 percent of all U.S. agricultural imports came from Western Hemisphere countries, while about 38 percent of U.S. agricultural exports went to the region.

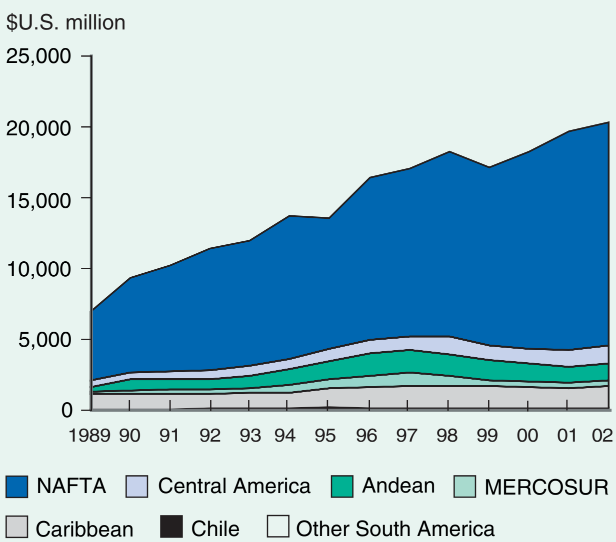
NAFTA trading partners (Canada and Mexico) dominate U.S. agricultural trade, together supplying about 38 percent of total U.S. imports and taking 30 percent of total U.S. agricultural exports in 2002. This asymmetry in U.S. import and export market shares is even more pronounced for other Western Hemisphere countries, which together supplied 17 percent of total U.S. agricultural imports but purchase only 9 percent of U.S. agricultural exports in 2002.

Among U.S. trading partners in the Western Hemisphere, not including Canada and Mexico, the top seven suppliers account for 83 percent of U.S. imports from the Western Hemisphere. Coffee and bananas constitute 32 percent of the $5.8 billion U.S. agricultural imports from the countries. However, the makeup of U.S. imports from each country is different. Grapes, wine, and stone fruits account for slightly over 60 percent of U.S. imports of $1.2 billion from Chile. Coffee, tobacco filler, prepared beef and veal, cashew nuts, and orange juice account for 54 percent of Brazil's $1.2 billion worth of exports to the United States. Coffee, cut flowers, and bananas account for 86 percent of Columbia's $928 million in exports to the United States. Bananas, pineapples, and coffee make up 67 percent of U.S. imports of $803 million from Costa Rica.

In terms of U.S. exports to the region, the geographic and commodity concentration is not as great. Excluding Canada and Mexico, the top seven countries account for 54 percent of total U.S. agricultural exports to the Western Hemisphere. Corn and wheat account for about 30 percent of the total $4.5 billion of exports shipped to the subregion, and again the makeup of exports to each country is different. In the top U.S. market, the Dominican Republic, tobacco, corn, soybean meal, and wheat account for about 60 percent of the $513 million worth of U.S. exports. In Colombia, corn and wheat account for about 54 percent of its $452-million market. Corn, wheat, and soybean meal make up 49 percent of Venezuela's $341-million market. In Guatemala, corn, soybean meal, and chicken meats account for about a third of its $341 million worth of U.S exports.

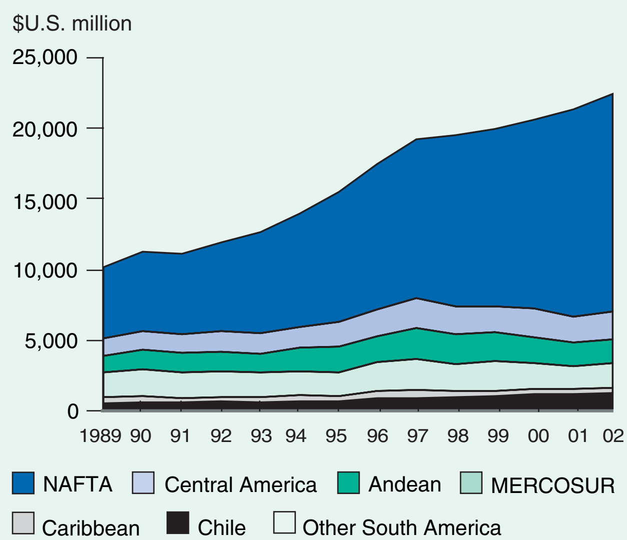
The United States is a vital source of agricultural imports for the subregion. In 2001, U.S. exports accounted for almost a fourth of their agricultural imports. The dichotomy was most striking for Andean countries, Central America, and the Caribbean countries. For these countries, U.S. market shares varied considerably by commodity category, with relatively low market shares for U.S. exports of horticultural and processed foods and relatively high market shares for U.S. exports of bulk and intermediate goods. The United States is also an important export market for the subregion, taking about a fifth of its exports in 2001.

U.S. agricultural exports to the Western Hemisphere, 1989-2002



Source: Foreign Agricultural Trade of the United States.

U.S. agricultural imports from the Western Hemisphere, 1989-2002



Source: Foreign Agricultural Trade of the United States.

Existing Regional Integration in the Western Hemisphere: Impacts on U.S. Agriculture

Trade preferences are prevalent in the agricultural trading system in the Western Hemisphere (table 1). Almost every member of the FTAA is now party to at least one agreement, and the multiple agreements to which most FTAA members belong create a network of overlapping memberships within the Western Hemisphere. A role of the FTAA will be to consolidate, rationalize, and potentially advance the trade liberalization that has occurred under these regional agreements.

Trade Preferences Have Already Lowered Agricultural Tariffs in the Hemisphere

Many types of trade preferences are extended in the Western Hemisphere. In reciprocal trade arrangements, all parties agree to mutual reduction or elimination of trade barriers, but the level of market integration can vary. In the Western Hemisphere, the most comprehensive reciprocal arrangements are customs unions, which now include MERCOSUR, the Central American Common Market (CACM), and the Caribbean Community and Common Market (CARICOM). In a customs union, members reduce or eliminate tariffs on products of other members and agree on common tariffs against the rest of the world. Free trade areas, such as NAFTA, reduce or eliminate internal tariffs but allow members to maintain separate external tariffs. Free trade areas therefore require detailed rules of origin to prevent the transshipment of imports into the union through the country with the lowest external tariffs. The FTAA will be a free trade area. Other, more limited, types of trade preferences used in the region include partial scope agreements, in which trade preferences are given to selected sectors. In economic complementation agreements, members increase economic cooperation with the objective of eventually realizing free trade.

In nonreciprocal preferences, which are applied extensively in the Western Hemisphere, only one party provides trade preferences. Among the major nonreciprocal arrangements are the U.S. Generalized System of Preferences (GSP) and Canada's Generalized Preferential Tariffs (GPT), both of which allow duty-free or preferential treatment for many agricultural imports from developing countries. Generally, neither arrangement allows preferences for the over-quota tariffs of tariff-rate quota (TRQ) regimes. The GSP and GPT preferences apply to all FTAA members, except NAFTA members, and GSP for Bermuda. Some countries party to GSP and GPT are also eligible for other trade preferences. The United States and Canada provide nonreciprocal preferences for many agricultural products from the Caribbean area, and the United States also provides preferences for imports from the Andean countries. Nonreciprocal preferences are concessions, not binding commitments; in some cases they may expire and require reauthorization. Reciprocal trade agreements that are ratified by their members provide a greater degree of assurance about the stability of negotiated tariff preferences.

In the Western Hemisphere, regional trade agreements and preferences have largely succeeded in including agriculture in trade liberalization, although sensitive imports are often exempted. NAFTA, for example, will eliminate almost all barriers to agricultural trade among its members by the time it is fully implemented in 2008, with some exceptions affecting trade with Canada, including dairy, poultry, eggs, peanuts, sugar and sweeteners, cotton, and tobacco. In MERCOSUR, almost all agricultural tariffs are to be removed, although Argentina's economic crisis has recently led its government to eliminate regional preferences on many items, including some food products.

In addition to regional trade agreements with Western Hemisphere partners, many FTAA members have trade agreements with non-Hemisphere partners. The United States has free trade agreements with Israel, Jordan, and Singapore. Other negotiations are underway or proposed, including agreements with Morocco, the South African Customs Union, Bahrain, and Australia. Mexico's trade agreements include a pact with the European Union (EU) that excludes agricultural commodities receiving EU domestic support and agreements with the European Free Trade Association (EFTA) and Israel. Chile's agreements include one with the EU, and a MERCOSUR-EU negotiation is in progress. Caribbean countries, along with African and Pacific countries, are extended preferences from the EU, and Haiti will receive the EU's "Everything-But-Arms" preferences extended to 48 least developed countries.

Most U.S. Agricultural Imports From the Western Hemisphere Are Already Eligible for Tariff Preferences

Partly due to existing trade preferences, 81 percent ($18.8 billion) of U.S. agricultural imports from the region qualified for duty-free entry in 2001 (table 2). Some of these imports received Most-Favored-Nation

Table 1—Selected Western Hemisphere trade agreements and their agricultural provisions

Trade agreement	Created	Current members	Agricultural provisions
Selected reciprocal trade agreements			
Andean Pact	1969	Bolivia, Colombia, Ecuador, Peru, Venezuela	Agricultural trade for many commodities has been liberalized. Only some members have agreed to a common external agricultural tariff, which includes the use of price bands.
Caribbean Community and Common Market (CARICOM)	1973	Antigua and Barbuda, Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Jamaica, Montserrat, St. Lucia, St. Kitts and Nevis, St. Vincent and the Grenadines, Suriname, Trinidad and Tobago	Members have developed a common market with duty-free movement of agricultural goods throughout the Caribbean Community. CARICOM has adopted a common domestic agricultural policy and a common agricultural trade policy.
Central American Common Market (CACM)	1960	Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua	Agricultural trade within the CACM is duty free, with a diminishing number of exempted agricultural products; a common external tariff is imposed on some agricultural products.
North American Free Trade Agreement (NAFTA)	1994 (Canada-U.S. Free Trade Agreement -1989)	Canada, Mexico, U.S.	Agricultural trade is treated bilaterally. Most agricultural tariffs were removed immediately, with a transition period of up to 15 years allowed for some commodities. NAFTA created a free trade area, with rules of origin.
Southern Common Market (MERCOSUR)	1991	Argentina, Brazil, Paraguay Uruguay	Nearly all intra-regional agricultural tariffs are removed. MERCOSUR created a common market, with a common external tariff ranging from 0-20 percent for agricultural products (avg. 10 percent)—generally lower than previous tariff levels.
Selected nonreciprocal preferential trade arrangements			
Canada CARIBCAN	1986	Anguilla, Antigua and Barbuda, Bahamas, Barbados, Belize, Bermuda, British Virgin Islands, Canada, Cayman Islands, Dominica, Grenada, Guyana, Jamaica, Montserrat, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Trinidad and Tobago, Turks and Caicos	Canada provides duty-free access on many agricultural products from the Commonwealth Caribbean countries.
Canadian Generalized Preferential Tariffs (GPT)	1974	Canada and most developing countries	Canada provides duty-free or preferential access for many agricultural products from developing countries to encourage development of their export sectors.
U.S. Andean Trade Preferences Act (ATPA)	1991	Bolivia, Colombia, Ecuador, Peru, U.S.	The U.S. provides duty-free or preferential access to many agricultural products from the Andean region.
U.S. Caribbean Basin Economic Recovery ACT (CBERA)	1983	Antigua and Barbuda, Aruba Bahamas, Barbados, Belize British Virgin Islands, Costa Rica, Dominica, Dominican Republic, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica Montserrat, Netherlands Antiles, Nicaragua, Panama, St. Kitts and Nevis, Saint Lucia, St. Vincent and the Grenadines, Trinidad and Tobago, U.S.	The U.S. provides duty-free or preferential access to many agricultural products to promote export growth of CBERA members and encourage their export diversification.
U.S. Generalized System of Preferences (GSP)	1991	The U.S. and most developing countries	The U.S. provides duty-free access for many agricultural products from developing countries to encourage their economic growth.

Source: Economic Research Service, USDA.

(MFN) duty-free status accorded by the United States to products from WTO member countries. Most of these free imports, however, received duty-free treatment under NAFTA or other preferences. Trade preferences covered over 60 percent of U.S. agricultural imports from Western Hemisphere countries in 2001 and allowed duty-free treatment or reduced tariff rates on many commodities.

Most of the U.S. agricultural imports that faced duties in 2001 entered from NAFTA partners. U.S. tariffs on imports from Mexico will be reduced to zero when NAFTA is fully implemented in 2008. Some other dutiable agricultural imports by the United States from the region enter under the U.S. TRQ system. In 2001, the U.S. imported $2 billion worth of agricultural commodities from the Western Hemisphere under its TRQ system. Of this total, $1.9 billion was under quota, 78 percent of which entered duty free, and about $106,000 entered at over-quota tariff rates.

As a result of preferences, average U.S. tariffs on agricultural imports from Western Hemisphere countries are below the average, 2001 U.S. MFN rate of 10.4 percent (table 3). Countries qualifying for CBERA or ATPA preferences face an average U.S. agricultural tariff of 1.8 percent, while other FTAA countries, benefiting only from GSP, face slightly higher average tariff rates. Due to NAFTA, Canada, at 1.2 percent, and Mexico, at 0.4 percent, face the lowest average U.S. tariffs among FTAA countries.

In 2001, NAFTA was the only reciprocal trade agreement in the Western Hemisphere to which the United States was a party.[3] Therefore, U.S. exports faced

Table 2—U.S. agricultural imports from the Western Hemisphere in 2001, by tariff treatment

Import classification	Value
	$U.S. billion
Total agricultural imports from the Western Hemisphere	23.1
Total duty-free imports	18.8
Duty-free imports under MFN	(7.5)
Duty-free imports under preferences	(11.3)
Preferential, nonzero tariffs (NAFTA)[1]	2.8
MFN tariffs less than 5 percent	.9
MFN tariffs over 5 percent	.6

[1]All U.S. tariffs under NAFTA will be reduced to zero when the implementation period is concluded in 2008.
Source: Agricultural Market Access Database.

[3]In late 2003, the United States entered a bilateral free trade agreement with Chile. The effects of this agreement on agricultural tariff levels is not incorporated in this analysis.

MFN tariffs in all Hemisphere countries other than Canada and Mexico. The average 2001 bound MFN agricultural tariff of Western Hemisphere countries, excluding the United States, is 43.3 percent. In general, U.S. exports face much lower applied tariffs in these markets, which average 12.5 percent.[4] However, the possibility that countries can increase their tariffs up to rates bound in the WTO creates a degree of risk for U.S. exporters. Furthermore, U.S. products face these MFN tariffs while exports from many competing suppliers in the region have preferential access.

Tariff Protection Remains High on Some Products

While agriculture is included in most preferential trade arrangements in the region, some sensitive products are allowed exemptions or long transition periods to free trade (Stout and Ugaz-Pereda). Comprehensive data on preferential tariffs in the Western Hemisphere are not available, but analysis of applied MFN tariff schedules provides some perspective on which commodities receive the most protection. Applied tariff rates are generally highest on meats, dairy products, sugar and sugar-containing products, and vegetable oils. Wheat, most oilseeds, fibers, and live plants and animals have relatively low MFN tariffs. Of interest to the United States are higher-than-average tariffs on tobacco products, meats, rice, beer, wine, and distilled spirits. Certain fruits and vegetables, including apples, grapes, oranges, grapefruit, potatoes, and onions, also face higher-than-average tariffs in many markets, especially during specific times of the year.

Many countries' agricultural exports are concentrated in a few commodities. For example, in 10 countries in the Western Hemisphere, a single commodity accounts for over half of total agricultural exports to the United States. Due to this commodity concentration, some countries are more concerned about tariff rates for specific commodities than about overall tariff rates, particularly if products in which they specialize face higher-than-average tariffs. The United States, for example, maintains relatively high tariffs, with limited preferential access, on some agricultural products of special export interest to FTAA countries, including sugar, peanuts, tobacco, orange juice, and dairy products.

One way to measure the alignment between an exporting country's export concentration and an importing country's tariff peaks is to calculate the weighted average

[4]These percentages are based on 6-digit aggregates of the Harmonized System. Applied tariff rates are not available for all countries.

of the importer's tariffs, using as weights the share of each commodity in the exporter's global agricultural exports. The "export-weighted" average tariff gives more weight to the importer's tariffs that are applied to the exporting country's most important exports to the world market (see box on comparing tariffs).

Table 3 compares the simple average applied tariffs with export-weighted applied tariffs, by country. For 6 of the 20 countries, U.S. preferences have resulted in lower tariffs on the commodities that are most important to the exporting country. For 13 countries, export weighting increases the effective U.S. tariff, indicating that U.S. tariffs remain relatively high on commodities that make up a larger share of an exporter's trade. Depending on the composition of a country's trade, U.S. preferences have therefore been more important for some of these 20 countries than for others.

Tariffs facing the U.S. do not differ much between simple average and export-weighted average rates. When NAFTA partners are excluded, the weighted (by U.S. exports) average bound rate facing U.S. agricultural products in the Western Hemisphere is 46 percent, although the rate actually applied is only 15 percent.

Challenges for FTAA Negotiations on Agricultural Market Access

While regional trade agreements and preferences have already helped to lower agricultural tariffs, the transition toward the elimination of remaining trade barriers through the FTAA will present challenging issues, including how to treat sensitive products and how fast to phase in the elimination of tariffs. So far, FTAA members have agreed that tariffs will be allocated among four baskets with different schedules for tariff elimination: immediate, no more than 5 years, no more than 10 years, and longer than 10 years. Reductions are in general to be taken from the October 2002 MFN applied rates rather than the bound rates. This means that significant trade liberalization can be expected to occur early in the FTAA implementation period.

Tariffs are relatively transparent trade policies and their effects in reducing import demand and raising domestic prices and production are well understood.

Table 3—Average applied agricultural tariffs in the Western Hemisphere, 2001

Country	U.S. tariffs on FTAA exporter		FTAA country tariffs on U.S.		
	Average tariff (including preferences)	Average weighted by country's exports (including preferences)	Average applied MFN tariff	Average applied MFN tariff weighted by U.S. exports	Average bound MFN rates weighted by U.S. exports
			Percent		
Argentina	3.9	6.1	12.9	12.7	34.9
Brazil	3.9	12.8	12.7	12.7	40.0
Canada	1.2	1.2	6.1	7.0	12.8
Chile	3.9	2.1	9.0	9.0	25.0
Colombia	1.8	2.2	14.8	15.0	104.3
Costa Rica	1.8	1.1	11.5	13.0	35.7
Dominican Republic	1.8	8.9	21.4	18.5	40.0
Ecuador	1.8	.6	14.3	14.0	26.7
El Salvador	1.8	5.1	10.3	9.6	43.4
Guatemala	1.8	6.3	9.2	9.4	54.7
Haiti	1.8	.1	16.0	16.0	16.0
Honduras	1.8	1.1	11.0	12.1	35.0
Jamaica	1.8	10.3	17.7	16.1	100.0
Mexico	.4	.8	2.9	8.6	51.8
Nicaragua	1.8	8.4	7.0	8.0	59.5
Panama	1.8	3.0	12.5	12.4	27.8
Paraguay	3.9	4.2	12.6	12.1	34.9
Peru	1.8	.5	17.2	16.9	30.0
Uruguay	3.9	6.1	12.7	12.5	36.8
Venezuela	3.9	7.0	14.8	15.0	56.2

Notes: U.S. tariffs are applied rates, including tariff preferences extended under nonreciprocal tariff preference programs (GSP, CBERA, and ATPA). Tariffs for Canada and Mexico are the 2001 NAFTA rates. Averages are calculated as simple means; averages and weighted averages are calculated at the six-digit Harmonized System level.

Source: Agricultural Market Access Database.

Many members of the FTAA employ trade barriers that are more complex, less familiar, and less transparent in their effects on prices and production than tariffs. These policies include price bands, seasonal tariffs, tariff rate quotas, special safeguards, and domestic absorption agreements.

One strategy for understanding complex trade policies is to deconstruct their essential components—their operation, their impacts, and their tax burden (who pays)—and compare them with more traditional tariffs and subsidies (table 4). Countries employ many different types of trade protection and domestic support policies that can have identical effects in raising prices received by producers or in reducing price variability. For example, some countries use price bands to restrict imports when world prices are low, which helps to insulate and stabilize domestic producer prices. Consumers pay the costs of price bands: they pay tariffs on the imported product and face higher prices for the domestic variety. WTO tariff bindings limit the ability of price bands to insulate domestic prices.

In a domestic absorption agreement, prospective importers are first required to purchase a specified amount of the product from domestic producers. The agreement does not change the total amount of the product consumed in a country, but it does increase the share of domestic production relative to imports in total consumption. The increase in demand for the domestic product leads to higher producer prices, while the amount of imports and tariff revenue collected by the domestic government fall. In effect, a domestic absorption agreement leads domestic buyers to shift expenditures from the import plus the tariff to the increased quantity and price of the domestic product.

The FTAA's mandate includes the identification of trade-distorting practices for agricultural products, including those that have an effect equivalent to agricultural export subsidies, to bring such policies under greater discipline. Some countries argue that agricultural policies with equivalent producer effects should be disciplined in the same way, regardless of their implementation. The U.S. position is that multilateral negotiations are the appropriate forum for addressing domestic support because a country's production subsidies affect its global, not just its regional, trade. The ongoing WTO multilateral negotiations are addressing market access, domestic support, and export subsidies.

Comparing Tariffs Across Countries

The aggregation of thousands of individual tariffs into a single, representative measure for each country means that some assumption must be made on how much weight to give individual tariffs. A simple average implies all tariffs are equally important, yet for some countries, most imports may be concentrated in only a few commodities. Giving equal weight to tariffs on lightly traded commodities therefore may not be representative of a country's tariff code. Tariffs are sometimes weighted by the share of each imported commodity in a country's total imports. But this understates the restrictiveness of a country's tariff code because import weights become smaller when tariffs become more restrictive. Consumption weights have the same measurement bias as import weights. Production weights would assure that highly protected commodities produced in large amounts get appropriately large weights, but production data at the tariff-line level are rarely available.

This report develops export weights in which the importing country's tariffs are aggregated using as weights the share of the commodity in the exporter's world agricultural exports (Sandrey). An aggregate measure of a country's tariffs is therefore calculated for each of its trade partners. This measure gives greater weight to those commodities important to an exporting country and avoids the bias introduced in bilateral trade by the importer's tariff schedule. It is especially appropriate when exporting countries are characterized by commodity concentration and the importer's tariffs are highly distorting of that trade. Its limitation is that differences in the composition of its bilateral trade may reflect differences among its partners' consumer preferences instead of their tariff structure.

As an example, consider a country for which cinnamon accounts for 95 percent of its global agricultural exports. The exporter may face zero tariffs on all other products in the importer's market, except for a nearly prohibitive tariff on cinnamon, say 100 percent. The importer's simple average agricultural tariff may be close to zero percent, yet the importer's single, nearly prohibitive tariff has a very restrictive effect on its trade with the cinnamon exporter. An import tariff weighted by the share of the commodity in the exporter's world trade (95 percent) places a greater weight on the importer's tariff on cinnamon than on other products, even if little, or even no, bilateral trade in cinnamon takes place. It will result in a weighted-average tariff in that importer's market of close to 95 percent with respect to its cinnamon-exporting partner.

While domestic production subsidies are often difficult to directly negotiate in a free trade area, market forces would discipline some types of support if free trade is achieved within a region. Open borders can place budgetary pressure on programs that attempt to support domestic market prices at above free-market levels (see box on U.S. sugar in the FTAA). If low-cost imports are allowed to enter freely from regional suppliers, domestic subsidy costs would have to rise to defend a price support against falling domestic prices.

U.S. Agriculture Has Benefited From Trade Liberalization in the Western Hemisphere

Trends in U.S. agricultural exports during 1980-99, a period in which many countries in the Western Hemisphere implemented substantial regional and unilateral trade reforms, provide a valuable perspective on the additional trade benefits that the FTAA is likely to generate. This analysis finds that the trade reforms already completed in the Western Hemisphere have supported an expansion of U.S. agricultural exports to the region.[5]

The impact of these reforms on U.S. agricultural exports is most obvious in the case of Mexico, which implemented a far-reaching set of unilateral trade reforms before it cemented the liberalization of its trade with Canada and the United States by joining NAFTA in 1994. In 1999, U.S. agricultural exports to Mexico were 2.5 times ($3 billion) higher than they would have been in the absence of these unilateral and regional trade reforms. NAFTA alone accounted for 20 percent of U.S.

[5]This analysis is based on a series of "gravity models." The approach is able to differentiate and measure the impact of trade reforms on U.S. exports to a specific country, compared with other factors, such as the relative closeness of that country's bilateral trade relationship with the United States and the size of the importing country's economy. However, the variables used to identify trade reforms may also capture the influence of other factors that are contemporaneous to specific trade agreements.

Table 4—Tariffs, complex tariffs, and domestic support: Equivalencies in operation, impacts, and tax burden

Policy	Treatment under WTO disciplines	Operation	Impacts on producer price	Who pays?
Ad valorem tariffs	Market access	Percentage (fixed) tax on import unit value	Raise domestic producer price	Consumers
Specific tariffs	Market access	Per unit (fixed) tax on import unit volume	Raise domestic producer price	Consumers
Tariff-rate quotas	Market access	Low duties applied to within-quota volume, high duties applied on over-quota volume	Raise domestic producer price	Consumers
Seasonal tariffs	Market access	Tax rate dependent on import season	Raise domestic producer price during seasons when production is highest	Consumers
Special safeguard tariffs	Market access	Tax rate dependent on import unit value (price trigger) or import volume (volume trigger)	Raise domestic producer price and reduce its volatility	Consumers
Price bands	Market access	Tax rate dependent on market trends in import unit values and domestic prices	Raise domestic producer price and reduce its volatility	Consumers
Price support	Domestic support	Fixed producer price floor, subsidy varies with domestic market price	Raise domestic producer price and reduce its volatility	Government/taxpayers
Domestic absorption agreements	Trade-related investment measures	Import license and tariff rebate requires purchase of domestic agricultural product	Raise domestic producer price	Consumers/taxpayers (foregone revenue)

Source: Economic Research Service, USDA.

U.S. Sugar in the FTAA

Stephen Haley

Increased FTAA access to the U.S. sugar market is a key issue in the FTAA negotiations on agriculture because U.S. import barriers are high and changes in access will significantly change market conditions facing competing sugar suppliers in the Western Hemisphere. The effect of an FTAA on the U.S. sugar industry will depend on how the increase in market access is achieved and on how U.S. sugar support programs may be modified as a result of these access commitments.

The U.S. domestic sugar market is supported by a sugar TRQ, a nonrecourse loan (price support) program, and a domestic supply control program (flexible marketing allotments). Excluding NAFTA, the U.S. sugar TRQ system allocates 40 countries the right to export raw sugar to the United States, with quota allocations based on historical trade shares from 1975-81. Twenty-three of the 40 countries are from the Western Hemisphere, and they accounted for 64 percent of the U.S. raw sugar TRQ in 2001. NAFTA currently allows Mexico duty-free access to the U.S. market for a limited quantity of raw sugar. Beginning in 2008, Mexico will have duty-free access with no quantitative limits.

The nonrecourse loan program allows U.S. sugar processors to take out loans from the Government using sugar as collateral. The loan rate in effect sets a floor price for sugar. After harvest, processors can pay off the loan in cash; alternatively, they can forfeit the sugar to the Government if market prices drop below the loan rate. Sugar forfeitures result in a buildup of Government stocks. The 2002 Farm Security and Rural Investment Act requires the program to be operated at no cost to the Government. Two mechanisms are used to meet this requirement: allowing processors to purchase sugar from Commodity Credit Corporation (CCC) stocks in exchange for reduced production, and adjusting marketing allotments downward if imports are below a specified volume.

This case study of sugar analyzes the effects on the U.S. sugar industry of two trade liberalization scenarios: an expansion of the U.S. sugar TRQ (2-million ton, or 280-percent, increase), and an elimination of the TRQ. If the TRQ is expanded but the current floor price is maintained, increased U.S. imports will likely cause sugar forfeitures to the Government to increase, with some of the producer adjustment occurring through transfers of publicly owned stocks. It is assumed that marketing allotments will be suspended because imports will exceed the threshold. CCC stockholding will become a major factor in the adjustment to the FTAA, with stocks projected at 88 percent of the additional market access in 2012. Alternatively, lowering loan rates to levels that would eliminate loan forfeiture by 2010 will allow more adjustment through declining domestic production (see table). While the domestic price will gradually recover to 23 cents, imports will permanently displace some domestic production.

Because the net surplus producer status of the Western Hemisphere is extremely large, and because the largest, lowest cost producers have low transport costs relative to non-Hemisphere competitors, it is assumed that full market access in an FTAA is the equivalent of unrestricted free trade in sugar for the United States. In this scenario, therefore, the U.S. is assumed to eliminate its sugar TRQ and nonrecourse loan program. The implications for U.S. sugar would be significant, with a 61-percent decline in production and a nearly fourfold increase in imports, which would account for almost 70 percent of domestic consumption. If the loan rate is abandoned, the U.S. raw sugar price will be closer to the world price, assumed to increase to 11 cents per pound. Remaining U.S. producers would face world price movements and constant market competition with FTAA producers. A large shift from high fructose corn syrup to sugar, while possible, is not likely.

It is not only U.S. producers who will face adjustments to a liberalized U.S. sugar market. Exporters to the U.S. now benefit from their access because they are able to sell sugar at the relatively high U.S. domestic price. Some of these exporters are currently high-cost producers that will likely have difficulty competing if equal access is provided to all FTAA members.

Adjustment of U.S. sugar to increased market access in an FTAA

	2-million metric ton increase in TRQ access		Elimination of U.S. sugar TRQ and loan program
Item	Fixed loan rate	Reduction in loan rate	No loan rate
Loan rate (cents/lb.)	18	13	Eliminated
Production (% change in 2012 from 2008 base)	-20.3	-26.6	-61.2
U.S. raw sugar price in 2012 (NY - No. 14)	20.2	23.0	13.1
Import share of consumption in 2012	38.1	43.6	68.6

Note: The reduction in the loan rate is calculated as the rate that avoids loan forfeiture by 2010.
Source: Economic Research Service, USDA.

exports to Mexico during 1994-99. These estimates are substantially larger than the assessment of ERS's 1997 NAFTA report (Crawford and Link), which concluded that U.S. agricultural exports to Mexico in 1996 were about 3 percent higher than they would have been in the absence of NAFTA. The 1997 study, however, which relied upon a computable general equilibrium model, examined only the first 3 years of NAFTA's 14-year transition to trade liberalization.

Many U.S. exports have benefited from Mexican trade reform, including wheat, rice, beef, apples, pork, and cotton—exported both as a raw commodity and embodied in yarn and thread (table 5). These findings reinforce the conclusions of ERS's 2002 NAFTA report (Zahniser and Link), which identified several U.S. agricultural exports to Mexico whose volume during 1994-2000 increased by more than 15 percent as a direct result of NAFTA, including include rice, cotton, and apples. The analysis conducted in this report, however, did not confirm Zahniser and Link's conclusions that NAFTA significantly increased U.S. exports of corn, oilseeds, and sorghum to Mexico.

The estimated impacts of the Canada-U.S. Free Trade Agreement (CFTA) and NAFTA on U.S. agricultural exports to Canada are large but not statistically significant. This finding may reflect that most barriers to U.S.-Canada trade were already low prior to CFTA, while several important agricultural sectors—including dairy, poultry, sugar and eggs—were exempted from trade liberalization. Within the context of this analytical approach, the main factors that help explain the level of U.S. agricultural exports to Canada are the size of the Canadian economy and the historically close trading relationship between the two countries.

MERCOSUR has created new opportunities for U.S. agricultural exports, even though the United States is not a member of that common market. For all four member countries, there are commodities where MERCOSUR is linked to increased U.S. exports, and at the aggregate level, MERCOSUR is found to have increased total U.S. agricultural exports to Argentina, Paraguay, and Uruguay. This positive effect on U.S. exports likely stems from MERCOSUR's implementation of a common set of external tariffs. In many instances, the new external tariffs are substantially lower than tariffs previously in place. However, it is important to keep this beneficial effect of MERCOSUR in context, as U.S. agricultural exports to MERCOSUR are measured in millions of dollars, while U.S. agricultural exports to both Canada and Mexico are measured in billions.

Although MERCOSUR is found to have stimulated many aspects of U.S. agricultural exports to Brazil, it may have diverted U.S. trade in milk and cream, legumes, and wheat. Among these commodities, wheat is the most likely case of trade diversion, as Argentina has dramatically increased its share of the Brazilian wheat market. Argentina's preferential access to the Brazilian wheat market via MERCOSUR partially explains this shift, but improved wheat yields in Argentina also help to explain the changing fortunes of U.S. wheat exports to Brazil.

Table 5—Effects of trade liberalization on U.S. exports to Mexico, Brazil, and Argentina, by commodity

Effects of Mexican unilateral reforms and NAFTA on U.S. exports to Mexico	Effects of MERCOSUR on U.S. exports to	
	Argentina	Brazil
Positive	**Positive**	**Positive**
Wheat	Fruit or vegetable juice	Rice
Rice	Nuts	Beef
Beef	Prepared breakfast foods	Cheese
Pork	Tobacco	Distilled beverages
Tomatoes		Fruit or vegetable juice
Apples		Apples
Grapes		Grapes
Cotton		Plants and bulbs
Cut flowers		Prepared breakfast food
Tobacco		Soda and bottled water
Beer		Wine
Soda		
Prepared breakfast foods		**Negative**
Macaroni		Wheat
Peanuts		Milk and cream
Yarn and thread		Legumes[1]

Notes: Table reports all commodities for which the impact of trade liberalization on U.S. exports is statistically significant at the 90-percent level, according to the gravity-model analysis.

[1]Effect of MERCOSUR on U.S. legume exports to Brazil is negative over 1991-99 but positive over 1994-99.

Source: Economic Research Service, USDA.

Advancing to the FTAA: Potential Effects on U.S. Agriculture

The FTAA will be a comprehensive agreement that is expected to address a range of economic issues. This analysis of the expected effects of the FTAA addresses several possible negotiating areas with implications for U.S. agriculture, including market access reforms (elimination of agricultural and manufacturing tariffs and other trade measures), foreign direct investment (FDI), U.S. agri-environmental impacts, sanitary and phytosanitary (SPS) measures, and trade remedy laws (see box on trade remedy laws).

Welfare Impacts of Market Access Reform in the FTAA

Based on the assumption that all (agricultural and manufacturing) tariffs will be eliminated, the FTAA will lead to welfare gains (or increased consumer purchasing power) of $63 billion for the Western Hemisphere, with gains achieved by every member of the trade agreement (table 6).[6] U.S. welfare is expected to increase $4.1 billion. Welfare gains derive from two sources: resource reallocation and productivity growth. First, tariff elimination removes tariff-based price distortions that influence production and consumption decisions. Countries can then reallocate resources to products in which they hold a comparative advantage, and consumers can follow their preferences in making expenditure choices. The resulting allocative efficiency gains from tariff elimination will account for almost $4 billion in welfare gains for the region. Every country will achieve these static welfare gains from the FTAA except Chile, which will experience a small loss (under $10 million) due to the welfare costs of its export taxes.

Second, the FTAA is expected to generate dynamic gains in the productive capacity of developing countries in the Western Hemisphere. The link between trade openness and accelerated economic growth has been widely observed in developing countries and attributed to several sources. Productivity gains accrue when the expansion of exports and imports of capital goods between developing and developed countries leads to technological spillovers that stimulate total factor productivity (TFP) growth in the developing countries. These spillovers can stem from technological advances embodied in traded goods, "learning by doing," increased input varieties, and the competitive pressures of global markets, all of which help increase the productive efficiency of land, labor, and capital in all sectors of a developing economy. Such potential productivity gains will add $59 billion to the estimated welfare impact of the FTAA on the region, with benefits accruing to every country, including Chile. Welfare gains will be largest in Argentina and Brazil, whose economies will increase in size by about 5 and 7 percent, respectively, due to the FTAA, mainly reflecting the large role of trade in manufacturing in these economies. By increasing returns to capital, productivity gains will also help to attract FDI, a goal of the FTAA for the Western Hemisphere's developing countries but a potential impact that is not incorporated in this analysis.

Aggregate Agricultural Trade Impacts of the FTAA

If all tariffs (agricultural and manufacturing) are eliminated in the FTAA and productivity gains are realized, annual agricultural trade within the Western Hemisphere will increase by about $4.0 billion, or about 6 percent (table 7). Agriculture will account for about 20 percent of trade expansion in the Hemisphere due to the FTAA, proportionally larger than its current 9-percent share of merchandise trade and a reflection that current agricultural tariffs are higher than manufacturing tariffs in many Western Hemisphere countries, including the United States. Annual U.S. agricultural exports to Western Hemisphere countries will increase by $1.4 billion (about 6 percent) due to the FTAA, and U.S. imports from the Hemisphere will increase by about $900 mil-

Table 6—Welfare impacts of an FTAA, by country

Country	Static welfare gains	Welfare gains including productivity growth
	$U.S. billion	
United States	2.3	4.1
Canada	.1	.2
Mexico	.1	.3
Central America and the Caribbean	.2	4.9
Andean countries	.5	6.6
Argentina	.2	20.5
Brazil	.2	25.3
Chile	0	.6
Rest of South America	0	.3
Total	3.6	62.8

Source: Economic Research Service, USDA.

[6] Welfare, trade, and production effects are based on a simulation using a global computable general equilibrium model. These results reflect outcomes after a long-term adjustment (10-15 years) of the world economy to trade liberalization. Results are reported in nominal U.S. 2002 dollars. Percent changes are reported relative to a representative base year (1997).

Table 7—Change in annual Western Hemisphere and U.S. trade due to the FTAA

Item	Imports from FTAA	Imports from rest of world	Exports to FTAA	Exports to rest of world
	$U.S. billion			
Total Western Hemisphere:				
Agriculture	3.9	0.2	3.9	-0.6
Manufacturing	16.2	-3.7	16.2	-1.2
United States:				
Agriculture	0.9	0.1	1.4	-0.3
Manufacturing	6.1	0.7	6.5	-2.6

Source: Economic Research Service, USDA.

lion (about 3 percent). The FTAA will be net trade creating in all sectors, including agriculture. In other words, the value of trade that is created within the Western Hemisphere will be greater than the decline in its trade outside the Hemisphere caused by preferential tariffs.

FTAA Trade Impacts by Commodity

The largest agricultural trade impacts of the FTAA will be in processed foods, for which the Western Hemisphere's annual global exports will increase by about $1.5 billion, or 3 percent (table 8). This export category is a large, heterogeneous sector that includes fruit and vegetable juices, syrups and confections, frozen seafood, flour, baked goods, roasted coffee and teas, sugar and sugar products, and orange juice. The Western Hemisphere's annual global exports of dairy products will also have relatively large growth, at about $330 million, or 33 percent, reflecting the high tariffs that remain on dairy products in the Western Hemisphere. The FTAA's global exports of "other crops"—a category that includes fibers, seeds, flowers, and tropical products, such as coffee and bananas—will increase by about $235 million, or 3 percent. Global, annual grain exports, including rice, wheat, and other grains, will increase about $460 million, or 6 percent. The commodity composition of the region's import growth due to the FTAA is similar to that of its exports, reflecting that most of the trade expansion is in intra-regional trade.

Country and Commodity Composition of U.S. Agricultural Trade Growth

The growth in annual U.S. agricultural exports due to the FTAA will be greatest to Central American and Caribbean countries ($650 million, mostly processed foods) and Andean countries ($360 million, mostly grains, and oilseeds and products) (table 9). Annual U.S. agricultural exports to Canada will increase by about $160 million (mostly dairy products) because the FTAA is assumed to liberalize trade in commodities excluded from NAFTA. Growth in annual U.S. agricultural exports to Argentina ($100 million) and Brazil ($120 million) will be mostly processed foods.

Central America and the Caribbean will also account for the largest increase in U.S. agricultural imports due to the FTAA ($310 million), followed by an increase in imports from the Andean region of $170 million (table 10). Most of the growth in U.S. agricultural imports from these two regions will be in processed foods. Although most U.S. tariffs on processed agricultural imports from these countries are already zero, U.S. preferences generally maintain high tariffs on a small number of commodities related to U.S. farm support programs, such as chocolate crumb, sweetened cocoa powders, cake mixes, and other sugar- and dairy-containing products. The United States also has a relatively high MFN tariff on frozen concentrate orange juice, also part of the processed foods sector (see box on U.S. orange juice).

Because trade with the Western Hemisphere accounts for a small share of U.S. agricultural production, trade expansion due to the FTAA will have very small effects on U.S. output. Except for rice, real output will change less than 1 percent for the aggregate sectors described in this report (table 11). Increased U.S. exports will lead to a small expansion of output in

Table 8—Change in annual, global agricultural imports and exports of FTAA members, by commodity

Commodity	Growth in FTAA members' global exports	Growth in FTAA members' global imports
	$U.S. million	
Rice	179.8	200.7
Wheat	130.5	183.1
Other grains	146.9	191.9
Horticulture	205.0	271.9
Oilseeds	126.1	166.7
Other crops	234.7	325.7
Livestock	45.0	100.9
Meats	172.2	265.4
Oils and fats	261.0	345.4
Dairy products	330.1	350.9
Processed foods	1,532.9	1,694.1
Total	3,364.1	4,096.6

Source: Economic Research Service, USDA.

oilseeds, oils and fats, milk, and dairy products. U.S. sugar production could decline significantly, depending on how the domestic support program may be modified in response to increased sugar imports from the Western Hemisphere countries (see box on U.S. sugar). The moderate decline in U.S. orange juice production due to the FTAA will be reduced if growth continues in U.S. demand for domestic, not-from-concentrate orange juice (see box on U.S. orange juice).

Inclusion of United States, Agriculture, Maximize Benefits of the FTAA

U.S. participation in the FTAA will help the Western Hemisphere attain the full potential benefits of the agreement. The large size of the U.S. economy makes it the single most important market for the rest of the region. In agriculture, U.S. participation will account for about one-third of the region's global agricultural export growth due to the FTAA and about one-quarter of the region's global agricultural import growth (table 12). For U.S. trade partners, the potential trade opportunities with the United States will support both their efficiency gains based on increased trade and specialization, and potential productivity gains linked to the expansion of trade between developing and developed country partners. For the United States, participation in the FTAA ensures expansion of both U.S. agricultural exports and imports. Without U.S. participation, U.S. agricultural exports would decline because preferential treatment will be extended to competing suppliers within the region through the terms of the agreement. Also, U.S. agricultural import growth, which lowers food costs and increases variety for consumers, would be diminished.

Table 9—Change in U.S. agricultural exports due to the FTAA

Commodity	Canada	Mexico	Central America and Caribbean	Andean countries	Argentina	Brazil	Chile	Rest of South America	Total FTAA	Rest of world	World
	$U.S. million										
Rice	0	-2	102	12	0	0	0	0	112	-14	98
Wheat	0	2	22	45	0	0	0	1	70	-11	59
Other grains	-8	-27	56	60	12	1	3	0	98	-7	91
Horticulture	-7	1	34	22	3	10	1	0	65	-30	35
Oilseeds	1	-9	14	29	32	30	1	0	98	-21	77
Other crops	-3	0	66	32	13	21	1	0	129	-39	90
Livestock	-3	-2	19	4	4	3	1	0	26	-33	-7
Meat	-8	-1	77	25	2	4	0	2	102	-52	50
Oils and fats	0	-3	64	67	1	3	2	1	135	-10	125
Dairy products	203	-2	25	10	2	3	0	1	242	-10	232
Processed foods	-16	1	171	57	34	45	8	25	325	-110	215
Total agriculture	159	-43	649	363	104	121	18	31	1,401	-336	1,065

Source: Economic Research Service, USDA.

Table 10—Change in U.S. agricultural imports due to the FTAA

Commodity	Canada	Mexico	Central America and Caribbean	Andean countries	Argentina	Brazil	Chile	Rest of South America	Total FTAA	Rest of world	World
	$U.S. million										
Rice, raw	0	0	0	0	0	0	0	0	0	8	8
Wheat	1	0	0	0	0	0	0	0	1	0	1
Other grains	34	0	0	0	1	0	3	0	38	4	43
Horticulture	0	5	14	1	1	10	22	0	54	1	55
Oilseeds	0	0	1	0	0	3	0	0	4	0	4
Other crops	1	3	15	5	1	24	2	0	53	2	55
Livestock	27	3	0	0	1	1	0	0	33	13	46
Meat	9	0	1	0	0	2	0	1	13	9	22
Oils and fats	3	0	0	0	0	1	0	0	4	4	9
Dairy products	0	0	1	0	4	0	0	1	7	7	13
Processed foods	10	3	279	164	47	91	75	10	679	39	718
Total agriculture	86	15	311	171	56	133	102	12	886	88	974

Source: Economic Research Service, USDA.

Table 11—Effects of the FTAA on U.S. agricultural production, by sector

Commodity	Real change in output
	Percent
Rice	3.2
Wheat	0.0
Other grains	-0.5
Horticulture	0.0
Oilseeds	0.4
Other crops	-0.6
Livestock	-0.4
Milk (raw)	0.1
Meat	-0.3
Oils and fats	0.5
Dairy products	0.1
Processed foods	-0.1

Source: Economic Research Service, USDA.

Agriculture is often a sensitive sector in free trade agreements because most countries provide domestic support or relatively high trade protection to their agricultural producers, and the effectiveness of some of these policies could be compromised by freer trade. Reflecting the diverse levels of economic development of FTAA members, their agricultural policies evidence a range of objectives, including providing farm income support, reducing price or income variability, providing income and employment in rural or low-income areas, and stimulating economic development. While the use of agricultural support and protection create challenges for the inclusion of agriculture in the FTAA, benefits will be greater if agriculture is included, rather than excluded, in the agreement. Trade liberalization of manufacturing alone would increase FTAA members' demand for manufacturing imports, causing some countries to reduce their agricultural production and trade to shift resources into industry. This redistribution of agricultural to manufacturing production will lead to a small increase in demand for agricultural imports in these countries. In addition, productivity gains linked to expanded trade in manufacturing sectors will stimulate consumer demand for all products, including food. The effects of the FTAA on agricultural trade in the Western Hemisphere will therefore still be positive but far smaller if agriculture is excluded from trade reform. Including agriculture in the FTAA increases these positive effects through the potential efficiency and welfare benefits linked directly to agricultural trade liberalization.

Foreign Direct Investment in Processed Foods: FTAA Could Expand Existing Agreements

Over the past decade, foreign direct investment (FDI) in the processed food industries has increased its role in the Western Hemisphere's agricultural economy. In 2001, the stock of U.S. FDI in the region's processed foods industries was about $13 billion, more than double the level in 1990 (fig. 1). These investments generated $45 billion in sales of processed foods in 2000, also doubling in value since 1990 (fig. 2). These sales in 2000 exceeded the value of U.S. exports to the region of processed foods in 2000 ($12.5 billion).

Most U.S. FDI in the Western Hemisphere is in Mexico and Canada, where both trade and investment in processed foods have steadily increased. Some of the increased trade in processed products, especially between the United States and Canada, is linked to growth in FDI. The two countries trade many semi-processed food items that are made into highly processed foods by U.S. affiliates serving both U.S. and Canadian markets.

Brazil and Argentina are also major host countries for U.S. FDI. Two factors make FDI more efficient than trade as a means for U.S. entry in these countries' processed foods markets. First, the two countries are similar to the United States in types of crops produced, which makes them competitors in the supply of inputs to the food industry. Second, the high transport costs between the Northern and Southern Hemispheres generally make it more cost efficient to purchase agricultural inputs locally than to import them.

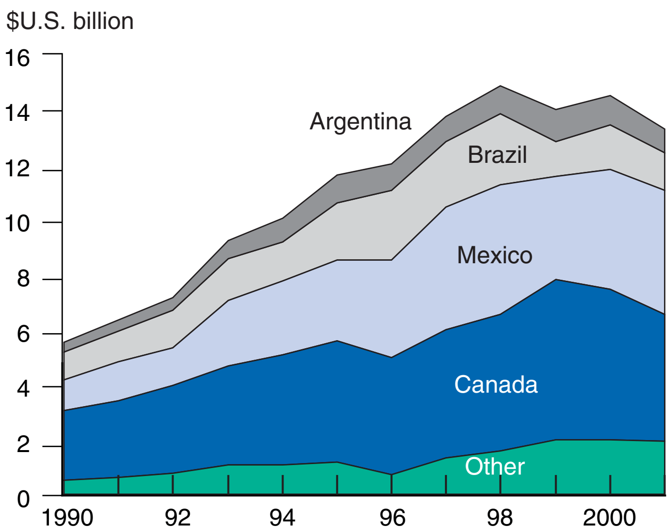
Table 12—Change in annual global agricultural trade due to the FTAA, without U.S. participation and without agriculture

Item	United States		Rest of Western Hemisphere	
	Exports	Imports	Exports	Imports
	$U.S. billion			
FTAA, including U.S. and agriculture	1.07	0.97	2.30	3.12
FTAA without United States	-.01	.06	1.47	1.39
FTAA without agriculture	-.05	.12	.06	.60

Source: Economic Research Service, USDA.

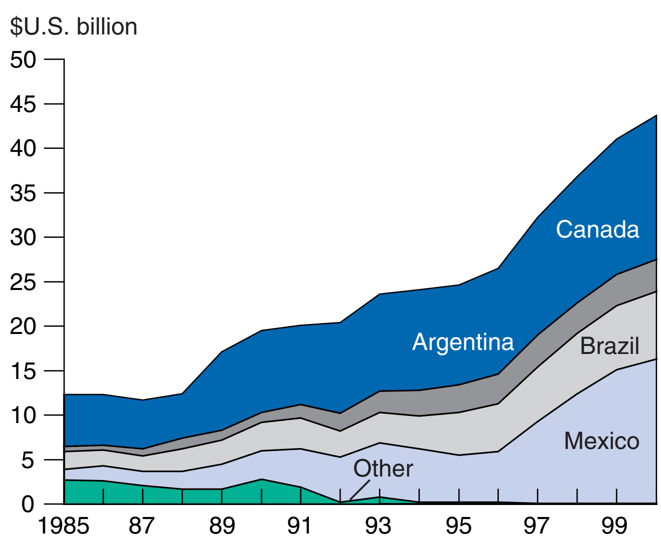
The United States is not the only foreign investor in these four markets, but it accounts for significant shares of FDI in their food industries (table 13). Country shares of FDI change continually, mainly based on the underlying "profit and loss" of individual firms. Shares are unlikely to reflect preferential investor treatment or "investment diversion" because of the fundamental change in the climate for FDI in the Western Hemisphere over the past decade. Latin American countries underwent a widespread adoption of investment treaties during the 1990s, in an effort to attract needed foreign capital (OAS). These treaties typically grant national treatment to foreign investors, eliminate most restrictions on capital and profit remittances, and specify dispute settlement procedures.

Figure 1
U.S. FDI position in the Western Hemisphere processed food industry during 1990-2001



Source: Economic Research Service, USDA. Calculations based on data from the Bureau of Economic Analysis.

Figure 2
U.S. FDI generates $45 billion in food product sales in the Western Hemisphere



Source: Economic Research Service, USDA. Calculations based on data from the Bureau of Economic Analysis.

Most countries in the Western Hemisphere are now party to at least one bilateral investment treaty. The United States is party to bilateral investment treaties with 10 Western Hemisphere countries, including Argentina. Some regional trade pacts also afford investment protection. The NAFTA agreement guarantees its members national treatment of investment and specifies a dispute settlement process. MERCOSUR has investment treaties governing both members and nonmembers, including the United States.

In the FTAA, FDI is being addressed in the negotiating group on investment. The objectives of the negotiations are to establish a fair and transparent legal framework and to create a stable and predictable environment that protects the investor, without creating obstacles to investment from outside the Western Hemisphere. So far, FTAA members are in general agreement on the types of protection to be addressed in the pact, including expropriation and compensation, transparency of laws, and dispute settlement, and members agree not to relax labor and environmental laws to attract investment. Members have yet to determine whether these protections will be extended to new investment or be restricted to existing investment, and whether the pact will cover financial portfolio investments as well as real, direct investments (U.S. GAO).

Incorporating investment protections in the FTAA would lock in the benefits already provided to the United States by bilateral and regional treaties, and it would extend protection of U.S. investments to the remaining countries in the Western Hemisphere with which it does not have treaties. These investment protections could expand the potential market for U.S. FDI in

Table 13—U.S. share in total FDI in processed food industries, 2000

Country	U.S. share in FDI
	Percent
Argentina	25
Brazil	40
Canada	Over 50
Mexico	60

Source: Economic Research Service, USDA. Calculations based on data from the Bureau of Economic Analysis and UNCTAD.

Trade Remedy Laws in the FTAA

John Wainio

FTAA countries are discussing trade remedy laws, which are used to counter imports that have been allegedly dumped by firms in the exporting country or subsidized by the government of the exporting country. National trade remedy laws are a particularly contentious issue, as some countries believe trade remedy laws are a form of thinly veiled protectionism. Other countries, including the United States, see these laws as essential to efforts to liberalize trade. Without them, they argue, it would be hard to assure domestic industries that they would be protected against unfair trade practices by other countries.

The initial proposals tabled within the Subsidies, Antidumping, and Countervailing Duties Negotiating Group of the FTA differed extensively. At one end of the spectrum, the United States argued that countries should be allowed to maintain their current trade remedy laws; at the other end, some proposed that use of trade remedy laws be limited or even eliminated within the FTAA (U.S. GAO). While negotiators have made progress in certain areas, a number of issues remain unresolved. Chief among these is the extent to which the FTAA will modify WTO rules to tighten the requirements that must be met before an FTAA country can impose antidumping and countervailing duties on other countries within the region. The United States is concerned that this could create a body of law that would be divergent from U.S. law applied to countries that are not members of the FTAA. This could complicate antidumping investigations that target suppliers from multiple countries, both within and outside the Western Hemisphere, as well as pose legal implications within the WTO.

In 2001, 10 FTAA countries reported having 634 active trade remedy measures in place (see table). Fourteen FTAA countries were the targets of these measures. The majority of these measures, 569, or 90 percent, were the result of alleged dumping. Five countries were applying both antidumping (AD) and countervailing duties (CVD), and five had only antidumping duties.[1] Eighteen percent of the antidumping measures applied by FTAA countries and 14 percent of the countervailing measures were assessed against imports from countries within the Western Hemisphere. The United States was the only country applying countervailing duties against its regional trading partners. The United States was also the heaviest overall user of trade remedy measures within the Western Hemisphere, with 32 measures in place against other FTAA countries. This represented 10 percent of U.S. AD/CVD measures in place on December 31, 2001.

