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Global Trade Patterns in Fruits and Vegetables

Sophia Wu Huang

Rising incomes, improved transport, and international agreements have led to rapid expansion of the global trade in fruits and vegetables.

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Abstract

International trade in fruits and vegetables has expanded at a higher rate than trade in other agricultural commodities, particularly since the 1980s. Not only has world trade in fruits and vegetables gained prominence, but the variety of commodities has expanded. Over the years, three regions—the European Union (EU), the North American Free Trade Agreement (NAFTA) area, and Asia (East, Southeast, and South)—have remained as both the major destinations and sources of supply. A substantial share of their trade is intraregional, particularly that of the EU. All the three regions, however, depend on Southern Hemisphere countries for imports of juices and off-season fresh fruits, and on equatorial regions for bananas, the leading fresh fruit import. In addition to global north-south trading, due mostly to the counter-cyclical seasons of the two hemispheres, Asian trade has also become much more important since the 1980s as incomes and populations have grown and policies changed.

Keywords: European Union (EU), North American Free Trade Agreement (NAFTA) area, Asia, United States, Canada, Mexico, Japan, China, Southern Hemisphere, Northern Hemisphere, bananas, fruits, vegetables.

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Contents

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Summary

Rising incomes, falling transportation costs, improved technology, and evolving international agreements have led to substantial growth in the volume and variety of fruits and vegetables traded globally. Three regions—the European Union (EU), the North American Free Trade Agreement (NAFTA) area, and Asia (East, Southeast, and South)—are the major destinations, as well as the major sources of supply, for this trade. All three regions depend on Southern Hemisphere countries for imports of juices and off-season fresh fruits, and on equatorial regions for bananas, the leading fresh fruit import.

The EU is both the leading destination and source of supply in the global fruit and vegetable trade, accounting for nearly half of the world's imports and more than 40 percent of the exports. Most EU trade, however, is intraregional, except for fresh fruit and juice imports, for which extra-EU trade is slightly larger than intra-EU trade. In addition, a substantial share of these extra-EU imports comes from geographically proximate partners or ex-colonies under preferential trade agreements.

Intraregional trade is also important for NAFTA, particularly for fresh vegetables, which are mostly intra-NAFTA commodities. For other commodity groups, however, NAFTA members import heavily from the Southern Hemisphere and send sizeable exports to Asia. Trade with the Southern Hemisphere and equatorial regions is mainly in imports of juices, off-season fresh fruits, and bananas. During 1999-2001, nearly 60 percent of fresh fruit and 45 percent of juice imported by NAFTA originated from Southern Hemisphere countries and equatorial regions. During the same period, Asian markets, mainly in East Asia, accounted for 20 to 30 percent of NAFTA exports.

Asian trade is dominated by China's exports and Japan's imports. Except for juices, most of China's exports were to neighboring Asian markets, with Japan the leading market for China's horticultural exports. Since the 1990s, China has sharply increased its presence in Japan's import market for fresh and frozen vegetables. The fast growth of China's frozen vegetable market does not yet pose a serious challenge to the position of U.S. frozen vegetables in Japan because each country ships different products. Chinese exports of fresh vegetables, however, pose more of a challenge to the United States; some of China's exports compete with leading U.S. vegetable exports.

While intraregional trade still dominates global trade patterns in fruits and vegetables, extraregional trade has become more important in the past decade. Most of it involves global north-south trading, due mainly to the countercyclical seasons of the two hemispheres. Tariff structures in the EU and NAFTA tend to reinforce this pattern. Asian trade has also become much more important since the mid-1980s as incomes and populations have grown and policies changed. A big exception to the seasonality of produce traffic is bananas, the most traded of all fruits and vegetables. Continuous-growth equatorial regions account for a substantial share of global banana exports, while year-round demand in developed countries has existed for decades.

These major trading patterns exist for a variety of reasons, which can be loosely grouped as supply, demand, institutional, and other factors. *Supply-side factors* include such fundamental aspects as climate, location, technology, costs, factor endowments, and infrastructure, among others. The ability to maintain quality through technology has enabled the emergence of a global market, for example, by allowing tropical fruits to be introduced into markets previously unreachable.

Demand-side factors, which include rising incomes and the creation of a middle class that demands quality produce in all seasons and is willing to pay, have had major consequences for trade. The cheaper prices and better quality resulting from lower tariffs and improved technology have also increased demand. High-income countries like the United States, EU members, Japan, and Canada, account for the overwhelming majority of the fruit and vegetable trade, as well as for its growth. The EU and the United States, in particular, are the largest traders in the global market of fruits and vegetables.

The Common Agricultural Policy in the EU and the trade liberalization measures in NAFTA are two examples of *institutional factors* that play a role in the patterns of global trade in fruits and vegetables. While the EU market is circumscribed by its numerous preferential agreements, the U.S. market is comparatively open. In addition, U.S. exports seem to be especially influenced by *other factors* such as exchange rates—an economic factor—whereas the U.S. import market appears to be largely influenced by U.S. income growth in addition to price and quality factors.

