

The U.S. Orange Juice Industry in the FTAA

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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.

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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.

¹SSE 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

¹Metric tons.

²Other uses include fresh distribution, non-certified, blends, and utilization by non-members of the Florida Citrus Processors Association.

³Forecast.

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
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
	<i>—Million SSE gallons¹</i>			
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

¹SSE 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
	<i>Million dollars</i>	
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

¹NFC 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

¹Million boxes.

²SSE gal/box.

³Million 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.

¹For 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.

¹For 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.

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