The United States was also the main target of other countries' measures within the region, with 39 antidumping measures in place against U.S. exports. The United States had measures against imports from five countries in the region (Argentina, Brazil, Canada, Chile, and Mexico), while six countries had at least one measure in place against the United States (Argentina, Brazil, Canada, Colombia, Mexico, and Venezuela).

[1]Another three countries (Chile, Costa Rica, and Uruguay) have reported trade remedy investigations in the past, but none reported active measure in place to the WTO during 2001.

Number of final antidumping and countervailing duty measures in force within the FTAA, as of December 31, 2001

	Countries applying both antidumping (AD) and countervailing duties (CVD)										Countries applying only antidumping duties					Total FTAA	
	United States		Argentina		Canada		Mexico		Venezuela[1]		Brazil	Colombia	Jamaica	Peru[1]	Trinidad and Tobago[1]		
Exporting country	AD	CVD	AD	CVD	AD	CVD	AD	CVD	AD	CVD	AD	AD	AD	AD	AD	AD	CVD
	Number																
Argentina	6	2			1						1					8	2
Brazil	1	4	11		5		3									20	4
Canada	6	2														6	2
Chile	2		3								2			2		9	0
Colombia																0	0
Costa Rica																0	0
Guatemala																0	0
Jamaica																0	0
Mexico	8	1	2		1						3			2		16	1
Nicaragua																0	0
Trinidad and Tobago												1				1	0
United States			1		14		11		2		5	3				36	0
Uruguay											1					1	0
Venezuela							1				1				1	3	0
FTAA total	23	9	17	0	21	0	15	0	2	0	13	4	0	4	1	100	9
Global total	260	48	47	3	94	10	61	1	19	3	53	14	1	15	5	569	65
FTAA share of global (%)	9	19	36	0	22	0	25	0	11	0	25	29	0	27	20	18	14

[1]Measures for Peru, Trinidad and Tobago, and Venezuela are as of June 30, 2001.
Source: WTO members' semi-annual reports to the Committees on Anti-dumping practices and Subsidies and Countervailing measures.

An Analysis of the U.S. Orange Industry

Jason Donovan* and Barry Krissoff

*Donovan is a USDA agricultural economist at the Center for Tropical Agricultural Research and Higher Learning (CATIE), Turrialba, Costa Rica.

The U.S. orange juice industry receives considerable tariff protection from imports. Given this insulation, U.S. juice producers and orange growers are concerned that the FTAA's reduction or elimination of the U.S. tariff on orange juice concentrate will expose the domestic sector to low-priced imports from the world's largest orange juice exporter, Brazil. As imports increase, U.S. processors are likely to demand fewer oranges from domestic growers. Currently, juice processors purchase 95 percent of Florida fresh orange production.

Our analysis of the U.S. orange and juice industry uses a global model of the orange juice sector. The model accounts for both the full implementation of NAFTA and the recent, and increasing, preference of U.S. consumers for not-from-concentrate (NFC) relative to frozen concentrate orange juice (FCOJ). If U.S. consumer preferences remain unchanged, elimination of the U.S. tariff on orange juice concentrate will lead to a substantial (26 percent) increase in orange juice imports by the United States, mostly of FCOJ (see table). Under this scenario, imports from Brazil will increase by 55 percent. Imports from other suppliers, however, will decline. Production of U.S. oranges will decline by 3 percent and U.S. prices will drop 15 percent. Grower revenue would fall 17 percent.

Our analysis also distinguishes between the two prevalent types of orange juice consumed, FCOJ and NFC. Consumers consider NFC orange juice to be of higher quality than FCOJ and are willing to pay a premium for it. The share of NFC in U.S. orange juice consumption has increased from 15 to 40 percent over the last 10 years. The high cost of transporting NFC juice from Brazil to the U.S. gives domestic producers a comparative advantage in supplying this product, although innovations in transportation technology could make imports more competitive in the future. Changes in U.S. consumer demand for orange juice and in transportation technologies are therefore key variables that could determine the effect of the FTAA on the U.S. orange and orange juice industry.

If the trend in increased consumer preference for NFC orange juice continues, even at a fairly small rate, overall U.S. orange juice production will experience a more modest decline, with less of an impact on the derived demand for U.S.-grown oranges. The potential shift in consumer preferences to NFC, combined with the FTAA, would result in decreases of 2 percent in domestic orange production and 4 percent in domestic prices. Grower revenue would drop 6 percent.

Effects of the FTAA on the U.S. orange and orange juice industries

U.S. industry segment	Base period quantity or price	Change with FTAA plus: No changes in U.S. preferences	Change with FTAA plus: Continued increase in U.S. preference for NFC[1]
	Million gal SSE	-----------*Percent*-----------	
Orange juice imports	376	26.1	23.4
Frozen	369	26.6	23.7
NFC	7	3.4	15.0
Orange juice production	1,370	-2.7	-1.9
Frozen	753	-4.9	-8.2
NFC	617	-0.1	5.6
	Dollars/gal SSE		
Frozen juice price	1.32	-10.4	-10.1
NFC price	1.82	-5.6	3.6
	Millions		
Orange boxes	217	-2.7	-1.9
	Dollars/box		
On-tree orange price	5.01	-15.1	-3.8

Notes: Juice yield conversion factor is 6.3 SSE gallons per box. NFC = Not from concentrate. SSE = Single strength equivalent. Base period is a simulation of post-NAFTA implementation quantities and prices.

[1]Scenario assumes a 2.5-percent increase in NFC share of consumption.

Source: Economic Research Service, USDA.

processed foods. However, FDI is influenced by many factors in addition to investment protection, particularly prospects for economic growth, a favorable business climate, and economic and political stability. These economic and political determinants of FDI are likely to be positively influenced by regional integration in the FTAA and may have a greater effect on stimulating further growth in FDI than any additional investment protection provided by the FTAA agreement.

Potential Agri-Environmental Impact of the FTAA

Within the past decade, environmental and consumer groups have called for formal consideration of the environmental impacts of trade agreements. One concern of these groups and others is that some countries may respond to expanded export opportunities by weakening their environmental standards to lower costs of production and attract foreign investment. Firms will then relocate production facilities to the less regulated country, resulting in a loss of jobs at home and a worsening of pollution as more production occurs using dirty technologies. The prevention of such a scenario in free trade is being primarily addressed in the FTAA's investment negotiations. The draft text includes a proposal that labor and environmental standards may not be weakened to attract foreign investment.

Weak environmental standards that already exist in some developing countries are another cause for concern. Compliance with environmental regulations in developed countries is assumed to impose costs, creating unfair competition if trade is liberalized between countries with different environmental standards. Differences in per capita incomes and levels of development are a reason that some countries have lower environmental standards than others. Environmental standards are more likely to be weak in low-income countries, although the income level itself may not be the driving factor (Dasgupta et al.). Conditions associated with countries that have lower income levels, such as weak regulatory environments and limited access to information on the costs of environmental damage, also lead to poor environmental quality.

Some argue that an improved environment is an achievable goal for the long run, as the economic growth associated with trade liberalization will lead to higher incomes and higher environmental standards in developing countries. Whether pollution could or must increase during the developmental transition has been a key issue in the debate on trade and the environment. A growing body of empirical evidence on the relationship between income levels and the environment suggests that developing countries today are better able to improve their environmental quality at lower levels of income and earlier stages of development than historically (Dasgupta et al.). Factors influencing this change include greater levels of public concern and greater knowledge about the costs of pollution. Trade liberalization, too, has been an influence; in addition to stimulating income growth, it allows the speedier adoption of newer and cleaner technologies and efficiency gains that typically are based on production practices that are less polluting.

To address growing concerns about the effects of globalization on the environment, the United States declared in 2001 that all trade agreements in which it will take part will be subject to an assessment of each agreement's impacts on the U.S. environment. Determining how such reviews are to be conducted and the scope of potential impacts that should or can be considered is a challenge for researchers and regulators. While research is available to support impact analyses of some indicators of conventional pollutants, many other pollutants are untested and still others may be unknown but of potentially great concern in the future. Environmental impact evaluations must therefore remain a sufficiently flexible process to adapt to changes in technologies, the level of knowledge about the environment, and social concerns about, and demand for, environmental quality.

The FTAA will be subject to an environmental review. Because trade liberalization in the FTAA is expected to have minimal effects on U.S. agricultural production, it has only a small potential to affect the U.S. agri-environment, and these impacts can be assessed in an agriculture sector model. The analysis reported here is not an official environmental review. It provides analysis of some of the agri-environmental indicators that could be included in such reviews.

Measurable environmental indicators for agriculture include soil depreciation, nitrogen loss, and soil erosion as production scale, composition, technologies, and location change.[7] The relatively small effects of the FTAA on U.S. agricultural production will result in only small impacts on these agri-environmental indicators. The FTAA will yield small benefits in terms of soil erosion and water pollution from nitrogen and

[7]The analysis in this section draws on the U.S. Mathematical Programming Model (USMP), a spatial and regional partial equilibrium model described in House et al. (1999).

phosphorus, with reductions of less than 0.2 percent of baseline values. It will, however, result in small environmental costs in terms of air pollution from nitrogen and soil depreciation, with increases of less than 0.1 percent of baseline values. The environmental impacts of the FTAA cannot yet be measured for sugar, among other products. Studies of sugarcane production in Florida suggest that a decrease in U.S. production could improve environmental quality as water-retention capacity in the neighboring Florida Everglades watershed increases. However, the final environmental consequence of retiring sugar acreage will depend on alternative uses of that land.

Sanitary and Phytosanitary Issues in the FTAA: Challenges of Implementation

Sanitary and phytosanitary measures can pose significant barriers to trade, and they are likely to become more prominent as tariff barriers are lowered. FTAA members have therefore committed themselves to identifying and developing mechanisms needed to facilitate Western Hemisphere trade consistent with the WTO SPS agreement concluded in the Uruguay Round and implemented in 1995. The WTO agreement provides a set of multilateral rules that ensure SPS measures are applied only to achieve appropriate levels of protection for human, animal, or plant life or health. To ensure that such regulations are not protection policies "in disguise," the agreement requires them to be based on scientific principles.

Negotiation of an agreement on SPS measures in the FTAA is expected to address whether the WTO SPS agreement provides a sufficient framework for the regional trade pact, or whether the region should pursue a "WTO-plus" agreement that spells out additional rights and obligations. So far, debate on SPS matters in the FTAA has mainly been over the implementation of current WTO SPS obligations in the region, rather than the WTO agreement's fundamental principles. Advancing to a WTO-plus agreement presents challenges: it is difficult to draft prescriptive rules to bring about a more energetic fulfillment of current obligations without codifying procedures that could become increasingly inappropriate as technology, institutions, and the WTO SPS agreement itself change over time.

The key issues on SPS in the FTAA are likely to mirror those in the WTO—particularly the concerns of developing country exporters about their ability to meet the increasing demand for food safety in developed countries. Developing country exporters need constructive solutions and assistance in fulfilling their obligations and in exercising their rights under the WTO SPS agreement.

Some countries have offered proposals that address implementation of the core principles of the WTO agreement: transparency, science-based standards, equivalence, regionalization, and multilateral harmonization. Transparency requires that countries notify the WTO (and, therefore, all trade partners) of changes in SPS regulations. Countries can also counter-notify, or complain, about other countries' regulations. Increased regulatory transparency in the region could improve the functioning of markets. While the major economies in the Western Hemisphere, including the United States, Canada, Mexico, Argentina, Brazil, and Chile, routinely notify the WTO of their proposed regulations, about one-third of Western Hemisphere countries (primarily the Caribbean countries) have not submitted any notifications to the WTO. Many developing countries have requested assistance with procedures, including translation of documents and extensions of deadlines.

Countries must be able to reference scientific evidence to support their risk mitigation measures. Developed country exporters have the resources to successfully challenge the scientific rationale of others' measures, as well as employ new, scientifically based initiatives to ensure food safety. For many of the smaller economies, the resources needed to establish a scientific basis for regulations are limited. Weak science is one factor that makes the equivalence principle difficult to implement between developed and developing countries. The equivalence principle ensures the right of exporting countries to use different measures if they demonstrably achieve the same safety outcome as importers' regulations, but insuffient inspection and services in developing countries often preclude them from taking advantage of this provision. This problem is increasing because a growing number of SPS measures are process standards designed to check the potential for hazards at critical points during production, rather than product standards that address the testable characteristics of the finished product only.

Regionalization, which allows trade among regions of countries where the risk of disease and pest transmission is low, was incorporated into NAFTA as well as the WTO SPS agreement. Regionalization is already opening trade in the Western Hemisphere. Chile is allowing imports of fresh melons and watermelons from some parts of the United States. The United States is allowing avocado imports from specified regions of Mexico to the Northeast and Midwest, and is considering opening access to all 50 States. In general, however, the benefits from regionalization have been constrained in many developing countries in part because regionalization requires adequate public investment in laboratory, inspection, monitoring, and certification infrastructure.

Like domestic support policies, SPS measures in some respects cannot be effectively addressed in a regional framework. SPS rules cannot be tailored for specific products of interest nor can preferential rules and regulations be established for regional partners.

Technical assistance, however, can be targeted regionally and may be especially suitable for the coalition of developed and developing countries that form the FTAA membership. Experience with the WTO SPS agreement suggests that technical assistance is an effective mechanism for addressing barriers to trade and helping to improve food safety. Options for technical assistance within the FTAA include assistance in pest and disease eradication, strengthening of public sector testing and certification capacity to speed equivalence determinations and support regionalization, and support for greater participation of developing countries in the activities of international standard-setting institutions.

The FTAA and the Doha Development Agenda

FTAA members (except the Bahamas) are negotiating their regional trade agreement at the same time that they are engaged in multilateral negotiations in the WTO Doha Development Agenda. Globally, the continued proliferation of regional trade agreements indicates that regionalism and multilateralism have become accepted as dual trade strategies for most countries. As of June 2003, 140 regional trade agreements are in force. Nearly every country in the world is now a member of at least one trade agreement (Crawford and Laird). Nevertheless, the benefits of a regional versus a multilateral trade strategy is the subject of a continuing public policy debate (Burfisher and Zahniser).

Multilateralism will always be a "first best" strategy because it is nondiscriminatory, that is, all countries participate and offer similar tariff treatment to all WTO members. This principle of nondiscrimination forms the foundation of today's global trade rules. Regionalism, on the other hand, violates this principle by offering preferential tariff treatment to selected trade partners. Opponents of regionalism argue that the creation of trade among a small group of preferred trade partners is mostly achieved at the expense of trade with and investment in nonmembers, and it may create large blocs of countries with competing regulatory and instititutional practices.

Advocates of regionalism generally emphasize its incremental and more attainable benefits, compared with global reform. Regional agreements are more likely to achieve deeper and faster reform among like-minded partners than is possible in the more diverse multilateral negotiations. Advocates also argue that a region's successful experience in dealing with nontariff barriers following the removal or reduction of regional tariffs can provide experience that strengthens the multilateral process. The newer regional agreements formed in the past decade, particularly those in the Western Hemisphere, have also helped to accelerate economic growth in small economies by locking in unilateral reforms, stimulating investment and productivity growth, and fostering links with large and more developed economies (Ethier). For small, reforming countries especially, regionalism can play a role as a first step in engaging in the global trading system, and it helps give such countries a greater stake in a rules-based global trading system. Trade rules that ensure predictability and fairness in trade relationships, and that offer a credible enforcement mechanism, provide conditions that are favorable for the conduct of business, investment, and the expansion of trade.

As the Western Hemisphere pursues a regional agreement, two factors make multilateral agricultural reform of continued importance for FTAA members. First, FTAA countries are global agricultural traders. They depend on non-FTAA markets, with about 65 percent of their agricultural exports destined for, and 35 percent of their agricultural imports originating from, outside the Western Hemisphere. Non-FTAA markets are especially important for the United States and Brazil, for whom they account for 75-80 percent of total agricultural exports. The FTAA region is also a major trade bloc in global agricultural markets. Agricultural exports going outside the Western Hemisphere account for about 45 percent of world agricultural trade, and imports from the rest of the world account for about 9 percent of that trade.

The Western Hemisphere's position as a large net agricultural exporter gives it a great stake in WTO negotiations that may further liberalize global agricultural markets. Despite the reforms achieved in the Uruguay Round, these markets are still characterized by significant policy distortions (USDA). Further multilateral reform will impose disciplines on FTAA members and the rest of the world alike. However, in general, the level of distorting policies used by FTAA members is lower than in most other countries and regions. The average, post-Uruguay Round bound agricultural tariff of FTAA countries of about 40 percent is lower than the global average bound rate of 62 percent (Gibson et al.). The average applied rate of FTAA countries is about 13 percent. Domestic support in the FTAA is also relatively low. The 2002 producer support estimates for the three FTAA members of the OECD are 18 percent (United States), 20 percent (Canada), and 22 percent (Mexico)—below the aggregate OECD rate of 31 percent (OECD). Finally, export subsidies by FTAA members are minimal, with the EU accounting for over 90 percent of global expenditures on these subsidies in 1998 (Leetma).

These patterns in agricultural trade flows and agricultural policy distortions suggest that the region will benefit from further global trade reforms. Any scenario of globalized reform shows the benefits of a multilateral agreement for the Western Hemisphere. For example, if the Doha Round replicates the limits set in the Uruguay Round, the region's annual agricultural exports outside the Western Hemisphere would increase 10 percent and imports would increase 2 percent. Western Hemisphere agricultural export growth in this scenario for multilateral reform is estimated to account for about 40 percent of the resulting expansion of global agricultural trade.

The multilateral negotiations also have significance for the FTAA because of their more comprehensive agenda for agricultural reform. The Doha Round is negotiating disciplines on market access, domestic support, and export subsidies. While the mandate for the FTAA includes export subsidies in the region and other practices that distort trade in agricultural products, its regional scope means that it is difficult for the FTAA to limit members' domestic support. In addition, the FTAA cannot address the use of export subsidies by non-FTAA countries, which affect competition within the Western Hemisphere and in third markets.

FTAA members recognize the global character of their agricultural markets and the importance of third-country policies. At the Toronto Trade Ministerial in 1999, FTAA members agreed to work in the multilateral negotiations toward the global elimination of export subsidies on agricultural products. FTAA members addressed the problem of domestic support at the Quito Trade Ministerial Meetings in November 2002. There, members agreed on the need for significant results in the negotiations on agriculture in both the FTAA and the WTO and, furthermore, noted that progress in the FTAA's market access negotiations for agriculture will depend on progress being made on a broader agriculture agenda. This interdependence of the regional and multilateral negotiations increases the Western Hemisphere's stake in the Doha Development Agenda.

Conclusion

As trade becomes increasingly important for both U.S. agricultural producers and consumers, the potential benefits from the U.S. pursuit of a more open and market-oriented global trading system become greater. U.S. producers will benefit directly from their greater access to world markets and indirectly from the accelerated economic growth and increased demand for food that trade liberalization can foster. Consumers will benefit because global trade rules and freer trade will increase variety, lower food costs, and ensure the safety and security of food supplies. U.S. pursuit of regionalism complements its pursuit of multilateralism. Both strategies reinforce the same principles of trade liberalization, with regionalism offering an opportunity to achieve deeper reforms on key issues with some partners and multilateralism providing the venue for more comprehensive and inclusive, but likely more gradual, trade liberalization.

Recommended Readings

Burfisher, Mary E., and Steven Zahniser (2003). "Multilateralism and Regionalism: Dual Strategies for Trade Reform," *Amber Waves*, Vol. 1, No. 4, pp. 22-29.

Crawford, Jo-Ann, and Sam Laird (2001). "Regional Trade Agreements and the WTO," *North American Journal of Economics and Finance*, Vol. 12 (2), pp. 193-211.

Crawford, Terry, and John E. Link (coord.) (1997). "NAFTA," *Situation and Outlook* Series, International Agriculture and Trade Report WRS-97-2, U.S. Department of Agriculture, Economic Research Service, <http://www.ers.usda.gov/briefing/nafta/mandated.htm>.

Dasgupta, Susmita, Benoit Laplante, Hua Wang, and David Wheeler (2002). "Confronting the Environmental Kuznets Curve," *Journal of Economic Perspectives*, Vol. 16 (1), pp. 147-168.

Ethier, William J. (2001). "The New Regionalism in the Americas: A Theoretical Framework," *North American Journal of Economics and Finance*, 12 (2), pp. 159-172.

Gibson, Paul, John Wainio, Daniel Whitley, and Mary Bohman (2001). *Profiles of Tariffs in Global Agricultural Markets*, Agricultural Economic Report No. 796, U.S. Department of Agriculture, Economic Research Service.

Hasha, Gene (2001). "EU Preferential Trading Arrangements: Heightened Competition for U.S.," *Agricultural Outlook*, No. AGO-287, U.S. Department of Agriculture, Economic Research Service, pp. 16-20.

House, R.M., H. McDowell, M. Peters, and R. Heimlich (1999). "Agriculture Sector Resource and Environmental Policy Analysis: An Economic and Biophysical Approach," in *Environmental Statistics: Analyzing Data for Environmental Policy*. New York: John Wiley and Sons, pp. 243-261.

Leetma, Susan. (2001). "Effects of Eliminating EU Export Subsidies," *Agricultural Policy Reform in the WTO: The Road Ahead*, Agricultural Economic Report No. 802, U.S. Department of Agriculture, Economic Research Service.

Organization for Economic Development and Cooperation (2003). *Agricultural Policies in OECD Countries: Monitoring and Evaluation, 2003*. OECD: Paris.

Organization of American States (2001). *Investment Agreements in the Western Hemisphere: A Compendium*, Study prepared for the FTAA Negotiating Group on Investment.

Sandrey, Ron (2000). *The Relative Tariff Ratio Index,* New Zealand Trade Consortium Working Paper No. 7, New Zealand Trade Consortium with the New Zealand Institute of Economic Research.

Stout, James V., and Julieta Ugaz-Pereda (1998). "Western Hemisphere Trading Blocs and Tariff Barriers for U.S. Agricultural Exports," *Regional Trade Agreements and U.S. Agriculture*, Agricultural Economic Report No. 771, U.S. Department of Agriculture, Economic Research Service.

U.S. Department of Agriculture, Economic Research Service (2001). *Agricultural Policy Reform in the WTO: The Road Ahead*, Agricultural Economic Report No. 802.

U.S. General Accounting Office (2001). *Free Trade Area of the Americas: Negotiators Move Toward an Agreement That Will Have Benefits, Costs to U.S. Economy*, GAO-01-1027.

World Trade Organization (2003). *Interim Report (2002) of the Committee on Regional Trade Agreements to the General Council*, WT/REG/12.

Zahniser, Steven, and John Link (eds.) (2002). *Effects of North American Free Trade Agreement on Agriculture and the Rural Econom*y, Agriculture and Trade Report WRS-0201, U.S. Department of Agriculture, Economic Research Service, <http://www.ers.usda.gov/publications/wrs0201/>.

Chapter 1

Trade and Welfare Effects of the FTAA

Mary E. Burfisher, Sherman Robinson and Karen Thierfelder

The FTAA will be introduced into a region that has already achieved substantial trade liberalization through a network of preferential trade relationships. Almost all FTAA members are also pursuing multilateral trade liberalization in the Doha Development Agenda. In this chapter, we analyze agriculture trade liberalization in the FTAA in this regional and multilateral context. First, we take into account the regional trade preferences that already provide low or nonexistent duties on many bilateral trade flows in the region. We find that the FTAA's role in consolidating and completing the regional integration that already has occurred in the Western Hemisphere can lead to significant, additional expansion in the region's agricultural trade. We also consider the relationship between the FTAA, which will focus on market access (tariffs and non-tariff trade barriers), and the more comprehensive multilateral Doha negotiations on agriculture, which are expected to address market access, domestic support and export subsidies. The Western Hemisphere's role as a major net agricultural exporter to the rest of the world gives it an important stake in multilateral agricultural reform, and progress in Doha negotiations on reducing domestic support and export subsidies will facilitate market access reform in the FTAA.

This analysis uses a global, computable general equilibrium (CGE) model to simulate the potential effects of the FTAA.[1] The model is composed of 16 country or regional models, including 9 from the Western Hemisphere, linked through trade. Since we focus on agriculture, the model includes nine primary agriculture sectors and six processed food sectors; the other sectors in the economy are broadly defined as natural resources, manufacturing, and services. The model accounts for preferential agricultural tariff rates in the region, and explicitly models domestic agricultural support in the European Union (EU), Japan, Mexico and Canada in 2001, and the 2002 U.S. Farm Security and Rural Investment (FSRI) Act.

Regional Trade Agreements in the Western Hemisphere

Trade preferences are an important feature of the agricultural trading system in the Western Hemisphere. About 20 preferential trade arrangements already are in effect in the hemisphere, in addition to nearly 40 agreements that provide preferences for specific sectors, and more trade agreements are under negotiation or proposed.[2] Almost every member of the FTAA is now party to at least one agreement, and the multiple agreements to which most FTAA members are party create a network of overlapping memberships within the Western Hemisphere. One role of the FTAA will be to consolidate and advance the trade liberalization that has already occurred under these regional agreements.

Many types of trade preferences exist in the Western Hemisphere. In *reciprocal trade arrangements*, all parties agree to mutual reduction or elimination of trade barriers, but the level of market integration can vary. In the Western Hemisphere, the most comprehensive reciprocal arrangements are *customs unions*, which now include MERCOSUR, the Central American Common Market (CACM), the Andean Community (former Andean Pact), and the Caribbean Community and Common Market (CARICOM). In a customs union, members reduce or eliminate internal tariffs and agree on common external tariffs. *Free trade areas,* such as the one created by

[1] See appendix 1-1 for a more detailed description of the model.

[2] A compendium of trade agreements in the Western Hemisphere is maintained at http://www.sice.org/TRADEE.ASP.

NAFTA, reduce or eliminate internal tariffs but allow members to maintain separate external tariffs. Free trade areas therefore require detailed rules of origin to prevent the transshipment of imports into the union through the country with the lowest external tariffs. The FTAA will be a free trade area. *Partial scope agreements* are agreements in which trade preferences are given to selected sectors. *Economic complementation agreements* are agreements to increase economic cooperation with the stated objective of realizing free trade.

Nonreciprocal preferences, in which only one party provides trade preferences, are applied extensively in the Western Hemisphere. Among the major programs are the U.S. generalized system of preferences (GSP) and Canada's generalized preferential tariffs (GPT), both of which allow duty-free or preferential treatment for many agricultural imports from developing countries. Generally, neither arrangement allows preferences in the over-quota tariffs of tariff-rate-quota (TRQ) regimes or for safeguards. The GSP and GPT preferences apply to all FTAA members, except NAFTA members and GSP for Bermuda. Some countries party to GSP and GPT also are eligible for other trade preferences. The United States and Canada provide nonreciprocal preferences for many agricultural products from the Caribbean, and the U.S. also provides preferences for imports from the Andean countries.[3] Nonreciprocal preferences are concessions, not binding commitments; in some cases they may expire and require reauthorization. Reciprocal trade agreements that are ratified by their participants provide a greater degree of assurance about the stability of the negotiated tariff preferences.

In the Western Hemisphere, regional trade agreements and preferences largely have succeeded in including agriculture in general in trade liberalization, although sensitive imports are often exempted (table 1-1). NAFTA, for example, will eliminate almost all barriers to agricultural trade among its members by the time it is fully implemented in 2008. Canada's imports of supply managed commodities (dairy, poultry and eggs) and U.S. imports of sugar, dairy, and peanuts from Canada are among the exceptions. In MERCOSUR, almost all agricultural tariffs are to be removed, although Argentina's economic crisis has led to the elimination of regional preferences on many items, including some food products. The U.S.-Chile free trade agreement, signed in 2003, includes all agricultural products.[4]

[3] The U.S. Caribbean Economic Recovery Act (CBERA), enacted in 1983, provides preferential or duty-free tariffs to 24 Central American and Caribbean countries. Canada's CARIBCAN program, enacted in 1986, provides duty-free access on many products to the Commonwealth Caribbean countries. The U.S. enacted the Andean Trade Preferences Act (ATPA) in 1991, which provides preferential duty treatment to Bolivia, Columbia, Ecuador and Peru. See chapter in this report on Market Access for a discussion of the commodity composition of U.S. nonreciprocal preferences.

[4] This U.S.-Chile free trade agreement is not incorporated into the CGE model described in this chapter.

Table 1-1—Average applied agricultural tariff rates in the Western Hemisphere, as calculated for use in CGE model

	Exporting countries									
Importing countries	Andean countries	Argentina	Brazil	Canada	C. Amer. Caribbean	Chile	Mexico	Rest S. America	U.S.	Rest world
Andean countries	0.0	12.9	11.2	10.9	10.4	9.5	10.4	10.4	12.4	11.5
Argentina	7.5	0.0	0.0	5.4	8.5	0.0	4.8	9.0	8.4	7.7
Brazil	25.7	0.0	0.0	7.5	26.6	0.0	0.0	8.6	9.5	21.2
Canada	22.0	20.0	19.0	0.0	14.2	16.4	14.5	20.6	14.3	24.6
C. Amer./Carib.	12.9	12.0	10.5	12.1	0.0	7.2	11.5	12.3	14.6	11.2
Chile	8.0	0.0	0.0	0.0	8.0	0.0	0.0	8.0	8.0	8.0
Mexico	17.3	13.3	0.0	2.5	19.8	0.0	0.0	9.4	0.0	16.2
Rest S. America	5.8	9.8	10.3	4.5	6.3	7.5	1.6	0.0	9.1	7.1
United States	2.7	4.3	4.3	0.0	2.7	4.4	0.0	4.4	0.0	8.5

Note: Tariff aggregation and weights vary by country and are described in the appendix. Tariffs are applied rates, including tariff preferences.
Sources: U.S. International Trade Commission, historical U.S. tariff database for 2000, Canada tariff schedule for 2000, Agricultural Market Access Database (AMAD), and GTAP v5, August 2001.

In addition to regional trade agreements among Western Hemisphere partners, many FTAA members have trade agreements with non-hemisphere partners. The United States has free trade agreements with Israel, Jordan, and Singapore, with other negotiations under way or proposed. Mexico has entered into a free trade agreement with the European Union that excludes agricultural commodities receiving EU domestic support, and it has agreements with the European Free Trade Association (EFTA) and Israel. Chile's agreements include one with the EU, and a MERCOSUR-EU negotiation is in progress. Caribbean countries, along with African and Pacific countries, are extended preferences by the EU, and Haiti will receive the EU's "Everything-But-Arms" extended to 48 least developed countries.

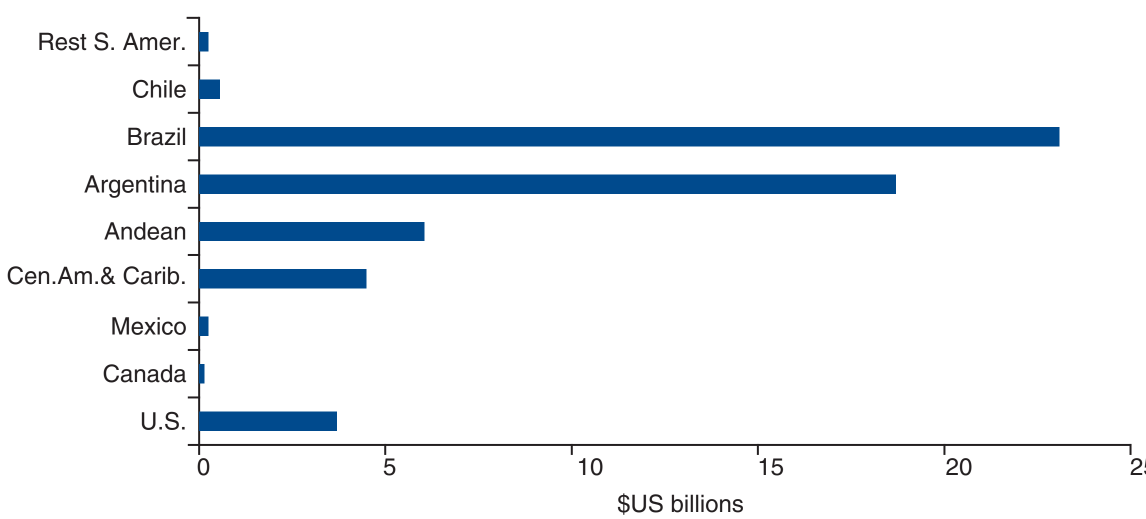
One benefit from moving forward to the FTAA will be the reduction or elimination of the discrimination that these pacts have introduced within the Western Hemisphere. The United States, for example, is not a member of MERCOSUR and faces a competitive disadvantage relative to its members' duty-free trade with each other. Likewise, FTAA countries outside of NAFTA no longer will have to compete against the preferences that the United States, Mexico and Canada give each other. In addition, the FTAA would "lock in" preferences, whereas nonreciprocal arrangements such as the U.S. GSP and ATPA must be periodically re-authorized and can therefore be allowed to lapse.

Welfare Effects of the FTAA

Based on the assumption that all agriculture and manufacturing tariffs will be eliminated, the FTAA will lead to welfare (or purchasing power) gains of $63 billion for the region, with gains achieved by every member of the trade agreement (fig. 1-1).[5] U.S. welfare is expected to increase by $4.1 billion. Welfare gains derive from two sources: resource reallocation and productivity growth. First, tariff elimination removes tariff-based price distortions that influence production and consumption decisions. Countries then can reallocate resources to products for

[5] Results reflect outcomes after a long-term adjustment (10-15 years) of the world economy. Results are reported in nominal U.S. 2002 dollars. Percent changes are reported relative to the model base year, a representative year in the global economy (1997).

Figure 1-1
FTAA's positive welfare effect on participants' economies



Source: ERS, USDA.

which they hold a comparative advantage, and consumers can follow their spending preferences. The resulting allocative efficiency gains from tariff elimination will account for almost $4 billion in welfare gains for the region. Every country will achieve these static welfare gains from the FTAA except Chile, which will face a small loss as a result of its export taxes.

Second, the FTAA is expected to generate dynamic gains in the productive capacity of developing countries in the Western Hemisphere. The link between trade openness and accelerated economic growth has been widely observed in developing countries, and attributed to several sources. Productivity gains accrue when the expansion of exports and imports of capital goods between developing and developed members leads to technological spillovers that stimulate total factor productivity (TFP) growth in the developing countries. These spillovers can stem from technological advances embodied in traded goods, "learning by doing," increased input varieties, or market expansion that leads to increasing returns to scale and/or Smithian economies of "fine specialization" (as opposed to Ricardian differences in factor proportions). All of these can help increase the productive efficiency of land, labor, and capital in all sectors of a developing economy.[6] Such potential productivity gains will add $59 billion to the estimated welfare impact of the FTAA on the region, with benefits accruing to every country, including Chile. Welfare gains will be largest in Argentina and Brazil, whose economies will increase in size by about 5 percent and 7 percent, respectively, due to the FTAA, mainly reflecting the large role of trade in manufacturing in these economies. By increasing returns to capital, productivity gains also will help to attract foreign direct investment, an important goal of the FTAA for the Western Hemisphere's developing countries but a potential impact that is not incorporated in this analysis.

Effects of the FTAA on Western Hemisphere Trade

If all tariffs (agricultural and manufacturing) are eliminated in the FTAA, and productivity gains are realized, annual agricultural trade within the Hemisphere will increase by about $4.0 billion, or about 6 percent (table 1-2). Agriculture will account for about 20 percent of the expansion in hemispheric trade due to the FTAA, proportionally larger than its current 9-percent share in merchandise trade and a reflection that agricultural tariffs are higher than on manufactures in many

[6] The link between trade liberalization and factor productivity growth, based on de Melo and Robinson (1991), is one way to approximate the faster economic growth observed in more open economies than in closed economies. Trade-productivity externalities have been incorporated into many recent analyses of trade liberalization (e.g., Hinojosa-Ojeda, Lewis and Robinson, 1995; Diao, Roe and Somwaru, 2001; and Andriamananjara and Hillberry, 2001). However, the conditions that must be in place for productivity growth to be accelerated are likely to include not only tariff reform, but also factors such as institutional reforms that facilitate investment and trade (Rodrick et al., 2002). Productivity gains may also come from an increase in the varieties of intermediate inputs available (Rutherford and Tarr, 2002). In our analysis, we assume a conservative coefficient to describe this relationship, identical for all developing countries in the Hemisphere. Recent empirical evidence on the trade-productivity link suggests this effect could be very large: in a 98-country study, Frankel et al. (1999) estimated that a 1-percentage-point increase in the trade share of GDP increased the contribution of productivity to output by about 2 percentage points.

Table 1-2—Change in annual Western Hemisphere and U.S. trade due to the FTAA ($US billion)

	Imports from FTAA	Imports from rest of world	Exports to FTAA	Exports to rest of world
Total Western Hemisphere				
Agriculture	3.9	0.2	3.9	-0.6
Manufacturing	16.2	-3.7	16.2	-1.2
United States				
Agriculture	0.9	0.1	1.4	-0.3
Manufacturing	6.1	0.7	6.5	-2.6

Source: Economic Research Service, USDA.

countries and regions, including the United States.[7] Annual U.S. agricultural exports to the hemisphere will increase by $1.4 billion (about 6 percent) and imports by about $900 million (about 3 percent).

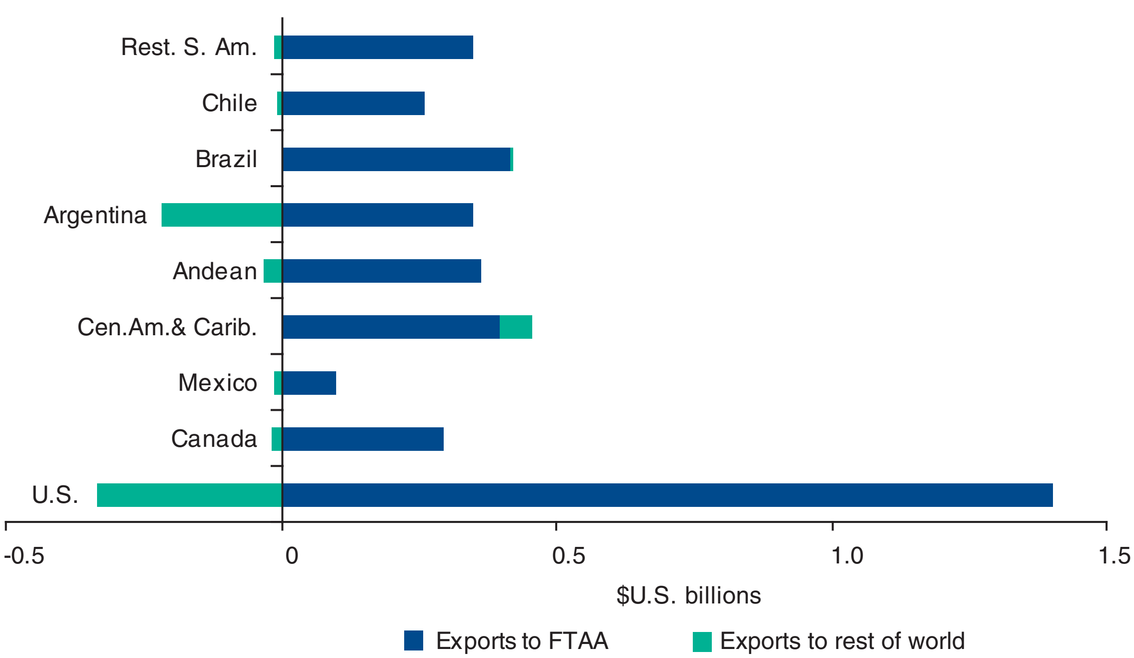
The increase in U.S. trade with the Western Hemisphere will lead to small adjustments in U.S. trade with the rest of the world. Annual U.S. agricultural exports to non-FTAA countries will decline about $300 million, and U.S. imports from these markets will increase slightly, about $100 million. On net, the FTAA will increase annual U.S. global agricultural exports and imports by about $1 billion each.

Figure 1-2 shows changes in FTAA members' global agricultural exports due to the FTAA. All countries will increase their agricultural exports to the region, including Mexico, which will face greater competition in the United States, its main export market, when the preferences it receives under NAFTA are extended to other FTAA members. The Andean region and the Central American/Caribbean region will have among the highest rates of growth in their annual agricultural exports (3 percent and 5 percent, respectively), with most export growth destined for the U.S. market. Despite their nonreciprocal preferences in the U.S. market, these regions face U.S. trade barriers on some agricultural products, particularly processed foods. U.S. tariffs are low or zero on most processed food products, but they remain very high on a small number of products. Comprehensive tariff reform in the FTAA can therefore result in additional agricultural export growth by countries that already benefit from preferences.

The Central American/Caribbean and Andean regions will also have relatively large increases in annual agricultural imports under the FTAA (16 percent and 18 percent, respectively), due to the relatively high tariffs they maintain on imports (fig. 1-3). Whereas most other countries in the

[7] Tariffs on FTAA members' imports from the Western Hemisphere, by commodity, are found in appendix table 1-1 C.

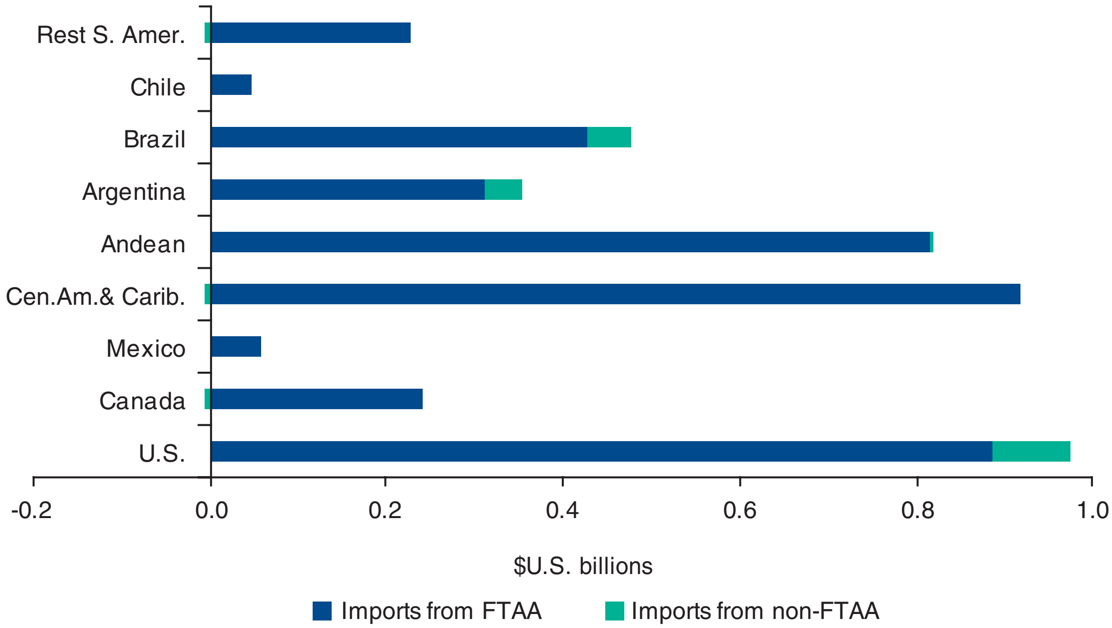
Figure 1-2
FTAA members' global agricultural exports would increase $3.3 billion



Source: ERS, USDA.

Figure 1-3

FTAA members' global agricultural imports would increase $4.1 billion



Source: ERS, USDA.

hemisphere have already liberalized their agricultural trade with major partners, these two regions receive nonreciprocal trade preferences from the U.S., their major trade partner in the hemisphere, and from Canada.

The expansion of both agricultural exports and imports in the Central American/Caribbean and Andean regions indicates that their agriculture is likely to undergo significant structural change in response to the FTAA, although on net their aggregate agricultural production will expand. Managing the process of structural change will be important for smaller economies. Their transition to a free trade environment has been a critical issue in the FTAA negotiations. FTAA members have agreed that the trade pact will take into account differences in the levels of development and size of the economies in the Western Hemisphere, in order to create opportunities for the full participation of the smaller economies and to increase their level of development. The U.S. FTAA proposal on market access is intended to facilitate the adjustment of small economies to free regional trade by offering them deeper and faster access to U.S. markets during the FTAA's expected transition period to free trade.

The largest agricultural trade impacts of the FTAA will be in processed foods, for which the Western Hemisphere's annual global exports will increase by about $1.5 billion, or 3 percent (table 1-3). This export category is a large, heterogeneous sector that includes fruit and vegetable juices, syrups and confections, flour, baked goods, roasted coffee and teas, sugar and sugar products, and orange juice. The Western Hemisphere's annual global exports of dairy products also will have relatively large growth, at about $330 million, or 33 percent, reflecting the high tariffs that remain on dairy products in the Western Hemisphere. The FTAA's global exports of "other crops"—a category that includes fibers, seeds, flowers, and tropical products such as coffee and bananas—will increase by about $235 million, or 3 percent. Global annual grain exports, including rice, wheat, and other grains, will increase about $460 million, or 6 percent. The commodity composition of the region's import growth due to the FTAA is similar to that of its exports, reflecting that most of the trade expansion is in intraregional trade.

Table 1-3—Change in annual, global agricultural imports and exports of FTAA members, by commodity ($US million)

Commodity	Growth in FTAA members' global exports	Growth in FTAA members' global imports
Rice	179.8	200.7
Wheat	130.5	183.1
Other grains	146.9	191.9
Horticulture	205.0	271.9
Oilseeds	126.1	166.7
Other crops	234.7	325.7
Livestock	45.0	100.9
Meats	172.2	265.4
Oils and fats	261.0	345.4
Dairy products	330.1	350.9
Processed foods	1,532.9	1,694.1
Total	3,364.1	4,096.6

Source: Economic Research Service, USDA.

Canada's largest growth in annual global agricultural exports due to the FTAA will be in wheat ($110 million); its largest import growth will occur in dairy products ($210 million). Mexico's largest increases in annual agricultural exports due to the agreement will occur in processed foods ($45 million) and horticulture ($16 million); its largest annual import growth will occur in processed foods ($21 million) and fats and oils ($30 million). Argentina's largest increases in annual exports due to the FTAA will occur in processed foods ($90 million) and oilseed and fat products ($40 million). Brazil's annual exports of processed foods, which include sugar and orange juice, will increase by $210 million under the agreement.

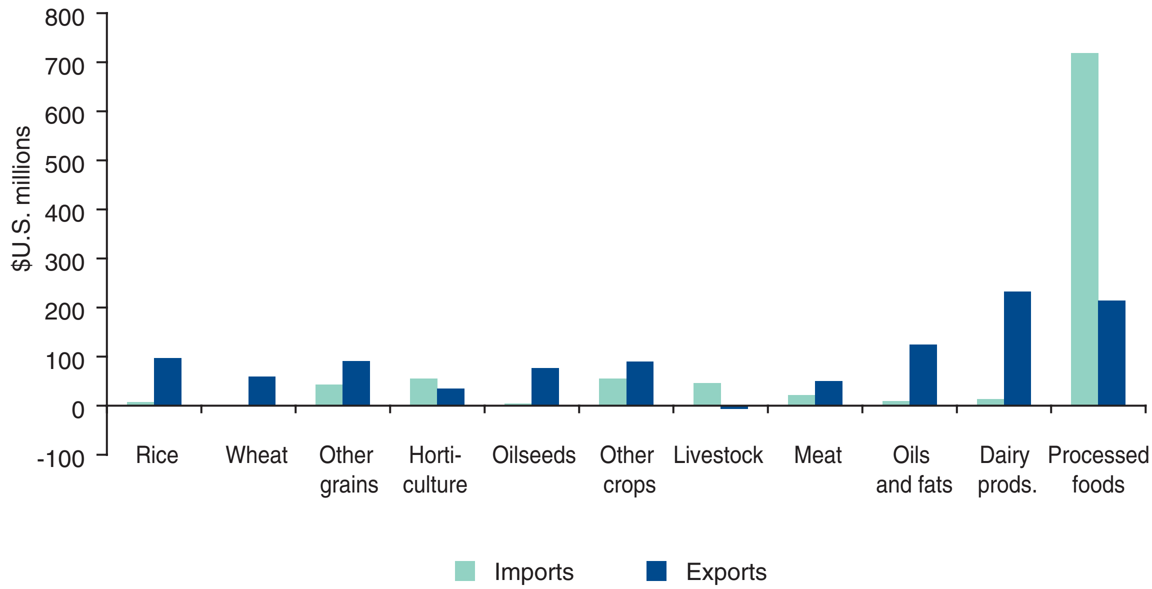
Effects of the FTAA on U.S. Agriculture

The growth in annual U.S. agricultural exports will be greatest to Central American and Caribbean countries ($650 million, mostly processed foods) and Andean countries ($360 million, mostly of grains, and oilseeds and products) (figs. 1-4 and 1-5).[8] Annual U.S. agricultural exports to Canada will increase by about $160 million (mostly dairy) in the FTAA. The FTAA will liberalize sensitive sectors that had been exempted by NAFTA, including Canadian dairy. Annual U.S. agricultural exports to Argentina ($100 million) and Brazil ($120 million) will be mostly in processed foods.

The Central American and Caribbean region also will account for most of the increase in U.S. agricultural imports due to the FTAA ($310 million), followed by increased imports from the Andean region of $170 million annually. Most of the growth in U.S. imports from these two supplying regions will be in processed food products. Although most U.S. tariffs on processed agricultural imports from these countries are already zero, U.S. preferences generally maintain very high tariffs on a small number of commodities related to U.S. farm programs including, for example, chocolate crumb, sweetened cocoa powders, cake mixes and animal feeds made with milk derivatives.

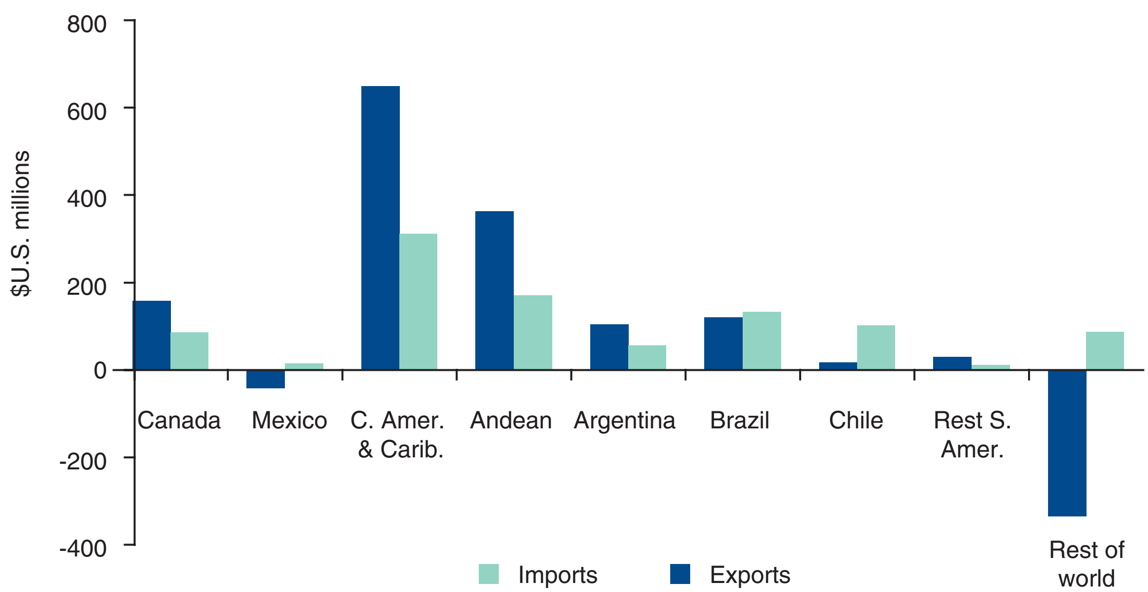
[8] Data on changes in U.S. agricultural trade by country and commodity are reported in appendix tables 1-1A and 1-1 B.

Figure 1-4
Diverse commodity composition of change in annual U.S. agricultural trade due to FTAA



Source: ERS, USDA.

Figure 1-5
Diverse partners account for change in annual U.S. agricultural trade due to FTAA



Source: ERS, USDA.

U.S. imports from Brazil will increase by about $130 million annually and from Argentina by about $60 million annually, with both trade flows composed of a variety of nongrain crops, including sugar and other processed food products. U.S. agricultural imports from Mexico will increase slightly due to the FTAA, by about $15 million annually.

Because trade with the Western Hemisphere accounts for a small share of U.S. agricultural production, trade expansion due to the FTAA will have only a small effect on U.S. output. Except for rice, real output changes by less than 1 percent in the aggregate sectors described in this analysis, by sector (table 1-4). Increased U.S. exports will lead to a small expansion of output in oilseeds, oils and fats, milk and dairy products.

Inclusion of U.S., Agriculture Maximize Benefits of the FTAA

The participation of the United States in the FTAA will help the Western Hemisphere attain the full potential benefits of the agreement. The large size of the U.S. economy makes it the single most important regional market for the rest of the hemisphere. In agriculture, U.S. participation will account for about one-third of the region's global agricultural export growth due to the FTAA and about one-quarter of the region's global agricultural import growth (table 1-5). For U.S. trade partners, the potential trade opportunities with the United States will support both their efficiency gains based on increased trade and specialization, as well as potential productivity gains linked to the expansion of trade between developing- and developed-country partners. For the United States, participation in the FTAA ensures expansion of both U.S. agricultural exports and imports. Without U.S. participation, U.S. global agricultural exports would decline because of the preferential treatment that will be extended to competing suppliers within the Western Hemisphere through the terms of the agreement. Also, U.S. agricultural import growth, which lowers costs and increases variety for consumers, would be diminished.

Agriculture is often a sensitive sector in free trade agreements because most countries provide domestic support or relatively high trade protection to their agricultural producers, and the effectiveness of these policies would be compromised by freer trade. Reflecting the diverse levels of economic development of FTAA members, their agricultural policies evidence a range of objectives, including farm income support, reducing price or income variability, providing income and employment in rural or low-income areas, and stimulating economic development. While the use of agricultural support and protection create challenges for the inclusion of agriculture in the FTAA, benefits will be greater if agriculture is included in, rather than excluded from, the agreement. Trade liberalization of manufacturing alone would increase FTAA members' demand for manufacturing imports, causing some countries to reduce their agricultural production and trade in order to shift resources into industry. This redistribution of agricultural to

Table 1-4—Effects of the FTAA on U.S. agricultural production, by sector

Commodity	Real change in output (%)
Rice	3.2
Wheat	0.0
Other grains	-0.5
Horticulture	0.0
Oilseeds	0.4
Other crops	-0.6
Livestock	-0.4
Milk (raw)	0.1
Meat	-0.3
Oils and fats	0.5
Dairy products	0.1
Processed foods	-0.1

Source: Economic Research Service, USDA.

Table 1-5—Change in global, annual agricultural trade due to the FTAA, without U.S. participation and without inclusion of agriculture ($US billion)

	U.S.		Rest of Western Hemisphere	
	Exports	Imports	Exports	Imports
FTAA including U.S. and agriculture	1.07	0.97	2.30	3.12
FTAA without United States	-0.01	0.06	1.47	1.39
FTAA without agriculture	-0.05	0.12	0.06	0.60

Source: Economic Research Service, USDA.

manufacturing production will lead to a small increase in demand for agricultural imports in these countries. In addition, productivity gains linked to expanded trade in manufacturing sectors will stimulate consumer demand for all products, including food. The effects of the FTAA on agricultural trade in the Western Hemisphere therefore still will be positive but far smaller if agriculture is excluded from trade reform. Including agriculture in the FTAA increases these positive effects through the potential efficiency and welfare benefits linked directly to agricultural trade liberalization.

Doha Development Agenda and the FTAA

FTAA members (except Bermuda) simultaneously are negotiating their regional trade agreement and multilateral policy reforms in the WTO Doha Development Agenda. Globally, the continued proliferation of regional trade agreements indicates that regionalism and multilateralism have become accepted as dual trade strategies for most countries. By May 2003, the WTO had been notified of 184 regional trade agreements (WTO, 2003). Nearly every country in the world is now a member of at least one trade agreement (Crawford and Laird, 2001). Nevertheless, the benefits of a regional versus a multilateral trade strategy is a continuing public policy debate.

Multilateralism will always be a "first best" strategy because it is nondiscriminatory, that is, all countries participate and offer similar tariff treatment to all WTO members. This principle of nondiscrimination forms the foundation of today's global trade rules. Regionalism, on the other hand, violates this principle by offering preferential tariff treatment to selected trade partners. Opponents of regionalism argue that the creation of trade among a small group of preferred trade partners is achieved at the expense of trade with and investment in nonmembers.

Advocates of regionalism generally emphasize its incremental and more attainable benefits compared with global reform, and its potential role in advancing or strengthening the multilateral process. Regional agreements are more likely to achieve deeper and faster reform among like-minded partners than is possible in the more diverse multilateral negotiations. Advocates also argue that a region's successful experience in dealing with nontariff barriers following the removal or reduction of regional tariffs can provide experience that strengthens the multilateral process. The newer regional agreements formed in the past decade, particularly those in the Western Hemisphere, have also helped to accelerate economic growth in small economies, by locking in unilateral reforms, stimulating investment and productivity growth, and fostering their links with large and more developed economies (Ethier, 2001). For small, reforming countries especially, regionalism can play a role as a first step in engaging in the global trading system, and it helps give such countries a greater stake in a rules-based global trading system. Trade rules that ensure predictability and fairness in trade relationships, and that offer a credible enforcement mechanism, provide conditions that are favorable for the conduct of business, investment, and the expansion of trade.

As the Western Hemisphere pursues a regional agreement, two factors make multilateral agricultural reform of continued importance for FTAA members. First, FTAA countries are global agricultural traders. They depend on non-FTAA markets, with about 65 percent of their agricultural exports destined for, and 35 percent of their agricultural imports originating from, outside the Western Hemisphere. Non-FTAA markets are especially important for the United States and Brazil, for whom they account for 75 percent to 80 percent of their total agricultural exports. The FTAA region is also a major trade bloc in global agricultural markets. Their agricultural exports outside the Western Hemisphere account for about 45 percent of world agricultural trade, and their imports from the rest of the world account for about 9 percent of that trade.

The Western Hemisphere's position as a large net agricultural exporter gives it a great stake in WTO negotiations that may further liberalize global agricultural markets. Despite the reforms achieved in the Uruguay Round, these markets are still characterized by significant policy distortions (USDA, 2001). Further multilateral reform will impose disciplines on FTAA members and the rest of the world alike. However, in general, the level of distorting policies used by FTAA members is lower than in most other countries and regions. The average, post-Uruguay Round bound agricultural tariff of FTAA countries of about 40 percent is lower than the global average bound rate of 62 percent (Gibson et al., 2001). The average applied rate of FTAA countries is about 13 percent. Domestic support in the FTAA is also relatively low. The 2002 producer support estimates for the three FTAA members of the Organization for Economic Cooperation and Development (OECD) are 18 percent (United States), 20 percent (Canada), and 22 percent (Mexico)—below the aggregate OECD rate of 31 percent (OECD, 2003). Finally, export subsidies by FTAA members are minimal, with the EU accounting for over 90 percent of global expenditure on these subsidies in 1998 (USDA, 2001).

These patterns in agricultural trade flows and agricultural policy distortions suggest that the region will benefit from additional global trade reforms. Any scenario of globalized reform shows the benefits of a multilateral agreement for the Western Hemisphere. For example, if the Doha Development Agenda replicates the limits set in the Uruguay Round, the region's annual agricultural exports outside the Western Hemisphere would increase by 10 percent and its imports by 2 percent. Western Hemisphere agricultural export growth in this scenario for multilateral reform is estimated to account for about 40 percent of the resulting expansion of global agricultural trade.

The multilateral negotiations also have significance for the FTAA because of their more comprehensive agenda for agricultural reform. The Doha Round is negotiating disciplines on market access, domestic support, and export subsidies. While the mandate for the FTAA includes export subsidies in the region and other practices that distort trade in agricultural products, its regional scope means that it is difficult for the FTAA to limit members' domestic support for their agricultural sectors. In addition, the FTAA cannot address the use of export subsidies by non-FTAA countries that affect competition within the Western Hemisphere and in third-party markets.

FTAA members recognize the global character of their agricultural markets and the importance of third-country policies. At the Toronto Trade Ministerial Meeting in 1999, FTAA members agreed to work in the multilateral negotiations toward the global elimination of export subsidies on agricultural products. FTAA members addressed the problem of domestic support at the Quito Trade Ministerial Meetings in November 2002. There, members agreed on the need for significant results in the negotiations on agriculture both in the FTAA and the WTO, and noted that progress in the FTAA's market-access negotiations for agriculture will depend on progress being made on a broader agriculture agenda. This interdependence of the regional and multilateral negotiations increases the Western Hemisphere's stake in the Doha Development Agenda.

Conclusion

As trade becomes increasingly important for both U.S. agricultural producers and consumers, the potential benefits from the U.S. pursuit of a more open and market-oriented global trading system become greater. U.S. producers will benefit directly from their greater access to world markets and indirectly from the economic growth and increased demand for food that trade liberalization can foster. Consumers will benefit because global trade rules help to increase product variety, lower food costs, and ensure the safety and security of food supplies. The U.S. pursuit of regionalism complements its pursuit of multilateralism. The dual pursuits reinforce the same principles of trade liberalization, with regionalism offering an opportunity to achieve deeper reforms on key issues with some partners. Multilateralism provides the venue for more comprehensive and inclusive, but likely more gradual, trade liberalization, and it can help minimize the potential negative impacts of regionalism.

This analysis focused on market access reforms in the FTAA. Market access is only one element of the FTAA negotiations, which also could address other areas that may affect trade in the hemisphere. Furthermore, trade is analyzed in this paper at relatively aggregate levels. For some individual commodities, complex trade policies and domestic programs will likely influence both the liberalization process and the potential trade flows in the FTAA. For these commodities, the results reported here can be only indicative of broad market trends in a free trade area.

References

Andriamananjara, Soamiely and Russell Hillberry. 2001. "Regionalism, Trade and Growth: The Case of the EU-South Africa Free Trade Arrangement." U.S. International Trade Commission. Office of Economics working paper No. 01-07-A.

Burfisher, Mary, Sherman Robinson, and Karen Thierfelder. 2002. "The Global Impacts of Farm Policy Reforms in OECD Countries." *American Journal of Agricultural Economics*, Vol. 84, No. 3 (August), pp. 234-241.

Crawford, Jo-Anne, and Samuel Laird. 2001. "Regional Trade Agreements and the WTO." *North American Journal of Economics and Finance.* Vol. 12, No. 2: 193-211.

De Melo, Jaime and Sherman Robinson. 1992. "Productivity and Externalities: Models of Export-Led Growth." *The Journal of International Trade and Economic Development*, Vol. 1, No. 1, pp. 41-68.

Ethier, W.J. 2001. "The New Regionalism in the Americas: A Theoretical Framework," *North American Journal of Economics and Finance.* No.12, Vol.2, pp: 159-172.

Frankel, Jeffrey A. and David Romer. 1999. "Does Trade Cause Growth*?" American Economic Review*, Vol. 89, No. 3, pp. 379-399.

Gibson, Paul, John Wainio, Daniel Whitley and Mary Bohman. 2001. *Profiles of Tariffs in Agricultural Markets.* U.S. Department of Agriculture, Economic Research Service. AER No. 796. Washington, D.C.

Global Trade Analysis Project (GTAP). Base data for 1997, Version 5.1. August, 2002.

Hinojosa-Ojeda, Raul, Jeffrey D. Lewis and Sherman Robinson. 1995. "Regional Integration and Options for Central America and The Caribbean After NAFTA." *North American Journal of Economics and Finance*. Vol. 6, No. 2, pp. 121-148.

Lewis, Jeffrey D., Sherman Robinson, and Karen Thierfelder. 2003. "Free Trade Agreements and the SADC Economies," *Journal of African Economies*, Vol. 12, no. 2, pp. 156-206.

Organization for Economic Cooperation and Development (2002). 2001 Producer and Consumer Subsidy Equivalent electronic database.

Organization for Economic Cooperation and Development (2003). 2002 Producer and Consumer Subsidy Equivalent electronic database.

Rodrik, Dani, Arvind Subramanian, and Francesco Trebbi. 2002. "Institutions Rule: The Primacy of Institutions over Geography and Integration in Economic Development." NBER Working Paper No. 9305.

Rutherford, Thomas F. and David G. Tarr. 2002. "Trade Liberalization, Product Variety and Growth in a Small Open Economy: A Quantitative Assessment," *Journal of International Economics*. Vol. 56, pp. 247-272.

Stout, James V. and Julieta Ugaz-Pereda. 1998. "Western Hemisphere Trading Blocs and Tariff Barriers for U.S. Agricultural Exports," in *Regional Trade Agreements and U.S. Agriculture*. U.S. Department of Agriculture, Economic Research Service.. AER No. 771. Washington, D.C.

United States Department of Agriculture, Economic Research Service. 2001. *Agricultural Policy Reform in the WTO: The Road Ahead*. AER No. 802. Washington, D.C.

United States Office of Management and Budget. 2003. *Budget of the United States for Fiscal 2003.* Historical Tables.

Chapter 2

Trade Liberalization in the Western Hemisphere: Impacts on U.S. Agricultural Exports

Steven Zahniser, Daniel Pick, Greg Pompelli, and Mark Gehlhar

Experience with the regional trade agreements already in effect in the Western Hemisphere suggests that the trade effects of the FTAA will exceed the impact of its tariff and quota changes. For instance, to the extent that the FTAA requires closer cooperation on sanitary and phytosanitary issues, as is the case with the North American Free Trade Agreement (NAFTA), member countries are likely to adjust their import standards so that they do not restrict trade unnecessarily. Moreover, the FTAA is likely to have a myriad of indirect effects that ultimately expand trade, even though these changes may not be spelled out in the agreement. Many developments of this sort took place following the implementation of NAFTA and the Common Market of the South (MERCOSUR, or Mercado Común del Sur). Examples include increased investor confidence within the two regions, the further exploitation of scale economies, and the upgrading of transportation linkages along new and existing routes of trade.

To better understand the potential breadth of the FTAA's influence, this chapter assesses the impact that NAFTA, MERCOSUR, and related agreements have had on agricultural trade within the Western Hemisphere. Focusing on U.S. agricultural exports from 1980 through 1999, the chapter employs a series of modified gravity models, as suggested by Cheng and Wall (1999), to identify noteworthy changes in trade coinciding with these agreements. A main strength of this approach is that it distinguishes the impact of a trade agreement on U.S. exports to a specific country from the relative closeness of that country's bilateral trade relationship with the United States. However, the variables used to identify trade agreements may also capture the influence of other factors that were contemporaneous to these reforms.

To develop a complete picture of regionalism's impact on U.S. agricultural exports, separate models are estimated at the aggregate level and for 32 individual commodities. This analysis generates several important findings:

(1) Unilateral trade reforms undertaken by Mexico during the late 1980s and early 1990s have provided a sizable boost to U.S. agricultural exports to Mexico. According to gravity-model estimates, these unilateral reforms accounted for 39 percent of U.S. agricultural exports to Mexico from 1989 through 1999, or an average of roughly $1.7 billion per year. Thus, one of NAFTA's main benefits to U.S. agriculture has been to "lock in" reforms that Mexico had made prior to NAFTA.

(2) NAFTA's estimated influence on U.S. agricultural exports to Mexico is positive and statistically significant for four of the commodities studied (grapes, tobacco products, yarn and thread, and leather), and it is positive but statistically insignificant for 18 other commodities. Although the model differentiates NAFTA and Mexico's unilateral reforms, both were components of an integrated strategy for market reform that Mexico has pursued since the mid-1980s. Mexican trade liberalization, both unilateral and through NAFTA, accounted for an average annual increase in U.S. agricultural exports to Mexico of $3.1 billion during 1994-99.

(3) The estimated impact of the Canada-U.S. Free Trade Agreement (CFTA) and NAFTA on U.S. agricultural exports to Canada is not statistically significant. This finding,

which is observed both at the aggregate level and for all the individual commodities studied, may reflect the fact that most barriers to U.S.-Canada agricultural trade were relatively low prior to CFTA, while several important sectors—dairy, poultry, and eggs—were exempted from trade liberalization.

(4) MERCOSUR's application of a common external tariff has lowered some barriers to U.S. agricultural exports, creating new opportunities for trade. Relatively high levels of U.S. agricultural exports during the MERCOSUR period are observed at the commodity level for all four MERCOSUR countries and at the aggregate level for Argentina, Paraguay, and Uruguay. In the cases of Argentina and Brazil, several consumer-oriented food products from the United States appear to have benefited from tariff reductions linked to MERCOSUR's common external tariff, although the value of this trade is still small compared with exports to Canada and Mexico.

(5) MERCOSUR appears to have had a trade-diverting effect on U.S. wheat exports to Brazil. With the creation of MERCOSUR, Argentina has dramatically increased its share of the Brazilian wheat market, while U.S. wheat exports to Brazil have declined. Argentine wheat enters Brazil duty free, while U.S. wheat faces MERCOSUR's common external tariff for the product.

The rest of the chapter contains a methodological overview of the modified gravity models and an extensive discussion of their findings. Technical aspects of the models are discussed in appendix 2-1, while the International Bilateral Agricultural Trade (IBAT) database, the source of the export data used in the chapter, is profiled in appendix 2-2.

Gravity Model Methodology

In its most basic application, the gravity model of international trade posits that the level of exports from one country to another is a function of each country's gross domestic product (GDP) and its population, as well as the distance between the two countries. To estimate the trade effects of regional trade agreements, a number of "gravity modelers" (such as Frankel, 1997; Endoh, 1999; and Soloaga and Winters, 2001) have included additional explanatory variables that indicate a country's membership in a specific trade agreement or trade bloc. These variables, however, do not distinguish the influence of a trade agreement from the long-term, relative closeness of a specific bilateral trading relationship. Nor do they account for the strong likelihood that the impact of a trade agreement varies from one participant to another.

To overcome these shortcomings, this chapter features a different specification of the gravity model (table 2-1). Following Cheng and Wall, the modified models include two sets of fixed effects (variables with the value of one or zero) that respectively identify specific importing countries and specific years. The fixed effects for importing country play a crucial role in the analysis, as they control for the importing country's long-term bilateral trading relationship with the United States. This increases the likelihood that the trade-agreement variables capture the effects of those agreements, rather than the general closeness of a particular bilateral relationship. Moreover, the trade-agreement variables are country-specific in order to address the possibility that the impact of an agreement varies among its participants. Table 2-2 provides a definition of each trade-agreement variable.

While the modified gravity models provide an improved framework for assessing regional trade agreements, the trade-agreement variables may still capture the influence of unrelated developments that are contemporaneous to these accords. Unusual weather patterns are an obvious

Table 2-1—Comparison of basic and modified gravity models

Basic gravity model	
Dependent variable:	Log of exports from country *i* to country *j*
Explanatory variables:	Intercept Log of GDP of country *i* Log of GDP of country *j* Log of population of country *i* Log of population of country *j* Log of distance between country *i* and country *j* Other variables selected by researcher, such as dummy variables to denote trade flows corresponding to particular trade agreements
Econometric Approach:	Ordinary least squares (usually)
Modified gravity model, as used in this chapter	
Dependent variable:	Log of U.S. agricultural exports to country *i* in year *t* (in U.S. dollars)
Explanatory variables:	Intercept Log of GDP of country i in year t (in U.S. dollars) Fixed effects denoting importing country For example, the fixed effect for Mexico equals one if Mexico is the importing country and zero otherwise. For purposes of comparison, no fixed effect is included for Canada. Fixed effects denoting year For example, the fixed effect for 1998 equals one if the year is 1998 and zero otherwise. For purposes of comparison, no fixed effect is included for 1999. Trade-agreement variables – dummy variables that identify country *i*'s participation in a particular trade agreement in year t
Econometric approach:	Tobit

Source: Economic Research Service.

Table 2-2—Trade-agreement variables in the modified gravity models

NAFTA countries	
Unilateral-Mexico	Equals one for exports to Mexico during 1989-99 and zero otherwise
NAFTA-Mexico	Equals one for exports to Mexico during 1994-99 and zero otherwise
CFTA-Canada	Equals one for exports to Canada during 1989-99 and zero otherwise
NAFTA-Canada	Equals one for exports to Canada during 1994-99 and zero otherwise
MERCOSUR countries	
Full members:	
Argentina/1991-99	Equals one for exports to Argentina during 1991-99 and zero otherwise
Argentina/1994-99	Equals one for exports to Argentina during 1994-99 and zero otherwise
Brazil/1991-99	Equals one for exports to Brazil during 1991-99 and zero otherwise
Brazil/1994-99	Equals one for exports to Brazil during 1994-99 and zero otherwise
Paraguay/1991-99	Equals one for exports to Paraguay during 1991-99 and zero otherwise
Paraguay/1994-99	Equals one for exports to Paraguay during 1994-99 and zero otherwise
Uruguay/1991-99	Equals one for exports to Uruguay during 1991-99 and zero otherwise
Uruguay/1994-99	Equals one for exports to Uruguay during 1994-99 and zero otherwise
Associate members:	
Bolivia/1997-99	Equals one for exports to Bolivia during 1997-99 and zero otherwise
Chile/1996-99	Equals one for exports to Chile during 1996-99 and zero otherwise

Source: Economic Research Service.

example of an unrelated phenomenon that causes short-term changes in agricultural production and trade, and less experienced observers might incorrectly attribute these changes to one or more trade agreements. By having encompassing measures of the effects of trade-policy reforms, the modified gravity models may offer better estimates of their impact than models that focus narrowly on tariff reductions. However, these measures may be so broad that they capture the influence of factors that have little to do with trade agreements.

Empirical Findings

Total Agricultural Exports. Table 2-3 summarizes the results from the model of total U.S. agricultural exports. Although each variable denoting exports to Canada or Mexico during the CFTA/NAFTA period obtains a positive coefficient, only the coefficient for Unilateral-Mexico is statistically significant. Thus, the model supports the theory that Mexico's unilateral reforms have boosted U.S. agricultural exports to Mexico since 1989. It also suggests that the role of NAFTA in "locking-in" Mexico's earlier reforms was an important one.[1]

Figure 2-1 contrasts the actual and expected values of U.S. agricultural exports to Mexico from 1980 through 1999, based on the coefficients from the model. The figure illustrates that the modified gravity model does a reasonably good job of capturing the broad features of this trade, given the relative simplicity of the model and the coarseness of the trade-agreement variables. The largest difference between the actual and predicted values occurs in 1995, right after the sudden devaluation of the Mexican peso in December 1994. This suggests that the inclusion of an exchange-rate variable might improve the performance of the modified gravity model.

Using the coefficients for Unilateral-Mexico and NAFTA-Mexico, one may calculate the expected value of U.S. agricultural exports to Mexico when these variables are held to zero.[2] This simulation reveals that the model attributes a great deal of influence to Unilateral-Mexico and NAFTA-Mexico. Mexico's unilateral reforms account for 39 percent of U.S. agricultural exports to Mexico during 1989-1993, while the reforms and NAFTA together account for 59 percent of this trade during 1994-99.[3] These percentages correspond to additional trade flows worth an average of $1.3 billion per year during 1989-93 and $3.1 billion per year during 1994-99. The impact of the unilateral reforms alone averages $1.7 billion per year during 1989-1999.

The simulation also provides an estimate (albeit insignificant) of NAFTA's impact on U.S. agricultural exports to Mexico. According to the model, NAFTA accounts for 20 percent of this trade during 1994-99. This estimate is substantially larger than the assessment of ERS's 1997 NAFTA Report (Crawford and Link, 1997), which concludes that U.S. agricultural exports to Mexico in 1996 were about 3 percent higher than they would have been in NAFTA's absence. This analysis relied upon a computable general equilibrium model and only examined the first 3 years of NAFTA's 14-year transition to trade liberalization. Based on careful consideration of

[1] A sample with more observations of U.S. agricultural exports to Canada and Mexico during the CFTA-NAFTA period might afford more precise estimates of these coefficients. To explore this possibility, an alternative model was estimated using the data for all 32 commodity groupings, but this model also yielded insignificant coefficients for CFTA-Canada, NAFTA-Canada, and NAFTA-Mexico. However, these coefficients were significant in another alternative model, estimated using ordinary least squares, in which the original sample was limited to countries with agricultural imports from the United States of at least $500 million. The results from both models are available from the authors.

[2] Appendix 2-1 describes this calculation in greater detail.

[3] A one-tailed t-test supports the joint hypothesis that the coefficients of Unilateral-Mexico and NAFTA-Mexico in Model 1 are greater than zero at the 90-percent confidence level, even though NAFTA-Mexico's coefficient by itself does not pass such a test.

Table 2-3—Parameter estimates for gravity models of total U.S. agricultural exports

Variable	Parameter Estimate	Standard Error		Interpretation
Number of observations	2,540			
Number of left-censored observations	5			
Intercept	12.7975	0.3690	***	
Log of importing country's GDP	0.3183	0.0438	***	U.S. agricultural exports increase with the importing country's GDP
Participation in NAFTA or MERCOSUR				Impact on U.S. agricultural exports:
CFTA-Canada (1989-99)	0.3758	0.3758		Insignificant
NAFTA-Canada (1994-99)	0.3028	0.4081		Insignificant
Unilateral-Mexico (1989-99)	0.4987	0.3759	*	Positive
NAFTA-Mexico (1994-99)	0.3892	0.4080		Insignificant
Argentina, 1991-99	1.0117	0.4390	***	Positive
Argentina, 1994-99	0.7019	0.4764	*	Positive
Brazil, 1991-99	-0.9025	0.4397	**	Negative
Brazil, 1994-99	0.8627	0.4764	**	Positive
Paraguay, 1991-99	1.5880	0.4389	***	Positive
Paraguay, 1994-99	0.2927	0.4765		Insignificant
Uruguay, 1991-99	0.0012	0.4390		Insignificant
Uruguay, 1994-99	0.6360	0.4765	*	Positive
Bolivia, 1997-99	-0.3799	0.4219		Insignificant
Chile, 1996-99	0.1391	0.3770		Insignificant
Fixed effects for importing country				Compared with exports to Canada, U.S. agriculture is:
Argentina	-4.2950	0.3059	***	Less likely to export to Argentina
Bolivia	-3.0016	0.3403	***	Less likely to export to Bolivia
Brazil	-1.8809	0.3021	***	Less likely to export to Brazil
Chile	-2.4824	0.3032	***	Less likely to export to Chile
Mexico	-0.2212	0.3178		Just as likely to export to Mexico
Paraguay	-5.5870	0.3617	***	Less likely to export to Paraguay
Uruguay	-4.9627	0.3477	***	Less likely to export to Uruguay
Scale	0.6710			
Log-likelihood	-2,595.8			

n.a. = not applicable

Coefficients for fixed effects for year and some fixed effects for importing country are not reported.

Results of one-tailed *t*-test of parameter estimate's significance:

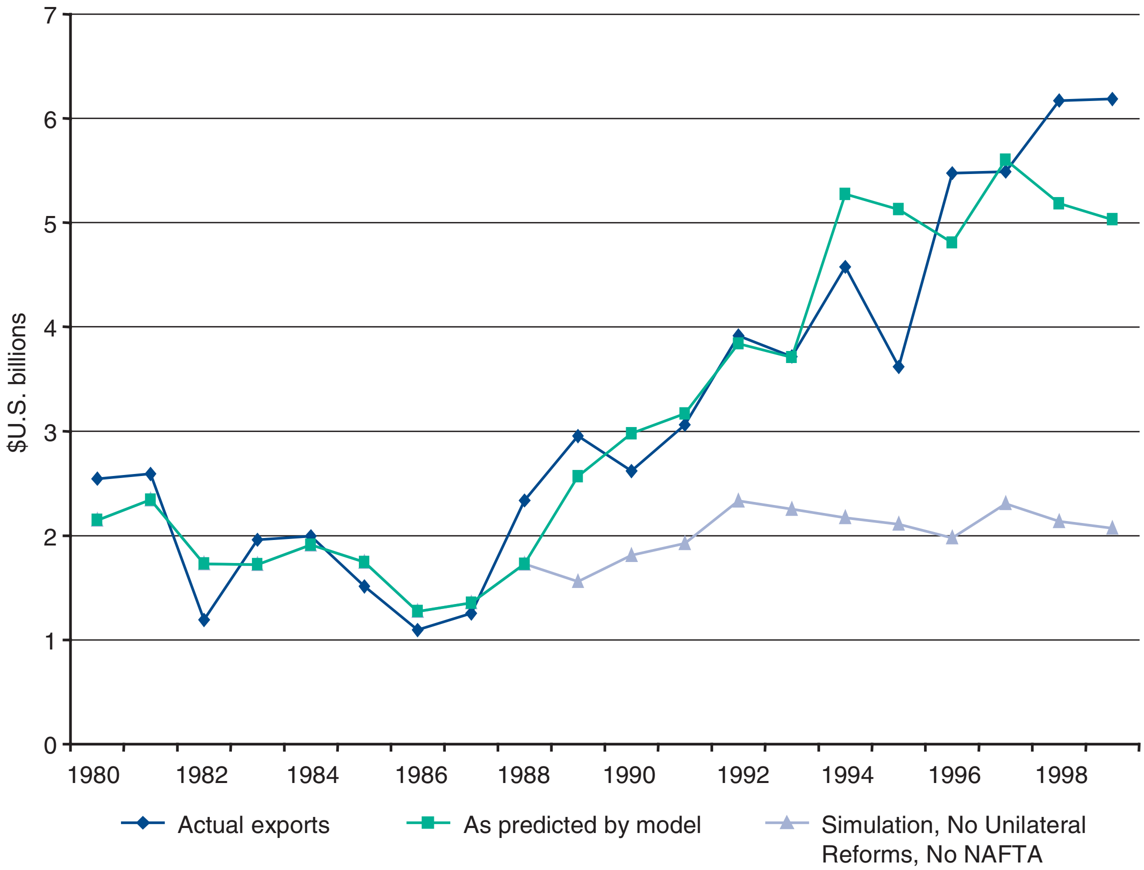
***Passes at 99-percent confidence level; **passes at 95-percent level; and *passes at 90-percent level.

Source: Economic Research Service.

NAFTA's commodity-specific provisions, ERS's 2002 NAFTA Report (Zahniser and Link, 2002) identifies several U.S. agricultural exports to Mexico whose trade volume during 1994-2000 increased by more than 15 percent as a direct result of NAFTA: rice, dairy products, cotton, processed potatoes, apples, and pears.

Figure 2-2 presents a similar simulation of U.S. agricultural exports to Canada in the absence of CFTA and NAFTA. Although the coefficients for CFTA-Canada and NAFTA-Canada are not statistically significant, the trade effects associated with these coefficients are large in value. Specifically, the model attributes an annual average of $2.3 billion of U.S. agricultural exports to Canada during 1989-1999 to the two agreements. Since 1985, U.S. agricultural exports to Canada have increased steadily and without interruption, a pattern that may correspond to the insignificance of CFTA-Canada and NAFTA-Canada.

Figure 2-1
Actual and expected values of U.S. agricultural exports to Mexico, 1980-1999

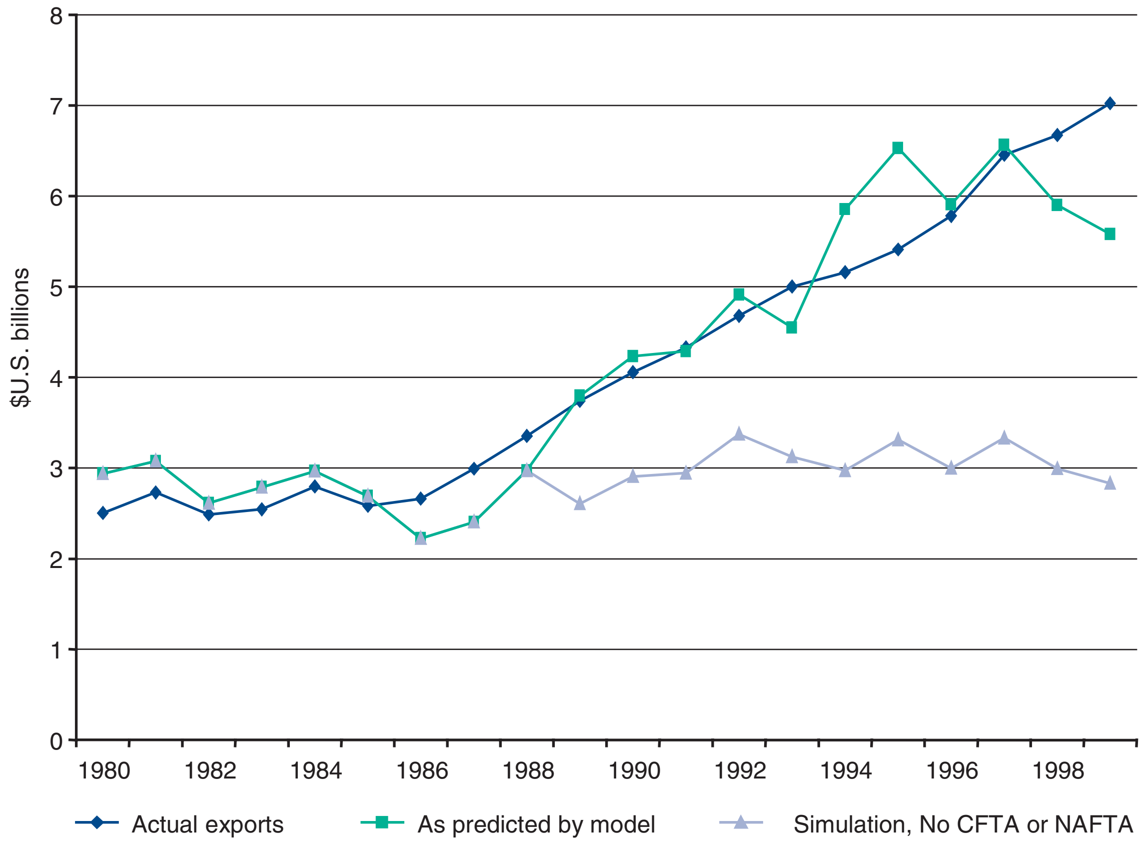


Source: Economic Research Service.

MERCOSUR appears to have had a trade-creating effect on U.S. agricultural exports to Argentina, Uruguay, and Paraguay. This trade has grown dramatically since MERCOSUR's implementation, but each of these countries is still a relatively minor market for U.S. agricultural products, especially when compared with Canada or Mexico. According to the IBAT database, U.S. agricultural exports to these three countries totaled $176 million in 1999, compared with $13.2 billion for Canada and Mexico combined. Argentina is the largest customer of U.S. agricultural products in MERCOSUR, with agricultural imports from the United States totaling $154 million in 1999. A simulation of this trade in MERCOSUR's absence suggests that the common market increased U.S. agricultural exports to Argentina by an average of $117 million per year during 1991-99 (fig. 2-3).

MERCOSUR's positive influence on U.S. exports probably stems from the common market's external tariff. In many instances, this external tariff is substantially lower than the tariffs previously applied individually by MERCOSUR's member countries. For example, Argentina's average applied tariff rate dropped from 20 percent to 10 percent between 1987 and 1995, while Brazil lowered its average from 58 percent in 1986 to 10 percent in 1995 (Stout and Ugaz-Pereda, 1998: p. 134). However, the model suggests that MERCOSUR has diverted U.S. agricultural exports away from Brazil, especially during 1991-93 (fig. 2-4). The initial decline in this trade corresponds not with the start of the common market in 1991 but instead with the year 1987. Thus, factors other than MERCOSUR may be partially responsible for the reduced level of exports. In addition, the commodity models analyzed below indicate that developments in wheat trade account for a substantial portion of the negative effect associated with MERCOSUR.

Figure 2-2
Actual and expected values of U.S. agricultural exports to Canada, 1980-1999



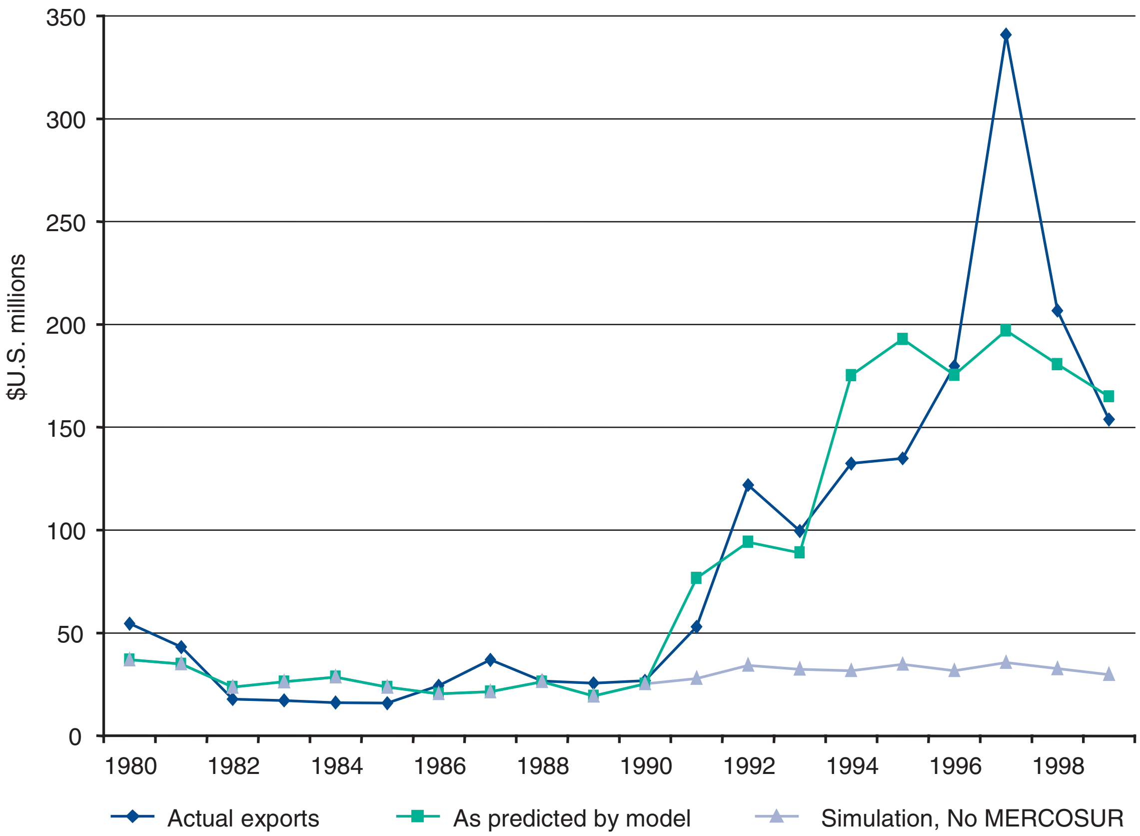
Source: Economic Research Service.

One additional result of interest lies among the fixed effects for importing country. Each fixed effect for the MERCOSUR countries is negative and strongly significant, a result that should not be surprising given that the excluded country for purposes of comparison is Canada. But the coefficient for exports to Mexico is statistically indistinguishable from zero. This suggests that the long-term U.S. trading relationship with Mexico is about as close as the long-term relationship with Canada, once the size of the two economies and the differing impacts of CFTA, NAFTA, and Mexico's unilateral reforms are taken into account.

Commodity Models. To explore the impact of regional trade agreements at the commodity level, we estimate 32 additional models, each for a specific commodity or group of commodities. Table 2-4 summarizes the results of these models with respect to the trade-agreement variables. As a group, these models provide additional support for the hypothesis that Mexico's unilateral trade reforms have strengthened U.S. agricultural exports to that country. Unilateral-Mexico obtains a positive and significant coefficient in 14 commodity models: beer, cotton, flowers and foliage, apples, rice, wheat, peanuts, macaroni, beef, pork, prepared breakfast food, soda and bottled water, tobacco, tobacco products, and tomatoes. In contrast, NAFTA-Mexico is positive and significant in only four commodity models (grapes, yarn and thread, leather, and tobacco products), but it is positive and insignificant for 18 other commodities.[4]

[4] The 18 commodities include cotton, cut flowers, fruit or vegetable juice, apples, corn, rice, wheat, peanuts, beef, poultry meat, plants and bulbs, prepared breakfast food, soybean oil, soybeans, sunflower seed oil, raw tobacco, tomatoes, and legumes.

Figure 2-3
Actual and expected values of U.S. agricultural exports to Argentina, 1980-1999



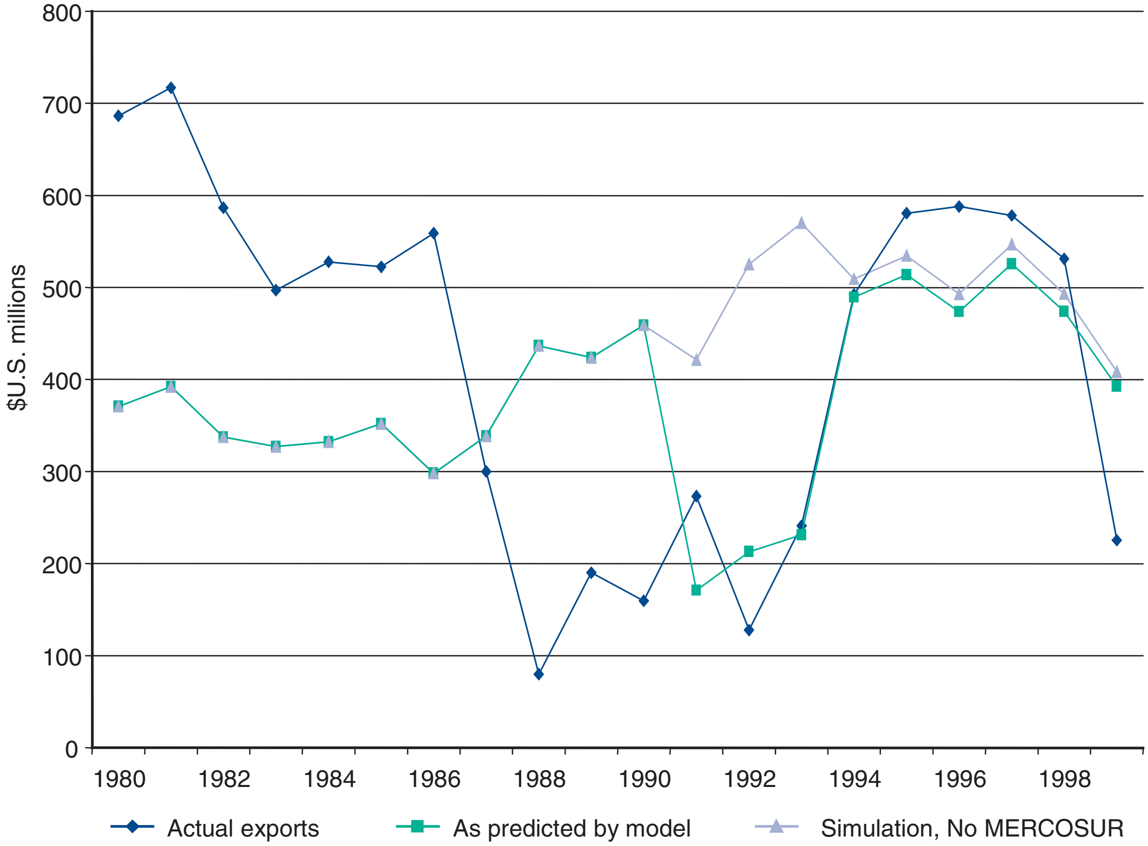
Source: Economic Research Service.

Given ERS's previous research about NAFTA, it is not surprising that grapes and yarn and thread are among the commodities where NAFTA-Mexico is significant. The 2002 NAFTA report describes Mexico's elimination of its import-licensing requirement for U.S. grapes as an important element of NAFTA. It also emphasizes the importance of NAFTA's rules of origin for textiles and apparel, which restrict NAFTA trade benefits to articles produced from fabric, yarn, thread, and fiber manufactured in the NAFTA countries. These rules are likely to have boosted demand of Mexican textile and apparel producers for U.S. yarn and thread.

But there are also many noteworthy absences from the list of commodities where NAFTA-Mexico is significant. The 2002 NAFTA report concludes that NAFTA provided a moderate boost (a 6-percent to 15-percent increase in trade volume during 1994-2000) to U.S. exports to Mexico of corn, oilseeds, beef, and sorghum. They also indicate that NAFTA provided a strong boost (more than 15 percent) to U.S. exports to Mexico of rice, dairy products, cotton, processed potatoes, apples, and pears. These findings suggest that the commodity models in this chapter would benefit from a NAFTA variable that more precisely measures the agreement's commodity-specific provisions.

Similar to the model of total agricultural exports, the commodity models provide no evidence that CFTA and NAFTA have had a significant impact on U.S. agricultural exports to Canada. The coefficient for CFTA-Canada is positive in 8 commodity models, while the coefficient for NAFTA-Canada is positive in 20 commodity models. However, none of these coefficients are statistically significant. Again, these results differ from ERS's commodity-level assessments of

Figure 2-4
Actual and expected values of U.S. agricultural exports to Brazil, 1980-1999



Source: Economic Research Service.

CFTA and NAFTA. The 2002 NAFTA report indicates that the two agreements have provided a moderate stimulus to U.S. exports to Canada of cotton and processed tomatoes and a strong stimulus to exports of beef and wheat products (flour, bulgur wheat, starch, gluten, and uncooked pasta). The general lack of significance of CFTA-Canada and NAFTA-Canada in the modified gravity models may be due to the relatively low level of Canadian protection that existed prior to CFTA against U.S. exports. Moreover, dairy products, poultry, and eggs were exempted from the process of U.S.-Canada trade liberalization. In any case, within the context of this chapter's modified gravity models, the size of the Canadian economy and the historically close trading relationship between the two countries are the main explanatory factors of U.S. agricultural exports to Canada.

The finding that MERCOSUR has boosted U.S. agricultural exports to Argentina and Paraguay is mirrored in several commodity models. Of the 15 commodity models in which Argentina is included, 3 models obtain a positive and significant coefficient for Argentina/1991-99: fruit or vegetable juice, edible nuts, and prepared breakfast food. For prepared breakfast food, MERCOSUR's positive influence on U.S. exports is even stronger during 1994-99, as evidenced by the positive and significant coefficient for Argentina/1994-99. Many of these exports benefited from tariff reductions linked to MERCOSUR's external tariff. During the 1980s, Argentine tariffs on dairy products, processed fruits and vegetables, fruit and vegetable juices, and other consumer-oriented agricultural products ranged from 20 to 38 percent. By 1995, the average tariff for consumer-oriented agricultural products had fallen to 14 percent (Stout and Ugaz-Pereda, 1998: p. 134).

Table 2-4—Overview of commodity-specific gravity models of U.S. agricultural exports

Model	Parameter: Unilateral-Mexico	NAFTA-Mexico	Argentina, 1991-99	Argentina, 1994-99	Brazil, 1991-99	Brazil, 1994-99
Total agricultural exports	Positive	Insig.	Positive	Insig.	Negative	Positive
Beer	Positive	Insig.	n.a.	n.a.	n.a.	n.a.
Cheese	Insig.	Insig.	n.a.	n.a.	Positive	Positive
Distilled alcoholic beverages	Insig.	Insig.	Insig.	Insig.	Positive	Positive
Cotton	Positive	Insig.	Insig.	Insig.	Insig.	Insig.
Flowers and foilage (cut)	Positive	Insig.	n.a.	n.a.	n.a.	n.a.
Fruit or vegetable juice	Insig.	Insig.	Positive	Insig.	Positive	Positive
Apples (fresh)	Positive	Insig.	n.a.	n.a.	Insig.	Positive
Grapes (fresh)	Insig.	Positive	n.a.	n.a.	Insig.	Positive
Corn	Insig.	Insig.	Insig.	Insig.	Insig.	Insig.
Rice	Positive	Insig.	n.a.	n.a.	Positive	Insig.
Wheat	Positive	Insig.	n.a.	n.a.	Negative	Insig.
Peanuts	Positive	Insig.	n.a.	n.a.	Positive	Insig.
Leather	Insig.	Positive	Insig.	Insig.	Insig.	Insig.
Live poultry	Insig.	Insig.	n.a.	n.a.	Insig.	Insig.
Macaroni	Positive	Insig.	Insig.	Insig.	n.a.	n.a.
Beef (fresh or frozen)	Positive	Insig.	n.a.	n.a.	Insig.	Positive
Pork (fresh or frozen)	Positive	Insig.	n.a.	n.a.	n.a.	n.a.
Poultry (fresh or frozen)	Insig.	Insig.	n.a.	n.a.	n.a.	n.a.
Milk and cream	Insig.	Insig.	Insig.	Insig.	Negative	Insig.
Edible nuts	Insig.	Insig.	Positive	Insig.	Insig.	Insig.
Plants and bulbs (live)	Insig.	Insig.	Insig.	Insig.	Insig.	Positive
Prepared breakfast food	Positive	Insig.	Positive	Positive	Positive	Positive
Soda and bottled water	Positive	Insig.	n.a.	n.a.	Positive	Positive
Soybean oil	Insig.	Insig.	n.a.	n.a.	n.a.	n.a.
Soybeans	Insig.	Insig.	Insig.	Positive	Insig.	Insig.
Sunflower seed oil	Insig.	Insig.	n.a.	n.a.	n.a.	n.a.
Tobacco (unmanufactured)	Positive	Insig.	Negative	Positive	Insig.	Insig.
Tobacco products	Insig.	Positive	Insig.	Insig.	Insig.	Insig.
Tomatoes	Positive	Insig.	n.a.	n.a.	n.a.	n.a.
Legumes	Insig.	Insig.	Insig.	Insig.	Negative	Positive
Wine	Insig.	Insig.	n.a.	n.a.	Insig.	Positive
Yarn and thread	Insig.	Positive	Insig.	Insig.	Insig.	Insig.

n.a. = not applicable
Sign of parameter estimate and estimate's significance according to a one-tailed *t*-test:
Insig. = Insignificant at 90-percent level
Positive = Positive coefficient, significant at 90-percent level
Negative = Negative coefficient, significant at 90-percent level
None of the parameter estimates for CFTA-Canada or NAFTA-Canada are significant.
Source: Economic Research Service.

In the model of U.S. soybean exports, the coefficient for Argentina/1994-99 is positive and strongly significant, which at first glance suggests that MERCOSUR has had a positive impact on this trade. However, the significance of this coefficient is more likely due to a severe drought that sharply reduced the size of Argentina's 1996/97 soybean crop (U.S. Department of Agriculture, Foreign Agricultural Service, 1997). As a result, U.S. soybean exports to Argentina, usually less than $200,000 per year, climbed to $124 million in 1997 and $10 million in 1998. Only the commodity model for raw tobacco shows that MERCOSUR has depressed U.S. exports to Argentina. U.S.-Argentina trade in this commodity was customarily small during 1980-1999, with exports to Argentina never exceeding $500,000 per year.

Paraguay appears in just seven commodity models, two of which indicate that MERCOSUR is a significant factor influencing U.S. exports to that country. First, the common market is found to have increased U.S. beer exports to Paraguay during 1991-99. This trade averaged $12 million per year during 1997-99, compared with just $204,000 per year during 1988-1990. Second, MERCOSUR is associated with lower U.S. exports of milk and cream to Paraguay. Like U.S. tobacco exports to Argentina, this trade was extremely small throughout the sample period, last exceeding $100,000 in 1983.

Although the model for total agricultural exports indicates that MERCOSUR has reduced U.S. exports to Brazil, the commodity models suggest that the common market has stimulated many aspects of this trade. The coefficient for Brazil/1991-99 is positive and significant for seven commodities: cheese, distilled alcoholic beverages, fruit or vegetable juice, rice, leather, prepared breakfast food, and soda and bottled water. In addition, the coefficient for Brazil/1994-99 is positive and significant for 11 commodities: cheese, distilled alcoholic beverages, fruit or vegetable juice, apples, grapes, beef, plants and bulbs, prepared breakfast food, soda and bottled water, legumes, and wine. In many instances, U.S. exports of these products are likely to have benefited from Brazilian tariff reductions associated with MERCOSUR's common external tariff. Stout and Ugaz-Pereda emphasize that Brazil's applied tariffs on agricultural products prior to MERCOSUR were much higher than Argentina's, with most tariff rates exceeding 40 percent.

The commodity models also provide evidence that MERCOSUR has limited some U.S. exports to Brazil, as the coefficient for Brazil/1991-99 is negative and significant in the models for wheat, milk and cream, and legumes. (The coefficient for Brazil/1994-99 is not negative and significant in any of the commodity models.) Among these products, milk and cream and legumes are not prominent candidates for trade diversion. Milk and cream exports to Brazil averaged less than $1 million per year during 1988-90 and only $3 million per year during 1997-99. Legume exports to Brazil actually have grown under MERCOSUR, from an average of $2 million per year during 1988-90 to $6 million per year during 1997-99.

Wheat, in contrast, is a completely different case. U.S. wheat exports to Brazil dropped from an annual average of $23 million during 1988-90 to just $4 million during 1997-99. Across the same two periods, Argentine wheat exports to Brazil surged from $183 million to $801 million per year. MERCOSUR's tariff preference partially explains this shift, as the common market's external tariff for wheat equaled 11.5 percent in 2002 (Svec, 2002: p. 12). But improved wheat yields in Argentina also help to explain the changing fortunes of U.S. wheat exports to Brazil. In fact, Argentine wheat producers have nearly closed the yield gap that separates them from their U.S. counterparts (Schnepf, Dohlman, and Bolling, 2001: pp. 30-31).

Conclusion

The modified gravity models in this chapter highlight a number of important recent developments in the pattern of U.S. agricultural exports. First and foremost, exports to Mexico during 1989-1999 are significantly higher than previous exports to Mexico, once the changing size of the Mexican economy and the historic closeness of the U.S.-Mexico trading relationship are taken into account. This result is obtained both at the aggregate level and for 14 different commodities. Unilateral reforms by Mexico to open its market in the late 1980s and early 1990s are responsible for most of the heightened level of this trade. The additional trade benefits secured by NAFTA appear to be less important to U.S. agricultural exports to Mexico, providing a significant stimulus only to grapes, yarn and thread, leather, and tobacco products. As a practical matter, the unilateral and regional trade reforms are both parts of the profound economic reorientation that Mexico has undergone since the late 1980s, and the two types of reform *together* are found to have a significant impact on U.S. agricultural exports to Mexico. With the exception of one alternative model, none of the models associate the CFTA/NAFTA period with a significant change in U.S. agricultural exports to Canada. Previous ERS assessments of NAFTA's commodity-specific provisions (included those originally negotiated in CFTA) suggest that CFTA and NAFTA have had a much broader impact on U.S. agricultural exports to both Canada and Mexico.

The models suggest that MERCOSUR has had a mixed effect on U.S. agricultural exports. For all four countries, there are commodities where MERCOSUR is linked to increased U.S. exports, and at the aggregate level, MERCOSUR is found to have created trade in the cases of Argentina, Paraguay, and Uruguay. With respect to Brazil, however, a finding of trade diversion is obtained at the aggregate level and for milk and cream, legumes, and wheat. Among these commodities, wheat is the most likely case of trade diversion, as Argentina has dramatically increased its share of the Brazilian wheat market.

Care must be taken in the evaluation of these findings, as the variables that denote the participation of a country in a particular trade agreement also capture the influence of other contemporaneous factors. Incorporating additional variables that more fully describe international markets for specific commodities should improve the performance of the models in this chapter. Examples include volume measures of trade, actual transportation costs, levels of production by country, changes in yields, the amount of consumption, and quantitative measures of trade impediments. Of course, additional data collection usually comes at a cost, and one of the main attractions of gravity models as they stand is that their data requirements are relatively small. The next generation of gravity models is likely to depart from this tradition.

References

Cheng, I.H., and Howard J. Wall. "Controlling for Heterogeneity in Gravity Models of Trade." Working Paper 99-010A, Federal Reserve Bank of Saint Louis, February 1999. Accessible at: http://www.stls.frb.org/research/wp/99-010.html.

Crawford, Terry, and John E. Link (coordinators). *NAFTA*. U.S. Department of Agriculture, Economic Research Service, International Agriculture and Trade Report, Situation and Outlook Series, WRS-97-2, September 1997. Accessible at: http://www.ers.usda.gov/briefing/nafta/mandated.htm.

Endoh, Masahiro. "Trade creation and trade diversion in the EEC, the LAFTA and the CMEA: 1960-1994." *Applied Economics*, Vol. 31 (1999), pp. 207-216.

Frankel, Jeffrey A. *Regional Trade Blocs in the World Economic System*. Washington: Institute for International Economics, 1997.

Green, William H. *Econometric Analysis*. New York: MacMillan Publishing Company, 1990.

International Monetary Fund. "World Economic Outlook Database." September 2000. Accessible at: http://www.imf.org/external/pubs/ft/weo/2000/02/data/index.htm.

Rosenzweig Pichardo, Andrés. "La Política de Comercio Exterior del Sector Agropecuario de México Durante La Década de los Noventas." In Andrés Casco and Andrés Rosenzweig (eds.), *La Política Sectorial Agropecuaria en México: Balance de una Década*, Mexico City: Instituto Interamericano de Cooperación para la Agricultura, December 2000.

Schnepf, Randall D., Erik N. Dohlman, and Christine Bolling. *Agriculture in Brazil and Argentina: Developments and Prospects for Major Field Crops*. U.S. Department of Agriculture, Economic Research Service, Market and Trade Economics Divison, Agriculture and Trade Report, WRS-01-3, November 2001.

Soloaga, Isidro, and L. Alan Winters. "Regionalism in the Nineties: What Effect on Trade?" *North American Journal of Economics and Finance*, Vol. 12, No. 1 (March 2001), pp. 1-29.

Stout, James H., and Julieta Ugaz-Pereda. "Western Hemisphere Trading Blocs and Tariff Barriers for U.S. Agricultural Exports." In Mary E. Burfisher and Elizabeth E. Jones (eds.), *Regional Trade Agreements and U.S. Agriculture*, U.S. Department of Agriculture, Economic Research Service, Market and Trade Economics Division, Agricultural Economic Report No. 771 (Washington, DC: November 1998), pp. 131-139.

Svec, Kimberly L. "Brazil: Grain and Feed Annual 2002." U.S. Department of Agriculture, Foreign Agricultural Service, Global Agriculture Information Network (GAIN) Report No. BR2605, March 25, 2002.

U.S. Department of Agriculture, Foreign Agricultural Service. "Oilseeds: World Markets and Trade," December 1997. Accessible at http://www.fas.usda.gov/oilseeds/circular/1997/97-12/dec97opd2.htm.

United Nations. *Demographic Yearbook*. New York: various issues.

United Nations. *Statistical Yearbook of the United Nations*. New York: various issues.

Zahniser, Steven, and John Link (eds.). *Effects of North American Free Trade Agreement on Agriculture and the Rural Economy*. U.S. Department of Agriculture, Economic Research Service, Agriculture and Trade Report, WRS-0201, July 2002. Accessible at: http://www.ers.usda.gov/publications/wrs0201/.

Chapter 3

Measuring Agricultural Tariff Protection

John Wainio and Paul Gibson

The focus of the FTAA negotiations differs from that of the multilateral WTO negotiations because the FTAA discussions cover only market access, one of the three WTO "pillars." While FTAA members recognize the need to discipline the use of export subsidies within the region, a second WTO pillar, progress on this issue depends largely on whether importing countries are willing to also forgo buying subsidized products from countries outside the region. As for the third pillar, domestic support, the United States always has insisted that it remain a multilateral issue, and thus not subject to negotiation in regional talks. As a result, market access issues are at center stage within the FTAA, particularly for agricultural trade. In this chapter, we focus on one aspect of market access, tariff liberalization, and the extent to which tariffs in the region pose an impediment to trade in agricultural goods between the United States and its neighbors in the Western Hemisphere.

FTAA members have already achieved substantial tariff reform through a combination of multilateral, subregional, and bilateral pacts trade pacts. Through multilateral negotiations, the WTO Agreement on Agriculture (AoA) resulted in the conversion of nontariff barriers to tariffs. Countries also committed to reducing their agricultural tariffs over the AoA's implementation period. However, even after all the cuts have been realized, the simple global average most-favored-nation (MFN) bound tariff on agricultural imports will exceed 60 percent.[1] While the average MFN bound tariff for countries in the Western Hemisphere is considerably lower at about 30 percent, substantial room remains for further liberalization.[2]

Additional steps have already been taken to reduce tariffs on interregional trade. Between 1990 and 2003, there were over 40 bilateral and subregional trade and investment pacts negotiated within the hemisphere, including several renewals of old initiatives such as the Central American Common Market (CACM) and the Caribbean Community and Common Market (CARICOM). The two largest trading blocs within the hemisphere were also created during this time, the North American Free Trade Agreement (NAFTA) and the Common Market of the South (MERCOSUR).[3] More recently, on December 17, 2003, the United States, El Salvador, Guatemala, Honduras, and Nicaragua concluded negotiations to form the Central American Free Trade Agreement (CAFTA) to promote regional economic integration and growth by phasing out tariffs and other trade and investment barriers. On January 25, 2004, negotiations concluded to add Costa Rica's participation in CAFTA. Subsequent negotiations that concluded on March 15, 2004, will add the Dominican Republic to CAFTA. Many of these subregional agreements provide greater access for agricultural goods by eliminating tariffs and other barriers on substantially all trade. As a result, the agricultural markets of most of the countries in the region have been opened up well beyond their WTO obligations.

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[1] Bound tariffs are the maximum duties that a country is permitted to levy on imports. Under WTO rules, a country cannot apply duties higher than the bound level without notifying and compensating other members. In practice, countries often apply duties significantly below the bound levels.

[2] See Gibson et al., for a description of how this average was calculated.

[3] Countries in the Western Hemisphere also are making agreements with those outside of the hemisphere. Mexico negotiated a free trade agreement with the European Union (EU), and Chile and MERCOSUR are negotiating their own bilateral free trade agreements with the EU.

Another outcome of these pacts is that trade within the region is conducted under an array of different tariff rates. Within the United States, agricultural goods imported from some countries may face MFN tariffs, while the same goods imported from NAFTA countries may face lower tariff rates. In addition, exports of certain agricultural goods from other FTAA countries may be eligible for duty-free treatment under the Generalized System of Preferences (GSP), the Caribbean Basin Economic Recovery Act (CBERA), or the Andean Trade Preference Act (ATPA). In 2001, more than 60 percent of U.S. agricultural imports from Western Hemisphere countries were eligible to enter at preferential tariff rates, i.e., rates below the MFN bound rates. At the same time, the duties faced by most U.S. exports in its NAFTA partners' markets are well below MFN levels. In addition, many of the other countries within the hemisphere actually apply duties at rates substantially lower than their permitted MFN bound levels. When trying to gauge the effect that cutting MFN tariffs may have on future trade, the large amount that currently takes place at preferential and applied tariffs below bound MFN rates has to be taken into account.

This chapter addresses a number of tariff-related questions relevant to the negotiations: What are the levels and patterns of tariff protection currently faced by U.S. agricultural exports within the FTAA? To what extent has the United States already opened its agricultural markets to the region? Which are the most important products being exported by our Western Hemisphere trading partners that continue to face high duties in the United States? Do some products within the region face higher protection across the board than do others and to what extent are these products exported by United States?

Trade and Tariffs Within the FTAA Region

The tariff liberalization that took place within the Western Hemisphere in the 1990s was accompanied by impressive growth in intraregional trade. During this period, the annual rate of growth in intraregional trade increased by 11.1 percent, exceeding the 8-percent annual growth rate in hemispheric trade with the rest of the world, as well as the annual growth rate in overall global trade of 6.6 percent per year (U.S. General Accounting Office, 2001). FTAA agricultural trade became an increasingly important component of overall U.S. agricultural trade as well. About 55 percent ($23.1 billion) of all U.S. agricultural imports and about 37 percent ($19.9 billion) of U.S. agricultural exports came from or went to FTAA countries in 2001. NAFTA partners Canada and Mexico accounted for 38 percent of U.S. agricultural imports and 29 percent of U.S. agricultural exports in 2001. Much of this trade already takes place at zero duties. Compared with NAFTA, overall trade with the rest of the FTAA countries is considerably less, accounting for 17 percent of U.S. agricultural imports and 8 percent of exports. It is this share of U.S. agricultural trade that will be most affected by the FTAA. In 2001, the leading U.S. agricultural exports to FTAA countries consisted of coarse grains, red meats, and snack foods. The leading imports were fresh vegetables, coffee, and red meats.

Within the region, the United States is generally the most important destination for exports. During the 1998-2000 period, the FTAA countries relied on the U.S. market for an average of 32 percent of their agricultural exports, although some marked differences existed between individual countries. The level of dependency on the U.S. market as an export destination was greatest for the Dominican Republic, which shipped about 80 percent of its total agricultural exports there. The NAFTA partners are also highly dependent on the United States, with about 73 percent of Mexico's and 55 percent of Canada's agricultural exports destined for the United States. The MERCOSUR countries, on the other hand, tend to trade most heavily with each other, shipping less than 10 percent of their exports to the United States.[4]

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[4] MERCOSUR consists of Argentina, Brazil, Paraguay, and Uruguay.

Table 3-1—Value of U.S. agricultural imports from FTAA countries, 2001, categorized by MFN or non-MFN duty faced[1]

Exporter	Total		Preferential			MFN duty-free			MFN with duties		
	Number of tariff lines	Imports ($000)	Number of tariff lines	Imports ($000)[2]	% of total	Number of tariff lines	Imports ($000)	% of total	Number of tariff lines	Imports ($000)	% of total
Antigua & Barbuda	6	180	3	130	72	3	50	28	0	0	0
Argentina	237	613,194	70	47,898	8	75	186,440	30	109	378,856	62
Bahamas	23	7,219	15	5,692	79	7	814	11	4	713	10
Barbados	25	7,662	17	7,014	92	7	635	8	2	14	0
Belize	34	39,085	27	38,702	99	5	85	0	4	298	1
Bolivia	28	16,473	9	3,380	21	13	12,982	79	8	111	1
Brazil	298	1,008,843	108	114,951	11	107	506,492	50	114	387,400	38
Canada	905	10,448,762	634	7,154,384	68	211	3,231,038	31	303	63,339	1
Chile	207	1,029,063	87	87,745	9	61	385,038	37	89	556,280	54
Colombia	229	944,012	149	369,707	39	60	542,296	57	57	32,009	3
Costa Rica	176	820,078	133	395,319	48	42	423,979	52	17	781	0
Dominica	11	83	8	60	72	2	17	21	1	6	7
Dominican Rep.	212	445,092	159	371,447	83	52	71,735	16	14	1,909	0
Ecuador	189	485,500	126	152,678	31	46	325,872	67	51	6,950	1
El Salvador	113	92,372	76	50,727	55	31	41,227	45	18	418	0
Grenada	7	1,863	5	158	8	2	1,705	92	0	0	0
Guatemala	188	607,914	149	175,730	29	37	431,525	71	15	660	0
Guyana	19	7,468	16	7,181	96	3	276	4	2	11	0
Haiti	23	7,040	13	4,158	59	10	2,864	41	1	18	0
Honduras	103	290,186	72	132,064	46	25	154,106	53	14	4,015	1
Jamaica	130	98,731	86	86,433	88	41	11,006	11	15	1,292	1
Mexico[2]	619	5,631,860	469	4,643,476	82	151	963,980	17	89	24,404	0
Nicaragua	75	106,727	54	60,066	56	18	46,351	43	9	310	0
Panama	66	41,132	40	25,420	62	20	15,333	37	10	379	1
Paraguay	26	15,927	8	7,009	44	12	8,016	50	8	903	6
Peru	217	213,186	146	130,103	61	59	72,251	34	48	10,831	5
St. Kitts & Nevis	1	72	0	0	0	1	72	100	0	0	0
St. Lucia	5	314	4	286	91	1	28	9	0	0	0
St.Vincent&Gren.	4	133	3	35	26	1	98	74	0	0	0
Suriname	2	295	1	19	6	1	276	94	0	0	0
Trinidad&Tobago	72	17,227	47	13,014	76	23	3,892	23	6	321	2
Uruguay	73	60,353	20	8,010	13	26	8,209	14	27	44,134	73
Venezuela	83	35,174	38	14,861	42	30	18,914	54	21	1,399	4
Total FTAA	1,255	23,093,219	888	14,107,856	61	302	7,467,603	32	549	1,517,761	7
Total NAFTA	1,079	16,080,622	792	11,797,860	73	255	4,195,018	26	339	87,743	1
Total non-NAFTA	831	7,012,598	493	2,309,996	33	213	3,272,584	47	373	1,430,017	20
Global Total	1,516	42,480,933	930	14,920,159	35	393	15,201,018	36	1,056	12,359,756	29

[1]The definition of agricultural trade corresponds with those tariff lines subject to tariff-cutting committments as specified in Annex 1 of the WTO Agreement on Agriculture.

[2]All trade entered duty-free with the exception of $2.805 billion of imports from Mexico, which came in at duties that have not yet been cut to zero under the NAFTA timetable.

Sources: U.S. International Trade Commission Trade Dataweb, http://dataweb.usitc.gov; Agricultural Market Access Database, http://www.amad.org

Table 3-1 provides some basic statistics on 2001 U.S. agricultural imports from FTAA countries as well as the number of tariff-line products in which trade took place.[5] Almost 70 percent of U.S. agricultural imports from the region came from NAFTA partners Canada and Mexico, both of which tend to have a much broader base in terms of the number of tariff lines and diversity of products exported to the United States. Of the remaining U.S. imports, spread out among the other 31 countries, Chile and Brazil led the way at over $1 billion each, accounting for almost 30 percent of the non-NAFTA total.

Table 3-1 also categorizes imports from Western Hemisphere countries by the amount of trade that came in at MFN versus preferential tariffs. This provides an important gauge of the capacity of the United States to further reduce tariffs under an FTAA as well as an indicator of how much actual trade will be impacted by tariff cuts.

The U.S. market is already relatively open to the hemisphere. In 2001, 49 percent ($11.3 billion) of total U.S. agricultural imports from FTAA countries entered duty-free under either NAFTA or one of the three nonreciprocal trade preference programs, the GSP, CBERA, and ATPA, each of which offers duty-free entry on a range of products. Another 32 percent ($7.5 billion) of total agricultural imports entered at MFN duty-free rates. This means that only about 19 percent of U.S. agricultural imports were assessed duties in 2001. About 12 percent of the total consisted of imports from Mexico at NAFTA rates that, while not yet duty-free, were considerably below MFN rates.[6] In 2001, only 7 percent ($1.5 billion) of the U.S. imports from FTAA countries came in at MFN duties. About 4 percent of U.S. imports were assessed MFN duties under 5 percent, while less than 1 percent came in at duties above 15 percent.

The larger FTAA countries tend to export a fairly wide range of agricultural products to the United States. For many of the smaller countries, however, exports to the United States consisted of only a few products, and often one product dominated. For example, almost 90 percent of Dominica's exports to the United States during 1998-2000 consisted of cigars, while 87 percent of Grenada's were made up of nutmeg. In 10 of the 33 countries, a single commodity accounted for at least one-half of its total exports to the United States.

The value of U.S. duty-free preferences under nonreciprocal trade programs varies across countries, depending on the overall makeup of their agricultural exports. At 99 percent, Belize had the highest share of its products enter under preferential rates. A number of Caribbean nations, including the Bahamas, Barbados, the Dominican Republic, Guyana, Jamaica, and St. Lucia exported over 80 percent of their U.S.-bound agricultural products under either GSP or CBERA. Through NAFTA, 68 percent of U.S. agricultural imports from Canada and 82 percent from Mexico benefited from preferential duties. Some countries, however, including Argentina and Chile, had extremely low shares (under 10 percent) of their U.S.-bound exports enter at preferential rates.

As a result of preferential rates, the simple unweighted average U.S. applied tariffs facing FTAA countries in 2001 were even lower. It is generally recognized that U.S. agricultural tariffs are relatively low, with an overall simple bound tariff mean of 10.4 percent. Due to NAFTA preferences, Canada at 4.7 percent and Mexico at less than 1 percent face the lowest simple average

[5] Product coverage is the same as that specified in Annex 1 of the WTO Agreement on Agriculture. In 2001, the U.S. agricultural tariff schedule distinguished between 1,754 tariff-line items.

[6] These duties are being progressively reduced to zero under the NAFTA timetable.

tariffs among FTAA countries.[7] Countries qualifying for tariff preferences under the CBERA or ATPA programs face simple average tariffs of slightly over 6 percent on agricultural products while other FTAA countries, which benefit only from the GSP, face slightly higher averages of about 9.1 percent.

While the simple averages may appear to be low, the United States continues to maintain relatively high tariffs, with little or no preferential access, on certain agricultural products, many of which are of special export interest to FTAA countries. These include import-sensitive products such as sugar and sugar-containing products, peanuts and peanut butter, certain types of tobacco, orange juice, dairy products, and beef. Tariff rate quotas (TRQs) limit imports of many of these products. A TRQ allows a certain amount of a product to be imported at a generally low "in quota" rate, with any additional imports facing the higher "over quota" rate. For example, the tariffs for tobacco imports within the quota are around 10 percent while the tariffs on over-quota imports are 350 percent.

Table 3-2 shows the extent to which individual FTAA countries' agricultural exports to the United States faced TRQs in 2001. The region as a whole accounted for slightly less than 50 percent ($2.0 billion) of the value of products imported under U.S. TRQs, with Canada alone accounting for 31 percent ($1.3 billion). The remaining amount was spread over 22 countries, from Brazil ($200,235) to Venezuela ($208). The bulk of this trade took place within the quota and most of it was at preferential rates. The small amount of over-quota trade was almost exclusively from NAFTA partners.[8] Neither the GSP, CBERA, nor ATPA program extends preferential access for products subject to over-quota tariffs. That there was very little over-quota trade at MFN rates suggests the trade-chilling effects of these high over-quota tariffs. It also indicates that for those FTAA countries whose exports face high over-quota rates, there would appear to be substantial potential benefit from an elimination of these barriers. A general conclusion from these tariff and trade data is that even though the trade benefits for FTAA countries from negotiating a free trade agreement with the United States might appear small, given the high proportion of trade already taking place at low or zero duties, when one takes into account those sensitive products on which prohibitively high rates are levied, the potential benefits could expand considerably.

Comparing Tariff Protection Across FTAA Countries

Comparing tariffs across countries is neither a straightforward nor a simple exercise. Over 50 years ago, Viner observed that "there is no way in which the 'height' of a country's tariffs as an index of its restrictive effect can be even approximately measured, or for that matter, even defined with any degree of significant precision" (Viner, 1950). While there are numerous approaches to calculate the overall level of tariff protection provided by a country's tariff schedule, none is without some aggregation bias. The easiest and most common approach is to calculate a simple unweighted tariff mean. The main drawback with a simple average is that it gives equal weight to all goods regardless of importance in trade.

[7] These tariff averages are calculated as simple means across the 1,754 tariff-line items found in the U.S. agricultural tariff schedule. Note that tariffs averages calculated from the full tariff schedule differ from those based on 6-digit aggregates of the Harmonized System, as reported in table 3.5

[8] Over-quota imports from Mexico were assessed preferential rates under NAFTA, while Canadian imports would have been assessed the MFN rate. All over-quota imports from other countries would also have been at MFN rates.

Table 3-2—Value of U.S. agricultural imports subject to tariff-rate quotas in 2001

Exporter	In-quota imports ($000)	Over-quota imports ($000)	Total TRQ imports ($000)	Percent of total U.S. TRQ imports accounted for by FTAA countries In-Quota	Over-Quota	Total TRQ
Antigua & Barbuda	0	0	0	0.0	0.0	0.0
Argentina	112,480	1,675	114,155	2.9	0.7	2.8
Bahamas	0	0	0	0.0	0.0	0.0
Barbados	0	0	0	0.0	0.0	0.0
Belize	4,747	0	4,747	0.1	0.0	0.1
Bolivia	3,114	0	3,114	0.1	0.0	0.1
Brazil	200,028	207	200,235	5.2	0.1	4.9
Canada	1,211,154	50,604	1,261,758	31.4	22.4	30.9
Chile	3,341	1,354	4,695	0.1	0.6	0.1
Colombia	12,109	144	12,253	0.3	0.1	0.3
Costa Rica	24,817	5	24,822	0.6	0.0	0.6
Dominica	0	0	0	0.0	0.0	0.0
Dominican Rep.	65,493	0	65,493	1.7	0.0	1.6
Ecuador	4,640	47	4,687	0.1	0.0	0.1
El Salvador	10,431	61	10,491	0.3	0.0	0.3
Grenada	0	0	0	0.0	0.0	0.0
Guatemala	21,178	2	21,180	0.5	0.0	0.5
Guyana	4,952	0	4,952	0.1	0.0	0.1
Haiti	0	0	0	0.0	0.0	0.0
Honduras	15,017	200	15,217	0.4	0.1	0.4
Jamaica	1,579	54	1,633	0.0	0.0	0.0
Mexico	63,352	46,408	109,760	1.6	20.5	2.7
Nicaragua	33,360	27	33,388	0.9	0.0	0.8
Panama	15,607	165	15,772	0.4	0.1	0.4
Paraguay	7,054	10	7,065	0.2	0.0	0.2
Peru	26,824	59	26,883	0.7	0.0	0.7
St. Kitts & Nevis	0	0	0	0.0	0.0	0.0
St. Lucia	0	0	0	0.0	0.0	0.0
St.Vincent & Gren.	0	0	0	0.0	0.0	0.0
Suriname	0	0	0	0.0	0.0	0.0
Trinidad & Tobago	2,851	2	2,853	0.1	0.0	0.1
Uruguay	32,179	5,000	37,178	0.8	2.2	0.9
Venezuela	127	80	208	0.0	0.0	0.0
Total FTAA	1,876,435	106,105	1,982,540	48.7	46.9	48.6
Total NAFTA	1,274,506	97,012	1,371,518	33.1	42.9	33.6
Total non-NAFTA	601,929	9,093	611,022	15.6	4.0	15.0
Global total	3,853,071	226,337	4,079,408			

Sources: U.S. International Trade Commission Trade Dataweb, http://dataweb.usitc.gov; Agricultural Market Access Database, http://www.amad.org

To remedy this deficiency, weighted averages are often calculated in an attempt to emphasize certain tariffs over others. Weighting a country's tariffs based on its import values is a commonly used weighting scheme. However, it provides distorted results because items with the most restrictive tariffs will receive virtually no weight, since little or no trade takes place under such tariffs. Weighting based on shares of domestic value of production would ensure that highly protected commodities produced in large amounts get appropriately large weights, but production data at the tariff-line level are rarely available. Using shares of the domestic value of consumption is another alternative weighting scheme, but also biased to the extent that high tariffs reduce consumption. Similar to production, consumption data are generally not available at the tariff-line level. Weighting by the value of global trade is perhaps the least biased alternative since it gives relatively greater weight to those products most important in international exchange and escapes, in large part, the distortions associated with using own-import weights.

Table 3-3—Top four agricultural exports and concentration ratios - FTAA countries

Country	Top four HS6-digit export categories	1998-00 average export value $000	Percent of total
Antigua & Barbuda	sunflower&safflower oil; peanut oil; raw cane sugar; frsh, chlled or frzn horsemeat	1,664	46
Argentina	soymeal; wheat (other than durum); corn, other than for seed; soybean oil	5,372,464	43
Bahamas	rum; bananas & plantains; natural sponges; sunflowerseed	152,794	95
Barbados	raw cane sugar; rum; food preparations, nes; margarine	48,631	72
Belize	raw cane sugar; bananas & plantains; frozen orange juice; soymeal	112,113	80
Bolivia	soymeal; soybeans; soybean oil; brazil nuts	291,607	65
Brazil	soybeans; unroasted coffee; soymeal; raw cane sugar	6,197,053	47
Canada	wheat (other than durum); durum wheat; rapeseed; live cattle	4,540,897	28
Chile	grapes; wine (< 2 lit); fishmeal; apples	1,693,058	48
Colombia	unroasted coffee; bananas & plantains; cut flowers and buds, fresh; raw cane sugar	2,542,788	80
Costa Rica	bananas & plantains; unroasted coffee; pineapples; melons	1,554,500	65
Dominica	bananas & plantains; cigars & cigarillos; sauces and preparations; unroasted coffee	19,254	82
Dominican Republic	cigars & cigarillos; raw cane sugar; cocoa beans; bananas & plantains	390,388	62
Ecuador	bananas & plantains; cut flowers and buds, fresh; unroasted coffee; cocoa beans	1,635,083	81
El Salvador	unroasted coffee; raw cane sugar; food preparations, nes; prepared cereal products	394,311	69
Grenada	nutmeg; wheat or meslin flour; mace; cocoa beans	16,676	84
Guatemala	unroasted coffee; raw cane sugar; bananas & plantains; cardamoms	1,266,949	65
Guyana	raw cane sugar; rice, husked (brown); rice, broken; rum	141,809	92
Haiti	unroasted coffee; guavas, mangoes, mangosteens; cocoa beans; essential oils	21,554	79
Honduras	unroasted coffee; bananas & plantains; coffee substitutes containing coffee; cigars & cigarillos	628,844	70
Jamaica	raw cane sugar; rum; bananas & plantains; unroasted coffee	187,685	56
Mexico	beer; unroasted coffee; tomatoes, frsh or chlled; spirits (incl.cordials, liqueurs, & vodka)	2,230,683	30
Nicaragua	unroasted coffee; raw cane sugar; boneless frsh & chlled beef; shelled peanuts, unroasted	246,582	58
Panama	bananas & plantains; raw cane sugar; unroasted coffee; melons	312,689	75
Paraguay	soybeans; soymeal; cotton (uncarded, uncombed); soybean oil	647,747	75
Peru	fishmeal; unroasted coffee; asparagus, prepared or preserved, unfrozen; fish oil	1,184,997	75
St. Kitts & Nevis	raw cane sugar; mineral & aerated waters; cane molasses; nonalcoholic beverages	8,147	93
St. Lucia	bananas & plantains; beer; mineral & aerated waters; peppers	51,716	96
St. Vincent & Grenadines	bananas & plantains; wheat or meslin flour; milled rice; roots and tubers	38,226	85
Suriname	bananas & plantains; rice, husked (brown); unmilled rice; milled rice	31,031	81
Trinidad & Tobago	rum; mineral & aerated waters; raw cane sugar; cookies & wafers	94,871	42
United States	soybeans; corn, other than for seed; cigarettes; wheat (other than durum)	18,092,007	24
Uruguay	boneless, frozen beef; milled rice; boneless, frsh & chlled beef; cigarettes	460,386	38
Venezuela	cigarettes; bananas & plantains; unroasted coffee; sesame seeds	188,140	36

Using the value of global trade as a weighting scheme may still not provide countries with the information that is needed to evaluate the level of protection their exports face in each importing country. Even though two countries' exports may face exactly the same tariffs in a third country, the average tariff each faces can differ based on the composition of each of the country's exports. The restrictive effect that an importing country's tariff schedule has on each of its trading partners' exports depends on how high its duties are on the basket of products being exported by each of these trading partners. Table 3-3 ranks selected FTAA countries based on the percent of total agricultural export value accounted for by the top four export categories. The degree of dependency on a few products is extremely high throughout almost the entire region, with the top four exports (at the HS 6-digit level) accounting for over 90 percent of total exports in the cases of St. Lucia, the Bahamas, St. Kitts and Nevis, and Guyana.[9] All but 10 countries earn over one-half of their agricultural export earnings from only four products. This concentration level demonstrates the importance that a relatively small subset of tariffs can have on trade between two partners. Even the United States, which has the most diversified export sector in the region, does not export every product nor is it equally concerned with every one of its trading partners' tariffs. The challenge is to devise a meaningful method of measuring and comparing relative levels of tariff protection between trading partners that distinguishes between "important" and "unimportant" tariffs.

The information found in tables 3-4 and 3-5 is one way to achieve this goal (see appendix 3-1). Each table contains three sets of tariff means—a simple, unweighted mean of applied tariffs and two trade-weighted means, one of applied tariffs and one of bound tariffs.[10] Table 3-4 contains tariff means faced by U.S. agricultural exports in each of the selected countries, while table 3-5 contains the tariff means faced in the United States by each of these countries' agricultural exports. The means are based on tariff and trade data at the HS 6-digit level (encompassing 682 categories).[11] The tables contain 3 sets of tariff means calculated across the 682 categories. In the case of the weighted means in table 3-4, the weights used to calculate each mean are based on global U.S. agricultural exports, not exports to the individual country. In turn, the weighted means in table 3-5 are generated using the global agricultural exports of each U.S. trading partner as weights. The export-weighting scheme seeks to overcome the usual concern about import-weighting schemes, that high tariffs lead to zero or small imports and thus are underrepresented in import-weighted averages. Using the exporting country's *total exports* as weights ensures that the greatest emphasis is placed on those tariffs in the importing country that are of most importance to the exporting partner. It also provides a valuable starting point for considering the effect that a country's tariff regime has on its trading partner's exports.[12]

From the U.S. perspective, the most protected country in the sample is the Dominican Republic, whether one uses the simple or weighted mean as an indicator. Based on the weighted mean, if

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[9] The Harmonized System (HS) provides an internationally recognized nomenclature for classifying globally traded goods. The World Customs Organization establishes the definitions of HS commodity groupings.

[10] All tariff rates were first aggregated in the form of simple averages from the national tariff-line level (usually the HS 8-digit level) to the HS 6-digit level.

[11] The U.S. tariff averages found on the previous page were calculated across the 1,754 bound HS-8 tariff-lines found in the U.S. schedule. The tariff averages found in tables 3-4 and 3-5 were calculated by first calculating simple averages for the 682 6-digit levels and then using these averages to calculate the weighted and unweighted overall means.

[12] See the appendix to this chapter for a detailed discussion of the export-weighting methodology. Like other weighting schemes, export weights have some limitations. Differences in the composition of a country's bilateral trade flows may result from differences in its trader partners' consumer preferences or from policies such as historical quota rights, rather than the partners' tariffs.

Table 3-4—Tariff averages faced by United States in selected FTAA countries

	Applied rates weighted by U.S.exports at the HS6 level	Simple unweighted MFN applied rates (HS6)	MFN bound rates weighted by U.S.exports at the HS6 level
Argentina	12.7	12.9	34.9
Brazil	12.7	12.7	40.0
Canada [1]	7.0	6.1	12.8
Chile	9.0	9.0	25.0
Colombia	15.0	14.8	104.3
Costa Rica	13.0	11.5	35.7
Dom Rep	18.5	21.4	40.0
Ecuador	14.0	14.3	26.7
El Salvador	9.6	10.3	43.4
Guatemala	9.4	9.2	54.7
Haiti	16.0	16.0	16.0
Honduras	12.1	11.0	35.0
Jamaica	16.1	17.7	100.0
Mexico [1]	8.6	2.9	51.8
Nicaragua	8.0	7.0	59.5
Panama	12.4	12.5	27.8
Paraguay	12.1	12.6	34.9
Peru	16.9	17.2	30.0
Uruguay	12.5	12.7	36.8
Venezuela	15.0	14.8	56.2

[1]Applied rates in the case of Canada and Mexico are the 2001 NAFTA rates.

Table 3-5—Tariff averages facing FTAA exports to the United States

	U.S. applied rates[1] Mean weighted by total exports	Simple unweighted mean	U.S. MFN bound rates weighted by total exports
Argentina	6.1	3.9	6.5
Brazil	12.8	3.9	13.6
Canada	1.2	1.2	4.2
Chile	2.1	3.9	2.7
Colombia	2.2	1.8	3.9
Costa Rica	1.1	1.8	3.8
Dom Rep	8.9	1.8	13.4
Ecuador	0.6	1.8	2.0
El Salvador	5.1	1.8	6.7
Guatemala	6.3	1.8	8.4
Haiti	0.1	1.8	3.0
Honduras	1.1	1.8	3.4
Jamaica	10.3	1.8	15.5
Mexico	0.8	0.4	5.5
Nicaragua	8.4	1.8	10.6
Panama	3.0	1.8	5.0
Paraguay	4.2	3.9	4.4
Peru	0.5	1.8	2.7
Uruguay	6.1	3.9	7.4
Venezuela	7.0	3.9	8.7

[1]Applied rates include tariff preferences extended under nonreciprocal tariff preference programs (GSP, CBERA, and ATPA). In the case of Canada and Mexico they are the 2001 NAFTA rates.

all U.S. agricultural exports had gone to the Dominican Republic during the base period, the average duty faced would be about 18.5 percent. This average is due to tariffs of 30 percent or higher on such important U.S. exports as tobacco products, pet foods, almonds, apples, and baked goods. These tariffs are assigned relatively heavy weights in the calculations. Peru had the second highest tariff protection on U.S. agricultural exports due to fairly high (25-30 percent) rates on meats and grains, other important U.S. exports. On the other end of the spectrum, five countries—Canada, Nicaragua, Mexico, Chile, and Guatemala—all have weighted tariff means of less than 10 percent.

U.S. exports face applied tariffs in Western Hemisphere markets that are considerably lower than the bound rates. The lowest applied rates tend to be concentrated in products of use to farmers (seeds, cuttings and live plants, semen, breeding stock, etc.) or plant and animal materials with commercial uses (gums, resins, essential oils, extracts, and hides and skins). Regional trade in many of these products is fairly modest. However, some products that are very important to U.S. agriculture, including wheat, soybeans, and cotton, also face low applied tariffs in many, although not all, countries within the hemisphere. It is also the case, however, that many products face uniformly higher-than-average tariffs within the region. From the standpoint of U.S. exports, the most important of these are tobacco products, meats, rice, beer, wine, and distilled spirits. Certain fruits and vegetables including apples, grapes, oranges, grapefruit, potatoes, and onions also face higher-than-average applied tariffs in many markets especially during specific times of the year when domestic production is available. Finally, dairy products, sugar, and processed products containing dairy products and sugar tend to face higher-than-average applied tariffs in most countries.

Comparing the weighted and simple unweighted applied means of each country gives a good indication of the level of bias each country's tariff schedule contains against U.S. exports. To the extent that a country levies higher tariffs on those products that are important from a U.S. export perspective than on those products not important to the U.S., the weighted average will exceed the unweighted one. In this respect, Mexico's tariff schedule demonstrates the highest relative bias against U.S. exports. When weighted by U.S. exports, Mexico's mean applied tariff is almost three times the simple unweighted mean. This is understandable, however, since under NAFTA tariffs on some products were immediately cut to zero while others were reduced to zero by the end of 2003. In the case of the most import-sensitive commodities, however, tariffs will not reach zero until 2008. In 2001, Mexico was still levying tariffs on several important U.S. export commodities, including corn, poultry, and tobacco/tobacco products. In general, however, there is not much difference between the weighted and unweighted tariff means in table 3-4 partly because countries within the hemisphere tend to have relatively low levels of dispersion across both their bound and applied tariffs.

The overall, export-weighted, average applied rate for the countries found in table 3-4 is 12.5 percent, less than one-third of the bound average of 43.3 percent. The difference between the applied rates that U.S. exports face and the bound rates are especially large for Jamaica, Nicaragua, and Colombia. Mexico also shows a large difference, with U.S. agricultural exports facing an export-weighted, average NAFTA tariff in Mexico of 8.6 percent versus an average bound tariff of over 50 percent. This is an indication of the maximum level of protection that U.S. exports could have faced if NAFTA did not exist and if Mexico applied tariffs at the bound levels. But, Mexico also tends to apply tariffs at levels below the MFN bound rates. Thus, a more accurate indication of the impact of NAFTA would be to compare the NAFTA average with an export-weighted average of Mexico's applied tariffs. If NAFTA were not in place, U.S. exports would have faced an export-weighted, average MFN applied tariff in Mexico of 35.4 percent versus the NAFTA average of 8.6 percent. In the case of Canada, the only other market in the hemisphere where the United States received preferential treatment in 2001, the MFN applied and bound rates are the same. Thus, in the absence of NAFTA, U.S. exports would have faced a weighted MFN bound rate of 12.8 percent in Canada instead of the lower NAFTA average of about 7 percent.

Table 3-5 reports the tariffs that each of the 20 FTAA countries faces in the U.S. market. The first two columns contain the unweighted and weighted means of U.S. applied tariffs, which can differ by exporter based on eligibility for tariff preferences under either NAFTA or one of the nonreciprocal tariff preference programs GSP, CBERA, or ATPA. Again, we provide a weighted average of bound tariffs for comparison purposes.

Given the mix of agricultural products it exports globally, Brazil, at 12.8 percent, faces the highest export-weighted duties in the United States. The United States levies relatively high tariffs on a number of Brazil's important exports, including sugar, orange juice, tobacco, and soybean oil. Jamaica was the only other country facing an export- weighted average tariff of over 10 percent, largely a function of the importance of its sugar exports, which make up over one-quarter of total exports. On the other end, the exports of four countries—Haiti, Peru, Ecuador, and Mexico—all faced average tariff rates below 1 percent in the U.S. market. The top exports from each of these countries tend to face very low or zero duties in the United States. In fact, for the region as a whole (excluding NAFTA partners) the top four exports are coffee, bananas, soymeal, and soybeans, all of which face low or zero duties.

Even though the averages are low, the export-weighted applied rates exceed the unweighted ones in all but six of the countries, and in some cases they are over three times as large. Is this an indication that the U.S. tariff schedule is biased against the exports of most FTAA countries? The answer is more complicated than it appears, because of the size and importance of the U.S. market and the structure of the U.S. tariff schedule. In the previous section, we demonstrated that the U.S. market is already relatively open to agricultural trade within the hemisphere, for two reasons. First, the United States has bound 22 percent of its agricultural tariffs at zero in the WTO, and most of the remaining rates have been bound at low levels. As a result, the United States has the lowest simple mean bound tariff in the region. Additionally, under the CBERA and the ATPA programs, eligible countries are granted duty-free access on their exports to the United States. The two programs extended duty-free access to about 65 percent of all agricultural tariff lines in the U.S. tariff schedule. With a total of 87 percent of all agricultural tariff-lines being duty-free, it is not surprising that CBERA and ATPA countries face simple applied tariff averages of only 1.8 percent.[13] However, these low averages conceal a number of relatively high tariff peaks, many of which are found on products of export interest to some FTAA countries, including sugar, tobacco, frozen orange juice, soybean oil, and peanuts. When these tariffs are weighted by each country's exports, the weighted averages tend to exceed the unweighted ones.

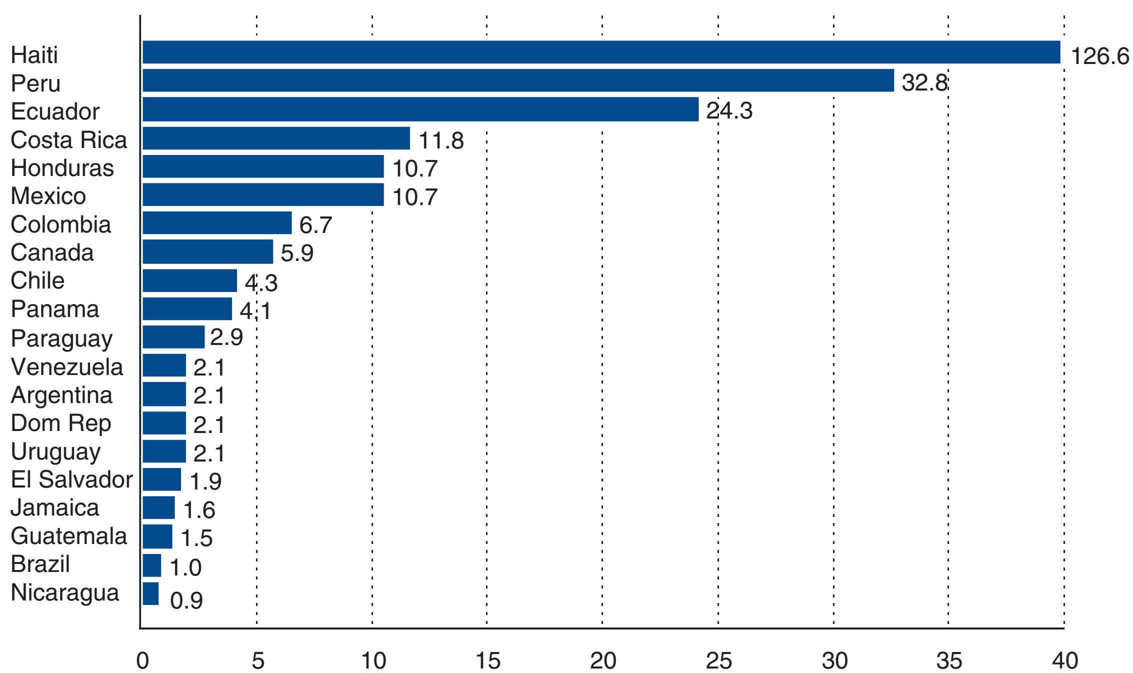
For some countries in the hemisphere, the differences in the weighted and unweighted averages demonstrate that there are considerable potential trade benefits from reducing U.S. tariffs. This conclusion would not have been evident based solely on the low simple average tariffs these countries face. For some of these, however, market access is being provided through tariff-rate quotas. This can skew the weighted tariff averages found in table 3.5. Sugar, the fifth most

[13] The simple averages reported in the previous section are higher than those reported above because they are an average over all 1,754 HS 8-digit tariff-lines in the U.S. schedule. In this section, we first calculated simple averages at the HS 6-digit level. This collapsed the tariff database to 682 HS 6-digit tariffs. This allowed us to use each country's exports, which are only available at the HS 6-digit level, as weights.

important export from FTAA countries is a good example, since it faces high average duties in the United States, as a result of steep over-quota tariffs. For almost one-half of the countries in table 3-5, U.S. sugar tariffs are the largest component of the weighted average (see table 3-3). The high weight accorded to sugar in our calculations is potentially misleading in the case of those countries whose sugar exports are largely a result of the quota allocation they receive under the U.S. sugar TRQ. This is particularly true of some Caribbean countries, where the quota allotment they receive is equal to more than one-half of their total exports to the world. Some of these countries are actually net importers of sugar, and it is likely that the value of their sugar exports would be significantly less were they not guaranteed a high price on their within-quota exports to the United States. When countries are allocated part of a lucrative quota, the result might be to create a trade flow that might otherwise not have taken place under free trade.

Comparing the preferential and MFN bound tariff averages is also revealing. In percentage point terms, the differences are perhaps not as great as one might expect, especially in view of the extension of duty-free access on 65 percent of all tariff-lines under the CBERA and ATPA programs. However, most of the eligible products under these programs already face low duties. In fact, the simple average tariff across those lines on which preferences are extended is about 7 percent, while the simple average of the remaining 13 percent of dutiable tariffs on which no preferences are extended is about 47 percent. The conclusion here is that the GSP, CBERA, and ATPA have not significantly diluted the potential value of an FTAA to the region. There are still many products of export interest to our regional trading partners that do not receive preferences under U.S. programs. In addition, just as U.S. trading partners in the region can legally raise their applied rates to their bound levels, the United States can always withdraw or modify the preferential access it gives under these programs. This should provide these countries an incentive to lock in duty-free access to the U.S. market through a reciprocal agreement like the FTAA.

Figure 3-1
Relative tariff ratio indices[1]



[1] Ratio of weighted tariff mean faced by U.S. exports in selected countries over weighted tariff mean faced by that country's exports in the United States.

Sources: U.S. International Trade Commission Trade Dataweb, http://dataweb.usitc.gov; USDA-ERS International Bilateral Agricultural Trade Database (compiled from the U.N. COMTRADE database).

To give expression to the relative importance of two trading partners' tariffs, Sandrey utilizes the sort of information found in tables 3-4 and 3-5 to create a tariff- and trade-based measure called the Relative Tariff Ratio Index (RTR).[14] The RTR is a useful way to combine the trade and tariffs of two trading partners into a single and concise figure. Figure 3-1 contains RTRs calculated as the ratio of the trade-weighted average tariff that U.S. exports face in the selected countries from table 3-4 (the numerator) and the equivalent average faced by their exports in the United States from table 3-5 (the denominator). A ratio of one would reflect similar protection in the respective tariff schedules of the two trading partners. A ratio greater than one means that U.S. agricultural exports face higher average tariffs in the trading partner's market than its exports face in the U.S. market. RTRs range from well over 100 for Haiti and to below 1 for Nicaragua (fig. 3-1). These ratios do not reflect the levels of tariffs, but rather the relative tariff protection faced at the respective borders of bilateral trading partners. In the case of Haiti, for every tariff percentage point, on average, that Haitian agricultural exports face in the United States, the United States faces 126.6 percentage points in Haiti. In 6 of the 20 countries surveyed, U.S. agricultural exports face average tariffs more than 10 times as high as their exports face in the United States. Nicaragua is the only country in which the tariffs faced by U.S. exports are less than those faced in the United States by its trading partner's exports.

Conclusion

Through a combination of multilateral, intraregional, and bilateral pacts, Western Hemisphere countries have made significant progress in reducing agricultural tariff protection over the last decade. In an effort to build on the trade and investment ties created by these pacts, 34 countries in the hemisphere resolved to form a FTAA. One of the main goals of the FTAA is to progressively eliminate tariffs on substantially all trade within the hemisphere.

It is in the interest of all Western Hemisphere countries to reduce tariff protection in order to obtain cheaper sources of supply and to achieve the increased level of economic activity made possible by a more efficient utilization of resources. Free trade permits these efficiency gains by allowing greater specialization according to each country's "comparative advantage." Trade liberalization will make possible important economic benefits such as greater exploitation of economies of scale and increased domestic and foreign investment in response to new export opportunities. An FTAA would stimulate the U.S. agricultural economy by reducing the high tariff barriers on U.S. agricultural exports to the region. U.S. agricultural exports face weighted average tariffs within the largest non-NAFTA markets in the region that range from just under 10 percent to almost 20 percent. The bound rates that these countries committed to in the WTO are even higher, with the weighted averages ranging from 16 percent to over 100 percent. The extent of the gains from increased trade to the United States depends not just on the level of applied tariffs to its exports but also on what these barriers might be in the future if no FTAA were established. There is always the possibility that these countries could raise their applied rates to the much higher bound levels.

Over the past decade, Western Hemisphere countries have actively pursued liberalizing and integrating their economies through a wide variety of interregional free trade and customs union agreements. The United States currently has negotiated free trade agreements with nine countries in the region: Canada and Mexico through NAFTA, the five Central American countries

[14] Sandrey attributes the original concept for the RTR to John Luxton, former Associate Minister for Foreign Affairs and Trade in New Zealand. See appendix for more information on the RTR.

plus the Dominica Republic through CAFTA, and Chile through the U.S.-Chile FTA. In the remaining countries in the hemisphere U.S. exporters often compete with other countries in the region whose exports are subject to considerably lower duties. From the U.S. perspective, a strong argument in favor of an FTAA is that it would eliminate the disadvantage U.S. exporters confront when competing with exports from countries facing preferential rates, thus enabling them to expand market share.

Opening hemispheric markets has presented negotiators with a number of challenging issues, including reaching agreement on which tariff rates to use as a starting point, how quickly to phase in the elimination of tariffs, and how to treat sensitive products (those most vulnerable to import competition). Negotiators have agreed to use tariffs that were actually being applied in October 2002 as the base rates from which cuts will be made (Spitzer, 2003).[15] Starting the cuts from applied tariffs is important for U.S. exports since our analysis shows that the weighted-average bound tariffs facing U.S. exports are on average 3.5 times higher than applied tariffs. Therefore, progressively eliminating tariffs from their bound levels would mean that significant trade liberalization for some U.S. products might not begin until the end of the implementation period. By agreeing to use the applied rates as the starting point, U.S. exporters will gain increased market access within the first year of the agreement.

Negotiators also have established four elimination categories: category A tariffs are to be eliminated immediately; category B in the short term (up to 5 years); category C in the medium-term (up to 10 years); and category D in the long term (longer than 10 years) for a limited number of the most sensitive commodities. To date, there has been no definitive agreement on the extent to which countries will be able to place sensitive agricultural products into category D, but according to the WTO rules governing the formation of FTAs, tariffs must be eliminated on substantially all products within 10 years after the agreement's initial implementation date.

This analysis has focused on one aspect of market access—tariff liberalization—and the extent to which tariffs in the region pose an impediment to trade in agricultural goods between the United States and its trading partners in the hemisphere. Using an index that combines trade flows and tariffs into one simple measure has allowed us to compare the levels of tariff protection that U.S. exports face in other countries with the average levels faced by those countries in the U.S. market. Using a country's trading partner's total exports as weights allows us to escape, in large part, the distorting effects that high tariffs have on the country's imports. This approach could provide a useful aggregate measure to compare how an individual country's allocation of products across categories with different tariff elimination timetables might affect the export barriers that it faces over the course of the implementation period.

While we cannot formally project the potential FTAA-induced expansion in U.S. agricultural exports in this analysis, our detailed comparison of the levels of trade and tariff protection within the region shows that there would be considerable potential benefits to the United States from further trade liberalization within the hemisphere. The average level of tariff protection in these countries is considerably higher than in the United States. As a result, an FTAA would require larger cuts in FTAA country tariffs than in U.S. ones. However, it does not necessarily follow that after all adjustments have had time to take place, we would see a significant imbalance in trade gains. Even in the short term, countries that export a large share of products such as sugar, peanuts, tobacco, and orange juice, on which protection is generally higher in the United States,

[15] An exception has been granted for the CARICOM countries, which will be allowed to start their reductions from WTO bound rates for some agricultural products.

are likely to benefit. In the longer term, because of its size and wealth, the U.S. market should provide ample incentive for countries currently protected by high tariffs to restructure their industries in order to compete with U.S. producers. Indeed, one of the main incentives for Latin American countries to form an FTAA is to attract the investment that would allow them to eventually diversify and expand their exports.

References

Erzan, Refik, and Alexander Yeats. *Free Trade Agreements with the United States—What's In It for Latin America?* WPS 827, The World Bank, January 1992.

Gibson, Paul, John Wainio, Daniel Whitley, and Mary Bohman. *Profiles of Tariffs in Global Agricultural Markets.* Agricultural Economic Report No. 796, U.S. Department of Agriculture, Economic Research Service, January 2001.

Sandrey, Ron. *The Relative Tariff Ratio Index.* New Zealand Trade Consortium Working Paper No. 7. The New Zealand Trade Consortium with the New Zealand Institute of Economic Research, 2000.

Spitzer, Robert J. *Progress in the FTAA Negotiations*. Paper presented at Agricultural Competitiveness and World Trade Liberalization conference. Fargo, ND. May 29-30, 2003.

U.S. General Accounting Office, *Free Trade Area of the Americas – Negotiators Move Toward Agreement That Will Have Benefits, Costs to U.S. Economy*. GAO-01-1027, September 2001.

Viner, Jacob. *The Customs Union Issue*. Carnegie Endowment for International Peace. New York, 1950.

Wainio, John and Paul Gibson. *U.S. Exports Face High Tariffs in Some Key Markets. FoodReview*, Vol.4, Issue 3, U.S. Department of Agriculture, Economic Research Service, September-December 2001.

Winters, L. Alan. "Reciprocity" chapter. *The Uruguay Round—A Handbook on the Multilateral Trade Negotiations*. J. Michael Finger and Andrzej Olechowski, editors. The World Bank, Washington, DC., 1987.

Chapter 4

U.S. Sugar in the FTAA

Stephen Haley

The consequences of a Free Trade Area of the Americas (FTAA) for the supply, distribution, and pricing of U.S. sugar are not yet known. Several scenarios of increased market access to the U.S. sugar market under the FTAA are possible, each with different effects on domestic sugar producers, consumers, and U.S. sugar policy.

Using the U.S. Department of Agriculture (USDA) sugar projections baseline model to analyze the effects of several market access options, this chapter looks first at the cost structures of Western Hemisphere sugar-producing sectors. The ability of Western Hemisphere sugar-producing countries to supply the U.S. market is discussed, with the assumption that FTAA outcomes will be consistent with current U.S. international commitments affecting sugar. The overall analysis is being done in the context of domestic sugar policy, with consideration of how some policy instruments may be used to adjust to increased sugar access from the hemisphere.

Costs of Sugar Production

One way of analyzing the competitiveness of sugar-producing countries in the Western Hemisphere is to compare and rank average costs of their production. LMC International periodically publishes estimates of world sugar and sweetener costs of production.[1] The data go back to 1979/1980 and *The 2000 Report* extends the data through 1998/99. Field, factory, and administrative costs are examined for 41 countries that produce sugar from sugar beets and for 63 countries that produce sugar from sugarcane. All sugar-producing countries in the Western Hemisphere are included. Although there are many limitations in the use of production cost estimates, these data can form the basis for comparing competitiveness in production across regions and countries.[2]

Table 4-1 shows four groupings of Western Hemisphere sugar-producing countries ranked according to average costs of producing raw cane sugar during 1994/95-1998/99. (Figure 4-1 shows the same information as a cumulative cost curve for the individual countries.) The lowest cost producers are in Center/South Brazil, Colombia, El Salvador, and Guatemala. Together, these countries' sugar production averaged about 14.8 million metric tons (mt) or about 48 percent of total hemispheric production. The average cost was estimated at a very low 7.7 cents a pound. The second grouping includes Bolivia, North/East Brazil, Costa Rica, Ecuador, Mexico, Nicaragua, and Florida in the United States. Production costs averaged 12.34 cents a pound, and average production averaged slightly less than 10.0 million mt. Together, the first and second cost groupings constitute more than 80 percent of cane sugar production in the Western Hemisphere, giving the cumulative cost curve a long portion below or close to the weighted-average hemispheric cost (100 in fig. 4-1).

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[1] The study is copyrighted. Results for specific countries or regions may not be quoted or published without the prior approval of LMC International. For more detailed information regarding LMC services, contact: Andrea Kavaler, LMC International, 1841 Broadway, New York, NY, 10023, or by telephone at (212) 586-2427, or via e-mail at: analysis@lmc-ny.com.

[2] See "U.S. and World Sugar and HFCS Production Costs, 1994/95-1998/99," in Sugar and Sweetener Situation and Outlook, USDA-ERS, SSS-232, September 2001, http://www.ers.usda.gov/publications/so/view.asp?f=specialty/sss-bb/.

Table 4-1—Costs of producing raw cane sugar, select categories of Western Hemisphere producers, 1994/95-1998/99

Category	Low	High	Average
		Cents/pound[1]	
Low cost[2]	6.72	11.69	7.70
Low-to-medium cost[3]	10.58	17.40	12.34
Medium-to-high cost[4]	14.25	21.83	16.54
High cost[5]	17.74	40.21	23.56

[1]Measured in current U.S. cents per pound, ex-mill, factory basis.

[2]Low-cost group is comprised of Center/South Brazil, Colombia, El Salvador, and Guatemala.

[3]Low-to-medium cost group is comprised of Bolivia, North/East Brazil, Costa Rica, Ecuador, Mexico (Gulf and Pacific Coasts), Nicaragua, and Florida.

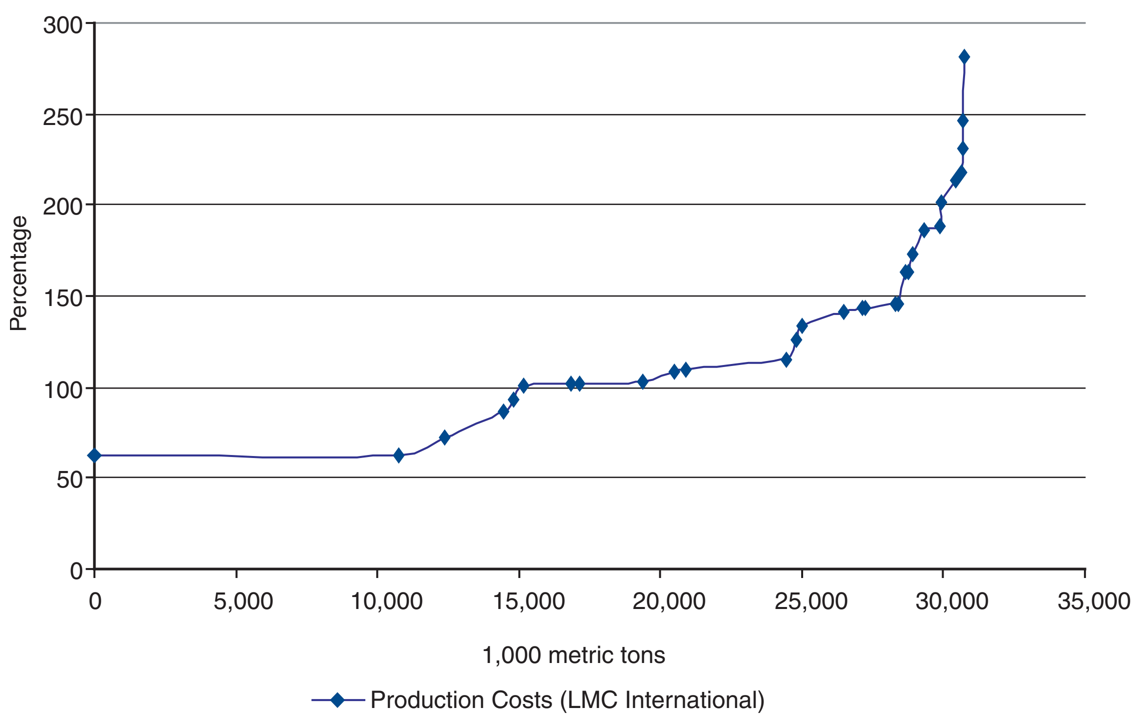
[4]Medium-to-high cost group is comprised of Argentina, Belize, Guyana, Honduras, Panama, Paraguay, Peru, Louisiana, Texas.

[5]High Cost group is comprised of Barbados, Dominican Republic, Jamaica, St. Kitts, Trinidad, Hawaii, Uruguay, and Venezuela.

Source: LMC International, 2000.

'igure 4-1

:umulative cane sugar costs in the Western Hemisphere, relative to weighted-average costs, 1994/95-1998/99



The third grouping includes Argentina, Belize, Guyana, Honduras, Panama, Paraguay, Peru, and Louisiana and Texas in the United States. Production costs averaged 16.54 cents a pound. The fourth group takes into account the highest cost areas, which includes Hawaii in the United States. The third and fourth groupings' production averaged 4.1 and 1.9 million mt, respectively. These third and fourth groupings represent the more nearly vertical shaping of the cost curve for cumulative production above 25 million mt (fig. 4-1).

These data show U.S. cane sugar-producing areas in Louisiana, Texas, and Hawaii in the higher cost categories. This means that at least 80 percent of cane sugar production in the hemisphere occurs at lower cost than in these areas.

The United States is the only significant producer of beet sugar in the Western Hemisphere. Although LMC International ranks the United States as one of the world's lowest cost producers of beet sugar, its costs in aggregate are still high relative to other Western Hemisphere cane sugar producers. Table 4-2 shows a low to high range of U.S. production costs, white sugar basis, for cane and beet sugar. The ranges are essentially overlapping in the United States, but the Western beet sugar producing areas generally have higher average costs than do those in the East.

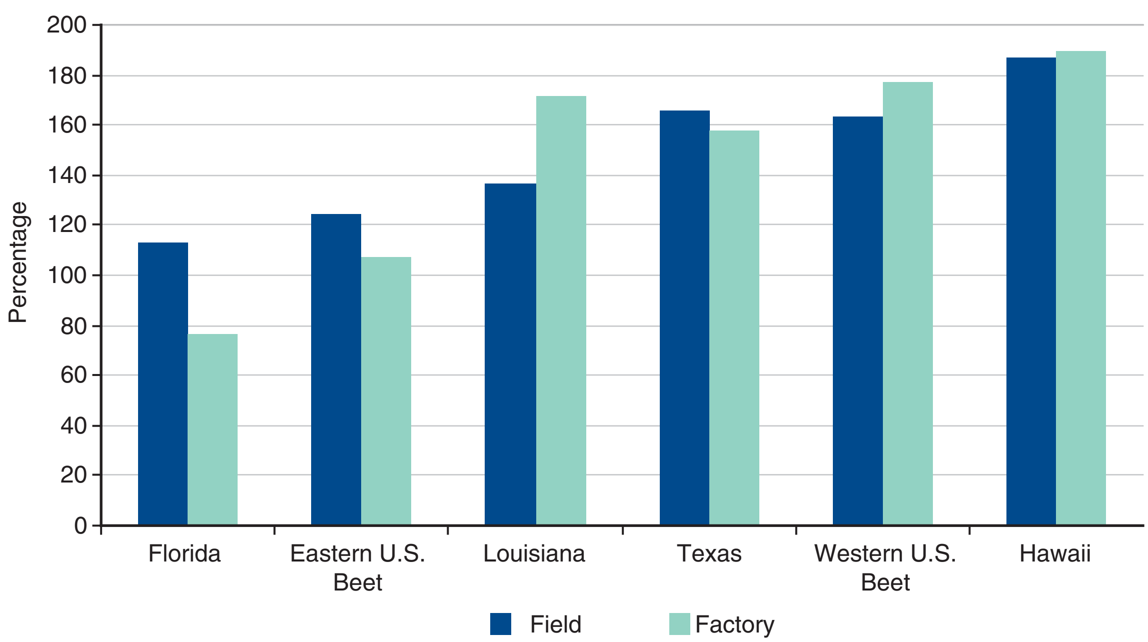
Figure 4-2 shows U.S. cane and beet sugar-producing regions' disaggregated field and factory costs as percentages of hemispheric averages. Only Florida has a cost element (factory costs) lower than the average. Field and factory costs in U.S. cane areas other than Florida are anywhere from 37 percent to 90 percent higher than the corresponding hemispheric average. The Eastern U.S. beet sugar costs are about 16 percent higher than in Florida. The Western U.S. beet sugar costs are intermediate between Texas and Hawaii.

Table 4-2—Range of costs of producing raw cane sugar, and refined beet sugar in the United States, 1994/95-1998/99

Category	Low	High
	Cents/pound[1]	
Cane sugar,		
white value equivalent	14.91	27.88
Beet sugar, Eastern U.S.	15.27	25.13
Beet sugar, Western U.S.	19.25	34.06

[1]Measured in current U.S. cents per pound, ex-mill, factory basis.
Source: LMC International, 2000.

Figure 4-2
U.S. sugar costs as percentage of Western Hemisphere average, 1994/95-1998/99



Costs: raw basis
Source: LMC International, 2000.

Net Surplus Production

Many factors influence the direction and magnitude of trade flows. Although cost considerations are important for assessing competitiveness, they are not sufficient for predicting trade flows. Factor endowments, marketing infrastructure, investment capital, industrial organization, consumer preferences, government policies, and other elements are important. These elements, however, are not analyzed here in depth because this report's focus emphasizes the implications of increased access of Western Hemisphere sugar on U.S. sugar supply, use, and prices.

Consideration of hemispheric costs shows the United States to be a relatively high-cost sugar producer, although there are U.S. producing regions where costs are competitive with cost-efficient hemispheric producers. Equally important for analysis is consideration of existing trade patterns and the likelihood that sugar produced in the Western Hemisphere could be shipped into the U.S. market. A simple way to approach this issue is to examine the net surplus production status of individual countries. Although there are alternative ways to define net producer status, the one chosen in this chapter is the difference of average production less average consumption for 1995/96-1999/2000. The averaging approach reduces the effects of extraordinary events and stock-level changes.

Table 4-3 shows net surplus production data for all countries, with totals reported for the geographical groupings of North America, the Caribbean, Central America, and South America. The hemisphere as a whole is a large net surplus producer of sugar—more than 8.4 million mt. Net surplus production is positive in all areas except North America where the U.S. and Canadian deficits outweigh Mexico's positive balance by more than 2.0 million mt. The ratio of net surplus production to production is sizeable in the three surplus areas: 57.1 percent in Central America, 36.2 percent in South America, and 32.9 percent in the Caribbean. Most countries in those areas are very experienced in the international market.

The South American and Central American countries tend to have lower costs of production coupled with relatively large net production surpluses. A combination of low production costs and large net surpluses would indicate a high capability of directing more exports to the U.S. market, although marketing costs would have to be considered as well. The Caribbean area, on the other hand, is fairly high cost. Most of their exports go to the European Union and the United States under preferential arrangements that guarantee them prices much higher than world levels, thereby covering, to a greater extent than otherwise, their high costs of production. It is only in this area where additional trade directed to the U.S. market might seem questionable.

U.S. Sugar Policy

In 1998 at the San Jose Ministerial meeting, the United States and other Western Hemisphere countries agreed that any FTAA agreement will be consistent with the rules and disciplines of the World Trade Organization (WTO) and that the FTAA will have to coexist with subregional agreements, such as the North American Free Trade Agreement (NAFTA). In addition, it seems reasonable that the U.S. Government is likely to continue its price support for U.S.-produced sugar.

U.S. sugar policy contains three elements: (1) WTO obligations, especially minimum access on imports of raw and refined sugar; (2) NAFTA obligations governing imports of sugar from Mexico; and (3) the U.S. sugar program. Descriptions of these elements follow.

Table 4-3—Average sugar production and consumption, 1995/95-1999/2000

Region/Country	Production	Domestic consumption	Net surplus production of sugar
North America			
Canada	128	1,230	(1,102)
Mexico	4,989	4,300	689
United States	7,260	8,913	(1,653)
Total	12,377	14,443	(2,066)
Caribbean			
Barbados	58	17	42
Dominican Republic	514	305	210
Haiti	10	84	(74)
Jamaica	215	125	89
St. Kitts and Nevis	21	4	17
Trinidad and Tobago	103	84	19
Total	922	619	303
Central America			
Belize	113	14	99
Costa Rica	361	205	156
El Salvador	418	219	200
Guatemala	1,560	438	1,121
Honduras	250	224	26
Nicaragua	349	181	168
Panama	168	99	69
Total	3,219	1,380	1,839
South America			
Argentina	1,644	1,421	223
Bolivia	295	228	67
Brazil	16,490	8,720	7,770
Chile	495	691	(196)
Colombia	2,155	1,333	821
Ecuador	356	390	(34)
Guyana	271	32	239
Paraguay	125	115	11
Peru	617	896	(279)
Surinam	1	14	(13)
Uruguay	20	110	(90)
Venezuela	580	752	(172)
Total	23,049	14,702	8,347
Grand Total	39,567	31,144	8,423

Source: USDA

U.S. Sugar Imports and the World Trade Organization

As part of the Uruguay Round Agreement on Agriculture (URAA), the United States agreed to import a minimum quantity of 1.256 million short tons, raw value (STRV) of raw and refined sugar each marketing year (October/September). Included in this amount is a commitment to import at least 24,251 STRV of refined sugar. The URAA made these commitments binding under the WTO.

The raw cane sugar tariff-rate quota (TRQ) is allocated to 40 quota-holding countries based on a representative period (1975-1981) when trade was relatively unrestricted. A duty of 0.625 cent a pound, raw value, is applied to in-quota imports.[3] Most countries have the low duty waived under the General System of Preferences or the Caribbean Basin Initiative. Between 95 and 98 percent of the raw cane sugar TRQ fills each year, and the refined sugar TRQ is filled almost as soon as it opens.

The high-tier sugar tariff applies to sugar imports above the level of the sugar TRQ. The Uruguay Round specified base rates for raw cane sugar of 18.08 cents a pound and for refined sugar of 19.08 cents a pound. Starting in 1995, the rates were to be cut by 0.45 cent a pound each year for raw sugar and 0.48 cent a pound for refined sugar. The yearly reductions were to take place until 2000, when the raw sugar high-tier tariff was to be 15.36 cents a pound and the refined sugar high-tier tariff rate was to be 16.21 cents a pound.

North American Free Trade Agreement

The North American Free Trade Agreement (NAFTA) contained provisions on trade in sugar. Those provisions were modified by a side letter in November 1993, before NAFTA went into effect on January 1, 1994.

According to the NAFTA side letter, Mexican sugar low-tier tariff exports to the United States are restricted by Mexico's net surplus production of sugar. The "net surplus" is defined as Mexico's production of sugar less its consumption of sugar and high-fructose corn syrup. From FY 2001 through FY 2007, Mexico is to have duty-free access to the U.S. market for the amount of its surplus as measured by the formula, up to a maximum of 250,000 metric tons, raw value (MTRV). Beginning in FY 2008, Mexico is to have duty-free access with no quantitative limit.

NAFTA specifies a declining high-tier tariff schedule for raw and refined sugar over the transition period to duty-free sugar trade in 2008. For 2003, the raw sugar tariff was 7.56 cents a pound, and the refined sugar tariff was 8.01 cents a pound. The raw sugar tariff is scheduled to drop about 1.5 cents each year, and the refined sugar tariff about 1.6 cents a year. Both rates will then reach zero in FY 2008.

Sugar Loan Program, Allotments, and Payment-in-Kind Acreage Diversion

The primary policy tools available to the U.S. Department of Agriculture to assist sugarcane and sugar beet producers are contained in the Farm Security and Rural Investment Act of 2002 (the 2002 Farm Act). The U.S. sugar program provides for USDA to make loans available to processors of domestically grown sugarcane at a rate of 18 cents per pound and to processors of domestically grown sugarbeets at the rate of 22.9 cents per pound for refined sugar. Loans are taken for a maximum term of 9 months and must be liquidated along with interest charges by the end of the fiscal year in which the loan was made. The loans are nonrecourse. This means that when the loan matures, USDA must accept sugar pledged as collateral as payment in full in lieu of cash repayment of the loan, at the discretion of the processor.

The 2002 Farm Act requires USDA, to the maximum extent possible, to operate the U.S. sugar loan program at no cost to the Federal Government. USDA must operate the program in a man-

[3] In the Harmonized Trade System, chapter 17 specifies the low-tier tariff at 1.46066 cents per kilogram less 0.0206686 cent per kilogram for each degree of polarization under 100 degrees.

ner that will avoid the forfeiture of sugar to Commodity Credit Corporation (CCC). To discourage forfeiture of nonrecourse loans, the sugar price at the time of loan repayment must be high enough to cover the loan principal plus interest expenses and other costs.

The 2002 Farm Act gives USDA the authority to accept bids from sugarcane and sugar beet processors to obtain raw cane sugar or refined beet sugar in CCC inventory in exchange for the reduction of the production of raw cane sugar or refined beet sugar. This is one way to control expected excess (or price depressing) supplies of sugar.

To facilitate operation of the sugar program at no cost to the Federal Government, the 2002 Farm Act requires USDA to establish flexible marketing allotments for sugar. The overall quantity of sugar to be allotted for a crop year is determined by subtracting the sum of 1.532 million STRV and carry in stocks of sugar (including CCC inventory) from the USDA's estimate of sugar consumption and reasonable carryover stocks at the end of the crop year. USDA is required to adjust allotment quantities to avoid the forfeiture of sugar to CCC.

USDA's authority to operate sugar marketing allotments is suspended if USDA estimates that sugar imported for human consumption, not including the reexport programs, will exceed 1.532 million STRV such that the overall allotment quantity would have to be reduced. The marketing allotments would remain suspended until such time that imports have been restricted, eliminated, or otherwise reduced to or below the 1.532 million STRV level.

Sugar Imports: Current Situation and Future Possibilities

The United States allocates the raw sugar TRQ to 40 countries based on historical trade shares from 1975-1981. Table 4-4 shows allocations made for FY 2001. Twenty-three of the 40 countries are situated in the Western Hemisphere. Excluding Mexico's NAFTA share, imports from Western Hemisphere countries total 715,541 mt, or about 64 percent of the raw sugar TRQ excluding NAFTA. Including the NAFTA share for FY 2001, the total becomes 821,329 mt, or about 9 percent of sugar for U.S. domestic food and beverage use.

Table 4-4 shows that the Caribbean area (excluding Cuba) is very much dependent on the U.S. market. It was allocated an amount that was about 46 percent of total exports estimated for the 2001 marketing year. Central American countries are less dependent on the U.S. market. They were allocated an amount equaling about 8.5 percent of their total exports. Although South American countries in aggregate received an allocation more than 38 percent higher than either of the other areas, their allocation amounted to only about 3.4 percent of total exports and 1.4 percent of their total production for 2001.

Various Future Outcomes: Analytical Framework

There is no sure way to predict an outcome of FTAA negotiations for increased imports of sugar into the United States. There may be no increased access. On the other hand, any increase would have to be consistent with U.S. WTO and NAFTA commitments. In the context of U.S. sugar price support policies, increased imports could induce large sugar forfeitures to the CCC.

Two types of increased sugar access are possible. In the first, the United States modifies its TRQ import regime by increasing sugar quota allocations made to hemispheric sugar exporters. The allocation amounts may be either moderate or large. Maintenance of the TRQ structure would still provide support to U.S. prices higher than world levels, and preferential imports would provide hemispheric exporters higher (or certainly no lower) returns than the world market. In the

Table 4-4 — U.S. sugar imports under raw sugar tariff-rate quota, by country, fiscal year 2001

Region/country	TRQ allocation	TRQ allocation as percentage of production	TRQ allocation as percentage of exports
	Metric tons, raw value	-Percent-	
North America			
Mexico	7,258		
Mexico (NAFTA)	105,788		
Total	113,046	2.30	26.41
Caribbean			
Barbados	7,372	14.74	14.74
Dominican Republic	185,346	40.21	100.19
Haiti	7,258	72.58	NA
Jamaica	11,584	5.39	6.44
St.Kitts and Nevis	7,258	36.29	40.32
Trinidad-Tobago	7,372	6.70	12.29
Total	226,190	26.12	45.88
Central America			
Belize	11,584	9.65	11.58
Costa Rica	15,797	4.27	9.87
El Salvador	27,381	6.35	13.97
Guatemala	50,549	3.10	4.25
Honduras	10,531	3.45	14.04
Nicaragua	22,115	6.08	11.40
Panama	30,540	18.51	46.98
Total	168,497	4.97	8.51
South America			
Argentina	45,283	2.94	25.16
Bolivia	8,425	2.96	16.85
Brazil	152,700	0.90	1.98
Colombia	25,274	1.07	2.57
Ecuador	11,584	2.31	19.31
Guyana	12,637	4.21	4.72
Paraguay	7,258	6.05	36.29
Peru	43,177	5.68	107.94
Uruguay	7,258	72.58	NA
Total	313,596	1.37	3.37
Other			
Australia	87,408	2.09	2.79
Congo	7,258	NA	NA
Cote D'Ivoire	7,258	4.10	11.17
Fiji	9,478	2.11	2.06
Gabon	7,258	NA	NA
India	8,425	0.04	1.69
Madagascar	7,258	NA	NA
Malawi	10,531	4.58	35.10
Mauritius	12,637	2.11	2.20
Mozambique	13,690	NA	NA
Papua New Guinea	7,258	16.13	145.16
Philippines	142,169	8.62	161.56
South Africa	24,221	0.84	1.53
Swaziland	16,850	3.19	6.71
Taiwan	12,637	4.21	84.25
Thailand	14,743	0.28	0.41
Zimbabwe	12,637	2.35	6.38
Total	401,716	NA	NA
Rounding	-62		
Total excluding NAFTA	1,117,195		
Total with NAFTA allocation	1,222,983		

Source: USDA.

second type of access, the United States permits hemispheric duty-free sugar imports with no upward quantitative limit. The second case resembles Mexico's sugar access to the United States under NAFTA in 2008.

The U.S. sugar baseline projections model is used for analyzing the effect of increased sugar imports from hemispheric exporters (see appendix). The model's advantage is that it incorporates substantial policy, production, processing, and consumption detail of the U.S. and Mexican sugar and high-fructose corn syrup sectors.[4] The model has been updated to be consistent with estimates and projections published in the April 2002 *World Agricultural Demand and Supply Estimates* report.

Four modeling scenarios are analyzed. In the first two scenarios, the United States retains its TRQ import regime but differs in the amounts of increased access. In the first, hemispheric quota access is doubled (excepting Mexico's raw sugar TRQ allocation of 7,258 MTRV) to 708,283 MTRV (780,740 STRV). This double-access scenario is intended as the case of a moderate increase. The second scenario, on the other hand, is a case of a large increase. It specifies an increase of 2.0 million MTRV (2.205 million STRV). Allocations to countries outside the Western Hemisphere would be equal to levels in FY 2001. Although NAFTA provisions would continue to hold, increased imports of sugar from FTAA countries into the United States are likely to affect the level of imports from Mexico.

The first two scenarios occur in the context of the U.S. sugar loan program. Because sugar imports for human consumption exceed 1.532 million STRV, marketing allotments are assumed to be suspended. Because the loan program provides for nonrecourse loans, processors are assumed to forfeit sugar placed under loan if U.S. sugar prices in the model are not projected to be above the minimum level to avoid forfeiture. For a loan rate of 18 cents a pound, the minimum price to avoid forfeiture is calculated to be 20.17 cents a pound. (The additional amount above 18 cents accounts for interest charges and expenses borne by the processor if the loan were to be paid off in cash. If the market price were below the minimum, then the processor would be ahead financially by forfeiting the sugar to the CCC instead of paying off the loan with cash.)

The 2002 Farm Act gives the USDA authority to exchange publicly owned sugar for reduced production of sugar crops. This enables the USDA to reduce sugar loan program costs by eliminating storage costs and reducing unneeded excess sugar production that could increase the likelihood of loan forfeitures. In the first two scenarios, it is assumed that the USDA exchanges sugar it owns for reduced production of sugarcane and sugar beets. Because these scenarios involve increases in U.S. sugar supply through granting greater market access to hemispheric producers, the likelihood of loan forfeitures at increased levels is greatly enhanced at a loan rate of 18 cents a pound. This implies that U.S. producer adjustments consist of increasingly larger transfers of publicly owned sugar for reduced plantings, with market prices stabilized at or above the minimum price to avoid forfeiture. While this represents one type of adjustment process, there could be pressure to reduce the loan rate to allow the market to adjust to the larger supply potential resulting from increased market access. The idea is that U.S. producers might be expected to bear a larger share of the burden of the FTAA through price-induced production reductions rather than the USDA through its sugar-exchange activities.

[4] See "Conceptual Overview of the U.S. Sugar Baseline" in Sugar and Sweetener Situation and Outlook. SSS-227, January 2000, www.ers.usda.gov/briefing/sugar/sugarpdf/baseline.pdf; and USDA Agricultural Baseline Projections to 2011, Staff Report WAOB-2002-1, www.ers.usda.gov/publications/waob021/waob20021.pdf.

In terms of the modeling activity, the first two scenarios are run with the loan rate first at 18 cents a pound and then at levels low enough to eliminate forfeitures to the CCC for both scenarios. In the case of the double-access scenario, the loan rate has to be reduced to 15 cents a pound in order to eliminate forfeitures. For the 2-million-MTRV scenario, the loan rate has to be reduced to 13 cents a pound to eliminate forfeitures.[5]

The third and fourth scenarios represent extremes where there is duty-free access to hemispheric producers with no quantitative limits. The U.S. sugar loan rate program is assumed abandoned, and the U.S. raw sugar price drops close to world levels, separated from it by an assumed marketing margin of 2 cents a pound. The third scenario assumes no change in world prices after the U.S. liberalization. The fourth scenario assumes that world prices increase by 2 cents a pound (a 22-percent increase) due to increased U.S. import demand. Although the FTAA negotiations are scheduled for completion by the beginning of 2005, it is assumed for modeling that increased sugar access is not in full force until 2009. This delay is imposed to eliminate confounding effects from U.S. adjustments to NAFTA sugar provisions. Although the high-tier NAFTA tariff on imports of Mexican sugar are decreasing prior to 2008, it is not until 2008 that the high-tier NAFTA tariff reaches zero and domestic Mexican sugar prices are formally bound to U.S. prices.[6]

TRQ Outcomes With An 18-cent Loan Rate

The sugar base assumes that the loan rate remains at 18 cents a pound throughout the course of the projections period. Modeling results for the model's base (table 4-5) indicate that the 18-cent loan rate level implies that the CCC sugar stockholding is likely to be a major factor through 2010, when a price equilibrium above the minimum price to avoid forfeiture is finally achieved. The effect of increasing hemispheric market access is to keep prices at the minimum level (20.17 cents a pound) through loan forfeitures that channel excess production to the CCC. Even in the moderate double-access scenario, CCC stocks in 2012 are projected at 79 percent of the additional market access (615,000 STRV). In the 2-million-MTRV scenario, CCC stocks in 2012 are projected at 1.95 million STRV, or 88 percent of the increased import access amount.

In these scenarios, U.S. sugar production decreases relative to the base primarily because of reduced planting due to USDA's Payment-in-Kind Diversion Program. Imports from Mexico are not much affected because U.S. sugar prices are about the same as in the base scenario.

[5] Although not modeled, there are other ways to provide support to sugar producers other than through price support. Even longstanding price support programs can be switched over to income support systems as was recently done to the peanut support program.

[6] Although it may be the case that prior to 2008 U.S. and Mexican prices are linked but separated by the NAFTA high-tier tariff, it is not certain when Mexican policymakers will permit this linkage to happen. Currently, the Mexican government owns about 50 percent of current sugar production capacity. For an undetermined time period, the Mexican government is expected to restrict how much sugar can be sold domestically and how much must enter into export channels. The baseline assumes that the Mexican government's goal is to create a marketing environment that will facilitate a re-privatization of the mills that the government owns and to help insure future returns to the entire sector until 2008 when the transition to NAFTA is complete. In other words, baseline modeling specifies that Mexican sugar prices are exogenous to modeling scenarios until 2008. It is because the NAFTA adjustments cannot be unambiguously handled until 2008 that the analysis of the FTAA starts in 2009, 1 year after the completion of NAFTA transition process.

Table 4-5—FTAA scenario results from increased sugar import access

Item	Units	Loan rate	Scenario	2008	2009	2010	2011	2012
Additional Import Access (FTAA)	1,000 STRV	18 cents/lb	Base	0	0	0	0	0
	1,000 STRV	18 cents/lb	Double-Access	0	781	781	781	781
	1,000 STRV	18 cents/lb	Two-Million MT	0	2,205	2,205	2,205	2,205
	1,000 STRV	15 cents/lb	Base	0	0	0	0	0
	1,000 STRV	15 cents/lb	Double-Access	0	781	781	781	781
	1,000 STRV	15 cents/lb	Two-Million MT	0	2,205	2,205	2,205	2,205
	1,000 STRV	13 cents/lb	Two-Million MT	0	2,205	2,205	2,205	2,205
	1,000 STRV	NA	Unrestricted	0	2,205	8,028	9,027	8,867
	1,000 STRV	NA	2 cent world price increase	0	1,250	5,685	5,977	6,029
CCC-owned sugar stocks	1,000 STRV	18 cents/lb	Base	326	237	107	0	0
	1,000 STRV	18 cents/lb	Double-Access	326	1,018	839	712	615
	1,000 STRV	18 cents/lb	Two-Million MT	326	2,441	2,175	2,051	1,950
	1,000 STRV	15 cents/lb	Base	326	0	0	0	0
	1,000 STRV	15 cents/lb	Double-Access	326	374	0	0	0
	1,000 STRV	15 cents/lb	Two-Million MT	326	1,798	1,145	1,012	886
	1,000 STRV	13 cents/lb	Two-Million MT	326	1,369	0	0	0
	1,000 STRV	NA	Unrestricted	326	0	0	0	0
	1,000 STRV	NA	2 cent world price increase	326	0	0	0	0
Raw Sugar Price (NY -No.14)	Cents/pound	18 cents/lb	Base	20.17	20.17	20.17	20.27	20.71
	Cents/pound	18 cents/lb	Double-Access	20.17	20.17	20.18	20.18	20.18
	Cents/pound	18 cents/lb	Two-Million MT	20.17	20.17	20.20	20.20	20.20
	Cents/pound	15 cents/lb	Base	20.17	19.07	20.18	20.79	21.14
	Cents/pound	15 cents/lb	Double-Access	20.17	17.17	18.00	19.16	20.46
	Cents/pound	15 cents/lb	Two-Million MT	20.17	17.17	17.14	17.13	17.14
	Cents/pound	13 cents/lb	Two-Million MT	20.17	15.17	19.72	23.04	22.93
	Cents/pound	NA	Unrestricted	20.17	11.24	11.08	11.08	11.08
	Cents/pound	NA	2 cent world price increase	20.17	13.24	13.07	13.07	13.07
U.S. Cane Production	1,000 STRV	18 cents/lb	Base	4,099	4,099	4,137	4,195	4,246
	1,000 STRV	18 cents/lb	Double-Access	4,099	4,099	3,781	3,861	3,919
	1,000 STRV	18 cents/lb	Two-Million MT	4,099	4,099	3,131	3,252	3,308
	1,000 STRV	15 cents/lb	Base	4,099	4,099	4,133	4,154	4,174
	1,000 STRV	15 cents/lb	Double-Access	4,099	4,099	3,546	3,718	3,743
	1,000 STRV	15 cents/lb	Two-Million MT	4,099	4,099	2,896	3,162	3,211
	1,000 STRV	13 cents/lb	Two-Million MT	4,099	4,099	2,029	2,706	2,760
	1,000 STRV	NA	Unrestricted	4,099	4,099	262	228	229
	1,000 STRV	NA	2 cent world price increase	4,099	4,099	1,198	1,083	1,084
U.S. Beet Production	1,000 STRV	18 cents/lb	Base	4,477	4,499	4,579	4,688	4,785
	1,000 STRV	18 cents/lb	Double-Access	4,477	4,499	4,105	4,241	4,349
	1,000 STRV	18 cents/lb	Two-Million MT	4,477	4,499	3,239	3,425	3,528
	1,000 STRV	15 cents/lb	Base	4,477	4,499	4,661	4,706	4,747
	1,000 STRV	15 cents/lb	Double-Access	4,477	4,499	4,213	4,475	4,520
	1,000 STRV	15 cents/lb	Two-Million MT	4,477	4,499	3,348	3,755	3,855
	1,000 STRV	13 cents/lb	Two-Million MT	4,477	4,499	2,569	3,475	3,537
	1,000 STRV	NA	Unrestricted	4,477	4,499	528	531	535
	1,000 STRV	NA	2 cent world price increase	4,477	4,499	2,382	2,397	2,414
U.S. Sugar Production	1,000 STRV	18 cents/lb	Base	8,576	8,598	8,717	8,883	9,031
	1,000 STRV	18 cents/lb	Double-Access	8,576	8,598	7,885	8,102	8,268
	1,000 STRV	18 cents/lb	Two-Million MT	8,576	8,598	6,370	6,677	6,837
	1,000 STRV	15 cents/lb	Base	8,576	8,598	8,795	8,861	8,922
	1,000 STRV	15 cents/lb	Double-Access	8,576	8,598	7,759	8,193	8,263
	1,000 STRV	15 cents/lb	Two-Million MT	8,576	8,598	6,244	6,917	7,067
	1,000 STRV	13 cents/lb	Two-Million MT	8,576	8,598	4,598	6,181	6,297
	1,000 STRV	NA	Unrestricted	8,576	8,598	790	760	764
	1,000 STRV	NA	2 cent world price increase	8,576	8,598	3,580	3,480	3,498
Total U.S. Imports for Consumption	1,000 STRV	18 cents/lb	Base	2,017	2,056	2,032	2,002	2,020
	1,000 STRV	18 cents/lb	Double-Access	2,017	2,837	2,812	2,785	2,784
	1,000 STRV	18 cents/lb	Two-Million MT	2,017	4,261	4,236	4,213	4,212
	1,000 STRV	15 cents/lb	Base	2,017	2,056	1,846	2,019	2,146
	1,000 STRV	15 cents/lb	Double-Access	2,017	2,837	2,573	2,573	2,597
	1,000 STRV	15 cents/lb	Two-Million MT	2,017	4,261	3,997	3,972	3,964
	1,000 STRV	13 cents/lb	Two-Million MT	2,017	4,261	3,937	4,105	4,867
	1,000 STRV	NA	Unrestricted	2,017	4,261	9,622	10,552	10,378
	1,000 STRV	NA	2 cent world price increase	2,017	3,307	7,353	7,592	7,630

NA = not applicable
Source: Economic Research Service.

TRQ Outcomes With Lowered Loan Rates

The TRQ scenarios are run again with lowered loan rate levels. The objective is to determine a loan rate level that is consistent with no sugar forfeitures to the CCC by the end of the projections period. Table 4-5 shows modeling results, including sourcing of U.S. sugar and CCC inventory levels for the various scenario versions for 2012.

For the double-access scenario, lowering the loan rate to 15 cents a pound yields zero forfeitures to the CCC for all years 2010 through 2012. For the 2-million-MTRV scenario, lowering the loan rate to 13 cents a pound allows CCC holdings to reach zero by 2010, with holdings as high as 1.369 million STRV in the first year of the FTAA. (This result comes about because the modeling specification implies that domestic production reacts to sugar prices lagged at least 1 year; that is, production responds to the 2009 price decrease in the 2010 crop year.)

These market-adjusting scenarios (double access with a 15-cent loan rate, and a 2-million-MTRV increase with the 13-cent loan rate) show a similar dynamic pattern: increased imports lower sugar prices; U.S. production decreases the succeeding year; sugar prices then rise, but U.S. production does not increase because abandoned mills and processing facilities are assumed permanently closed. Price dynamics serve to move U.S. sugar supply from domestic to imported sourcing, but because the imports are capped under a TRQ system, prices recover eventually and sustain U.S. producers and processors who survived the intervening price downturn.

In the first scenario (double access), FTAA imports cause the U.S. raw sugar price to decrease 10 percent in the first year (17.17 cents a pound) relative to the 15-cent loan rate base. The raw price recovers in the second year by 0.83 cent and is 20 to 21 cents a pound by 2012. U.S. sugar production is reduced 8.5 percent (768,000 STRV) relative to the 18-cent loan rate base in 2012. Sugar imports from Mexico are lowered by 203,000 STRV, or 24.9 percent relative to the base in 2012. (Lower prices in Mexico increase Mexican beverage end user demand for sugar relative to HFCS.) Imports as a source of U.S. sugar consumption increase from 18.3 percent to 23.9 percent in the base.

In the second scenario (2-million-MTRV access), U.S. production in 2012 is reduced by 30.3 percent (2.73 million STRV) relative to the base. FTAA imports cause the U.S. raw sugar price to decrease 24.8 percent in the first year (to 15.17 cents a pound) relative to the base. The large price reduction serves to eliminate sugar-processing capacity and lay the groundwork for price recovery. This price recovery begins in 2010 (19.72 cents a pound), and prices are in the 23-cent range by 2011. Imports from Mexico in 2012 are actually up by 642,000 STRV relative to the base because of the high U.S. price. Imports as a share of U.S. sugar consumption are projected at 43.6 percent.

Unrestricted FTAA Access

The third scenario (unrestricted) opens the U.S. sugar market to all Western Hemisphere producers at zero tariff. Because the net surplus producer status of the hemisphere is extremely large, and because the largest, lowest-cost producers have low transport costs relative to non-hemispheric competitors, it is assumed that this scenario is equivalent to unrestricted free trade in sugar for the United States. The implication is that the level of U.S. sugar prices will be closer to world price levels, and that changes in U.S. prices will be highly correlated with changes in corresponding world prices. The price dynamic associated with the first two scenarios (TRQ allows a sugar price recovery after the exit of some U.S. production) is no longer present. U.S. producers and processors will have to have low costs to survive.

The baseline model assumes that future world raw sugar prices will be in the 9-cent-a-pound range after 2008. The U.S. loan rate equals 18 cents a pound through 2008, and the loan rate program is assumed abandoned in 2009. Taking into account various price margins, a U.S. raw sugar price is about 11 cents a pound starting in 2009. Table 4-5 shows various results.

Implications for U.S. sugar production are severe: cane sugar production is projected at only 229,000 STRV by 2012, and beet sugar production is projected at 535,000 STRV. These declines are of such great magnitude (95-percent reduction for cane sugar and 89-percent for beet sugar) that one cannot be assured that any U.S. sugar production would remain, save the production of niche sugars.

The fourth scenario is similar to the third, but world prices are assumed to rise to 11 cents a pound because of increased world excess sugar demand caused by the U.S. action. The U.S. price is about 13 cents a pound. The higher 2-cent price compared with the third scenario has significant effects for U.S. production. Production is decreased by 61.3 percent rather than being mostly eliminated. Beet sugar decreases 49.6 percent to 2.414 million STRV, and cane sugar production decreases by 74.5 percent to 1.084 million STRV. Most of the remaining production is located in the low-cost Eastern beet-producing areas and in Florida cane growing areas. Most sugar consumed in the United States would be coming from imports—7.63 million STRV, or 68.6 percent.

Although these latter results do not imply the complete abandonment of sugar production in the United States, the challenge is very real. With open access, the U.S. sugar sector is subject to world price movements. An assumed long-term equilibrium world sugar price at 9 cents a pound may be too high. Also, the world sugar market is at times volatile, and low prices below most producing countries' costs of production are commonplace. Whether the U.S. sugar sector could survive this environment without assistance would likely be a serious concern.

Modeling results do not indicate large shifts away from high-fructose corn syrup (HFCS) to sugar as sugar prices decline. Costs of producing HFCS in the United States are only slightly higher than costs of producing sugar in Center/South Brazil, the lowest cost sugar producer in the hemisphere. HFCS may be substituted for refined sugar, whose price generally incorporates the additional costs of refining raw sugar, about 3 cents a pound. Even though results imply that U.S. HFCS producers can lower prices to meet the competition from lower priced sugar, the results are still dependent on low-to-moderate prices of U.S. produced corn and world raw sugar prices equal to or higher than 9 cents a pound. Either lower raw sugar prices or greater U.S. corn prices could cause some significant shifting away from HFCS.

Conclusion

Analysis shows the United States to be a relatively high-cost sugar producer, although U.S. producing regions (Florida and Eastern sugar beet-producing areas) have costs that are competitive with cost-efficient hemispheric producers. The hemisphere as a whole is a large net surplus producer of sugar and could meet all U.S. sugar needs. The effect of an FTAA would depend on whether increased access were capped under a TRQ system or unlimited. Under a TRQ system, increased imports could cause sugar forfeitures to the CCC. Keeping the current loan program and controlling U.S. Government budget exposure might require a lowering of the loan rate, especially for higher levels of FTAA sugar access.

Analysis of the FTAA shows that under a TRQ system, U.S. sugar prices recover to pre-access levels but imports permanently replace some U.S. production. In effect, harm to surviving U.S. sugar producers is temporary and is felt only during the transition to increased sugar imports resulting from the FTAA. In the case of unlimited FTAA access, surviving U.S. producers must absorb world price movements and face constant competition with the hemisphere's most cost-efficient exporters. Sugar imports would likely constitute over 70 percent or more of all sugar consumed in the United States. Although results do not indicate consumption shifts away from HFCS, these results are dependent on raw sugar prices at or higher than 9 cents a pound.

References

LMC International. 2000. *The LMC Worldwide Survey of Sugar and HFCS Production Costs*. Oxford, England, December 2000.

U.S. Department of Agriculture. 2000. "Conceptual Overview of the U.S. Sugar Baseline," *Sugar and Sweetener Situation and Outlook*. SSS-227, Jan. 2000, pp 11-19.

U.S. Department of Agriculture. 2000. "Calculation of Real Price Indices for U.S. Sugar Crops," *Sugar and Sweetener Situation and Outlook*. SSS-229, Sept. 2000, pp 11-23.

U.S. Department of Agriculture. 2001. "U.S. and World Sugar and HFCS Production Costs, 1994/95-1998/99," *Sugar and Sweetener Situation and Outlook*. SSS-232, Sept. 2001, pp 10-13.

U.S. Department of Agriculture. Economic Research Service. "Commodity Costs and Returns," in http://www.ers.usda.gov/data/costsandreturns.

Chapter 5

The U.S. Orange Juice Industry in the FTAA

Jason Donovan* and Barry Krissoff

As the United States engages in negotiations to create the FTAA, Florida orange growers have expressed concern over the impact that reduced import tariffs would have on their share of the domestic juice market. The Florida orange industry enjoys considerable tariff protection against imports, especially against imported frozen concentrate. Orange growers worry that reducing or eliminating the tariffs would decrease the price competitiveness of juice produced from domestically grown oranges. Orange growers then would face decreased demand for their oranges from U.S.-based juice processors. Since juice processors purchase about 95 percent of Florida fresh orange production, a decline in processor demand would have an adverse effect on orange prices and grower revenue.

With these concerns in mind, our objective in this chapter is to assess the potential impact of the FTAA on the U.S. orange juice market. We begin with an overview of the U.S. market, including a discussion of the changing tastes of American consumers, who now often favor fresh (more precisely, not-from-concentrate) orange juice. Our discussion distinguishes between the two prevalent types of orange juice consumed, namely frozen concentrate (FCOJ) and not-from-concentrate (NFC) and why this distinction is important in how the FTAA would affect U.S. orange growers and processors. In the subsequent sections, we describe our global orange juice model and present estimates of the impact on U.S. trade, production, and consumption of implementing a comprehensive FTAA. The last section provides some concluding comments.

The U.S. Orange Juice Market

U.S. customers consumed more than 1.6 billion single-strength equivalent (SSE) gallons of orange juice in 1999, making the United States the world's leading consumer of orange juice. Since the mid-1980s, overall per capita orange juice consumption has been increasing. The average 1997 and 1999 per capita consumption (6 gallons) represents a 15-percent increase over the 1985-87 average (table 5-1). Estimates show that orange juice makes up nearly 20 percent of Americans' total fruit servings (Putnam, Kantor, and Allshouse, 2000). Economic growth, as well as the general shift toward convenience products and healthier lifestyles, has played a major role in stimulating consumer demand for orange juice.

The most important trend in consumer demand over the past decade has been the shift away from traditional, reconstituted and frozen concentrated orange juice (FCOJ), toward not-from-concentrate (NFC) orange juice. NFC is processed orange juice that has never been in a concentrated form. Consumers perceive it as having a taste that more closely resembles the taste of fresh-squeezed orange juice. During the 1990s, NFC consumption grew, on average, 2 percent per year, and by 1999, consumption had reached about 40 percent of total juice consumption (table 5-2). Consumers have been willing to pay the higher per-unit price for NFC orange juice. The average annual retail price for NFC is $5.35 per gallon, while the comparable price for frozen juice is $3.22 per gallon.[1] The premium paid for NFC reflects higher production, storage, and transportation costs compared with the more established frozen market.

[1] ERS calculations from AC Neilson Scantrak data for marketing year October 1999 through September 2000.

* Donovan is a USDA agricultural economist at the Center for Tropical Agricultural Research and Higher Learning (CATIE), Turrialba, Costa Rica. Senior authorship is not assigned.

U.S. orange juice production ranks second in the world behind Brazil, with total U.S. production surpassing 1.4 billion SSE gallons in 1999/2000. The U.S. industry is centered in Florida and is estimated to generate $9.13 billion in output, nearly 90,000 jobs, and $4.18 billion in value added (Hodges et al., 2001). During the 1990s, Florida oranges used in juice production increased on average 5 percent per year (table 5-2). While utilization increased for both major juice types, the average annual increase for NFC, at 10 percent, was more than twice that of FCOJ.

EU, Brazil, and U.S. Dominate World Orange Juice Trade

The United States is the world's second-largest importer and exporter of orange juice, behind the European Union (EU) and Brazil, respectively. At 355 million SSE gallons, imports made up roughly 14 percent of U.S. orange juice supplies in 1999/2000 season. The majority of U.S. orange juice imports is FCOJ, because it is easy to ship internationally. Relatively little NFC is imported. At 65 degree Brix (the level of concentration at which most FCOJ is traded), seven parts water must be added to reconstitute the juice for direct consumption. An equivalent amount of NFC would mean shipping seven times the volume. The high shipping costs for NFC have insulated the United States from Brazilian import competition and have enabled the U.S. industry to dominate the domestic and Canadian NFC orange juice market. Over the past decade, orange juice imports as a share of domestic supplies have declined markedly in the United States (table 5-3). The main cause for these changes in trade flows was the large increase in production from the Florida growers. High production levels—combined with relatively low prices—have resulted in significant increases in U.S. orange juice stocks. Increased stockpiles may induce Florida processors to sell at relatively low prices, thereby putting downward pressure on prices of imported juice.

A few countries (Brazil, Mexico, Costa Rica, and Belize) supply more than 95 percent of U.S. orange juice imports (table 5-4). Brazil is the principal supplier to the United States, supplying 271 million SSE gallons, or 75 percent of total imports, in 1999. During the 1990s, Brazil's orange exports to the United States declined markedly—from 330 million SSE gallons (average 1989-1991) to 204 million SSE gallons (average 1997-99). Moreover, Brazil's share of total U.S. orange juice imports declined from 91 percent to 68 percent during the same period. With increased competition in the U.S. market, Brazil has shifted its attention to other markets, such as Europe and Japan, where demand for orange juice has been growing or is expected to grow at a relatively brisk pace.

Some Brazilian exporters have been dissuaded from exporting to the United States by the U.S. imposition of anti-dumping duties. In 1987, the U.S. Department of Commerce first issued an anti-dumping duty on imports of FCOJ from Brazil. By 1999, the Commerce Department had revoked duties for three of the four largest processors in Brazil (*Federal Register*, 1999b). Currently, most Brazilian processors are subject to a low antidumping duty of 1.96 ad valorem (*Federal Register*,

Table 5-1—U.S. per capita orange juice consumption, 1985-1999

Year	Gallons SSE per capita[1]
1985	5.00
1986	5.22
1987	4.99
1988	5.09
1989	4.25
1990	4.65
1991	4.29
1992	5.19
1993	5.06
1994	5.38
1995	5.27
1996	5.38
1997	6.21
1998	5.27
1999	5.79

Source: Economic Research Service, USDA.
[1]SSE means single-strength equivalent.

1999a). Five firms are subject to the high duties ranging from 27 to 64 percent *ad valorem*, likely making the U.S. market prohibitive in these cases (*Federal Register*, 1999b; Federal Register, 2000). Under the FTAA, the United States has opposed changing World Trade Organization (WTO) anti-dumping rules.

Mexico, Costa Rica, and Belize are competitive in the U.S. market largely because of preferential trade agreements, such as the North American Free Trade Agreement (NAFTA) and the Caribbean Basin Initiative. Under NAFTA, the United States agreed to phase out tariffs on orange juice imports from Mexico over 15 years, beginning in 1994. The agreement establishes a tariff-rate quota (TRQ) that gives Mexico annual access for 40 million SSE gallons of frozen concentrate and 4 million SSE gallons of NFC. The FCOJ in-quota rate is currently at 18 cents per SSE gallon. Once the quota fills, Mexico is charged 30 cents per SSE gallon. The in- and over-quota rates for NFC are currently the same, at 8 cents per SSE gallon; thus, the TRQ acts as a simple tariff. In addition, a safeguard protects the U.S. industry against anticipated surges of imports from Mexico. Under the terms of the safeguard, tariffs on imports of Mexican FCOJ return to pre-NAFTA or most-favored-nation (MFN) levels (whichever was lower) whenever two triggers are reached. These are a volume trigger (annual import from Mexico in excess of 70 million SSE gallons during 1994-2002 and 90 million SSE gallons during 2003-07) and a price trigger (when for 5 consecutive days the FCOJ price falls below the most recent 5-year average price for the corresponding month). While Mexico has often exported beyond the TRQ, it has not met the requirements for the safeguard provision.

Enacted in 1983, the Caribbean Basin Initiative (CBI) allows the importation of orange juice duty-free to those countries identified under the act. CBI countries that currently export orange juice to the United States include Costa Rica, Belize, Honduras, and the Dominican Republic. With the exception of the Dominican Republic, the orange juice industries of these countries depend almost completely on export markets, as their domestic markets are quite small. In recent years, CBI exports to the United States have risen sharply (table 5-4). This trend is the result of increased investments in orange production, mostly in Belize and Costa Rica, and increased competition in the EU market, prompting the Central American and Caribbean industries to turn to the United States (Del Oro, 2002). CBI exports accounted for 20 percent of U.S. orange juice imports in 2000.

Table 5-2—Use of Florida oranges, 1990/91 through 1999/2000

Season	Oranges used for frozen concentrate production[1]	% of total	Oranges used for not-from-concentrate production	% of total	Oranges for other uses[2]	Total orange production
1990/91	4,099	66	1,559	25	531	6,189
1991/92	3,699	65	1,510	26	498	5,707
1992/93	5,238	69	1,931	25	449	7,618
1993/94	4,560	64	2,082	29	478	7,120
1994/95	5,748	69	2,180	26	461	8,389
1995/96	5,278	64	2,535	31	486	8,299
1996/97	6,038	65	2,682	29	514	9,234
1997/98	6,385	64	3,054	31	523	9,961
1998/99	3,821	50	3,270	43	490	7,581
1999/2000[3]	4,466	51	3,674	42	596	8,736

[1]Metric tons.
[2]Other uses include fresh distribution, non-certified, blends, and utilization by non-members of the Florida Citrus Processors Association.
[3]Forecast.
Source: Florida Department of Citrus, as reported in USDA, 2000b.

Table 5-3—Domestic and import shares of U.S. orange juice supply, 1985-1999

Year	Domestic production	Imports	Beginning stocks
		Percent	
1985	0.46	0.37	0.17
1986	0.51	0.36	0.13
1987	0.59	0.27	0.14
1988	0.62	0.24	0.14
1989	0.47	0.36	0.17
1990	0.61	0.23	0.16
1991	0.68	0.21	0.11
1992	0.71	0.19	0.10
1993	0.63	0.23	0.14
1994	0.66	0.11	0.23
1995	0.67	0.14	0.19
1996	0.68	0.12	0.20
1997	0.66	0.13	0.21
1998	0.58	0.17	0.25
1999	0.62	0.16	0.22

Source: Economic Research Service, USDA.

In recent years, increased domestic production and growing international demand have prompted the U.S. orange juice industry to place greater attention on export markets, such as Canada and the EU. U.S. orange juice exports grew 60 percent during the 1990s, to reach $278 million in 2000.[2] Among U.S. processed horticultural products, orange juice exports are surpassed only by frozen potatoes and wine in terms of total export value. Table 5-5 shows that NFC was the driving force behind the increase. While frozen concentrate revenues hardly fluctuated in the 1990s, NFC exports increased by over 300 percent in value (from $35 million to $157 million). Canada has become the largest NFC consumer outside the United States, accounting for 68 percent of the value of exports in 2000. Canada is a likely destination for NFC because of its proximity to U.S. producing areas. As methods of transportation have improved, the EU has increased its NFC purchases and is likely to continue to do so (Goodrich and Brown, 1999).

Brazilian and U.S. Orange Juice Industries In Fierce Competition

Orange juice is a high-value product with markets mainly limited to high-income countries. Competition is strong between Brazil and the United States. By comparing production and transportation costs, this section puts some perspective on the advantages and disadvantages facing both industries.

Table 5-6 compares orange production, orange utilization, and orange juice production for the United States and Brazil from 1997/98 through 1999/2000 seasons.[3] The orange crop in Brazil is much larger than in the United States. However, the U.S. juice industry utilizes a larger proportion of total orange production than the Brazilian industry—processed utilization in Brazil averages 77 percent of the crop, while in Florida it averages 95 percent. Higher processed utilization combined with higher juice yields allows U.S. orange juice production to rival Brazil's.

Brazil and the United States harvest oranges for processing during opposite seasons. Brazil starts to harvest fruit in late June or July, depending on fruit maturity, and extends to the end of

[2] Excludes fortified orange juices equaling $9 million in 2000.

[3] Data for Brazil and the United States are from the States of Sao Paulo and Florida. Almost all orange production in other States in these two countries is sold as fresh fruit.

Table 5-4—U.S orange juice imports by source, 1985-2000

Year	Mexico	Brazil	CBI	Total
	Million SSE gallons[1]			
1985	9.17	562.45	6.95	581.71
1986	32.47	527.91	8.92	574.29
1987	40.96	470.83	8.69	522.87
1988	52.38	352.84	5.45	413.28
1989	45.16	332.15	7.51	388.82
1990	63.27	390.80	13.82	472.11
1991	49.35	269.89	5.52	326.83
1992	6.59	249.70	18.68	276.88
1993	20.94	309.67	16.45	348.59
1994	45.88	321.72	17.39	387.80
1995	68.71	96.49	21.46	188.60
1996	49.70	201.71	28.50	281.51
1997	50.94	155.88	45.91	254.01
1998	67.79	188.74	40.62	298.93
1999	48.19	270.84	32.23	354.95
2000	43.44	207.71	64.70	320.42

[1]SSE means single-strength equivalent.

Note: CBI countries that export orange juice include Belize, Costa Rica, Dominican Republic, and Honduras.

Source: Economic Research Service, USDA.

December and often into January. Florida usually begins to harvest its crop in mid-November and goes through June. Juice made from Florida's early to mid-season oranges is pale and sometimes very sweet. To consistently meet consumers' quality expectations, Florida processors blend domestic juice with imported juice that is less sweet and of deeper color. In this way, the U.S. and Brazilian industries can complement each other. However, because frozen concentrate can be stored for several years, competition between the countries is often intense despite counter-seasonal production cycles.

Brazil is more likely to be affected by drought than Florida. Drought tends to reduce juice yields and make orange trees more susceptible to disease. Brazilian growers generally do not irrigate, relying instead on rainfall. By contrast, most Florida growers irrigate their groves. Irrigation not only provides moisture during drought conditions, but reduces the effects of frosts or freezes by warming the surrounding area and icing over the oranges, keeping them warmer internally.

Orange processors in Brazil enjoy a sizable advantage in the cost of production compared to Florida. One study estimates that production costs are 42 cents per gallon SSE versus 75 cents per gallon SSE in Florida (Muraro et al., 2001). Import tariffs and other expenses considerably raise the price of Brazilian orange juice delivered to the United States. The current U.S. tariff on frozen concentrate imports from Brazil is about 30 cents per gallon SSE. Muraro et al. estimate that transportation costs and the Florida equalization tax add an additional 10 cents to the cost of delivered product to the United States. Thus, the total estimated costs of Brazilian frozen concentrate delivered with all taxes and tariffs paid is around 80 cents which is slightly higher than comparable costs in Florida. The higher production costs faced by Florida producers generally reflect higher prices for labor, land, and machinery. Clearly, the U.S. orange juice tariff supports the price of orange juice in the United States, and liberalization of the tariff would allow the Brazilian orange juice industry to capitalize on the lower production costs it enjoys compared to the U.S. industry.

Table 5-5—U.S. orange juice exports, by type, 1990-2000

Year	Frozen Concentrate	NFC[1]
	Million dollars	
1990	142	35
1991	138	38
1992	139	66
1993	145	71
1994	149	91
1995	169	104
1996	163	114
1997	171	128
1998	145	151
1999	136	165
2000	121	157

[1]NFC means "not from concentrate."
Source: Economic Research Service, USDA.

Measuring FTAA's Potential Impact

To measure the potential impacts of the FTAA on the U.S. orange juice industry, we developed a multimarket simulation model of the global orange juice market. The model is an extension of work by Alston and James (2001) recognizing that countries consume and bilaterally trade similar products with different qualities. Our model explicitly distinguishes two types of orange juice: frozen concentrate and NFC. It specifies the major players in the orange juice market, the United States, Brazil, the EU, Canada, and Mexico, and a rest-of-world region.

In our model design, we focus on two economic agents: producers and consumers of orange juice. Consumers and producers are assumed to make their decisions in purchasing and selling orange juice depending on prices of frozen concentrate and NFC. The demand for and supply of frozen concentrate and NFC thus depends on "own and cross" prices. The two products are considered to be imperfect substitutes. NFC is a high-quality juice product and as such is able to command a higher price than frozen concentrate. In the model, we establish parameters that indicate low consumer substitutability of frozen concentrate and NFC.

Consumers also choose within each of the two juice categories whether to purchase domestically or from foreign sources and from which importer they prefer in making their purchases. (This is a simplification from the "real world" where the processor makes this decision in response to packers' demands; packers dilute, add flavors and vitamins, and provide different packaging and sell to retailers, who in turn sell to the consumer.) By distinguishing products according to country of origin, we take into account consumer preferences reflecting certain country-specific quality attributes typically associated with that product—for example, sweetness and color. Nevertheless, we assume that juices from different countries and the domestic product are highly substitutable. This is a reasonable assumption since juice is storable, and countries can compete on an all-year-round basis.[4] The appendix provides the specifics of the simulation model.

Creating Tariff Scenarios

We consider two counterfactual scenarios. In each scenario we first eliminate the U.S. tariff on its NAFTA partner Mexico. The tariff is scheduled to decrease to zero by 2008. Thus, we estimate an adjusted base period (base period plus NAFTA) inclusive of a fully implemented NAFTA agreement. By following this approach, the solutions of our two counterfactual simula-

[4] Bulk frozen concentrate can be stored for several years provided the temperature is kept at acceptable levels. NFC can be stored two ways, frozen or chilled. Each of these storage methods allows NFC to be stored for at least a year.

Table 5-6—Estimated utilization of oranges and orange juice processed in Florida (U.S.) and Sao Paulo (Brazil), 1997/98-1999/2000 season

Product	United States			Brazil		
	1997-98	1998-99	1999-2000	1997-98	1998-99	1999-2000
Orange production[1]	244	186	231	420	342	395
% of production processed into juice	95	94	96	76	81	74
Juice yield[2]	6.27	6.47	6.25	5.89	5.75	5.85
Orange juice production[3]	1486.8	1154.6	1420.5	1884.2	1609.9	1726.8

[1]Million boxes.
[2]SSE gal/box.
[3]Million SSE gallons.
Source: Spreen and Muraro.
Note: All figures for Brazil and the United States are from the States of Sao Paulo and Florida. Almost all orange production in other States in these two countries is sold as fresh fruit.

tions can be compared to the adjusted base period and interpreted solely as the effects of the FTAA. The simulation results should be interpreted as the longrun effects of FTAA. The long run is defined as a time period sufficient to allow orange growers to adjust the planting of orange trees and the bearing of oranges commensurate with market conditions.

Nevertheless, we assume that other factors such as utilization rates, juice yields, and other technological innovations remain constant.

In Scenario 1, we eliminate U.S. tariffs imposed on Brazilian orange juice.[5] In Scenario 2, we again remove the U.S. tariffs on Brazilian orange juice *and* we relax the assumption that consumer preferences remain constant. Instead, we allow for U.S consumers to increase their demand for NFC compared with frozen concentrate, to mirror recent trends in U.S. consumption patterns.

Table 5-7 reports the results of the first counterfactual scenario for the United States. Removal of the U.S. tariff reduces the Brazilian import price, thereby enhancing the competitiveness of Brazilian imports. U.S. consumers demand more Brazilian orange juice and less domestically produced juice and the U.S. price for frozen concentrate falls by 10.4 percent. On the supply side, U.S. frozen juice production decreases 4.9 percent.

Lower priced frozen orange juice leads to a 3.2-percent increase in consumption. Brazilian imports more than account for the increase. U.S. imports of Brazilian frozen concentrate increase 55 percent and Brazil's (volume) share of the U.S. import market rises from 65 percent to 80 percent, a level not seen since the early 1990s. In contrast, the switching of import sources to Brazil results in a loss of trade for Mexico. Mexico's exports to the U.S. decline 11.2 percent while its share of the U.S. frozen concentrate market falls from 21 percent to 15 percent.

Although not explicitly included in the model, a complete elimination of the U.S. orange juice tariff vis-à-vis Brazil would have adverse effects on the CBI countries that currently enjoy duty-free access to the U.S. market. Given that all of the countries in this region currently export most of their orange juice production to the United States, reduced tariffs for Brazilian exporters would result in lower prices paid for exports from CBI, along with a loss of market share. Our rest-of-world region, which closely mirrors CBI exports, experiences a market share

[5] Tariff rates used on imports from Brazil do not reflect the anti-dumping duties.

decline from 14 percent to 6 percent. Reduced market share will likely result in a contraction of their industries.

To meet stronger U.S. demand for frozen concentrate, Brazil increases production 1.4 percent and diverts trade, mainly from the EU, to the United States. The EU is the largest importer of Brazil's frozen concentrate production. The tariff imposed by the EU on frozen concentrate imports is 15 percent ad valorem. With the elimination of the U.S. tariff, the United States becomes relatively more attractive than the EU to Brazilian exporters. Brazil exports to the EU decline 4.7 percent, from 1,154 to 1,100 million gallons SSE, while expanding to the United States by 55 percent, from 240 to 371 million gallons SSE.

In Scenario 1, we also reduce the U.S. tariff on Brazilian NFC. The qualitative effects on the United States in this market are analogous to frozen concentrate but the quantitative effects are considerably smaller (table 5-7). This is because U.S. import tariffs are smaller on NFC relative to frozen concentrate and there is far less reliance on the import market. While the value share in production of the U.S. juice market is roughly evenly divided between NFC and frozen concentrate, NFC imports are a fraction of frozen concentrate imports. Brazilian fresh exports to the United States increase 15.1 percent with the more liberalized trading environment, but Brazil's share of the U.S. market is still substantially under 1 percent.

It is important to note that our estimates of the impact on the U.S. NFC market may be understated. These estimates are small partly because the parameter estimates used to calculate the changes are based on trade patterns observed during the late 1990s—a period when the United States imported relatively small amounts of NFC. NFC imports continue to make up a fraction of total U.S. NFC supplies. In the future, however, the comparative advantage that the U.S. industry enjoys in supplying the domestic NFC market may be eroded by reductions in the costs of producing and shipping Brazilian NFC. Evidence suggests that Brazil already has begun to increase its NFC exports. From 1999 to 2001, Brazilian NFC exports rose from $4 million to $33 million.

In Scenario 1, demand for oranges from U.S. growers falls. We estimate that the 2.7-percent decrease in overall production of both frozen concentrate and NFC would lead to a corresponding decline in the demand for oranges (table 5-8). Assuming fixed costs for harvesting and hauling oranges from the field to the processing plant, a constant utilization rate and juice yield, and fixed processing margins, we estimate that orange prices would fall 15.1 percent. Clearly, lower orange prices combined with lower production hurt orange grower revenue and likely profitability of the sector. We estimate a $185-million decline in revenue or 17 percent from our adjusted base period.

In Scenario 2, we consider the possibility that the expansion in favor of U.S. consumer preferences for NFC over frozen concentrate continues into the future. This preference change is important because it affects how much juice is imported relative to how much is produced in the United States. Domestic producers supply most of the NFC consumed in the United States; this is not the case for frozen concentrate supplies, which are far more dependent on imports. Thus, increased demand for NFC relative to concentrate would imply more domestic production and less importation.

NFC's share of U.S. orange juice consumption increased 20 percent during the 1990s. If the trend continues, by 2010 the fresh share of total juice consumption would increase by another 20 percent. However, it is more likely that the market for NFC will reach maturity in the near future, thus likely mitigating the growth in its share of the market. For this reason, in Scenario 2

Table 5-7—Impact on the U.S. orange juice market of eliminating U.S. tariffs on Brazil, Scenario 1

	Adjusted base period	FTAA new equilibrium	Percent change
Frozen Concentrate			
Price/gallon SSE	1.32	1.18	-10.4
Production	753	717	-4.9
Consumption	1,036	1,070	3.2
Total imports	369	467	26.6
Total exports	86	114	31.9
Imports from Brazil	240	371	55.0
NFC			
Price/gallon SSE[1]	1.82	1.72	-5.6
Production	617	616	-0.1
Consumption	523	521	-0.3
Total imports	7	7	3.4
Total exports	101	102	1.1
Imports from Brazil	1	2	15.1

Note: All quantity units are in millions of gallons SSE.

[1]For NFC, we calculate prices for each country by adding a price premium of $.50 per gallon SSE to the frozen concentrate price. Imported NFC prices also take into account higher shipping expenses, which are seven times the costs of shipping frozen concentrate.

Source: Economic Research Service, USDA.

Table 5-8—Impact on U.S. orange growers of eliminating U.S. tariffs on Brazil, Scenario 1

	Adjusted base period	FTAA new equilibrium	Percent change
Orange juice production	1,370	1,333	-2.7
Frozen concentrate price/gallons SSE	1.32	1.18	-10.4
NFC price/gallons SSE	1.82	1.72	-5.6
Orange boxes	217	212	-2.7
On-tree orange price per box	5.01	4.25	-15.1

Note: Orange juice production in million of gallons SSE and oranges in millions of boxes. Juice yield conversion factor is 6.3 SSE gallons per box.

Source: Economic Research Service, USDA.

we consider modestly increasing the relative shares in favor of NFC by 2.5 percent while maintaining the increase in total juice consumption from Scenario 1. Other factors remain constant as in Scenario 1. For example, we do not consider increased demand because of population growth and therefore may understate the long-term demand for orange juice. We also do not consider improvements in transportation that would make Brazilian NFC exports to foreign markets more feasible.

Tables 5-9 and 5-10 report the results from Scenario 2 (FTAA and a preference change in favor of NFC) for the U.S. orange juice and orange market. We find that if this trend in consumer preferences continues even at a fairly small rate, overall U.S. orange juice production falls by only 1.9 percent (frozen concentrate production falls 8.2 percent but NFC production increases 5.6 percent). The decline in the derived demand for oranges grown in the United States would correspondingly be eased. While it is far from certain that consumer preferences will continue to

Table 5-9—Impact on the U.S. orange juice market of eliminating U.S. tariffs on Brazil and U.S. consumer preference change, Scenario 2

	Adjusted base period	FTAA & NFC preference	Percent change
Frozen Concentrate			
Price/gallon SSE	1.32	1.18	-10.1
Production	753	692	-8.2
Consumption	1,036	1,034	-0.3
Total imports	369	457	23.7
Total exports	86	115	32.8
Imports from Brazil	240	364	51.8
NFC			
Price/gallon SSE[1]	1.82	1.88	3.6
Production	617	652	5.6
Consumption	523	559	6.8
Total imports	7	8	15.0
Total exports	101	100	-0.2
Imports from Brazil	1	2	38.4

Note: All quantity units are in millions of gallons SSE.
[1]For NFC, we calculate prices for each country by adding a price premium of $.50 per gallon SSE to the frozen concentrate price. Imported NFC prices also take into account higher shipping expenses, which are seven times the costs of shipping frozen concentrate.
Source: Economic Research Service, USDA.

Table 5-10—Impact on U.S. orange growers of eliminating U.S. tariffs on Brazil and U.S. consumer preference change, Scenario 2

	Adjusted base period	FTAA & NFC preference	Percent change
Orange juice production	1,370	1,344	-1.9
Frozen concentrate price/gallons SSE	1.32	1.18	-10.1
NFC price/gallons SSE	1.82	1.88	3.6
Orange boxes	217	213	-1.9
On-tree orange price per box	5.01	4.82	-3.8

Note: Orange juice production in million of gallons SSE and oranges in millions of boxes. Juice yield conversion factor is 6.3 SSE gallons per box.
Source: Economic Research Service, USDA.

favor NFC into the future, this change combined with FTAA would result in orange production and prices falling by 1.9 and 3.8 percent, respectively (table 5-10). Grower revenue would drop by 6 percent, a decline that is considerably less than the 17 percent estimated in Scenario 1.

Conclusion

There are two main points that can be drawn from our analysis of the potential effects of FTAA for the juice industry. First, removal of the U.S. import tariffs on orange juice increases Brazil's competitiveness and leads to substantially larger frozen concentrate imports into the United States. Adjustments in the U.S. market occur on both the production and consumption sides of the market. Orange juice production declines by approximately 3 percent. Consequently, the demand for U.S.-grown oranges decreases and on-tree prices substantially fall, thus damaging orange grower revenues.

Secondly, the U.S. industry's focus on NFC production helps to mitigate the adverse impacts of FTAA on the U.S. industry. U.S. orange growers are in a better position than they would have been if tariffs on Brazilian juice had been eliminated several years ago. U.S. and Brazilian producers supply nearly all the frozen concentrate to the U.S. market, while, in contrast, the U.S. industry alone supplies nearly all the NFC. The U.S. tariff protection on frozen concentrate is also roughly three times the tariff on NFC. Removal of U.S. tariffs would make Brazil relatively more dominant in the frozen concentrate market. The U.S. industry's advantage in NFC would not be seriously compromised from the FTAA. Furthermore, should U.S. consumers' demand for NFC increase over the next decade, even at a reasonably slow rate, the impacts of the FTAA on U.S. orange juice and orange production would be less severe. Then again, reductions in transportation costs of NFC may help Brazil become more competitive in the future. Consumer preferences and innovation in transportation technology therefore become key variables in affecting the outcome of the FTAA on the U.S. orange juice sector.

References

Alston, Julian M. and Jennifer S. James. 2002. "Price Policies and the Domestic and International Distribution of Commodity Quality Theory and Application to EU Wheat." in *Global Food Trade and Consumer Demand for Quality*, edited by Barry Krissoff, Mary Bohman, and Julie Caswell. Kluwer Academic Press.

Del Oro. 2002. Authors' personal conversations with officials of Del Oro-Belize, Inc. May.

Federal Register. 1999a. Notices. Vol. 64, No. 66. Wednesday, April 7.

Federal Register. 1999b. Notices. Vol. 64, No. 154. Wednesday, August 11.

Federal Register. 2000. Notices. Vol. 65, No. 109. Tuesday, June 6.

Florida Department of Citrus. 1997. "Florida-Brazil Processing Linkages." Working Paper Series Economic and Market Research Department.

Goodrich, R.M. and M.G. Brown. 1999. "European Markets for NFC: Supply and Demand Issues." Food and International Agricultural Trade and Development Center, International Working Papers Series, Food and Resource Economics Department, University of Florida, Gainesville, FL.

Hodges, Alan, Effie Philippakos, David Mulkey, Tom Spreen, and Ron Muraro. 2001. "Economic Impact of Florida's Citrus Industry, 1999-2000." Economic Information Report EI 01-02, Food and Resource Economics Department, University of Florida, Gainesville, FL,July.

Muraro, Ronald P., Thomas H. Spreen, and Fritz M. Roka. 2000. “Focus on Brazil: The Impact of the 1999 Brazilian Devaluation on the Delivered-in Costs of Oranges Produced in São Paulo.” *Citrus Industry*, pp. 20-22. January.

Putnam, Judy, Linda Scott Kantor, and Jane Allshouse. 2000. “Per Capita Food Supply Trends: Progress Toward Dietary Guidelines.” *FoodReview*, Vol. 23, Issue 3.

Spreen, Tom and Ron Muraro. Undated. “The World Market for Citrus Products and Risk Management for Florida Citrus Growers.” Economic Information Report, Food and Resource Economics Department, University of Florida, Gainesville, FL.

U.S. Department of Agriculture, Economic Research Service. 2000a. *Fruit and Tree Nuts, Situation and Outlook Report*, FTS-289. September.

U.S. Department of Agriculture, Foreign Agricultural Service. 2000b. “Recent Development in the World Orange Juice Trade and the U.S. Competitive Position.” Available at: http://www.fas.usda.gov/htp2/circular/2000/00-02/ojspecial.htm

Zabaneh, Louis. 1999. “Economic Impacts of International Trade Agreements on the World Frozen Concentrate Orange Juice Market.” Unpublished Ph.D. Dissertation, Clemson University, Clemson, SC.

Chapter 6

U.S. Foreign Direct Investment in the Western Hemisphere

Christine Bolling

Foreign direct investment (FDI) plays an ever-increasing role in defining the U.S. presence in the Western Hemisphere processed food industry. An especially large burst of U.S. FDI in the hemisphere occurred during the 1990s, following Mexico's investment code reforms in 1989, the implementation of MERCOSUR (Common Market of the South) in 1991, and NAFTA (North America Free Trade Agreement) in 1994. Given this experience, will the FTAA likely affect the rate of U.S. FDI growth in the hemisphere?

There is no clear-cut answer to this issue, since many factors affect companies' decisions to establish affiliates in other countries. This paper provides some perspectives on the FTAA and U.S. FDI. It describes trends in U.S. FDI in the processed food industries in the hemisphere since the early 1990's. It discusses motivations for FDI, including recent changes in FDI protections in the Western Hemisphere, due in part to regional trade agreements. Finally, it offers conclusions on the potential effects of the FTAA on the motivations for U.S. firms to increase FDI in the hemisphere.

U.S. FDI in the Western Hemisphere

The stock of U.S. foreign direct investment in the Western Hemisphere food processing industry reached $13 billion by 2001, more than doubling since 1990 (fig. 6-1). These investments generated sales that were also double the level of 1990 (fig. 6-2). The importance to the U.S. of FDI in the FTAA is underscored by the fact that the $45 billion of sales from foreign affiliates of U.S. firms in the hemisphere has eclipsed U.S. processed food export earnings to the hemisphere ($12.5 billion in 2000).

Mexico, Canada, Brazil, and Argentina are the largest host countries for U.S. FDI in the Western Hemisphere processed food industry. Mexico and Canada are the second and third most important worldwide destinations for U.S. FDI in the food processing industry after the United Kingdom. U.S. investments cover a wide array of processed food products, but investments in beverages—both soft drinks and malt beverages—oilseed processing, and highly processed foods are the largest.

Some U.S. companies, such as Kellogg, General Mills, and Corn Products International have been in these markets for decades.[1] Others such as Tyson Foods, Perdue, and Smithfield, ventured into the hemisphere market during the past decade. Cargill, ADM and Bunge increased their presence in the Latin American oilseed complex in the 1990s. Corn Products International is one of the largest food processing companies in the United States and is now perhaps the largest presence of the U.S. processing firms operating in the hemisphere. Latin America accounted for a fifth of the company's earnings, and in the early 1990s, the company's consumer food sales and earnings compounded at 11 percent and 17 percent, respectively.

Within NAFTA, market integration has been deepening, as evidenced by rapidly expanding two-way trade and the greater north-south orientation of U.S.-Canada and U.S.-Mexico industries.

[1] See appendices for a list of U.S. and other firms engaged in FDI in Argentina and Brazil.

Some of the increased NAFTA trade in intermediate and processed products is linked to growth in FDI. Large firms are now better able to divide production lines between member countries, so that a product mix can be produced on either side of the border with considerable duty-free import/export activity in intermediate goods.

In contrast to Canada and Mexico, FDI has provided the primary means for U.S. companies to participate in the Argentina and Brazil markets, with limited trade in intermediate or processed food products. From the U.S. perspective, Argentina and Brazil have been limited and even declining markets for U.S. processed food exports since the 1990s. Sales from U.S. FDI affiliates in the Argentine and Brazilian processed food industry are $3 billion and $6 billion respectively, far greater than the level of U.S. exports of processed foods to those countries (figs. 6-3 and 6-4). U.S. FDI sales are also larger than exports in Venezuela, Colombia, Peru, Chile, Honduras, Costa Rica, and the Dominican Republic, indicating that it is less costly to set up affiliates to serve those markets than to attempt to export from the United States.

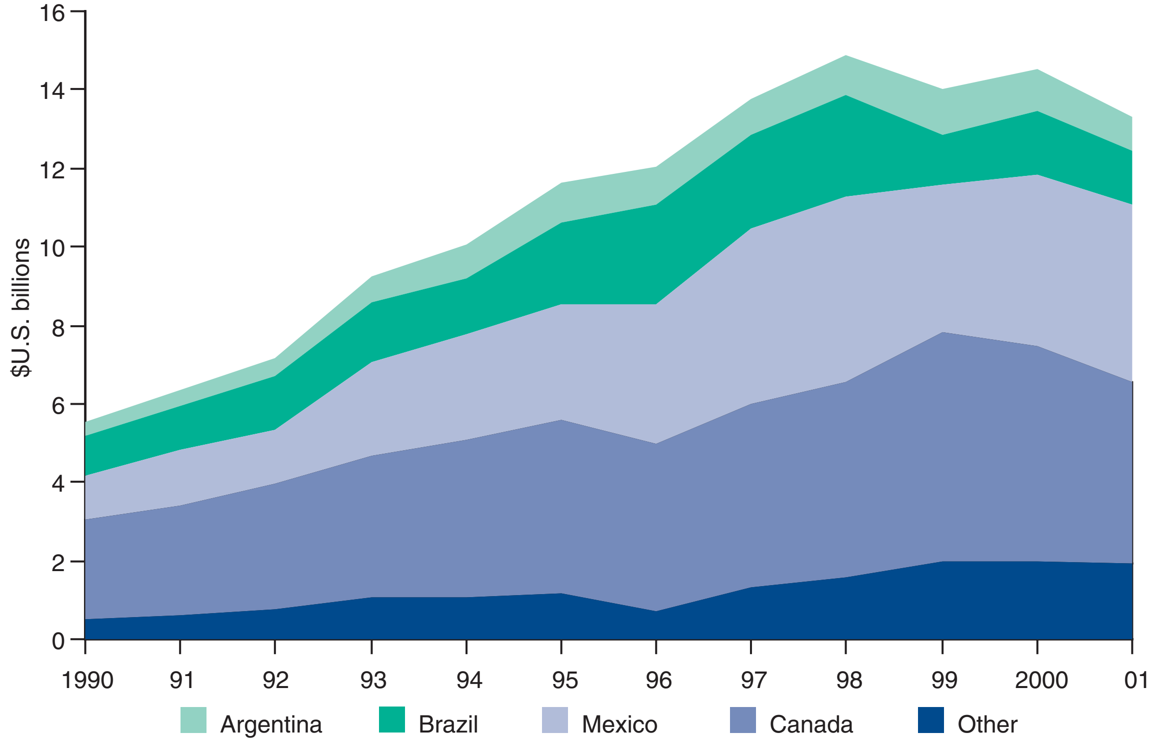
Because Brazil and Argentina produce many of the same commodities as the United States and have lower input costs, it is more economical for U.S. firms in those countries to produce processed products by FDI from local inputs. Also, most of the products from U.S.-owned firms in Argentina and Brazil are destined for their domestic markets. Even in export-oriented Argentina, nearly three-fourths (and in Brazil, nearly two-thirds) of the sales from U.S. FDI are for domestic use. Nevertheless, some U.S. FDI is export-oriented. U.S.-owned firms in Argentina and Brazil supply products to the U.S. market such as apple juice and frozen concentrated orange juice, processed meats, processed nuts, chocolate, coffee, and sugar products.

Some processed food trade between the U.S., and Brazil and Argentina is due to trade among affiliates. U.S. imports of processed foods from Argentine affiliates of U.S.-based multinationals were valued at $60 million in 1998 (table 6-1). The value of U.S. imports from affiliates in Brazil is undisclosed, but is thought to be much larger. U.S. exports to food processing affiliate plants in Argentina and Brazil amounted to only $72 million and $21 million respectively in 1998. U.S. exports to Argentine affiliates, at 60 percent of the total, comprised a significant share of the total processed food exports.

The United States is not the only foreign investor in the hemisphere, but it accounts for a significant share of the region's FDI. It is estimated that the United States has approximately 40 percent of the total FDI in Brazil's processed food industry. In Argentina's processed food industry, it is estimated that U.S. firms account for 25 percent of the total foreign direct investment. Likewise, about 60 percent of the total FDI in Mexico's processed food industry and more than half of the total FDI in Canada's processed food industry are from the United States. Major non-U.S. investors include industry giants Nestlé (Switzerland) and Unilever (U.K.-Netherlands), the two largest food processing companies worldwide in terms of sales. Danone (France) and Parmalat (Italy) are relative newcomers in the Western Hemisphere market.

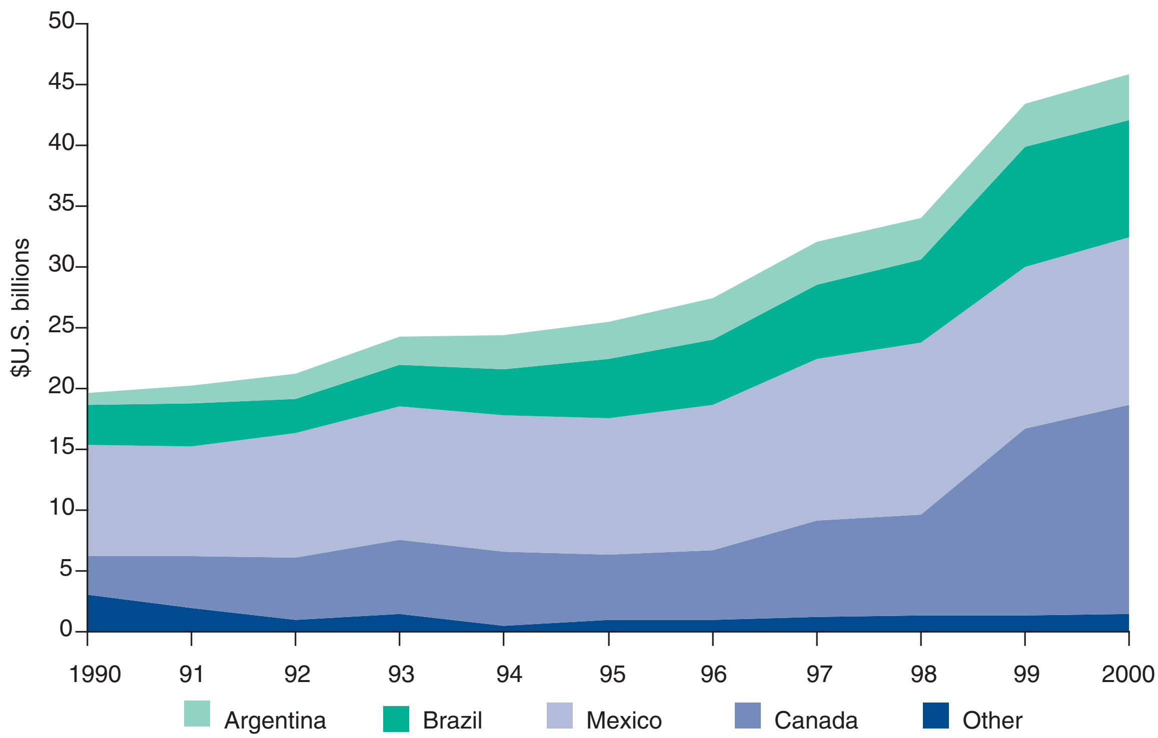
Domestic or multinational firms tend to dominate individual sectors. For example, in Brazil, Kellogg's manufactures most breakfast cereals, while Coca-Cola and Pepsi dominate the soft drink market. Nestle and Parmalat dominate the dairy industry, along with Brazilian dairy cooperatives. Unilever's affiliate Gessy Lever is Brazil's leader of canned vegetables and tomato-based products. Brazilian firms dominate meat processing, most processed fruits, orange juice and beer.

Figure 6-1
U.S. foreign direct investment in the Western Hemisphere processed food industry



Source: Economic Research Service, USDA.

Figure 6-2
Sales from U.S. FDI in the Western Hemisphere processed food industry



Source: Based on data from Bureau of Economic Analysis, U.S. Department of Commerce.

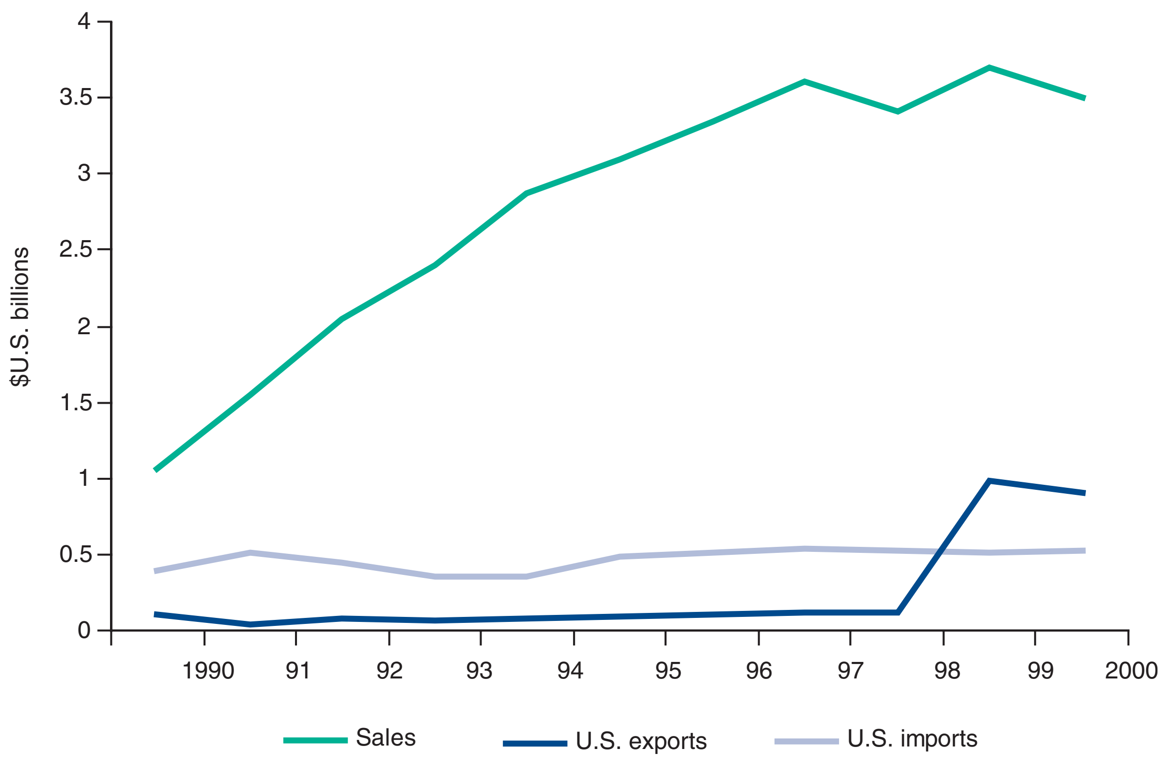
Motivations for FDI

Motivations for FDI come from internal factors, such as prospective economic growth rates, and external factors, such as trade and FDI policies. At the heart of increased FDI in the hemisphere has been investor sensitivity to macroeconomic conditions relating to economic stability and growth in key countries such as Mexico, Canada, Argentina, and Brazil, the largest host countries for U.S. FDI in the hemisphere. Sizeable population increases, and the fundamental changes that are occurring in eating habits, such as increased use of prepared foods and away-from-home consumption, are other factors driving FDI in food industries. Also, firms are recognizing the new market opportunities that are emerging for creating global supply chain systems that have the potential to operate efficiently across borders.

Unilateral trade reforms and free trade agreements have played roles in increasing opportunities for FDI. Market integration provides the opportunity for companies to operate with even larger economies of scale in regional rather than national markets. Falling trade barriers permit companies to reconfigure trade patterns that are more efficient and find new opportunities such as accessing seasonal supplies that reduce inventory and storage costs.

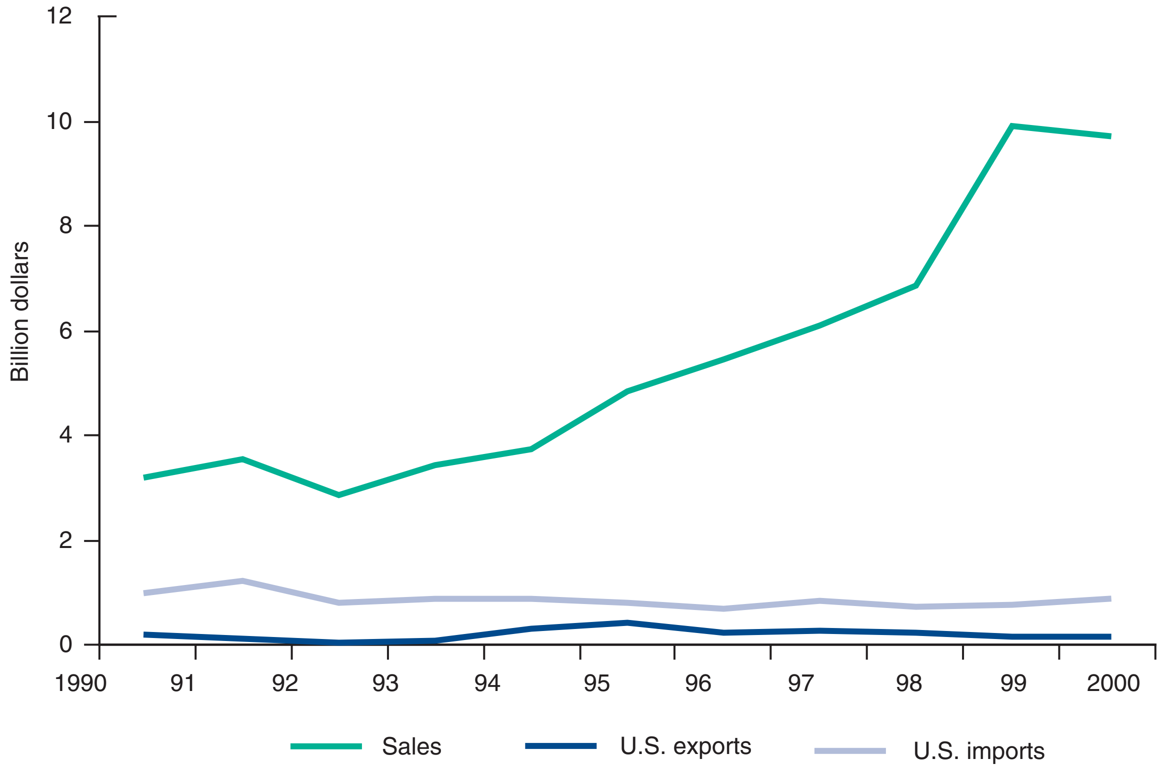
Liberalization of FDI rules have also helped to stimulate FDI in the hemisphere. Mexico adopted a major unilateral reform of its longstanding restrictive foreign investment regime in May 1989. The Regulations of the Law to Promote Mexican Investment and to Regulate Foreign Investment were issued, which provided greater certainty by establishing rules for classified activities. These laws were extended in a new Foreign Investment Law in 1993 that allowed investment in more sectors of the economy. Important rules enacted under NAFTA regime include the rights of foreign investors to have the same process of recourse to dispute settlement

Figure 6-3
Sales by U.S.-owned affiliates in Argentina vs. U.S. trade in food products



Source: Based on data from Bureau of Economic Analysis, U.S. Department of Commerce.

Figure 6-4
Sales by U.S.-owned affiliates in Brazil vs. U.S. trade in food products



Source: Based on data from Bureau of Economic Analysis, U.S. Department of Commerce

as national investors do, with some exceptions. Expropriations can only proceed by public utility cause and through compensation at the commercial valuation. In addition, Canadian, Mexican, and U.S. investors have the right to third party arbitration in investment-related disputes for nationals, governments, or state enterprises of the three countries.

Argentina and Brazil have FDI rules in place through bilateral agreements and through MERCOSUR. Through the 1990s, the Argentine government signed bilateral agreements with 14 Western Hemisphere countries and Canada that included provisions for investment. The Argentine Government signed the Reciprocal Encouragement and Protection of Investment Agreement with the United States in 1991. Brazil signed bilateral agreements with Chile and Venezuela that included investment provisions.

The Colonia Protocol for the Promotion and Protection of Investments in MERCOSUR adopted in January 1994 is the principal regulation for governing foreign direct investment between MERCOSUR member countries, with provisions on investment treatment, transfers, expropriation, and settlement of disputes. The Buenos Aires Protocol for the Promotion and Protection of Investments, which applies to nonmember countries, was approved in August 1994. There are exceptions to investment protection, which include fishing (Argentina), and leasing of rural property (Brazil). Settlement of disputes between contracting parties is under the dispute settlement proceedings established under the Protocol of Brasilia (1991) or the mechanism established in the framework of the Treaty of Asuncion (Article 8 of Protocol of Colonia). For nonmember countries, settlement is through arbitration according to Article 2 of the Buenos Aires Protocol.

Table 6-1—U.S. trade with foreign affiliates in NAFTA and MERCOSUR countries in processed foods, 1998

Country	U.S. exports to affiliates in:	U.S. exports to:	U.S. imports from affiliates in:	U.S. imports from:
	Million dollars			
Canada	894 (17%)	5,249	2,182 (32%)	6,881
Mexico	461 (16%)	2,843	525 (22%)	2,360
Argentina	72 (61%)	118	60 (11%)	531
Brazil	21 (9%)	234	NA (NA)	762

NA = Not available for reasons of disclosure. The figure may be as high as $400 million. Percent is percent of total exports and imports to country.

Source: U.S. Department of Commerce, Bureau of Economic Analysis. U.S. Foreign Direct Investment Abroad: Operations of Foreign Affiliates of U.S. Companies, Preliminary 1998 Estimates.

Conclusion

If rules that are conducive to foreign direct investment are adopted, the FTAA could affect the rate of growth of FDI in the hemisphere. Increased FDI will contribute to the achievement of an increasingly integrated food supply system that serves the hemisphere efficiently.

Strategic corporate considerations will be at the heart of decisions on increased foreign direct investment. Countries chosen for additional FDI will most likely have some comparative advantage in agricultural products and other major inputs. While Brazil, Argentina, Canada, and Mexico are most likely to remain as the core countries, U.S. FDI will probably increase in other countries as well if the FTAA succeeds in extending protection of U.S. FDI to all countries in the region.

Given that many firm-specific factors affect individual firms' FDI decisions, it is difficult to bracket the potential growth in FDI in the hemisphere. Nevertheless, growth in FDI is expected to be positively influenced by free trade agreements for any given set of foreign direct investment motivations. Favorable business climate and favorable investment laws, a stable economy and government, and the potential for economic growth are positive precursors for both FDI and trade agreements. One difficulty in measuring the effect of free trade agreements is that trade agreements are typically trailing indicators of an improved business environment in a host country.

References

Bolling, Chris, and Agapi Somwaru. "The Role of Foreign Direct Investment in NAFTA and MERCOSUR Countries." Northeastern Agricultural Economics Meetings, Morgantown, WV, 1999.

Bolling, Christine, Steve Neff, and Charles Handy. *U.S. Foreign Direct Investment in the Western Hemisphere Processed Food Industry*. ERS AER-760, March 1998.

Farina, Elizabeth M.M.Q. "Challenges for Brazil's Food Industry in the Context of Globalization and Mercosur Consolidation," *International Food and Agribusiness Management Review*, Vol. 2 No. 3 and 4, 1999.

Jank, Marcos Sawaya, Maristela Franco Paes Leme, Adre Meloni Nassar, and Paulo Favaret Filho, "Concentration and Internationalization of Brazilian Agribusiness Exporters," *International Food and Agribusiness Management Review*, Vol. 2 No. 3-4, 1999.

Mexico, Background of the Foreign Investment Regime. Available at: http://www.apecsec.org/sg/Guidebook/Mexico.htmlthe.

Munirathinam, Ravichandran, Michael Reed, and Mary A. Marchant. "Competitive Tradeoffs Between Foreign Direct Investment and Trade." *International Advances in Economic Research*. 3:3 (August 1997) pp. 312-324.

The NAFTA, Chapter 11: Investment, Vol. I. *North American Free Trade Agreement Between the United States of America, the Government of Canada, and the Government of the United Mexican States,* U.S. Government Printing Office, Superintendent of Documents, Washington, DC, 1993.

Organization of American States, Foreign Trade Information System (SICE). "Investment Agreements in the Western Hemisphere: A Compendium." http://www.sice.oas.org.bitse.asp.

USDA Foreign Agricultural Service, *Brazil: Food Processing Sector 2000*, Global Agriculture Information Network, GAIN Report No. BR0017, 2000.

U.S. Department of Commerce, Bureau of Economic Analysis. *U.S. Foreign Direct Investment Abroad: Operations of Foreign Affiliates of U.S. Companies, Preliminary 1998 Estimates*.

Chapter 7

Environmental Issues

Joseph Cooper, Robert Johansson, and Mark Peters

In the United States, legislation requiring formal environmental assessments of certain physical projects dates back 30 years. Within the last decade, nongovernmental organizations (NGOs) and other stakeholders have been calling for an extension of these environmental assessments to trade agreements (WWF, 2001). The goal of this chapter is to discuss the economics of trade and environment links, discuss environmental issues in the Free Trade Area of the Americas, provide a review of existing literature on the environmental effects of agricultural trade liberalization, and quantify the possible environmental effects of an FTAA on U.S. agricultural areas. This chapter does not represent an official environmental review under U.S. Executive Order 13141, which mandates that the environmental impacts of trade agreements be evaluated.

The first relatively in-depth environmental assessment of a free trade agreement, was the U.S.-Chile Free Trade Agreement (FTA) (USTR, undated). However, that assessment of U.S. environmental effects of agricultural trade liberalization was conducted in a qualitative manner. The assessment's judgment that these environmental impacts in the U.S. will be small is primarily based on the fact that U.S. agricultural exports to Chile are, and will continue to be, a small fraction of total U.S. exports. While a qualitative analysis was sufficient in the U.S.-Chile FTA case, many interest groups may desire a more rigorous analysis for trade agreements that may alter trade flows significantly.

Although the discussion in this chapter focuses on effects in the United States, the environmental impact of trade liberalization, and the assessments thereof, are of global interest. For instance, paragraphs 6 and 31-33 of the ministerial declaration of the Fourth World Trade Organization Ministerial Conference held in Doha, Qatar in November 2001 address trade and environment issues. These include "the efforts by members to conduct national environmental assessments of trade policies on a voluntary basis."[1]

The Environmental Impact of Trade Liberalization

What are the short- and long-run environmental outcomes of liberalization? Such outcomes may be positive (decreased environmental damage) or negative (increased environmental damage). Both Anderson (1992) and Lopez (1994) find that if countries do not have effective environmental policies in place, the environmental effects of freer trade can be negative. On the other hand, if such policies are in place, freer trade will generally increase total benefits to society (Anderson, 1992). As an aid to understanding the possible outcomes and their causes, it can be useful to sort the environmental impact of trade liberalization into three general categories of effects—scale, technique, and composition effects (Cole, Rayner, and Bates, 1998):

- *Scale Effect*. Empirical evidence has long linked open economies to economic growth (Edwards, 1992; Harrison, 1996). Increased output and scale of production due to trade liberalization, however, may generate additional pollution emissions and accelerate the depletion of natural resources (outcome: likely to be negative).

[1] See http://www.wto.org/english/thewto_e/minist_e/min01_e/mindecl_e.htm for text of the declaration.

- *Technique Effect*. All else being equal, increasing per capita income due to liberalization tends to result in calls for increased regulation mandating cleaner technologies. Trade liberalization thus may have a technique effect as producers alter production methods to adopt cleaner production technologies (outcome: positive). In addition to this wealth-driven effect, market-driven technological change reduces the ratio of inputs to outputs, and re-engineers production processes so as to minimize waste (outcome: likely to be positive).

- *Composition Effect*. Trade liberalization may also affect the composition of output produced in an economy, as resources formerly devoted to inefficient protected industries, which are frequently pollution-intensive, will be utilized elsewhere according to the notion of comparative advantage (outcome: uncertain).

These three effects may interact to create an inverted-U relationship between income and pollution, although it is not at all clear how robust this relationship is (Dasgupta et al., 2002). Named in honor of Simon Kuznets, who proposed a similarly shaped relationship between income and income inequality, this hypothetical relationship is known as the environmental Kuznets curve (EKC) (Dasgupta et al., 2002; World Bank, 1999). The argument is that when a country develops from an initially low level of income, the scale effect dominates, as there is increased demand for all inputs, including the use of the environment as a sink (disposal site) for waste. Rising incomes, however, increase the willingness to pay for environmental amenities. Regulations are enacted, forcing a shift to cleaner production processes, as the technique effect reduces harmful emissions and environmental damage. As resources are shifted out of protected polluting industries and rising incomes shift preferences to cleaner goods, the composition and technique effects eventually dominate the scale effect. See Nimon, Cooper, and Smith (2002) for a more detailed discussion of these concepts.

Agricultural production can both enhance and degrade the environment. Agriculture provides rural landscape amenities and wildlife habitat, but also has resulted in soil erosion, nutrient and pesticide runoff, and the loss of wetlands. Agriculture is likely the leading source of water quality impairment of rivers and lakes in the United States (U.S. EPA, 1998). If agricultural trade liberalization increases total production in the United States then in parallel, environmental degradation could increase. However, at the same time, the loss in rural amenities in some regions (through conversion of agricultural land to other uses) could slow down. Mitigating the increasing degradation associated with scale effects could be the increasing adoption of environmentally benign farm management practices in less developed regions as their incomes increase. Certainly there will be regional shifts in levels, as well as types, of environmental externalities as comparative advantage produces geographic redistribution of agricultural production.

The relative importance of types of agricultural production methods may differ according to a country's level of per capita income. For example, the prevalence of *extensive* methods of agricultural production, in which output is increased by expanding the area planted, possibly to marginal lands, may be greater in poorer countries. In contrast, higher-income countries tend to be more likely to employ *intensive* methods, in which output is increased by expanding the use of inputs other than land.

Extensive and intensive methods are associated with different types of externalities. For example, soil erosion and deforestation may be relatively more prevalent externalities for extensive agriculture while nutrient and pesticide runoff may be relatively more prevalent under intensive agricultural practices (Wood et al., 2000). Agricultural trade liberalization may affect the overall level of environmental degradation, but it may also cause shifts between types of effects.

Only a few empirical studies specifically examine the environmental effects of agricultural trade liberalization, and even fewer studies focus on the FTAA countries. Some research has been conducted on Organization for Economic Cooperation and Development (OECD) countries and a few studies have been done on NAFTA countries (United States, Mexico, and Canada). As these three countries will account for a large portion of the amount traded with in the FTAA, this research does provide some insights. However, taken as a whole, the results of these studies are inconclusive. See Nimon, Cooper, and Smith (2002) for a discussion of these studies.

Environmental Impact on U.S. Agricultural Areas

Regarding the change in U.S. agricultural output as a result of trade liberalization under an FTAA, the production changes are quite small, so it would be reasonable to expect that the environmental effects will be small as well. However, there are still several justifications for conducting an empirical analysis of the environmental effects. One is to confirm that these effects will indeed be small. Secondly, even though the overall effects may be small, they may hide some notable regional effects. Finally, it can serve as a model for analysis of the environmental impacts of future trade agreements.

In this section, we empirically analyze the environmental effects on the United States of estimated agricultural production changes associated with the trade liberalization scenario.[2] The empirical framework used is the U.S. Regional Agricultural Model (USMP, see appendix 7-1 for further discussion). USMP simulates how changes in various farm policies (e.g., those related to commodity production, resource use, the environment, and trade), commodity market conditions, and agricultural sector technologies will affect regional commodity supplies, commodity prices, commodity demands, farm input use, farm income, government expenditures, participation in farm programs, and various indicators of environmental quality.[3] The USMP model, in addition to scale effects, allows for some composition effects such as changing crop mix and technology effects such as changing fertilizer application rates and tillage practices, in response to trade shocks, although these are expected to be small given the small predicted changes in production associated with the FTAA.[4]

Among the primary environmental impacts that traditionally tend to be of interest in agriculture are measures of soil erosion and nitrogen and phosphorus contamination (see appendix 7-1). As the current version of USMP has 24 environmental indicators relating primarily to these impacts,

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[2] U.S. agricultural production impacts of the FTAA are reported in the chapter on trade and welfare effects of the FTAA, in this report.

[3] USMP and the MTED model use somewhat different aggregations for the output categories. Appendix 7-2 maps the MTED output categories to the closest related USMP output categories. MTED's fruit and vegetable and sugar categories have no counterpart in USMP, and hence are not considered here.

[4] The state-of-the-art approach for quantitative national level analysis across multiple commodities of the environmental impacts of a trade agreement would be through multiple commodity partial equilibrium (PE) models (a simplified model of the economy that presumes no income effects due to price changes), such as USMP, or through multi-sector computable general equilibrium models (a model which simultaneously represent all the industries in a national economy, or even in all of the world's economies), such as ERS' Future Agricultural Resources Model (FARM) model (USTR, 2000). To the best of the authors' knowledge, the analysis presented in this chapter is the only quantitative national level analysis across a reasonably comprehensive set of agricultural commodities of several environmental impacts of an agricultural trade agreement. Other comprehensive analyses appear to have been performed for several countries utilizing ad hoc approaches (e.g., UNEP, 2001). In the American hemisphere, Agriculture Canada's Canadian Regional Agricultural Model, a PE model similar in scope to USMP, could in principle be used for an environmental assessment of a trade agreement. OECD (2000) provides an overview of methodologies for assessing the environmental effects of trade liberalization agreements.

only a small subset can be presented here; the focus in this presentation is on the indicators in USMP that may be the most direct measure of environmental implications beyond the edge of the field. These indicators are nitrogen loss to water and to the atmosphere, phosphorous loss to water, and sheet-, rill-, and wind-related soil erosion.

As is evident from table 7-1, the total national level impacts (last column) are minimal, as would be expected given the small changes in production. Nationwide in the United States, the FTAA is predicted to lead to small environmental benefits in terms of soil erosion and water pollution from nitrogen and phosphorus, with reductions of less than 0.2 percent of baseline values, and small environmental costs in terms of air pollution from nitrogen, with increases of less than 0.1 percent of baseline values. However, the totals do mask some larger, but still relatively small changes at the regional level. For instance, while soil erosion decreases nationwide, it does increase slightly in some regions, and while air pollution from nitrogen increases nationwide, it does decrease in some regions. It is important to consider the change in the actual levels in conjunction with the percentage changes as some of the larger percentage changes (e.g., the 3.9 percent and 2.9 percent increase nitrogen loss to surface and ground water and to atmosphere, respectively, in the Pacific region) represent changes from relatively small baselines. The higher percentage changes in the Pacific region relative to the other regions may be due to USMP predicting that most of the increase in U.S. rice production will occur there. Given the spatial reallocations in production of a given crop as well as the shifts from one crop to another as predicted by USMP, both decreases and increases in environmental indicators are evident in the tables. The production changes are too small for changes in environmental indicators to be ascribed to changes in input application rates. At any rate, an in-depth analysis of the specific model results is not a productive exercise as the changes in the indicators are likely smaller than the range of inaccuracy in the results.

Placing monetary values on these environmental impacts (see appendix 7-1) is useful for assessing the costs and benefits of agri-environmental policies. However, not only are researchers still in the early stages of assessing the environmental impacts of agricultural activities beyond the edge of the field, relatively few attempts have yet been made to assign monetary values to these impacts. As is evident from table 7-2, the total national level effects (last column) are minimal, as would be expected given the small changes in production. Offsite damages due to nitrogen loss to surface water (table 7-2) increase by $500,000 (with most of that increase being attributable to changes in the Pacific region), while offsite damages due to sheet and rill erosion decrease by $2.4 million. However, the totals do mask some larger, but still relatively small changes at the regional level. The net increase in the cost of loss of soil productivity due to erosion (i.e., soil depreciation) is minimal.

Additional Trade and Environmental Concerns

This section provides brief overviews of trade and environment issues that cannot be addressed by our empirical analysis, but that may be of some concern within the FTAA region. These issues include the creation of "pollution havens," the introduction of harmful nonindigenous species, the environmental impacts of sugar and horticultural production, and transboundary environmental issues.

One concern regarding trade liberalization frequently expressed by governments is that this process creates an incentive for countries to lure capital by lowering environmental standards, which in turn may cause other countries to respond in kind. This process is commonly referred to as the "race to the bottom" hypothesis. Little evidence has been found for this effect in practice (e.g., Fredriksson and Millimet, 2000; Xu, 1999), and the concept appears to apply more to manufacturing than to agriculture. A related concept is that of the “pollution haven” hypothesis, which says that some countries with low demand for environmental quality will adopt lax environmental standards that attract investment and export pollution-intensive goods. Countries with a high demand for environmental quality will adopt high standards and import pollution-intensive goods.

Another concern is that increased agricultural trade among FTAA countries may increase the risk of introducing invasive agricultural pest species and diseases to new countries and new geographic areas. The costs of invasive pests can be significant, in terms of increased production costs, lost output, reduced access to foreign markets, and ecosystem damage. However, the difficulty in

Table 7-1—Change in physical environmental indicators resulting from agricultural trade changes under FTAA (from USMP)

Indicator		North East	Lake States	Corn Belt	North Plains	Appa-lachia	South East	Delta States	South Plains	Moun-tain	Paci-fic	U.S. Total[1]
Nitrogen						*Million tons*						
Loss to atmosphere	Base	0.020	0.103	0.600	0.283	0.058	0.018	0.077	0.281	0.060	0.060	1.559
	FTAA Scenario	0.020	0.103	0.600	0.283	0.058	0.018	0.077	0.279	0.060	0.061	1.559
	Change	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.002	0.000	0.002	0.000
	% Change[2]	-0.195	0.021	0.024	0.136	-0.122	-0.245	-0.350	-0.541	0.340	2.889	0.034
Loss to water	Base	0.237	0.460	1.670	1.039	0.455	0.164	0.472	0.631	0.165	0.096	5.388
	FTAA Scenario	0.237	0.460	1.670	1.040	0.455	0.164	0.470	0.628	0.165	0.099	5.386
	Change	0.000	0.000	0.000	0.000	0.000	0.000	-0.002	-0.003	0.000	0.004	-0.003
	% Change	-0.309	0.018	-0.032	0.047	-0.176	-0.154	-0.327	-0.484	-0.066	3.933	-0.050
Phosphorous						*Million tons*						
Loss to water	Base	0.038	0.038	0.180	0.124	0.053	0.023	0.046	0.060	0.020	0.003	0.585
	FTAA Scenario	0.038	0.038	0.180	0.124	0.053	0.023	0.046	0.060	0.020	0.003	0.584
	Change	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	% Change	-0.337	-0.135	-0.053	0.053	-0.179	-0.193	-0.416	-0.771	0.362	0.113	-0.159
Soil erosion						*Million tons*						
Sheet & rill erosion	Base	47.542	97.992	419.721	169.302	68.660	46.252	83.480	82.284	62.300	41.033	1118.566
	FTAA Scenari	47.504	98.114	419.713	169.276	68.633	46.174	83.140	82.062	62.445	40.552	1117.614
	Change	-0.038	0.122	-0.008	-0.025	-0.027	-0.078	-0.340	-0.222	0.145	-0.481	-0.952
	% Change	-0.081	0.125	-0.002	-0.015	-0.039	-0.168	-0.407	-0.270	0.232	-1.172	-0.085
Wind erosion	Base	0.948	119.919	41.466	136.953	0.498	0.000	0.000	199.336	162.493	28.570	690.184
	FTAA Scenario	0.950	120.216	41.431	138.085	0.498	0.000	0.000	196.491	163.215	27.957	688.843
	Change	0.002	0.297	-0.035	1.132	0.000	0.000	0.000	-2.846	0.722	-0.613	-1.340
	% Change	0.235	0.248	-0.084	0.827	0.108	0.000	0.000	-1.428	0.444	-2.147	-0.194
Total soil erosion	Base	48.490	217.911	461.187	306.255	69.157	46.252	83.480	281.620	224.794	69.604	1808.750
	FTAA Scenario	48.454	218.330	461.144	307.361	69.131	46.174	83.140	278.553	225.660	68.509	1806.457
	Change	-0.036	0.419	-0.043	1.107	-0.026	-0.078	-0.340	-3.068	0.866	-1.095	-2.292
	% Change	-0.074	0.192	-0.009	0.361	-0.038	-0.168	-0.407	-1.089	0.385	-1.573	-0.127

[1]Due to rounding of the numbers necessary for presentation in the tables, the regional subtotals may not add up to the values in the U.S. total column. Negative numbers denote reduced environmental damage relative to baseline; positive numbers denote on increase in damage.

[2]Due to rounding of the numbers necessary for presentation in the tables, the ‘% Change’ numbers may be nonzero even though the ‘change’ values may be zero.

Source: USMP.

measuring these costs makes it extremely challenging to determine what standards should be set for import screening. A standard of "zero entry" would be prohibitively expensive, while standards that are too lax could expose agricultural producers, consumers, and the natural environment to unacceptable risks. To safeguard against invasive pests, USDA's Animal and Plant Health Inspection Service (APHIS) operates a variety of point-of-entry, quarantine, and foreign pest control programs and activities. The important policy question then is whether current standards and resources devoted to these programs and activities are appropriate given the increasing level of trade expected among the FTAA countries, and hence, expected risks from trade.

Thirdly, among the products whose environmental impacts cannot be modeled by USMP is sugar, either from sugarcane or sugar beets, given that these commodities are not included in the model. One significant agri-environmental issue in the United States involves the Florida Everglades Agricultural Area (EAA), where sugarcane production has contributed to loss of water retention capacity of the land base, a loss which has negative environmental consequences for the broader Florida Everglades watershed. The lowering of natural water tables on drained cropland has accelerated oxidation and decomposition of organic peat soils in the EAA, resulting in wide scale land-elevation declines due to soil subsidence. Soil subsidence and related loss in water retention capacity in soil are a serious concerns in the EAA (Aillery, Shoemaker, and Caswell, 2001). Such losses increase excessive floodwater discharges to the Everglades marsh, decrease dry-season water flows to the marsh and to Florida Bay, and increase reliance on lake management for water storage purposes. Hence, a decrease in crop production in the EAA could potentially increase water retention capacity. Aillery, Shoemaker, and Caswell (2001) found that a 10 percent (20 percent) reduction in the domestic price of raw sugar could increase EAA water retention capacity by 10,000 (80,000) acre-feet annually over baselines levels of 46,000 acre-feet annually, attributable primarily to an acceleration of cropland retirement. The magnitude of this change cannot be directly compared to the environmental effects estimated for other commodities by USMP as

Table 7-2—Monetized value of selected environmental indicators resulting from agricultural trade changes under FTAA (million $)

Indicator		North East	Lake States	Corn Belt	North Plains	Appalachia	South East	Delta States	South Plains	Mountain	Pacific	U.S. Total[1]
Nitrogen loss to surface water damage												
Offsite $ damages	Base	29.0	0.7	5.4	0.6	39.4	34.5	16.2	23.8	2.1	16.0	167.7
	FTAA scenario	29.0	0.7	5.4	0.6	39.4	34.5	16.1	23.8	2.1	16.6	168.1
	Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.5
	% Change[2]	-0.1	-0.1	-0.1	0.0	0.0	-0.1	-0.3	0.1	-0.4	3.7	0.3
Sheet and rill soil erosion damages and soil depreciation												
Offsite $ Sheet & rill damages	Base	642.8	576.3	1029.0	234.2	222.6	176.3	297.4	307.7	96.5	127.5	3710.3
	FTAA scenario	642.5	577.5	1028.9	234.1	222.5	176.0	296.3	307.0	96.7	126.4	3707.8
	Change	-0.3	1.2	-0.1	-0.1	-0.1	-0.3	-1.2	-0.6	0.2	-1.1	-2.4
	% Change	0.0	0.2	0.0	0.0	0.0	-0.2	-0.4	-0.2	0.2	-0.9	-0.1
Soil $ depreciation	Base	14.4	12.9	77.7	123.8	40.5	1.3	51.5	1.9	9.0	36.8	369.9
	FTAA scenario	14.5	13.2	77.9	123.9	40.6	1.4	51.0	2.0	9.0	36.4	369.9
	Change	0.1	0.2	0.3	0.1	0.1	0.0	-0.4	0.0	0.0	-0.4	0.1
	% Change	0.5	1.9	0.3	0.1	0.3	1.2	-0.9	2.4	0.3	-1.0	0.0

[1]Due to rounding of the numbers necessary for presentation in the tables, the regional subtotals may not add up to the values in the U.S. total column. Negative numbers denote reduced environmental damage relative to baseline; positive numbers denote on increase in damage.
[2]Due to rounding of the numbers necessary for presentation in the tables, the '% Change' numbers may be nonzero even though the 'change' values may be zero.
Source: USMP.

implications of water retention capacities for the environmental indicators in USMP (the level of decrease in erosion, for instance) are unclear. Of course, the long-term environmental consequences of the movement of land out of sugar production depend on the alternative land uses. For instance, if the land is developed into urban uses, the negative environmental consequences could be greater than under sugarcane production.

In addition to sugar, the USMP model does not contain horticultural products, and hence, it cannot assess the environmental impacts of changes in their production. Horticultural production tends to be associated with high levels of pesticide and herbicide applications. However, with a predicted production increase of 0.1 percent due to the FTAA, the environmental consequences are likely to be small.

Fourthly, in terms of the transboundary environmental implications of agriculture under FTAA, the risk of introducing harmful nonindigenous species (HNIS) is likely to be the main area of direct concern to the United States, since additional transboundary implications for air and water pollution associated with the FTAA over those associated with NAFTA are probably small. One would expect that increased trade with countries not on the U.S. border will have minimal transboundary effects on air and water quality in the United States. Of course, this assumption presumes that trade between NAFTA countries will not greatly increase with an increase in the free trade area. On the other hand, due to the FTAA, trade between NAFTA countries in some commodities could decrease, potentially leading to decreasing transboundary effects on air and water quality between those countries. Finally, the expansion of trade within North America will likely be associated with increased traffic, congestion, and air pollution along certain transportation corridors.

Conclusion

Agricultural trade liberalization under the FTAA is likely to affect the environment in a variety of ways, some positive and others negative. However, our modeling results show the effects on selected U.S. agri-environmental indicators to be small, which should be expected given the small predicted changes in U.S. production associated with the FTAA. Longer run effects are ambiguous, especially given the scale, technique, and composition effects that can occur outside the static time reference of the model used here. The FTAA likely will produce composition effects associated with the process of liberalization, as price incentives concentrate industries in areas possessing a comparative advantage. Crop substitution, technological modernization, importation of invasive agricultural pest species, increased use of transportation, and the development of environmentally friendly products are other examples in which the expanded agricultural trade associated with the FTAA could have positive or negative effects on the environment.

In principle, assuming that increased trade contributes to rising future incomes in the hemisphere, then the increasing willingness to pay for environmental amenities could translate in the long run into increasingly stringent domestic environmental regulations and enforcement. This, at least, is the case made by the environmental Kuznets curve (EKC) which suggests that beyond a certain income level at least, increasing income is associated with decreasing negative environmental consequences, given that increasing income results in the increasing demands for environmental services. Growth in GDP in the Caribbean region and several South American countries attributable to the trade liberalization under the FTAA could be significant. Income increases in these regions or countries may result in their increasing willingness to pay in those regions for environmental amenities. Nonetheless, it is unknown whether or not such an increase in incomes will be sufficient to induce increasingly stringent domestic environmental regulations and enforcement related to their agriculture sectors.

References

Aillery, M., R. Shoemaker, and M. Caswell. "Agriculture and Ecosystem Restoration in South Florida: Assessing Trade-Offs from Water-Retention Development in the Everglades," *American Journal of Agricultural Economics* v83, n1 (February 2001): 183-95.

Anderson, K. "Agricultural Trade Liberalisation and the Environment: A Global Perspective," *World Economy* v15, n1 (January 1992): 153-71.

Burfisher, M.E., House, R.M., and Langley, S.V., 1992. Effects of a Free Trade Agreement on U.S. and Southern Agriculture. *Southern Journal of Agricultural Economics*, 24: 61-78.

Claassen, R., L. Hansen, M. Peters, V. Breneman, M. Weinberg, A. Cattaneo, P. Feather, D. Gadsby, D. Hellerstein, J. Hopkins, P. Johnston, M. Morehart, and M. Smith. 2001. *Agri-Environmental Policy at the Crossroads: Guideposts on a Changing Lanscape.* AER-794. Economic Research Service, USDA.

Claassen, R., Heimlich, R.E., House, R.M., and Wiebe, K.D., 1998. Estimating the Effects of Relaxing Agricultural Land Use Restrictions: Wetland Delineation in the Swampbuster Program. *Review of Agricultural Economics,* 20: 390-405.

Cole, M., A. Rayner, and J. Bates. 1998. "Trade Liberalisation and the Environment: The Case of the Uruguay Round," *The World Economy* 21,3: 337-347.

Dasgupta, Susmita, Benoit Laplante, Hua Wang and David Wheeler (2002). "Confronting the Environmental Kuznets Curve," *Journal of Economic Perspectives* Vol. 16, No. 1, pp: 147-168.

Economic Research Service (ERS). "Briefing Room on Conservation and Environmental Policy," USDA, Economic Research Service, December 2001 update. http://www.ers.usda.gov/briefing/ConservationAndEnvironment/Questions/consenvwq2.htm *and* http://www.ers.usda.gov/briefing/ConservationAndEnvironment/Questions/consenvwq1.htm

Economic Research Service. "Briefing Room on Global Climate Change," USDA, Economic Research Service, December 2000 update. http://www.ers.usda.gov/Briefing/GlobalClimate/Questions/Ccmqa4.htm#lewandrowsk

Edwards, Sebastian. "Trade Orientation, Distortions, and Growth in Developing Countries." *Journal of Development Economics*, Vol. 39, No. 1 (July 1992), pp. 31-57.

Faeth, P. 1995. *Growing Green: Enhancing the Economic and Environmental Performance of U.S. Agriculture*. World Resources Institute, Washington DC.

Feather, P., D. Hellerstein, and L. Hansen. 1999. "*Economic Valuation of Environmental Benefits and the Targeting of Conservation Programs: The Case of the CRP*," AER-778, Economic Research Service, USDA.

Fredriksson, Per G., and Daniel Millimet. 2000. "Is There a Race to the Bottom in Environmental Policies? The Effects of NAFTA." Paper presented at the Commission for Environmental Cooperation's North American Symposium on Understanding the Linkages between Trade and Environment. Washington, D.C., October 11-12. http://www.cec.org/programs_projects/trade_environ_econ/pdfs/Fredrik.pdf.

Harrison, Ann. 1996. "Openness and Growth: A Time-Series, Cross-Country Analysis for Developing Countries." *Journal of Development Economics* Vol. 48, No. 2 (March), pp. 419-447.

Heimlich, R.E., Wiebe, K.D., Claassen, R., and House R.M. 1997. Recent Evolution of Environmental Policy: Lessons from Wetlands. *Journal of Soil and Water Conservation*, 52: 157-161.

Hellerstein, D. and V. Breneman. 2000. *Estimating the Effects of Changes in Estuarine Water Quality on Outdoor Recreation: A First Order Gravity Model*. White paper. Economic Research Service, USDA.

Horner, G., Hatchett, S.A., House, R.M., and Howitt, R.E., 1990. *Impacts of San Joaquin Valley Drainage-Related Policies on State and National Agricultural Production*. In: *National Impact of Drainage-Related Policies*, University of California and San Joaquin Valley Drainage Program.

House, R.M., H. McDowell, M. Peters, and R. Heimlich. 1999. "Agriculture sector resource and environmental policy analysis: an economic and biophysical approach." in *Environmental Statistics: Analyzing Data for Environmental Policy*. New York: John Wiley and Sons. pp 243-261.

House, R.M., Peters, M., Baumes, H., and Disney, W.T. 1993. *Ethanol and Agriculture: Effect of Increased Production on Crop and Livestock Sectors*. AIB-667, Economic Research Service, USDA.

ICF Consulting. 2001. "North American Trade and Transportation Corridors: Environmental Impacts and Mitigation Strategies." Paper prepared for the North American Commission for Environmental Cooperation, February 21.
http://www.cec.org/programs_projects/pollutants_health/trinational/corridors-e.pdf.

Lopez, R. 1994. "The Environment as a Factor of Production: The Effects of Economic Growth and Trade Liberalization," *Journal of Environmental Economics and Management* v27, n2 (September 1994): 163-84.

McCarl, B., and T. Spreen. 1980. "Price Endogenous Mathematical Programming as a Tool for Sector Analysis." *American Journal of Agricultural Economics.* 62(1): 86-102.

Nimon, W., J. Cooper, and M. Smith. 2002. "NAFTA, Agricultural Trade, and the Environment," chapter in "Effects of North American Free Trade Agreement on Agriculture and the Rural Economy," Steven Zahniser and John Link (eds), *Agriculture and Trade Report No. WRS0201*, Economic Research Service, USDA.

OECD. 2000. *Assessing the Environmental Effects of Trade Liberalisation Agreements: Methodologies*, OECD, Paris.

Padgitt, M., D. Newton, R. Penn, and C. Sandretto. 2000. "Production Practices for Major Crops in U.S. Agriculture, 1990-97, " *Statistical Bulletin No. 969*. 114 pp, September 2000.

Peters, M., J. Lewandrowski, R. House and H. McDowell. 2001. "Economic Impacts of Carbon Charges on U.S. Agriculture." *Climatic Change* 50: 445-473.

Peters, M., McDowell, H., and House, R., 1997. Environmental and Economic Effects of Taxing Nitrogen Fertilizer. Selected paper presented at the annual meetings of the American Agricultural Economics Association, July 20–July 27, at Toronto, Ontario, Canada.

Ribaudo, M. 1986. *Reducing Soil Erosion: Offsite Benefits*, AER-561, Economic Research Service, USDA.

Ribaudo, M., R. Heimlich, R. Claassen, and M. Peters. 2001. "Least-cost Management of Nonpoint Source Pollution: Source Reduction vs. Interception Strategies for Controlling Nitrogen Loss in the Mississippi Basin." *Ecological Economics* 37: 183-197.

Salathe, L., J. M. Price, and K. Gadson. 1982. "The Food and Agricultural Policy Simulator," *Agricultural Economics Research*, Vol 34, No. 2, pp. 1-15.

Sierra Club and Shelia Holbrook-White. 2000. "NAFTA Transportation Corridors: Approaches to Assessing Environmental Impacts and Alternatives." Paper presented at the North American Symposium on Understanding the Linkages between Trade and Environment, Washington, D.C., October 11-12. http://www.cec.org/programs_projects/trade_environ_econ/pdfs/sierra.pdf

UNEP (United Nations Environmental Program). 2001. "Economic Reforms, Trade Liberalization and the Environment: A Synthesis of UNEP Country Projects," Nov. 5, 2001, UNEP, Geneva, Switzerland.

U.S. Department of Agriculture, Economic Research Service. 1996. "Commodity Costs and Returns." Available at http://www.ers.usda.gov/data/costsandreturns/

U.S. Department of Agriculture, Soil Conservation Service. 1981. *Land Resource Regions and Major Land Resource Areas of the United States*. AH-296.

U.S. Department of Agriculture, Soil Conservation Service. 1994. *Summary Report, 1992 National Resources Inventory*.

U.S. Department of Agriculture, World Agricultural Outlook Board. 1998. *USDA Agricultural Baseline Projections to 2007*. Staff Report WAOB-98-1, U.S. Department of Agriculture, Office of the Chief Economist.

U.S. Environmental Protection Agency. 1998. *National Water Quality Inventory: 1996 Report to Congres*s. EPA841-R-97-008. Office of Water.

U.S. Environmental Protection Agency. 2000. *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-1998*. EPA 236-R-00-001.

U.S., Government of. 1999a. "Linkages Between Trade And Environmental Policies: Statement Of The United States," WTO High Level Symposium On Trade And Environment, http://www.ustr.gov/environment/statements.shtml March 15-16, 1999.

U.S., Government of. 1999b. "Synergies Between Trade Liberalization And Sustainable Development," WTO High Level Symposium On Trade And Environment, http://www.ustr.gov/environment/statements.shtml March 15-16, 1999.

U.S. International Trade Commission. 1997. "Cattle and Beef: Impact of the NAFTA and Uruguay Round Agreements on US Trade." Investigation No. 332-371. Publication 3048. Washington, DC: U.S. Government Printing Office, July 1997.

USTR (U.S. Trade Representative), Quantitative Analysis Working Group. 2000. "Report of the Quantitative Analysis Working Group to the FTAA Interagency Environment Group," October 2000. http://www.ustr.gov/environment/environmental.shtml.

USTR (U.S. Trade Representative). 2001. "FTAA–Free Trade Area of the Americas, Draft Agreement, Chapter on Agriculture," FTAA.TNC/w/133/Rev.1. Available at: http://www.ftaa-alca.org/ftaadraft/eng/ngag_e.doc, July 3, 2001.

USTR (U.S. Trade Representative). Undated. "Environmental Reviews and Reports," available at: http://www.ustr.gov/environment/environmental.shtml

Williams, J., C. Jones, and P. Dyke. 1990. The EPIC Model: EPIC-Erosion/Productivity Impact Calculator, model documentation. In: A.Sharpley and J. Williams (eds.), *EPIC-Erosion/Productivity impact Calculator 1. Model Documentation*. USDA Technical Bulletin No. 1768, pp. 3-92.

Wood, Stanley, Kate Sebastian, and Sara Scherr. 2000. *Pilot Analysis of Global Ecosystems: Agroecosystems*. A joint study by the International Food Policy Research Institute and the World Resources Institute. Washington, DC.

World Bank. 1999. *Greening Industry: New Roles for Communities, Markets, and Governments.* A World Bank Policy Research Report. New York: Oxford University Press, Inc.

World Trade Organization, 2001a. "Framework for Conducting Environmental Assessments of Trade Negotiations: Communication from Canada," WT/CTE/W/183, Geneva, Switzerland, March 15, 2001.

World Trade Organization, 2001b. "Legitimate Non-Trade Concerns: Submission by Argentina (Item 6 of the Work Programme)," WT/CTE/W/188, Geneva, Switzerland, April 25, 2001.

World Wildlife Federation. "Balanced process, balanced results: Sustainability Assessments and Trade." WWF-World Wildlife Fund for Nature, Gland Switzerland, 2001. Available at: http://www.balancedtrade.panda.org

Xu, X. 1999. "Do Stringent Environmental Regulations Reduce the International Competitiveness of Environmentally Sensitive Goods? A Global Perspective," *World Development* v. 27, n. 7 (July 1999): 1215-26.

Chapter 8

Regionalizing the Rules for Sanitary and Phytosanitary Measures

Donna Roberts

Technical regulations can be significant barriers to regional as well as global trade. In some instances, countries entering into preferential trading agreements have elected to harmonize their measures to eliminate such trade impediments, a strategy that has been pursued in sectors such as motor vehicles and measurement instruments in the European Union (Sykes, 1995). Harmonization can increase economic welfare if the resulting gains from trade outweigh the net benefits of existing regulations. This outcome is more likely if the origins of regulatory heterogeneity are the result of chance events, information differences, or interest group capture. However, harmonization is likely to be inefficient if incomes, tastes, and risks are the primary sources of variation in national regulations. In these instances, other forms of regulatory rapprochement are likely to be more appropriate. The customary choice allows regulators in different jurisdictions to adopt different substantive measures subject to mutually agreed-upon constraints, sometimes referred to as "policed decentralization" (Sykes, 1999).

This latter option was chosen by the negotiators of the WTO Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement) in the Uruguay Round. The agreement was negotiated to provide a set of multilateral rules that would recognize the legitimate need for countries to adopt different measures to protect human, animal, and plant health, while establishing a framework to reduce their trade-distorting aspects (see box). The agreement reiterates earlier commitments under the General Agreement on Tariffs and Trade (GATT) to apply technical restrictions only to the extent necessary and to avoid unjustifiable discrimination among members, but also requires regulators to (1) provide notification through the WTO of proposed regulations that affect trade (transparency); (2) use scientific risk assessment to inform regulatory decisions (science-based risk management) while allowing national determination of the level of SPS protection (national sovereignty); (3) recognize that different measures can achieve equivalent safety outcomes (equivalence); and (4) allow imports from regions that are free or nearly free of pests or diseases (regionalization). Adoption of international standards (multilateral harmonization) is encouraged, but not required. In addition to these principles, the agreement establishes a permanent SPS committee to oversee implementation of its provisions. Dispute settlement is available when WTO countries are unable to resolve differences through bilateral negotiations.

The physical and economic diversity of the Western Hemisphere countries is a significant obstacle to harmonization of SPS measures within the FTAA region.[1] Because optimal measures for mitigating the risks of exotic pests and diseases are usually contingent on the climate of the importing country, identical animal and plant health measures for tropical and temperate countries would generally lower economic welfare. Large differences in per capita incomes throughout the region likewise could make harmonization of many food safety measures inappropriate: consumers' willingness to pay for reductions in risks is a function of income, so harmonizing developed and developing countries' food safety regulations either "up" or "down" could decrease aggregate consumer welfare in the region.

[1] There are different definitions of harmonization. In this discussion, harmonization is defined as the adoption of identical measures.

Some form of policed decentralization would therefore appear to be a better model for an agreement in a region comprised of heterogeneous countries. This determination, however, still leaves several alternatives open to negotiators. Does the WTO SPS Agreement provide a prototype of policed decentralization that is suitable for the Western Hemisphere, or would a "WTO-plus" agreement which spells out additional rights and/or obligations better serve the interests of FTAA trading partners?

An evaluation of the options before FTAA negotiators logically begins with a review of the implementation of the WTO SPS Agreement, which came into force in 1995. General assessments of this record by FTAA countries are reviewed in the subsequent section of the paper. The final section examines whether modification of the WTO SPS principles themselves or other options could more effectively advance the overarching goal of welfare enhancement through trade in the FTAA region.

Implementation of the WTO SPS Agreement

The SPS Agreement has met with broad approval since it went into effect in 1995. WTO members concurred that there was no need to amend the SPS Agreement following the first formal review of the agreement in 1999 (WTOa, 1999). The absence of any proposals to renegotiate the SPS Agreement in the next round of multilateral trade negotiations also signaled general acceptance of its provisions.[2]

Beyond these broad assessments, a review of the implementation of the individual provisions of the agreement affords more specific evidence about its achievements and shortcomings, providing a more reliable basis for judging the suitability of these rules for FTAA countries. The record indicates that the multilateral disciplines for transparency and science-based risk management have yielded benefits for the world trading system without compromising legitimate regulatory goals. Fewer gains can be reported under regionalization, equivalence, and multilateral harmonization.

Transparency. There is perhaps more systematic evidence available to gauge fulfillment of the transparency obligations than for any other commitment under the SPS Agreement. These obligations include notification of proposed changes to SPS measures that affect trade, as well as identification of official contact points responsible for providing information about regulatory regimes. The notification requirements constitute the cornerstone of the agreement's transparency provisions that are intended to facilitate decentralized policing by trading partners to ensure compliance with the SPS Agreement's substantive provisions.

While transparency does not guarantee that countries will not misuse SPS measures, it contributes to the smooth functioning of the world trading system by facilitating both compliance and complaints by trading partners. Compliance is aided when advance notice of new or modified measures provides an opportunity for firms to change production methods to meet new import requirements, thereby minimizing disruptions that such changes can cause to trade flows. More than 2,500 notifications were submitted between 1995 and 2001, far more than the number submitted under prior GATT obligations.[3]

[2] Nonetheless, in the WTO "implementation negotiations" leading up to the Doha Ministerial Conference, WTO members agreed to several initiatives to improve implementation of the SPS agreement (as well as other WTO agreements) to help developing countries. The WTO initiated these negotiations to address the needs of developing countries in May 2000 after the Seattle Ministerial Conference failed to launch a new round of trade negotiations. Details of the entire "implementation package" agreed to by WTO members at Doha can be found in WTO(b), 2001.

[3] Countries notified only 168 measures to prevent risks to public health and safety between 1980 and 1990 under the TBT Agreement, and fewer than half of those notifications concerned SPS regulations (GATT).

WTO Agreement: Principal Provisions of the Agreement on the Application of Sanitary and Phytosanitary Measures

The SPS Agreement requires:

- Science-based risk management (Articles 2 and 5): SPS measures must be based upon scientific principles and sufficient scientific evidence; more particularly, measures must be based on a risk assessment. Measures should be chosen so as to minimize distortions to trade and must be no more trade restrictive than necessary to achieve a country's "appropriate level of protection." Members are to avoid variation in the levels of health protection provided by its measures if this variation creates a disguised restriction on trade. Countries may adopt a provisional measure to avoid risk, but must seek information and carry out a risk assessment to justify permanent use of a trade-restricting measure.

- Equivalence (Article 4): A WTO member must accept that the SPS measures of another country are equivalent to its own if it is objectively demonstrated that the exporter's measures achieve the importer's appropriate level of protection, even if the measures themselves differ.

- Regionalization (Article 6): A country is required to allow imports from regions that are free or nearly free of pests or diseases.

These obligations are balanced by a recognition of:

- National sovereignty (Article 3): A country may choose a measure that differs from the international standard to achieve its appropriate level of protection as long as it complies with the other rules of the Agreement. This recognizes that individual nations may be unwilling to subscribe to uniform measures for all hazards.

The Agreement endorses:

- Harmonization (Article 3): Members are urged (but not required) to adopt international standards. A country that does adopt the standards of the three designated international organizations is presumed to be in compliance with its WTO obligations.

The Agreement also establishes enforcement mechanisms, including:

- Notification: A WTO member is required to publish its regulations and provide a mechanism for answering questions from trading partners.

- WTO SPS Committee: The WTO Committee meets three to four times a year to develop guidelines and discuss contentious SPS measures on a continuing basis.

Dispute settlement: Mechanisms include formal consultations between the parties to a dispute, followed by adjudication by a WTO panel if required. Decisions by trade dispute panels may be appealed to the WTO Appellate Body.

Although one-third of Western Hemisphere countries (primarily Caribbean islands) have not submitted any notifications to the WTO, all of the major agricultural exporting and importing countries in the region, including the United States, Canada, Mexico, Argentina, Brazil and Chile, routinely notify proposed measures. The United States alone accounted for more than 500 notifications over the 1995-2001 period, while a few developing countries such as Paraguay only submitted one.

Notifications also provide an opportunity for trading partners to raise objections or questions about the legitimacy or design of a proposed measure, possibly averting a trade dispute. WTO members have registered 187 interventions in the SPS Committee between 1995 and 2001 that reference complaints or questions about notified measures. [4] The tabulation of these interventions by region indicates that FTAA countries fully exercised their rights under the transparency provisions: these countries were twice as likely to be the source (85) rather than the target (48) of complaints (table 8-1). The majority of their complaints were against the measures of European countries. Similarly, the regulations of FTAA countries drew more complaints from European countries than from any other region. Intraregional disputes (20) ranked second as both the source and target of Western Hemisphere complaints.

Globally, 30 percent of the interventions cited food safety measures, more than for any other type of regulation (table 8-2). Another 27 percent of the complaints targeted measures related to transmissible spongiform encephalopathies (TSEs).[5] Plant and animal health measures respectively accounted for 22 percent and 18 percent of the complaints, while the remaining 3 percent of the committee complaints identified other concerns.

The interventions involving intraregional FTAA complaints differed significantly from the global pattern. Within the FTAA, plant and animal health measures were challenged more often than food safety measures. Only three complaints (all by the United States) identified regional food safety measures as unjustified obstacles to trade. Another distinguishing feature of the FTAA's intraregional disputes is that they were more likely to be resolved in bilateral consultations before advancing to formal dispute settlement proceedings. FTAA countries reported resolution of 35 percent of their intraregional complaints, compared to 23 percent for complaints involving at least one country outside the region (WTOd, 2001). Finally, there was a stark difference between the global and regional number of developed-country complaints against developed-country regulations: globally, it was the largest category, while regionally it was the smallest, suggesting that the United States and Canada have similar approaches to regulating SPS risks.

While progress on regulatory transparency has been one of the more notable successes of the SPS Agreement, many members have identified procedural shortcomings in the current system. Developing countries in particular have requested assistance with translating documents, extension of deadlines to comment on pending measures, and more timely responses to their requests for further information. The WTO SPS Committee revised its recommended notification procedures in 1999 and again in 2002 (WTOe, 1999 and 2002). More recently, controversy arose over *if* as well as *how* certain measures must be notified. Exporters have identified instances in which importers did not notify regulatory actions—even if they severely disrupted trade—because these actions were regarded as implementation of existing regulations rather than new measures. Canada's unexpected embargo of Brazil's processed beef exports in February, 2001, provides one example of a regulatory action that has prompted interest in strengthening or at least clarifying current notification requirements (WTOf, 2001; WTOg, 2001).

Science-based risk management and national sovereignty. The obligation to reference scientific evidence in defense of a trade-restricting measure clearly reduces the degrees of freedom for disingenuous use of SPS regulatory interventions. In each of the four SPS disputes to reach

[4] Complaints are variously recorded under "information from members," "specific trade concerns," and other business" in the committee minutes.

[5] TSEs include bovine spongiform encephalopathy (BSE), a zoonoses (i.e., disease affecting both animals and humans) which has been linked to new variant Creutzfeldt Jakob disease (nvCJD) in humans.

the WTO Appellate Body over the 1995-2002 period, the measures at issue were judged to be in violation of the provisions which requires that measures be based on a scientific risk assessment.

However, the impact of the disciplines of the SPS Agreement extends far beyond formal dispute settlement results. While hard to quantify, it is apparent that the agreement has generated broad-based regulatory review by some WTO members, as major agricultural exporters and importers determine whether they and their trading partners are complying with the obligation to base their risk management decisions on scientific assessments. Evidence suggests that regulatory authorities are either unilaterally modifying regulations, or voluntarily modifying regulations after technical exchanges (Roberts, 1998).

To give just two examples of accelerated schedules for making longstanding measures consistent with the science obligations in the SPS Agreement, Japan agreed to rescind its 46-year-old ban on several varieties of tomatoes grown in the United States based on scientific research indicating that they were not afflicted with tobacco blue mold disease (USDA), and the United States ended a 20-year-old dispute with four European countries by agreeing to allow imports of rhododendron in growing media under a new phytosanitary protocol. More systematic reports, while far from comprehensive, reinforce the anecdotal evidence. WTO members collectively have reported 35 negotiated or partial settlements, which have increased access for: exports of Uruguayan beef to Israel; exports of Hungarian apples, pears and quinces to the Slovak Republic; Brazilian exports of gelatin to Norway; and shipments of European Union potatoes to the Czech Republic (WTOd, 2001). Still greater is the number of issues that has been resolved before reaching the Committee. The United States and Australia respectively report resolution of 338 and 240 SPS cases in bilateral negotiations over 5 years (APHIS, 1997-2000; *World Food Chemical News*, 2001). This evidence indicates that enacting regulatory changes that allow greater market access has likely become easier now that the SPS Agreement assures policymakers that their trading partners must conform to the same principles.

It is important to note that while countries must be able to reference scientific evidence to support their risk mitigation measures, the national sovereignty provisions entitle them to adopt the levels of SPS protection of their choice, as long as any variation in the levels of protection does not constitute discrimination or a disguised restriction on trade. The SPS Agreement thus leaves scope for importing countries to maintain or adopt exigent standards, as long as they are consistently rigorous for comparable risks. Conservative measures may be maintained under the agreement even when these measures fail to increase domestic welfare. To cite but one example, New Zealand decided to maintain a ban on imports of bone-in poultry cuts from the United States based on an assessment that shipments posed a risk of three disease introductions in backyard (i.e., noncommercial) flocks per 100 importation years (Ministry of Agriculture and Forestry,

Table 8-1—Interventions in the WTO SPS Committee, 1995–2001

	Number of interventions[1] against:					
	FTAA	Europe	Asia	Africa and Middle East	Multiple countries	Total
By:						
FTAA	20	45	17	1	2	85
Europe	25	24	17	3	1	70
Asia	3	12	10	1	0	26
Africa and Middle East	0	5	0	0	1	6
Total	48	86	44	5	4	187

[1]Numbers exclude 'repeat' interventions by members that registered complaints against the same measure more than once.

Source: WTO (c) and author's calculations.

Table 8-2—Interventions in the WTO SPS Committee, by regulatory objective, 1995-2001[1]

	Total		FTAA intraregional	
	Number	Percent	Number	Percent
Food safety	57	30	3	15
Protection from TSEs[2]	50	27	1	5
Plant health	42	22	9	45
Animal health	33	18	7	35
Other concerns	5	3	0	0
Total	187	100	20	100

[1]Numbers exclude 'repeat' interventions by members that registered complaints against the same measure more than once.

[2]Transmissable spongiform encephalopathies.

Source: WTO (c) and author's calculations.

2000). Such policies may be scientifically justifiable, but nonetheless fail cost-benefit tests if they ignore the benefits of imports to domestic consumers.

Provisions in the agreement, which (1) recommend that countries take into account the objective of minimizing negative trade effects, and (2) require that measures be no more trade restrictive than necessary, alludes to a larger role for economics in SPS policy choice. These two provisions clearly do not require SPS measures to be justified by the economic welfare effects on producers, consumers, taxpayers, and industries which use the regulated product as an input, but at least envision consideration of economic factors that extend beyond the potential risk-related costs of imports. Greater gains from trade could be realized if FTAA countries adopted a normative framework which would account for the benefits as well as the potential costs of imports, but requiring (rather than just allowing) countries to do so may be seen as an unacceptable infringement on national sovereignty.

Regionalization. The agreement's regionalization provision is an integral part of a science-based approach to regulating trade, as SPS risks often do not correspond to political boundaries. Regionalization provides countries with an opportunity to export products from areas where animal or plant health risks are considered negligible, thereby benefiting consumers without jeopardizing the agricultural resource base in the importing country. By ensuring that partial eradication or control leads to trade gains, regionalization also provides incentives for additional investments in control measures, so that over time this provision is likely to be of growing importance in international agricultural markets.

The trade effects of regionalization are already evident in the Western Hemisphere. Chile's decision to allow imports of fresh melons and watermelons from all production areas in the United States except Hawaii provides one example of a regional approach to mitigating pest risks (WTOh, 2001). Developing-country exporters have also benefited from regionalization: one prominent example is provided by the United States' 1997 decision to replace its 83-year-old ban on imports of Mexican avocados with measures that allow imports from specified regions of Mexico to the U.S. Northeast (Roberts, 1997). This measure was subsequently amended to extend the length of the shipping season and to increase the number of States that can import Mexican avocados, and U.S. authorities now are considering opening access to all 50 States.

In general, however, farmers and ranchers in developing countries will face more challenges in capitalizing on the regionalization provisions than developed country producers, because exports will be contingent on adequate public sector investments in laboratory, inspection, monitoring, and certification infrastructure. Argentina's recent experience with outbreaks of foot and mouth disease (FMD) illustrates the importance of such investments. The United States and Canada, as well as several other countries, lifted longstanding bans on Argentina's exports of fresh, chilled, or frozen beef in 1997 as the country neared completion of its FMD eradication program. Exports of Argentine beef to the United States reached 45,000 metric tons in 1999, but the following year U.S. market access for the beef was suspended when FMD was detected in animals that had been smuggled across the border. The United States re-opened its market to Argentine beef in December 2000, subject to certification that the beef came from FMD-free regions (along with other requirements). However, recurring outbreaks led the United States and Canada to reinstate their bans in early 2001.

This episode underscores the fact that investments in public sector regulatory infrastructure must be forthcoming if there is to be a return on private sector eradication efforts. It is also evident that national regimes will not work in some cases: trans-border pest or disease controls may be required where there are insufficient natural barriers or when animals (including wildlife) move freely across borders. It is therefore likely that creating or reinforcing regional sanitary and phytosanitary regimes *across* as well as *within* countries will often be necessary to fully realize the gains from trade in the region. Coordination of this sort may be beyond the institutional capabilities of some FTAA countries.

Equivalence. The SPS Agreement requires members to accept other countries' measures as equivalent to their own if an exporter shows that its measures achieve the importer's desired level of SPS protection. This provision recognizes that regulatory flexibility allows countries to allocate scarce resources efficiently rather than identically. The agreement also encourages members to create bilateral and multilateral agreements to foster equivalence.

Equivalence determinations usually involve process standards, since countries can easily compare product standards, which stipulate observable and/or testable attributes of end products. An enormous number—and arguably a growing proportion—of SPS measures are process standards. One of the principal lessons to emerge from 2 decades of environmental regulation is that process standards are generally an inefficient means of achieving regulatory goals. However, food technologists argue that the unique nature of food hazards—which include pathogens (such as *Salmonella*) that can regenerate and cross-contaminate at several points in the production chain—requires regulating production processes to avoid repeated, expensive tests of conformity with product standards (MacDonald and Crutchfield, 1996). Some analysts have challenged this conclusion (Antle, 1996), but process standards continue to emerge as components of risk management programs, notably in Hazard Analysis and Critical Control Point (HACCP) programs, which an expanding number of countries mandate for a growing number of food products. The equivalence obligation therefore theoretically has the potential to yield significant benefits in international markets for products such as cheeses, meats, fresh produce, and seafood for which process standards are key policy instruments for managing microbial risks.

While the SPS Committee has urged members to submit information on their bilateral equivalence agreements and determinations, few have done so (WTOi, 2001). Consequently, there is no systematic accounting of achievements to date. However, experts indicate that such arrangements are still rare (Gascoine, 1999).[6] Numerous regulatory differences remain in contention

[6] Possibly the most prominent equivalence accord has been a veterinary agreement signed by the U.S. and the EU in July 1999, after 6 years of occasionally high-profile negotiations over matters seemingly as minor as the colors of wall paint in food-processing facilities. The veterinary agreement reduces—but does not eliminate—inspection of some $1 billion in EU exports of dairy products, fish, and meat to the United States, and $1 billion in U.S. exports of fish, hides, and pet food to EU countries.

even between countries generally recognized as having rigorous regulatory standards that are rigorously enforced. One example is the 1997 EU ban on U.S. poultry exports: European authorities do not consider the chlorine decontamination used in U.S. poultry processing plants equivalent to lactic acid decontamination.

Developing countries therefore have questioned whether the equivalence obligation will actually provide many export opportunities for them, given the difficulties that developed countries have had in exercising their rights under this provision (WTOj, 1998). A number of equivalence arrangements between developing and developed countries do exist, especially for seafood products. However, developing countries—echoing the claims of developed countries—have argued that developed countries often require "compliance" rather than equivalence of measures. Even developing countries that have had substantial success as agricultural exporters, such as Brazil, Mexico, and Thailand have gone on record to note the difficulties in gaining recognition of equivalence (WTOk, 1999, and WTOl, 2001). Globally, the limited access to developed country markets for poultry meat illustrates the both the potential and challenge of equivalence. Of the 144 countries that are WTO members, only 15 are currently eligible to export fresh, chilled, or frozen poultry meat to the EU, 4 may export to the U.S.,[7] 1 may ship to Canada, and none are allowed to export to Australia.

The United States, with the most lucrative market for developing-country exporters in the Western Hemisphere, has stated that its experience indicates the potential for equivalence may be limited because the actual trade benefits of an equivalence determination or agreement may not justify the administrative burden (WTOm, 2000). The United States has also cautioned that *equivalence* does not imply *mutual recognition*: under the equivalence provisions of the SPS Agreement, market access is contingent on a scientific determination that an exporter's alternative measure achieves the level of SPS protection required by the importer, not on reciprocity.

Multilateral harmonization. The SPS Agreement urges the widest possible harmonization of countries' SPS measures based on internationally recognized standards, and identifies three organizations to promote this objective: the Codex Alimentarius Commission (Codex) for food safety measures, the International Plant Protection Convention (IPPC) for plant health measures, and the International Office of Epizootics (OIE) for animal health measures.

The agreement's endorsement of harmonization stems from repeated complaints by exporters that complying with divergent SPS measures substantially increases the transactions costs of trade. The net benefits of harmonization for exporters will be positive if the resulting revenues exceed the costs of complying with the international standard. These benefits are usually considered large compared to those of regionalization or equivalence, as the former usually permits greater economies of scale in both production and certification. Consumers may also benefit from harmonization if eliminating regulatory heterogeneity among countries lowers prices and expands product choice.

The limits to multilateral harmonization as sound policy prescription is limited by the factors noted earlier for regional harmonization. However, the impact of multilateral harmonization on trade appears to have been constrained as much by the lack of international standards as by normative considerations. The majority of 1995-99 notifications from WTO members stated that no international standard existed for the notified measure (fig. 8-1). The character of international standards as a public good leads to an expectation of under-investment in their creation. This underinvestment leads not only to too few international standards, but also to too many outmod-

[7] In addition to the four countries that are permitted to export fresh, frozen and chilled poultry to the United States (Canada, Great Britain, France, and Israel), some plants in northern Mexico may also re-export U.S.-origin poultry meat to the United States after minimal processing.

ed standards, which may account, in part, for the low adoption rate for those standards that do exist. Partial or full acceptance of international standards as a percentage of total measures notified by income category was highest for the lower-middle income countries (38 percent) followed by high-income (22 percent), lower income (20 percent) and upper-middle income countries (17 percent) (Roberts, Orden, and Josling, 1999).

The nature of international standards is also important in assessing their impact on trade. Over the past decade, the three standards organizations have allocated most of their resources to the development of metastandards, which identify common approaches to risk identification, assessment, and management rather than international standards per se. In fact, the IPPC has not produced any commodity-specific standards, although some are under development. Exporters' anticipated gains from international metastandards may be smaller than from international standards: for example, even if an importing country has used the IPPC standard to determine the pest status of an exporting country, its measures may nonetheless vary from those of other importers. These metastandards have contributed to the trading system by setting out scientific approaches to regulation, not by promulgating product standards that will be identical across adopting countries.

The WTO SPS Agreement and the FTAA Countries

Developed-country exporters, including the United States and Canada, are the strongest proponents of the current balance of rights and obligations in the WTO SPS Agreement. It is clear why. These countries have been able to successfully challenge measures that have no scientific basis while maintaining their own stringent health and environmental standards that reduce verifiable risks to negligible levels. All four cases to advance to the WTO Appellate Body between 1995 and 2002 have been won by the developed-country complainants: the United States and Canada in *EC Hormones*, Canada in *Australia Salmon*, the United States in *Japan Varietal Testing,* and the United States in *Japan Apples* (table 8-3). Developed-country exporters have also been successful in using dispute settlement procedures to achieve their objectives before their complaints reach a WTO panel. For example, Korea agreed to modify its shelf-life measures in response to separate complaints from the United States (primarily for processed meats) and Canada (bottled water) as the result of formal consultations. At the same time, new initiatives in developed countries to improve food safety, such as the U.S. Food Quality and Protection Act (FQPA), have not been challenged in the WTO even though these new policies have resulted in lower imports from some countries.

Although many developing exporters in the region, including Chile, Argentina, and Brazil, have also been able to capitalize on the institutional innovations established by the SPS Agreement, their intermittent success has sometimes been overshadowed by exogenous regulatory trends that not only frustrate attempts to expand exports, but also have reduced trade in some instances. The increasing demand for food safety in developed countries is the most prominent trend; another is increased reliance on process standards that place more responsibility on the regulatory infrastructure of the exporting country than on border inspection in the importing country. A regulation that reflects both of these trends, the U.S. HACCP requirements for meat and poultry, resulted in a loss of market access for five developing countries (FSIS, 1999).[8] Adoption of new

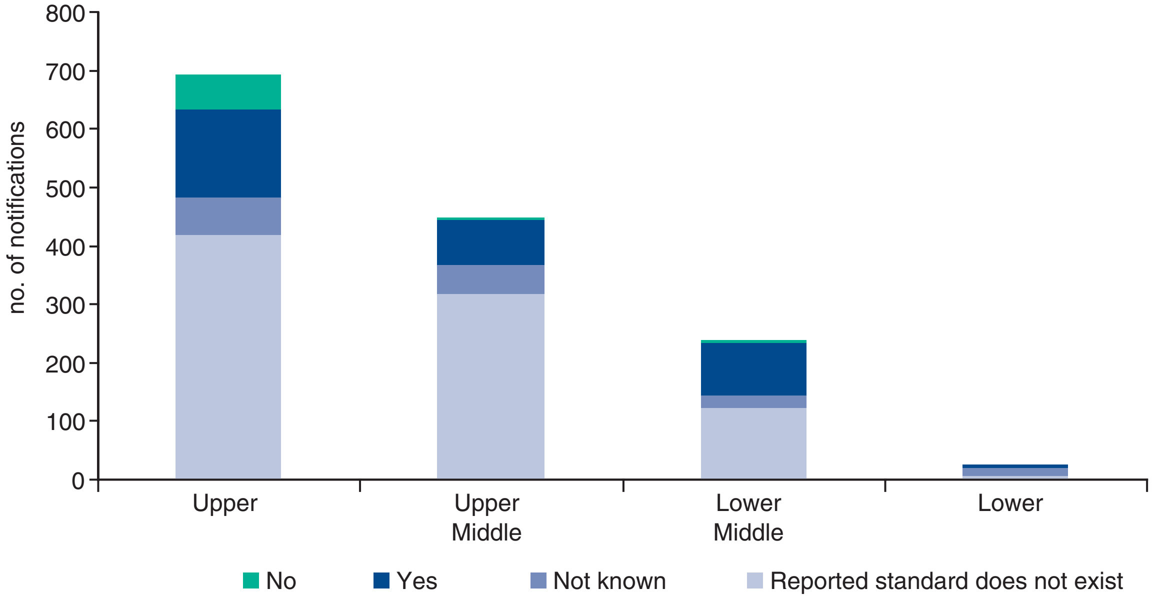
[8] Four countries (the Dominican Republic, Guatemala, Honduras, and Slovenia) were "delisted," which means that they voluntarily delisted all establishments certified for the U.S. market while developing a HACCP program. The U.S. will not accept product from these countries until full documentation is received and evaluated to determine whether the foreign HACCP program meets domestic requirements. Paraguay's eligibility to export to the United States was suspended as it did not implement HACCP requirements or equivalent measures.

Table 8-3—Complaints related to SPS measures that have advanced to formal WTO dispute settlement, 1995-2002

Case Number(s)	Issue	Complainant(s) (*Co-complainants*)	Status
DS 3/41	Korea—produce inspection	United States	Settled
DS 5	Korea—shelf-life requirements	United States	Settled
DS 18/21	Australia—ban on salmon imports	Canada (*EC, India, Norway, US*)	Panel and Appellate Body ruled against Australia. Australia notified its new measures to the WTO.
DS 20	Korea—bottled water	Canada	Settled
DS 26/49	EC—ban on use of hormones	United States and Canada *(Australia, New Zealand, Norway)*	Panel and Appellate Body ruled against EC. Retaliation was authorized by the WTO when the EC failed to change its measures.
DS 76	Japan—varietal testing requirements	United States *(Brazil, EC, Hungary)*	Panel and Appellate Body ruled against Japan. Japan has notified its new measures to the WTO.
DS 96/1	India—quantitative restrictions in imports of agricultural, textile, and industrial products	EC	Settled
DS 100	US—poultry requirements	EC	Pending
DS 133	Slovakia—dairy product imports and transit of cattle (BSE restrictions)	Switzerland	Pending
DS 134	EU– restrictions on rice	India	Pending
DS 137	EU—measures on pine wood nematodes in conifer wood	Canada	Pending
DS 144	US—state restrictions on Canadian trucks	Canada	Pending
DS 203	Mexico—measures affecting trade in live swine	United States	Pending
DS 205	Egypt—import prohibition on canned tuna with GM soyoil	Thailand	Pending
DS 237	Turkey—restrictions on fresh fruit	Ecuador	Panel suspended
DS 245	Japan—apples	United States	Panel and Appellate Body ruled against Japan.
DS 265	Turkey—import ban on pet food	Hungary	Pending
DS 270	Australia—importation of fruits and vegetables	Philippines	Under review by panel
DS 271	Australia—importation of fresh pineapple	Philippines	Consultations

[1]Some 'pending' cases appear to be settled, but settlement has not yet been officially notified to the WTO.
Source: WTO.

Figure 8-1
Notification of adoption of international standards, by income class, 1995-99



Source: Author's calculations from WTO data.

HACCP measures by other developed countries has similarly led to the suspension of developing country exports, particularly seafood (Unnevehr and Hirschhorn, 2000). These countries therefore fear that without more progress on implementing the provisions of the agreement that offer constructive solutions to these challenges, such as regionalization, equivalence and harmonization, their participation in international trade will be further marginalized (WTOj, 1998).

The primary focus of developing importers, on the other hand, is on fulfilling their obligations rather than exercising their rights under the SPS Agreement. They claim that the new obligations (related to requirements for risk assessments, for example) have diverted scarce resources from investments needed to capitalize on the trade opportunities created by other Uruguay Round agreements. This group of importers, including some Central American countries and Caribbean islands in the FTAA region, advocate various forms of increased technical assistance to address their concerns (WTOn 2001; WTOo, 1999).

The varying objectives of these three groups will determine the nexus of interests for a FTAA SPS agreement. The challenge before the SPS negotiators will be to find common ground among those who favor the status quo (developed-country exporters), strengthened commitments to aid market access (developing-country exporters), or increased assistance to live up to current obligations (developing-country importers). The absence of any developed-country net importers (such as Switzerland or Japan) in the Western Hemisphere should simplify the task of reaching consensus on a regional SPS pact. Many developed importers in the WTO have proposed incorporation of the precautionary principle in the current rules to allow more latitude for addressing consumer concerns in SPS regulation, a suggestion that has been strongly opposed by both developed and developing exporters in the Western Hemisphere (WTOp, 2001).

Options for an FTAA SPS Agreement

A regional accord to discipline the use of SPS measures will differ in important respects from the preferential trading arrangements made for tariff and other nontariff barriers within the region. Rules cannot be tailored for specific products of interest to regional trading partners, nor establish preferential schedules for regional exporters to comply with SPS measures. As in a multilateral agreement, a regional agreement consists of a set of rules, applicable to all FTAA countries, that is aimed at reducing the trade distorting aspects of all SPS measures.

If new rules or principles are to be negotiated, it should be recognized that the starting point for the FTAA negotiators will be the WTO SPS Agreement. All FTAA countries, as WTO members, are bound by the provisions in this agreement. The decentralized policing rules of the WTO SPS Agreement therefore establishes a "floor" for any regional rules. Hypothetically, even if FTAA exporters were to agree to relax the equivalence obligation for Western Hemisphere importers, the importers still would be required to recognize the equivalent measures of non-FTAA exporters. Membership in the WTO therefore limits the options of FTAA countries to either existing WTO rules or to "WTO plus" rules that augment trade.

No FTAA country has yet proposed a new addition to the current WTO principles of transparency, science-based risk regulation, national sovereignty, regionalization, equivalence, and multilateral harmonization. Rather, FTAA proposals have ranged from leaving the existing WTO rules intact to making existing rules far more prescriptive (FTAA, 2001). This suggests that differing views on the success or shortcomings of the WTO SPS Agreement does not involve differences over fundamental principles, but rather *implementation* of the current obligations. Although modifying basic treaty rules is favored by those countries who would like to improve implementation of the current obligations, this option has a number of shortcomings. First, making treaty rules more prescriptive is at best a blunt tool for engineering more energetic fulfillment of obligations to achieve region-specific goals or outcomes. Secondly, this option also risks codifying detailed procedures that may be increasingly inappropriate over time. Finally, altering the basic principles of the WTO rules in a regional accord may eventually jeopardize coherence in risk management policy as the multilateral rules evolve over time.

One remedy that can be targeted regionally, and may be especially suitable for a coalition of developed and developing countries (unlike more homogenous regions) is technical assistance. Seven years of experience with the provisions of the WTO SPS Agreement suggest the following options for technical assistance to expand regional trade:

- helping the region's developing countries to eradicate or mitigate pests and diseases in specific regions could yield substantial payoffs, because the complaints raised in the SPS Committee identified animal and plant health measures as the more significant impediments to trade in the hemisphere. Such assistance could be, in effect, extra-territorial investments in biosecurity for importing countries, resulting in increased foreign shipments that benefit domestic consumers without increasing SPS risks that could harm domestic production;[9]

- targeting technical assistance to the strengthening of public sector testing and certification services in the developing countries to speed equivalence determinations or compliance audits by developed country food safety regulators. Technical assistance could also

[9] Some intergovernmental efforts to eradicate animal and plant pests, including Mediterranean fruit flies, screwworm, and FMD are already under way in the region.

be used by developing countries to establish a separate “enclave” food system that meets higher regional standards, while maintaining standards that are more suitable for the domestic market given national preferences, technologies, and endowments;

- using technical assistance to promote the participation of regional developing countries in activities of the international standards organizations. It is important for new participants to recognize that more widespread adoption of international standards may not always increase trade—trading partners that adopt international HACCP standards, for example, may still have different requirements for gaining access to domestic markets, as seen in the poultry meat sector. Nonetheless, the standards organizations are important institutions for development of science-based regulation, and greater participation by developing countries may contribute to the more effective functioning of international markets by increasing the predictability of regulation in these countries; and,

- technical assistance to help the least developed countries in the region come into compliance with their obligations as importers. However, nearly every FTAA country has fulfilled the SPS transparency requirements, the most basic obligation under the WTO SPS Agreement, and the costs and benefits of investment in national risk assessment capabilities for least developed countries needs to be weighed against the costs and benefits of alternative strategies, including adoption of international standards.

Technical assistance is already widely recognized as an effective mechanism for addressing SPS barriers to trade. The WTO SPS Agreement includes an article on technical assistance that states “Members agree to facilitate the provision of technical assistance to other members, especially developing-country members ...”. If FTAA countries choose increased technical assistance as a means of expanding regional trade, they will still have to determine how to best strengthen the current WTO commitment in a regional trade pact. Institutional arrangements will also be an important issue for negotiators. Options include establishment of new regional committees, or use of WTO mechanisms (including existing subcommittees of the Codex Commission, the Office of International Epizootics, and the International Plant Protection Convention) to accomplish FTAA goals. Regardless of the outcome, FTAA policymakers will need guidance on establishing priorities for SPS initiatives in the region. Economic research that could aid in the identification of priority projects currently lags far behind analysis of other trade barriers. Additional investments in multidisciplinary research on SPS measures therefore will be necessary if the objective of increasing regional welfare through trade is to be realized.

References

Animal and Plant Health Inspection Service (APHIS). “SPS Accomplishment Reports,” Washington D.C., various issues, 1997–2000, Washington, D.C.

Antle, John (1996). “Efficient Food Safety Regulation in the Food Manufacturing Sector,” *American Journal of Agricultural Economics*, 78 (5): 1242 - 1247.

Food Safety and Inspection Service (1999). “Equivalence Evaluation of Pathogen Reduction and HACCP Requirements,” December 14, on file with author.

Gascoine, Digby (1999). “Harmonisation, Mutual Recognition and Equivalence: How and What is Attainable,” WHO/FAO Conference on International Food Trade Beyond 2000,” Melbourne, Australia, October.

General Agreement on Tariffs and Trade (GATT). *International Trade*, 1990-91, Volume 1, Geneva, Switzerland.

Free Trade Area of the Americas (2001). Draft Agreement: Chapter 1 (Agriculture), Section Five (Sanitary and Phytosanitary Measures), FTAA.TNC/w/133/Rev.1, July 3 on FTAA website at http://www.ftaa-alca.org.

MacDonald, James and Stephen Crutchfield (1996). "Modeling the Costs of Food Safety Regulation," *American Journal of Agricultural Economics*, 78 (5): 1285-1290.

Ministry of Agriculture and Forestry, 2000. *Import risk analysis: chicken meat and chicken meat products*, Biosecurity Authority, Wellington, NZ, April 7 (on file with author).

Roberts, Donna (1997). "USDA to Lift Import Ban on Mexican Avocados." *Agricultural Outlook*, July: 17-21.

Roberts, Donna (1998). "Preliminary Assessment of the Effects of the WTO Agreement on Sanitary and Phytosanitary Trade Regulations," *Journal of International Economic Law*, 1 (3): 377 – 405.

Roberts, Donna. L. Unnevehr, J. Caswell, I. Sheldon, J. Wilson, T. Otsuki, D. Orden. (2001). *Agriculture in the WTO: The Role of Product Attributes in the Agricultural Negotiations.* Presented at the International Agricultural Trade Research Consortium Annual Membership Meeting in Washington, DC. May 18-20, 2001. Commissioned paper No. 17.

Roberts, Donna, David Orden, and Timothy Josling (1999). "WTO Disciplines on Sanitary and Phytosanitary Barriers to Agricultural Trade: Progress, Prospects, and Implications for Developing Countries," invited paper, Conference on Agricultural and the New Trade Agenda from a Development Perspective, World Bank, Geneva, October.

Sykes, Alan (1999). "The (Limited) Role of Regulatory Harmonization in International Goods and Services Markets," *Journal of International Economic Law*, 2(1): 49–71.

Sykes, Alan O. (1995). *Product Standards for Internationally Integrated Goods Markets*, The Brookings Institution, Washington, DC.

Unnevehr, Laurian, and Nancy Hirschhorn (2000). "Food Safety Issues in the Developing World," World Bank Technical Paper No. 469, World Bank, Wash., D.C.

World Food Chemical News, 2001. "Quarantine laws cited as way to gain market access," September 10, p. 11.

World Trade Organization (WTOa) 1999. "Review of the Agreement on the Application of the Sanitary and Phytosanitary Agreement," G/SPS/12, March 11, on WTO website at http://www.wto.org.

WTO (b) 2001. "Implementation-Related Issues and Concerns–Decision of 14 November," WT/MIN(01)/17, November 20, 2001 on WTO website at http://www.wto.org.

WTO (c). “Summaries of the Meetings of the Committee on Sanitary and Phytosanitary Measures,” Sanitary and Phytosanitary Committee, G/SPS/R series, 1995–2001, on WTO website at http://www.wto.org.

WTO (d) 2001. “Specific Trade Concerns,” Note by the Secretariat, Sanitary and Phytosanitary Committee, G/SPS/GEN/204/Rev.1, March 5, 2001 on WTO website at http://www.wto.org.

WTO (e) 1999 and 2002. “Recommended Notification Procedures,” Sanitary and Phytosanitary Committee, G/SPS/7/Rev.1, November 26, and G/SPS/R/Rev. 2, April 2, on WTO website at http://www.wto.org.

WTO (f) 2001. “Agreement on the Application of Sanitary and Phytosanitary Measures: Proposal by Brazil,” G/SPS/W/108, June 22, on WTO website at http://www.wto.org.

WTO (g). 2001. “Enhancing Transparency: Proposed Changes to The Recommended Notification Proedures,” Submission by New Zealand, G/SPS/W/112, October 15, on WTO website at http://www.wto.org.

WTO (h) 2001. “Notification,” Sanitary and Phytosanitary Committee, G/SPS/N/CHL/56, November 11, on WTO website at http://www.wto.org.

WTO (i) 2001. “Equivalence: Note by the Secretariat,” G/SPS/W/111, July 4, 2001, on WTO website at http://www.wto.org.

WTO (j). 1998. “The WTO SPS Agreement and Developing Countries,” Committee on Sanitary and Phytosanitary Measures, G/SPS/W/93, November 5, on WTO website at http://www.wto.org.

WTO (k) 1999. “Summary of the Meeting Held on 7–8 July, 1999”, Sanitary and Phytosanitary Committee, G/SPS/R/15, October 29, on WTO website at http://www.wto.org.

WTO (l) 2001. “Experience with Recognition of Equivalence: Statement by Thailand,” G/SPS/GEN/242, April 6, on WTO website at http://www.wto.org.

WTO (m) 2000. “Equivalence: Submission from the United States,” G/SPS/GEN/212, November 7, on WTO website at http://www.wto.org.

WTO (n). 2000. “Proposal by Small Island Developing States”,G/AG/NG/W/97, December 29, on WTO website at http://www.wto.org.

WTO (o) 1999. “Development and Adaptation of Sanitary and Phytosanitary Systems in Developing Countries for the Purpose of Complying with Commitments under the Agreement on the Application of Sanitary and Phytosanitary Measures: Statement by Guatemala, December 17, on WTO website at http://www.wto.org.

WTO (p) 2000. “Note on Non-Trade Concerns,” Submission to the Third Special Session of the WTO Committee on Agriculture, G/AG/NG/W/36, September 22, on WTO website at http://www.wto.org.

Appendix 1-1

A CGE Model

The computable general equilibrium (CGE) model used in this chapter is composed of 16 countries or regions linked by trade. There are nine primary agriculture sectors and six processed food sectors; the other sectors in the economy are broadly defined as natural resources, manufacturing, and services.[1] The model data are from the Global Trade Analysis Project (GTAP) version 5, August 2002 update. The model base year is 1997, with results adjusted to 2002 dollars using the U.S. gross domestic product (GDP) deflator (U.S. OMB, 2003).

The model follows the standard neoclassical specification of trade-focused CGE models. Each sector produces a composite commodity that can be transformed according to a constant elasticity of transformation (CET) function into a commodity sold on the domestic market or into an export. Output is produced according to a constant elasticity of substitution (CES) production function in primary factors, and fixed input-output coefficients for intermediate inputs. The model simulates a market economy, with prices and quantities assumed to adjust to clear markets. All transactions in the circular flow of income are captured. Each country model traces the flow of income (starting with factor payments) from producers to household, government, and investors, and finally back to demand for goods in product markets.

Consumption, intermediate demand, government, and investment are the four components of domestic demand. Consumer demand is based on Cobb-Douglas utility functions, generating fixed expenditure shares. Households pay income taxes to the government and save a fixed proportion of their income. Intermediate demand is given by fixed input-output coefficients. Real government demand and real investment are fixed exogenously. Import demand is described by almost-ideal demand system (AIDS) import demand functions.

The model includes three primary factors and associated factor markets: labor, capital, and agricultural land. Land is disaggregated into two types-cereals and oilseeds, and all other land. Full employment for all categories is assumed, and aggregate factor supplies are fixed. In the experiments reported here, we assume that all factors are fully mobile. However, land markets are segmented. Land used in cereals and oilseeds cannot be substituted for land used to produce other crops.

There are three key macro balances in each country model: the government deficit, aggregate investment and savings, and the balance of trade. Government savings are the difference between revenue and spending, with real spending fixed exogenously, and revenue depending on a variety of tax instruments. The government deficit is therefore determined endogenously. Real investment is set exogenously and aggregate private savings are determined residually to achieve the nominal savings-investment balance. The balance of trade for each country (and hence foreign savings) is set exogenously and valued in world prices. Each model solves for the relative domestic prices and factor returns that clear the factor and product markets, and for an equilibrium real exchange rate which brings aggregate export supply and import demand into balance, given the exogenous aggregate trade balance of each country.

The model incorporates budgetary expenditure for 2001 domestic farm programs in the European Union, Japan, Canada and Mexico from the OECD Producer Support Estimate data-

[1] We use the standard global CGE model described in Lewis, Robinson, and Thierfelder (2003).

base for 2001 (OECD, 2002). Data for U.S. farm programs are the annual average of July 2002 projected expenditures under the Farm Security and Rural Investment Act. The model incorporates endogenous farm programs, where applicable, following Burfisher, et al. (2002). In the U.S., loan deficiency payments support floor prices for grains and oilseeds, with payments to farmers increasing when market prices decline below the loan rate. In the EU and Canada, export subsidies are used to clear excess domestic supplies resulting from the EU's fixed intervention prices for grain, oilseeds and livestock, and Canada's price management program for dairy.

Other farm payments are exogenous income transfers to households. These include direct payments and countercyclical payments in the United States, Canada (National Income Stabilization Accounts or NISA payments) and Mexico (PROCAMPO, the Farmers Direct Support Program). Households spend these transfers on consumption, savings and taxes according to the aggregate average propensities described in national accounts data.

The model also includes fixed, per unit ad valorem subsidies to inputs and output. Since the production technology in the model uses fixed input-output coefficients for intermediate inputs, a subsidy to intermediate goods operates like an output subsidy. Subsidies on capital inputs in agriculture lower the costs of capital and attract capital out of non-agricultural sectors.

The model uses data on tariffs and tariff equivalents from various sources. MFN agricultural tariffs for all countries are from the Agriculture Market Access Database (AMAD). AMAD provides tariffs on an ad-valorem basis, including the ad valorem equivalents of specific tariffs. Tariff rate quotas are modeled as ad valorem tariffs using the average of above and below quota tariff rates. AMAD tariffs are aggregated to the GTAP categories using import weights.

This chapter develops a preferential agricultural tariff database for U.S. GSP, ATPA and Caribbean Basin Economic Recovery Act (CBERA) programs, and for Canadian GPT and Caribbean preferences. Preferential tariff data for the U.S. and Canada are from their tariff schedules for 2000, aggregated to GTAP categories using simple averages. In MERCOSUR and Chilean bilateral trade pacts, agricultural tariffs in the model are assumed to be zero, although MERCOSUR, the Andean Community, and other preferential agreements in the Western Hemisphere allow some exceptions to their common external tariffs and zero internal tariffs (Stout and Ugaz-Pereda, 1998). This assumption may therefore lead to an underestimate of the FTAA's effects.

Following de Melo and Robinson (1992), the model incorporates links between the expansion of exports and imports of capital goods between developing and developed countries and technological spillovers that stimulate factor productivity growth in the developing country. Trade is assumed to have a role in stimulating productivity growth through channels that include technology differences among countries, knowledge spillovers, the transmission of ideas, and market expansion that leads to increasing returns to scale and/or Smithian economies of "fine specialization" (as opposed to Ricardian differences in factor proportions). A sectoral export externality links export growth in manufactures to an increase in total factor productivity (TFP) within the sector. An import externality links imports of manufactures with sectoral TFP. Finally, an increase in aggregate exports leads to economy-wide increases in the efficiency of capital inputs. Note, however, the conditions that must be in place for productivity growth to be accelerated are likely to include not only tariff reform, but also factors such as institutional reforms that facilitate investment and trade (Rodrick et al., 2002).

Appendix Table 1-1 A—Change in U.S. agricultural exports due to an FTAA ($U.S. billion)

	Canada	Mexico	C. America & Caribbean	Andean	Argentina	Brazil	Chile	Rest S. America	Total FTAA	Rest of world	World
Rice, raw	0	-2	102	12	0	0	0	0	112	-14	98
Wheat	0	2	22	45	0	0	0	1	70	-11	59
Other grains	-8	-27	56	60	12	1	3	0	98	-7	91
Horticulture	-7	1	34	22	3	10	1	0	65	-30	35
Oilseeds	1	-9	14	29	32	30	1	0	98	-21	77
Other crops	-3	0	66	32	13	21	1	0	129	-39	90
Livestock	-3	-2	19	4	4	3	1	0	26	-33	-7
Meat	-8	-1	77	25	2	4	0	2	102	-52	50
Oils and fats	0	-3	64	67	1	3	2	1	135	-10	125
Dairy prods.	203	-2	25	10	2	3	0	1	242	-10	232
Processed foods	-16	1	171	57	34	45	8	25	325	-110	215
Total agric.	159	-43	649	363	104	121	18	31	1401	-336	1,065

Source: Economic Research Service, USDA.

Appendix Table 1-1 B—Change in U.S. agricultural imports due to an FTAA ($U.S. million)

	Canada	Mexico	C. America & Caribbean	Andean	Argentina	Brazil	Chile	Rest S. America	Total FTAA	Rest of world	World
Rice, raw	0	0	0	0	0	0	0	0	0	8	8
Wheat	1	0	0	0	0	0	0	0	1	0	1
Other grains	34	0	0	0	1	0	3	0	38	4	43
Horticulture	0	5	14	1	1	10	22	0	54	1	55
Oilseeds	0	0	1	0	0	3	0	0	4	0	4
Other crops	1	3	15	5	1	24	2	0	53	2	55
Livestock	27	3	0	0	1	1	0	0	33	13	46
Meat	9	0	1	0	0	2	0	1	13	9	22
Oils and fats	3	0	0	0	0	1	0	0	4	4	9
Dairy prods.	0	0	1	0	4	0	0	1	7	7	13
Processed foods	10	3	279	164	47	91	75	10	679	39	718
Total agric.	86	15	311	171	56	133	102	12	886	88	974

Source: Economic Research Service, USDA.

Appendix Table 1-1 C—Average agricultural tariff rates of FTAA members on imports from Western Hemisphere, by country and commodity

	U.S.	Canada	Mexico	Central America	Andean	Argentina	Brazil	Chile	Rest. S. World
Rice	4.2	0.3	9.0	30.2	16.0	6.8	9.8	3.8	8.5
Wheat	0.9	41.9	15.4	0.6	6.8	2.0	2.3	5.1	0.7
Other grains	0.2	4.4	17.9	4.7	9.4	2.9	3.6	6.5	1.5
Fruits & vegetables	3.8	1.5	13.3	15.8	14.7	9.0	9.0	8.6	10.4
Oil seeds	14.4	0.0	1.5	2.9	6.3	3.7	4.4	7.8	1.2
Raw sugar	0.1	0.0	5.7	1.7	0.4	0.7	1.3	2.1	0.0
Other crops	17.3	2.0	7.6	8.3	8.8	7.7	6.9	8.1	7.0
Livestock	0.6	11.6	7.8	10.2	8.2	4.9	5.8	8.6	5.0
Meat manufacturing	3.6	41.6	40.3	16.7	16.5	9.7	10.5	8.7	11.7
Oils & fats	3.6	4.5	15.7	9.5	15.3	7.3	8.6	7.6	8.9
Dairy manufacturing	34.4	202.4	33.5	23.9	16.7	14.4	15.9	4.8	22.5
Processed sugar	43.6	2.7	1.4	12.5	10.5	9.6	12.0	8.5	10.7
Processed foods	8.2	21.0	16.1	15.2	16.5	13.9	14.9	9.1	15.2
Manufacturing	3.4	4.2	8.9	9.3	11.7	11.0	11.0	8.9	10.9
Average agric. tariff	10.4	25.7	14.2	11.7	11.3	7.1	8.1	6.8	7.9
Ratio ag. to mfg. tariff	3.1	6.2	1.6	1.3	1.0	0.6	0.7	0.8	0.7

Sources: AMAD, U.S. and Canadian 2000 harmonized tariff schedules. Tariff rates include bilateral preferential tariff rates.

Appendix 2-1

Description of Methodology

Econometric Approach. In the not too distant past, most gravity models of international trade were estimated using ordinary least squares, and this approach continues to be applied by many researchers. However, the data sets that describe bilateral trade flows usually lack observations for those instances where trade equaled zero or was not reported. This is particularly true at the commodity level, where the proportion of such observations can be rather high. Since this characterization applies to the database used in this chapter, the modified gravity models here are estimated as tobit models, as presented by Green (pp. 727-729):

(1) $$y^*_{it} = \beta' x_{it} + \varepsilon_{it} ,$$
$$y_{it} = 0 \text{ if } y^* \leq 0 ,$$
$$y_{it} = y^*_{it} \text{ if } y^* > 0 ,$$

where y^*_{it} is latent measure of trade. The observed, dependent variable (y_{it}) equals the log of U.S. exports to country *i* in year *t*, as measured in U.S. dollars.

The number of missing observations in the export data increase as one moves backwards in time through the data set, so the sample is restricted to the 1980-1999 period to ensure that missing observations do not drive the results. In addition, a country's observations are included only if there are at least 10 nonzero observations (out of 14) during 1980-1993 and at least 5 non-zero observations (out of 6) during 1994-99. This evaluation is conducted on a model-by-model basis. Thus, the set of countries included in the model of total agricultural exports is substantially larger than the sets used in the commodity models.

Explanatory Variables. In addition to the intercept, the models in this chapter contain a number of explanatory variables. The log of the importing country's GDP accounts for variations in U.S. exports due to the size of the importing economy. This variable, measured in U.S. dollars, is drawn primarily from the International Monetary Fund's World Economic Outlook Database. GDP data for countries not in this database are from the *Statistical Yearbook of the United Nations*.

Although population estimates are readily available in the World Bank's *World Development Indicators CD-ROM* and the United Nations' *Demographic Yearbook*, the models employed here do not include the log of the importing country's population, a variable that appears in many previous gravity models. This decision is motivated by the fact that the log of population is closely correlated to the log of GDP. According to 1995 data, the correlation coefficient between the two variables is 0.70 for the 127 countries in the sample.

Trade-Agreement Variables. Of primary interest are the explanatory variables that indicate a country's participation in a particular trade agreement (table 2-2). Unlike most previous works, these variables are country-specific in order to address the possibility that the impact of a trade agreement varies among its participants. This possibility is especially strong in the case of NAFTA, which took effect on January 1, 1994, and will complete its implementation phase on January 1, 2008. NAFTA includes three distinct schedules for tariff elimination: a U.S. schedule for Mexican exports, a Canadian schedule for Mexican exports, and a Mexican schedule for U.S. and Canadian exports. Moreover, NAFTA subsumes CFTA and its tariff-elimination schedules for U.S.-Canada trade.

CFTA took effect on January 1, 1989, and its provisions were fully implemented on January 1, 1998. Thus, the first 5 years of NAFTA (1994-98) coincide with the last 5 years of CFTA's tariff-elimination schedule. To distinguish the impact of this latter phase of CFTA's implementation from the agreement's broad influence since 1989, the models include two variables that identify exports to Canada during the CFTA/NAFTA period: CFTA-Canada (1989-1999) and NAFTA-Canada (1994-99).

For Mexico, NAFTA is the extension of a process of unilateral trade reforms that followed the country's accession to the General Agreement on Tariffs and Trade (GATT) in 1986. In the late 1980s and early 1990s, Mexico dramatically reduced its tariffs and opened its economy to foreign direct investment. Import licensing was eliminated for many agricultural products, and tariffs were established well below the 50-percent ceiling established by Mexico's GATT Adhesion Protocol. U.S. exports that benefited from these reforms include beef, pork, sorghum, soybeans, and other oleaginous crops (Rosenzweig Pichardo, 2000). Because Mexico is one of the most important customers for U.S. agricultural products, these reforms may be viewed as a predecessor to NAFTA, somewhat akin to CFTA. For this reason, the models employ two variables to measure trade liberalization's impact on exports to Mexico: Unilateral-Mexico (1989-1999) and NAFTA-Mexico (1994-99). The year 1989 is selected as the beginning of the period covered by Unilateral-Mexico to account for the piecemeal implementation of the reforms over a long period, as well as the fact that key agricultural trade reforms were implemented after 1989.

All four variables listed above are hypothesized to have a positive impact on U.S. agricultural exports, as these measures have provided the United States with substantially freer access to the Canadian and Mexican markets. In contrast, the process of regional integration in South America may have positive or negative effects on U.S. exports. Argentina, Brazil, Paraguay, and Uruguay created MERCOSUR through the Treaty of Asunción, which took effect on November 29, 1991. By progressively eliminating most tariff barriers within the common market, MERCOSUR provides its members with preferential access to each other's markets. Since the United States is not part of MERCOSUR, this process may divert potential U.S. exports from the common market.

However, MERCOSUR also provides for a common external tariff ranging from zero to 20 percent towards non-member countries. In many instances, this tariff is substantially lower than the tariff previously applied by the individual MERCOSUR countries. Thus, its implementation may spur additional U.S. exports to the common market. In addition, Chile and Bolivia became associate members of MERCOSUR in 1996 and 1997, respectively. This means that they share in MERCOSUR's project of internal trade liberalization but do not apply the common external tariff.

To gauge MERCOSUR's impact on U.S. exports, four variables identify exports to particular MERCOSUR countries following the common market's creation: Argentina/1991-99, Brazil/1991-99, Paraguay/1991-99 and Uruguay/1991-99. Four more variables (Argentina/1994-99, Brazil/1994-99, Paraguay/1994-99, and Uruguay/1994-99) indicate exports to these countries during 1994-99. This latter group of variables is intended to capture the additional effect associated with the progressive reduction of tariffs within MERCOSUR, as well as NAFTA's possible influence on U.S. exports to MERCOSUR. Finally, two variables (Bolivia/1997-99 and Chile/1996-99) identify exports to Bolivia and Chile following their becoming associate members of MERCOSUR.

The coefficient for each trade-agreement variable measures the shift in the intercept associated with the observations denoted by that variable. As an example, consider the results for CFTA-Canada in the model of total agricultural exports (table 2-3). The coefficient for this variable

(0.3758) equals the difference between the expected value of the latent trade variable y_{it}^* when CFTA-Canada equals zero and the expected value of y_{it}^* when CFTA-Canada equals one.

Expected Value of the Dependent Variable. Following Green (p. 728), the expected value of the dependent variable (the log of exports to country *i* in year *t*) equals

$$(2) \qquad E[y_{it} \mid x_{it}] = \Phi\left(\frac{\beta' x_{it}}{\sigma}\right)\left(\beta' x_{it} + \sigma\lambda_{it}\right),$$

where

$$\lambda_{it} = \frac{\phi(\beta' x_{it} / \sigma)}{\Phi(\beta' x_{it} / \sigma)}$$

and σ is the model's scale parameter.

By subtracting the model's coefficient for Unilateral-Mexico (0.4987) from $\beta' x_{it}$ and then substituting this difference for $\beta' x_{it}$ in equation (2), one may calculate the expected value of U.S. agricultural exports to Mexico during 1989-1993 when Unilateral-Mexico is held equal to zero. Similarly, for corresponding exports during 1994-99, one may calculate the expected value when Unilateral-Mexico and NAFTA-Mexico are held to zero by also subtracting the coefficient for NAFTA-Mexico (0.3892) from $\beta' x_{it}$ when re-calculating the equation. This technique provides the basis for a simple simulation of what the value of U.S. agricultural exports to Mexico would have been in the absence of NAFTA and Mexico's unilateral reforms.

Appendix 2-2

The International Bilateral Agricultural Trade Database

The export data for the models are drawn from the International Bilateral Agricultural Trade (IBAT) database. This unique statistical resource, developed by Mark J. Gehlhar of ERS, reflects an innovative effort to choose among the competing trade statistics reported to the United Nations. Given the trade statistics reported by two countries, the IBAT database includes the figures from the country with the larger share of reported trade that matches the reported trade of its trading partners. This evaluation is conducted on an annual basis at the 4- and 5-digit level of the Standard Industrial Trade Classification (SITC). Countries in the sample are listed in appendix table 2-1.

A relatively simple example from Argentina-Brazil trade helps to illustrate this process. As reported to the United Nations, the official statistics of Argentina and Brazil contain incompatible measures of Argentine wheat exports to Brazil in 1995. This trade equaled $662 million according to Argentina, but just $4 million according to Brazil. Fortunately, the entire body of statistics reported by Argentina, Brazil, and their trade partners provides insight into the general reliability of the two countries' trade reports. With this information, one may calculate a "Reliability Index" for Argentina's wheat export data and for Brazil's wheat import data for 1995. This index is defined as the proportion of a country's reported trade that matches the statistics of its partners. Then, the statistic with the higher Reliability Index is included in the IBAT database. With the assistance of a computer, this decision rule can be elegantly applied to all the bilateral trade data reported to the United Nations—commodity by commodity, year by year, and country by country.

Consider first the wheat export data of Argentina (appendix table 2-2). A match is defined as having occurred when Argentina's reported exports to country *i* equal the imports from Argentina reported by country *i*, plus or minus 20 percent. Eight of Argentina's reported bilateral export flows qualify as matches, for a total of $128 million. This value forms the numerator of the Reliability Index. The denominator equals the sum of Argentina's reported export flows where both Argentina and the importing country report some non-zero level of trade ($128 million + $797 million = $925 million), minus the value associated with the largest proportionate discrepancy ($662 million). In this instance, Brazil is the country with the largest discrepancy. Thus, the denominator equals $263 million ($925 million - $662 million), and the Reliability Index for Argentina' wheat export statistics for 1995 equals 0.49.

Next, consider the wheat import data of Brazil. For 1995, Brazil reported wheat imports from only two sources: Argentina ($4 million) and Paraguay ($1 million). A match occurs when Brazil's reported imports from country *i* equal the exports to Brazil reported by country *i*, plus or minus 20 percent. Neither figure qualifies as a match, so the Reliability Index for Brazil's wheat import statistics for 1995 is zero. Since 0.49 is greater than zero, the IBAT database records Argentine wheat exports to Brazil in 1995 as $662 million, not $4 million.

With respect to U.S. trade, the IBAT database primarily uses information provided by the United States, which has the higher Reliability Index in most face-to-face comparisons. But U.S. data are not used on every occasion. Appendix table 2-3 lists the proportion of observations in the IBAT database that were reported by the United States for the 32 commodity categories featured in the commodity models. Among these commodities, grapes have the highest proportion of U.S. observations (0.767) and sunflower seed oil has the lowest (0.519). The median proportion is 0.6485,

Appendix Table 2-1—Countries appearing in sample

Algeria	Guinea	Peru
Angola	Guyana	Philippines
Argentina	Honduras	Poland
Australia	Hong Kong	Portugal
Austria	Hungary	Qatar
Bahamas	Iceland	Romania
Bahrain	India	Samoa
Bangladesh	Indonesia	Saudi Arabia
Barbados	Ireland	Senegal
Belgium and Luxemburg	Israel	Seychelles
Belize	Italy	Sierra Leone
Benin	Ivory Coast	Singapore
Bermuda	Jamaica	Solomon Islands
Bolivia	Japan	Somalia
Brazil	Jordan	South Africa Customs Union (5)
Brunei Darsm	Kenya	Soviet Union, former (6)
Bulgaria	Korea	Spain
Burkina Faso	Kuwait	Sri Lanka
Cameroon	Lebanon	St. Kitts, Nevis, and Anguilla
Canada	Liberia	Sudan
Central African Republic	Macau	Suriname
Chile	Madagascar	Sweden
China, mainland	Malaysia	Switzerland
Colombia	Mali	Syria
Congo	Malta	Taiwan (7)
Costa Rica	Mauritania	Tanzania
Cyprus	Mauritius	Thailand
Denmark	Mexico	Togo
Dominican Republic	Morocco	Trinidad and Tobago
Ecuador	Mozambique	Tunisia
Egypt	Myanmar	Turkey
El Salvador	Nepal	Uganda
Equatorial Guinea	Netherlands	United Arab Emirates
Ethiopia, former (1)	Netherlands Antiles (3)	United Kingdom
Fiji	New Caledonia (4)	United States
Finland	New Zealand	Uruguay
France (2)	Niger	Venezuela
Gabon	Nigeria	Yemen
Gambia	Norway	Yugoslavia, former (8)
Germany, united	Oman	Zaire
Ghana	Pakistan	Zambia
Greece	Papua New Guinea	Zimbabwe
Guatemala	Paraguay	

(1) Djibouti, Ethiopia, and Eritrea
(2) Also includes French Guiana, Guadeloupe, Martinique, and Reunion
(3) Curacao, Aruba, and Turks and Caicos Islands
(4) Also includes Wallis and Futana Islands
(5) Botswana, Lesotho, Namibia, South Africa, and Swaziland
(6) Armenia, Azerbaijan, Belarus, Estonia, Georgia, Kazakshtan, Kyrgyzstan, Latvia, Lithuania, Moldova, Russian Federation, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan
(7) Asia, not elsewhere specified
(8) Bosnia-Herzogovia, Croatia, Slovenia, Macedonia (Skopje), and Yugoslavia

Appendix Table 2-2—Competing reports of Argentine wheat exports, 1995

Importing Country	Reported Exports (x)	Reported Imports (m)	m / x
	$U.S. thousands		
Exporter reports no trade			
Egypt	0	3,687	n.a.
Greece	0	3,231	n.a.
Italy	0	1	n.a.
Switzerland	0	169	n.a.
Importer reports no trade			
Angola	943	0	0.00
Bangladesh	4,534	0	0.00
Iran	25,754	0	0.00
Kenya	35,926	0	0.00
Mozambique	6,603	0	0.00
Netherlands	20	0	0.00
Tanzania	2,556	0	0.00
Yemen Rep.	4,016	0	0.00
Total, non-reporting importers (A)	80,352		
Both countries report trade, large discrepancies			
Bolivia	879	2,129	2.42
Brazil	661,878	4,457	0.01
Chile	21,289	28,232	1.33
Colombia	10,110	14,736	1.46
Indonesia	60,549	94,750	1.56
Jordan	26,971	14,218	0.53
Paraguay	11,417	5,934	0.52
Reunion	108	142	1.32
Spain	6	8	1.40
Zimbabwe	3,533	9,183	2.60
Total, large discrepancies (B)	796,740		
Both countries report trade, small discrepancies			
China	34,176	39,705	1.16
Germany	6	7	1.09
Malaysia	657	791	1.20
Peru	71,243	85,564	1.20
South Africa	6,399	5,218	0.82
Turkey	7,250	8,482	1.17
Uruguay	122	139	1.14
Venezuela	8,429	7,164	0.85
Total, small discrepancies (C)	128,282		
Total exports (D = A + B + C)	1,005,374		
Total, non-reporting importers (A)	80,352		
Observation with largest proportionate discrepancy (B*)	661,878	(Brazil)	
Qualified reported exports (E = D - A - B*)	263,144		
Total, small discrepancies (C)	128,282		
Reliability Index (RI = C / E)	48.8		

Source: Economic Research Service.

Appendix Table 2-3—Proportion of observations in IBAT database that were reported by the United States, U.S. exports, 1980-99, by commodity (number of observations reported by United States divided by total observations)

Beer	0.586	Pork (fresh or frozen)	0.760
Cheese	0.519	Poultry (fresh or frozen)	0.583
Distilled alcoholic beverages	0.592	Milk and cream	0.548
Cotton	0.649	Edible nuts	0.609
Flowers and foliage (cut)	0.671	Plants and bulbs (live)	0.715
Fruit or vegetable juice	0.731	Prepared breakfast food	0.666
Apples (fresh)	0.621	Soda and bottled water	0.706
Grapes (fresh)	0.767	Soybean oil	0.597
Corn	0.648	Soybeans	0.596
Rice	0.567	Sunflower seed oil	0.514
Wheat	0.549	Tobacco (unmanufactured)	0.753
Peanuts	0.723	Tobacco products	0.600
Leather	0.545	Tomatoes	0.708
Live poultry	0.588	Legumes	0.647
Macaroni	0.746	Wine	0.714
Beef (fresh or frozen)	0.738	Yarn and thread	0.603

Source: Economic Research Service.

which is the average of the proportions for corn (0.648) and cotton (0.649). The possibility that as many half of U.S. trade reports for certain commodities could be inferior to the reports submitted by U.S. trade partners provides strong justification of the IBAT database's selective approach.

Appendix 3-1

It is no easy task to even approximately measure the protective effect of a country's tariff schedule by collapsing it into a single measure such as a mean. Undeterred by this difficulty, economists have devised numerous ways to estimate tariff means. At the same time, most caution against interpreting these measures as an expression of the restrictive effect of duties on trade flows. The most common procedures generally used involve either calculating a simple average of all tariffs or assigning weights to tariffs before averaging.

The main problem with simple averages is that they fail to distinguish between "important" and "unimportant" tariffs, even though the relative importance of individual tariff lines in a country's tariff schedule differs considerably. In the U.S. agricultural tariff schedule, for example, imports in 2001 ranged from a high of $2.3 billion under the national tariff line for beer from malt to just $330 under one of the over-quota national tariff lines for long-staple cotton. Across the 1,754 agricultural tariff lines within the U.S. schedule, 238 registered no imports at all in 2001. Many of these items faced tariffs in excess of 100 percent. Despite its limitations, the simple average is often used because it is relatively easy to compute and understand.

The common alternative to a simple average involves assigning weights to each line in an effort to emphasize certain tariffs over others. The most commonly used weighting scheme assigns weights based on the value of a country's imports at each tariff line. This would be equivalent to dividing the value of total imports by the total duty collected, if all imports were assessed the rate in question. This approach has repeatedly been shown to provide biased results, since low tariffs tend to be associated with high imports and thus large weights, while high tariffs tend to restrict or prohibit imports and thus have small or zero weights. In addition, countries often apply different tariffs based on the country of origin due to free trade agreements or the extension of tariff preferences under nonreciprocal programs such as the Generalized System of Preferences (GSP). Thus, the information conveyed by a tariff mean calculated using an importer's MFN rates may have no value to a trading partner that faced preferential rates.

To remedy these deficiencies, Sandrey uses the Relative Tariff Ratio Index (RTR) to measure and compare relative levels of tariff protection between trading partners. The RTR first matches an exporter's trade to an importer's tariffs, using the exporting country's total exports as the weighting scheme. This provides a practical way of distinguishing between "important" and "unimportant" tariffs in the schedules of each of the exporter's trading partners.

In order to calculate an RTR, one would, of course, need comparable data between one partner's exports and the other partner's tariffs. Unfortunately, these data do not necessarily exist at the tariff-line level, when a country has bound its tariff at a level more precise than the HS 6-digit level. Tariff schedules across countries use identical HS nomenclatures for categorizing duties up to the 6-digit level. Beyond the 6-digit level, however, commodity definitions vary from country to country, making specific comparisons across countries impossible. In our calculations, we used trade data for the 3-year period, 1998-2000, from the United Nations Trade Database, a collection of trade statistics reported by member countries to the United Nations. Agricultural trade is aggregated into 682 HS-6 categories. Because the HS-6 categories are less detailed than many country's tariff schedules, it was necessary to first average tariffs to the HS-6 level. This was done via a simple average. We then calculated weights based on the value of each exporting country's total exports at the HS-6 level during the 1998-2000 period.

These weights were then used to calculate a unique average tariff for each set of trading partners. This was done by weighting each of the importing country's average tariffs at the HS-6 level by the proportion of the exporting country's total exports accounted for by products found in that HS-6 category. For example, assume country A's only export was wheat, while country B's only exports were wheat and soybeans, and each accounted for 50 percent of the total export value. If both countries had a tariff of 20 percent on wheat and zero on soybeans, then country A would face an average tariff of 20 percent in country B, while country B would face an average tariff of 10 percent in country A. Even though both countries have over 600 HS 6-digit average tariffs, the only tariffs that factor into the calculation of the importing country's average are those on products the trading partner is exporting.

While we find this method of weighting tariffs appealing because it avoids the problem of restrictive tariffs getting little or no weight, like all methods, it is not without its potential drawbacks. The weighted tariff averages calculated using this methodology are biased in favor of products that the exporting country is actually exporting, rather than those it might potentially export. One may argue, however, that given the mercantilist view that most governments bring to trade negotiations, actual exports tend to be more influential than potential ones when individual tariff barriers are considered. The reality is that actual trade is known beforehand, while potential trade can only be estimated after factoring in changes in tariffs. The measure also does not account for demand differences across individual importers. Products that a country does not export in large amounts, but for which potential import demand in an individual importing country may be relatively large, will receive low weights. One also runs the opposite risk of giving large weight to products that in certain countries may not have any import potential due to a lack of consumer demand for reasons related to individual tastes and preferences, religious restrictions, or public health concerns.

Tariffs used in the calculations included the final bound MFN tariffs scheduled by WTO members and the actual tariffs applied to trade. To the extent possible, all non ad valorem duties have been expressed in ad valorem equivalents, which are needed for the calculations. The final tariff bindings reflect the rate that will be effective after phased implementation of Uruguay Round tariff cuts. As a general rule, developed countries phased in their tariff schedules during the period 1995-2000. Developing countries began phasing in their tariff reductions in 1995 as well, but have until 2004 to complete implementation. In cases where developing countries applied tariffs that were unbound, they had the flexibility to offer ceiling bindings on these products. These ceiling bindings were exempt from the reduction commitments, so the final bound tariff would take effect in 1995.

For the United States, the applied tariffs differ from the MFN bound tariffs depending on whether the country is a NAFTA partner or whether it qualifies for one of several nonreciprocal trade preference programs, such as the GSP, the CBERA, and the ATPA. Likewise, the tariffs the United States faces in other countries can differ from the bound rates if a country applies a lower MFN rate in practice. The only preferential rates the United States faces in the hemisphere in 2001 were those negotiated through NAFTA.

Appendix 4-1

The U.S. Sugar Baseline Modeling Framework

USDA releases its U.S. sugar baseline projections at the annual Agricultural Outlook Forum held each February. Baseline projections are a conditional scenario based on specific assumptions about macroeconomics, agricultural policy, weather, and international developments. All commodity baselines incorporate provisions of the Farm Security and Rural Investment Act of 2002 (2002 Farm Act) and assume that its provisions remain in effect throughout the projections period. Additionally, the U.S. sugar baseline incorporates the provisions of the URAA and the NAFTA.

The USDA sugar baseline model currently projects supply, use, and prices out through 2011. The production sector includes sugarcane-producing areas of Florida, Louisiana, Texas, Hawaii, and Puerto Rico. The sugar beet-producing areas include the Great Lakes region (Michigan and Ohio), the Red River Valley (Minnesota and eastern North Dakota), the Upper Great Plains (Montana, northwestern Wyoming, and western North Dakota), the Central Great Plains (Colorado, Nebraska, southeastern Wyoming), the Northwest (Idaho, Washington State, eastern Oregon), and the Far West (California, central Oregon). Acreage allocation decisions are modeled as functions of grower prices relative to alternative crop prices.[1] Crop yield projections are based on observed trends. Regional sugar yield per-acre projections are based on econometric analysis of the relationship between sugar yields and crop yield developments and yearly trend improvements that capture technical improvements in each region.

Sugar production differs from other field crops in that it requires extensive processing to be put in a form that is marketable. Unless processing facilities are close to cropping acreage, it is uneconomical to grow sugar crops. In the baseline model, adjustments to processing capacity are a function of the margin between predicted sugar prices and the average sugar price necessary for processors to cover variable costs. Within a producing region, it is assumed that there is a normal distribution of costs about point estimates reported by USDA.[2] If the margin drops to zero, the modeling specification indicates the exit of half of processing capacity from that region. It is further assumed that capacity reductions are irreversible; that is, there is a very high cost of reopening closed facilities.

Sweetener demand is composed of end use demands by the beverage and food-processing industries, nonfood demanders, and households or nonindustrial users. Commodity coverage includes not only sugar but also high-fructose corn syrup. In recognition of the importance of NAFTA, the USDA sugar baseline model includes a Mexican sweetener component. Particular attention is placed on modeling how much exportable sugar surplus Mexico possesses throughout the projections period. Substitution tradeoffs in Mexico between sugar and HFCS are of particular modeling concern because of the potential of HFCS to displace sugar, especially in beverage end uses.

[1] See "Calculation of Real Price Indices for U.S. Sugar Crops," in Sugar and Sweetener Situation and Outlook. SSS-229, Sept. 2000.

[2] See www.ers.usda.gov/farmincome for costs of processing for cane and beet sugar.

Appendix 5-1

Equations (1) and (2) depict the decision process. For each orange juice f = frozen concentrate and n = not-from-concentrate in each importing country (i, j, or k), consumers demand the

$$(1) D_f^{ij} = a_f^{ij} + \sum_k b_f^{ijk} P_f^{ijk} + c_f^j \, avgP_n^j$$

$$(2) D_n^{ij} = a_n^{ij} + \sum_k b_n^{ijk} P_n^{ijk} + c_n^j \, avgP_f^j$$

where D_f^{ij} and D_n^{ij} represent country i's demand for concentrate produced in country j for all i's and j's. P_f^{ijk} and P_n^{ijk} are market prices inclusive of import tariffs where relevant. (When $j = k$ the price represents the own price of demand and when $k \neq j$ the price represents cross prices.) In addition, demand depends on the average consumer price, avg P_n^j or avg P_f^j (weighted by value of the domestic and import shares in the base equilibrium), of the substitute product, which is either n or f. Other demand shifters such as income and population growth are assumed fixed.

The supply of product n and f is a function of its own and cross prices:

$$(3) S_f^j = a_f^j + b_f^j P_f^j + d_f^j P_n^j$$

$$(4) S_n^j = a_n^j + b_n^j P_n^j + d_n^j P_f^j$$

Where P_f^j and P_n^j are prices in the producer's domestic market. We assume producers of frozen concentrate and NFC base their production decisions on own and cross prices. Other supply shifters such as juice yields are assumed fixed.

Also, prices of imported products deviate from domestic prices depending on transportation costs (*TC*) and whether there are any tariffs (τ). In particular, we specify tariffs as ad valorem equivalents:

$$(5) P_f^{ij} = P_f^j (1 + \tau_f^{ij}) + TC_f^{ij}$$

$$(6) P_n^{ij} = P_n^j (1 + \tau_n^{ij}) + TC_n^{ij}$$

for all i where $i \neq j$ in equations 5 and 6.

World markets clear when net trade of juice across all countries equals 0:

$$(7) \sum_i T_f^{ij} = S_f^j - \sum_i D_f^{ij}$$

$$(8) \sum_i T_f^{ij} = S_n^j - \sum_i D_n^{ij}$$

domestically produced juice (either f or n) and similar but not identical foreign produced juices.[1]
The linear consumer demand functions can be expressed as:
The equilibrium solution reproduces all prices and quantities observed circa 1999. We call this our base solution that is assumed to be a longrun equilibrium. When tariffs are reduced or removed, the model generates a new equilibrium by recalculating domestic supply and demand

[1] Brazil and Mexico's demand functions are specified with domestic price as the only right-hand-side variable since imports are limited.

levels, re-balancing world trade, production, consumption, and prices in the process. The pattern of prices and quantities observed in the base solution can then be compared to the pattern that emerges from the simulation exercise.

The model requires own- and cross-price elasticity estimates for the supply and demand equations. We specified the overall demand elasticities equal to –0.4 (table 5-11). This is in line with demand elasticity estimates found in the recent literature (Zabaneh, 1999; Goodrich and Brown, 1999). Our search of the literature did not find estimates of cross-price elasticities between U.S. and Brazilian products, supply elasticities, or elasticities of substitution or transformation. Thus, these estimates are based on our understanding of the industry and markets. The elasticity of substitution between NFC and FCOJ was set equal to –1 (in countries that consume both juices). The small size of the elasticity of substitution between NFC and FCOJ is based on the observation that industrialized consumers perceive NFC to be a relatively higher quality product and that consumers would be reticent to substitute for FCOJ. We assume a high elasticity of substitution (-5) between juice from different countries and the domestic product. Given the limited empirical evidence and lack of data for estimation, we specified the values of the fundamental parameters of the model to be equal across countries.

We assumed supply to be inelastic (0.3 for the United States and the European Union and 0.5 for Brazil, Mexico, and rest-of-world). With orange juice being a derived product from oranges, and orange trees generally having a commercial life span of approximately 25 to 30 years, there is likely to be little production responsiveness to yearly price movements resulting from trade liberalization. Over a longer time period (several years) orange growers can adjust the planting of orange trees commensurate with market conditions. Depending on the age distribution of trees and alternative uses of the land, the adjustment period may take longer or shorter. We define the long run as a time period sufficient to allow orange growers to adjust plantings and enter or exit the industry.

The remaining model parameters are calculated based on the assumptions of weak separability and homotheticity for the demand side and from a similar representation of the individual firm's profit maximization problem for the supply side and stylized facts about the juice market for the 1998-2000 marketing years (Florida Department of Citrus, 1997; U.S. Dept of Agriculture, 2000a). This approach follows the methodology described in Alston and James (2002).

Appendix 7-1

The U.S. Agriculture Sector Mathematical Programming Model (USMP)

To consider the effects of trade liberalization on U.S. agriculture's environmental performance the latter, we employ USMP, a regional model of the U.S. agricultural sector. USMP is a comparative-static, spatial and market equilibrium model of the type described in McCarl and Spreen (1980). The model incorporates agricultural commodity, supply, use, environmental emissions and policy measures. The model has been applied to study various issues, such as design of agri-environmental policy (Claassen et. al., 2001), regional effects of trade agreements (Burfisher et al., 1992), climate change mitigation (Peters, et al., 2001), water quality (Ribaudo et al., 2001; Peters et al., 1997), irrigation policy (Horner, et al., 1990), ethanol production (House et al., 1993), wetlands policy (Heimlich et al., 1997; Claassen et al., 1998), and sustainable agriculture policy (Faeth, 1995).

USMP estimates equilibrium levels of commodity price and production at the regional level, and the flow of commodities into final demand and stock markets. Geographic units consist of 45 model regions within the United States based on the intersection of the 10 USDA Farm Production Regions and the 25 USDA Land Resource Regions (USDA, SCS, 1981). Within each region, highly erodible land (HEL) is distinguished from non-HEL. Twenty-three inputs (e.g., nitrogen fertilizer, energy, labor) are included, as are 44 agricultural commodities (e.g., corn, hogs for slaughter) and processed products (e.g., soybean meal, retail cuts of pork). Crop production systems are differentiated according to rotation, tillage, and fertilizer rate. Production, land use, land use management (HEL, non-HEL, crop mix, rotations, tillage practices), and fertilizer applications rates are endogenously determined. Substitution among the production activities is represented with a nested constant elasticity of transformation function. Parameters of the nested-CET function are specified so that model supply response at the national level is consistent with supply response in the USDA's Food and Agriculture Policy Simulator (Salathe et al., 1982), an econometrically estimated national level simulation model of the U.S. agriculture sector.

Major government agricultural programs, chiefly the Production Flexibility Contract Program (PFCP), the Conservation Reserve Program (CRP), and conservation compliance also are represented. The most important of these for this analysis is conservation compliance, which limits expansion of production onto HEL by requiring producers to forego FCP and CRP payments when bringing new HEL into production without implementing an approved conservation system.

On the demand side, domestic use, trade, ending stocks and price levels for crop and livestock commodities and processed or retail products are determined endogenously. Trade is represented with excess demand and supply curves, with the assumption that there is no policy response by the rest-of-world to U.S. environmental policies. Hence, trade volumes respond to changes in prices.

For this analysis the USMP model is calibrated to projected crop and livestock supply, demand, production, acreage, government program, input cost and other conditions for 2005. U.S. agriculture sector conditions in 2005 come from the USDA Baseline. Costs of production for crop production activities and livestock enterprises are based on ERS 1996 cost-of-production budgets (USDA, ERS, 1996). The costs are then indexed to the USDA Baseline projections of variable costs for 2005.

With data from U.S. Department of Agriculture (USDA) production practice surveys (Padgitt et al., 2000), the USDA Long-Term Agricultural Baseline (USDA, WAOB, 1998), the National Resources Inventory (USDA, SCS, 1994), and the Environmental Policy Integrated Climate model, or EPIC (formerly known as the Erosion Productivity Impact Calculator) (Williams et al., 1990), USMP is used to estimate how changes in environmental or other policies affect U.S. input use, production, demand, trade, world prices, and environmental indicators.

Environmental indicators include soil erosion, losses of nitrogen and phosphorous to ground and surface water, volatilization and denitrification of nitrogen, nitrogen runoff damage to coastal waters and erosion damage.[1] [2] Environmental emissions for each crop production activity were obtained from simulations of the production activities using EPIC. EPIC utilizes information on soils, weather, and management practices, including specific fertilizer rates, and produces information on crop yields, erosion, and chemical losses to the environment. For the simulations management practices and initial fertilizer application rates were set consistent with agronomic practices for the 45 regions as reported in the USDA's Cropping Practices Survey (a predecessor of the Agricultural Resource Management Survey). Yield and environmental indicators—such as, nitrogen losses and erosion—were then estimated by running each of the cropping systems represented in USMP through EPIC. Take, for example, the process of constructing USMP's erosion indicator. In the first step, yields were obtained by running EPIC for 7 years for each crop in the rotation with erosion rates set at zero and the distribution of rainfall and temperature set to match reported rainfall and temperatures for the seven-year period from 1989-1995 for each region. Erosion rates were set at zero to ensure that the yields were a function of weather and not of losses in soil productivity. Average yields by crop for each region were calculated from county data from USDA's National Agricultural Statistical Service (NASS) for this same time period and used to evaluate EPIC's performance in simulating crop growth. EPIC-based average yields by crop and region came within 10 percent of average reported yields for these crops and regions over the 7-year period. The environmental indicators were then obtained by running the systems through EPIC with erosion rates set at zero for a period of 60 years. This permitted the systems to be run through two complete cycles of the weather distribution, removing the effect of particular weather patterns on the results. For the estimation of nitrogen losses, a similar two-step process was repeated for nitrogen application rates representing 10-, 20-, 30-, 40-percent reductions from their initial values.

In USMP, economic values have been linked to several of the environmental indicators. With regards to onsite values, agricultural soil erosion results in agricultural productivity losses, polluted air from wind erosion, and off-site costs attributed to water pollution. The loss of productivity stems primarily from the loss of topsoil and nutrients. The USMP's soil-depreciation indicator is the discounted value of long-term yield changes due to this loss, and is based on current output prices.

Estimates of the monetary value of offsite damages are derived from sediment and nitrogen damage indexes developed by the USDA (Claassen et al., 2001; Ribaudo, 1986; Feather et al., 1999). Amenities included in the indexes are municipal water use, industrial uses, irrigation ditch maintenance, road ditch maintenance, water storage, flooding, and soil productivity, fresh water-based recreation, navigation, and estuary-based boating, swimming, and recreation. This

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[1] Denitrification is the process by which nitrogen is released to the atmosphere due to bacterial action in wet and compact soils and volatilization occurs when fertilizer applied releases directly to the environment. The sum of these is the USMP indicator "nitrogen loss to the atmosphere."

[2] For information on the environmental impacts of agriculture, see the ERS Briefing Room on Conservation and Environmental Policy (ERS, 2001) as well as the Briefing Room on Global Climate Change (ERS, 2000).

set of amenities is by no means an exhaustive list of all amenities affected by sediment and nitrogen runoff, let alone that the impacts of the other environmental indicators have not been monetized yet. Hence, the monetized estimates of offsite damage calculated by USMP here—the value of nitrogen loss to water and the value of sheet and rill erosion damages—should be viewed as a lower bound on total offsite damages.

Of course, while USMP does contain some of the important agri-environmental indicators, the set is by no means complete. One example of an omitted indicator is emissions of pollutants associated with fuel usage. Agricultural trade will be a significant component of overall FTAA trade (see chapter 1 of this report), and increased international commerce likely involves increased transportation and fuel usage. Thus, expanded agricultural trade may contribute to increased emissions of pollutants. Increased ground transportation is often concentrated in a few border corridors, resulting in hotspots of localized environmental stress, such as the high traffic areas in and around Laredo, Texas, and Detroit, Michigan (Sierra Club and Holbrook-White, 2000). A recent study of the border corridors of Vancouver-Seattle, Winnipeg-Fargo, Toronto-Detroit, San Antonio-Monterrey, and Tucson-Hermosillo concludes that NAFTA trade "contributes significantly to air pollution" in all five corridors (ICF Consulting, 2001). Another example of an omitted source of pollution is manure production, and its contribution to nitrogen and phosphorus production. However, the next version of USMP will contain these manure-related indicators. Finally, USMP cannot estimate environmental impacts associated with commodities not in the model, such as sugar and fruit and vegetables empirical evidence and lack of data for estimation, we specified the values of the fundamental parameters of the model to be equal across countries.