Globalization of the fruit and vegetable trade has made fresh produce accessible to consumers around the world, overcoming seasonality and smoothing price fluctuations. High income-growth rates in developing countries portend higher rates of fruit and vegetable consumption and trade in the future. In the meantime, developed countries will dominate global consumption and trade of fruits and vegetables, not only because of their high income levels but also because of consumers' increasing concerns about healthy eating, which tend to increase fruit and vegetable intake in their diets. The United States is well placed to take advantage of the potential for greater horticultural trade, both as an importer and as an exporter, because of its income level, access to advanced technology and transportation, and trade agreements that allow for the freer flow of products around the globe.

Chapter 1

Global Trade Patterns in Fruits and Vegetables

Introduction

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International trade in fruits and vegetables has expanded more rapidly than trade in other agricultural commodities, especially since the 1980s. Although fruits and vegetables now claim a significant share of world agricultural trade, little research has been done on the global patterns and dynamics of this trade. The category "fruits and vegetables" encompasses a great variety of commodities, each with its own characteristics and institutions. Despite this variety, some trends, and the forces behind them, appear to apply to a large number of fruits and vegetables. The purpose of this study is to explore those trends and causes over the last decade. The report is presented as follows:

Overview of Patterns of the Global Fruit and Vegetable Trade. Fruits and vegetables have claimed an increasing share of world agricultural trade, from a nominal value of $3.4 billion (10.6 percent) in 1961 to nearly $70 billion (16.9 percent) in 2001. The variety of offerings has increased as well. Bananas, apples, oranges, and tomatoes accounted for over 30 percent of the total fruit and vegetable trade in the 1960s and 1970s, but by the end of the 1990s they accounted for less than 20 percent. Fresh grapes, fresh vegetables, frozen potatoes, tree nuts, and other fruit and vegetable products are entering world trade channels in increasing quantities.

Several trade flow patterns emerge. Most trade in fruits and vegetables occurs within a few geographic regions—the European Union (EU),[1] the North American Free Trade Agreement (NAFTA) countries, and Asia. Typically, each of these regions has high-income consumer countries, with nearby supplier countries that may or may not be high-income but that have suitable climates or other factors for producing—or facilitating— exports. For example, imports within the EU flow mostly to Britain, France, and Germany, and the largest exporters are Spain (for its produce) and the Netherlands (through whose seaports many of the exports are shipped). The United States accounts for most of the fruit and vegetable imports within NAFTA, and Mexico is the main exporter. In Asia, Japan is the largest importer and China the largest exporter.

In addition to its intraregional aspect, the trade in fruits and vegetables has become increasingly globalized since the 1980s as remarkable technological developments have expanded its dimensions. With large volumes of fruits and vegetables moving from one continent to another, the seasonality of produce markets is greatly reduced. A prime example of this global trade boom is the counterseasonal imports by the Northern Hemisphere from the

[1] The European Union in this report refers to the 15 countries who became members before 2004: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, and United Kingdom. As of May 1, 2004, there are 10 additional members: Czech Republic, Cyprus, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, and Slovenia.

Southern Hemisphere, which make a year-round supply of fruits and vegetables possible for northern consumers. Another example is the rise of East Asia—particularly Japan—as an attractive market for global exporters, notably the United States.

Determinants of Trade. The expansion of global trade in fruits and vegetables is related to supply and demand, institutional and economic factors, and national, regional, and international characteristics. In particular, in combination with changing consumer preferences as incomes rise, advanced technology and trade agreements have played large roles in allowing access to markets, breaking through old constraints of climate, location, and growing season to encompass what is truly a global market. In turn, globalization has fomented change in wholesale and retail markets around the world, providing consumers with an expanding array of fruit and vegetable varieties year-round.

The Major Players. The study delves into the domestic markets and trade experiences of the main fruit and vegetable traders—the EU, NAFTA, China, and Japan—in order to better understand how economic and institutional factors in these countries affect patterns of trade. Individual chapters are devoted to:

- **The EU**, the leading destination and source of supply in the global trade of fruits and vegetables. In the EU, a customs union, all member countries have not only a common tariff for third countries, but also a common market organization, with policy mechanisms and trade agreements to stabilize markets for their fruit and vegetable sector. Implications of both the domestic and external policies of the EU for the fruit and vegetable trade will be analyzed.

- **NAFTA**, whose three members—Canada, Mexico, and especially the United States—are very important producers, consumers, and traders of horticultural products. North American trade in fruits and vegetables has flourished under NAFTA. The chapter looks at the trade flows and related policy issues as they affect commerce in fruits and vegetables.

- **Asia: China and Japan.** As a growing competitor in export markets, particularly in Japan, China is a chief actor in the global fruit and vegetable trade, with potential to become a key importer as well. The large population of Asia does not play as much of a role in determining trade as the income level of the countries, which is why Japan stands out as an importer. Japan is a harbinger of what other Asian countries may become, and its market is very important for understanding future U.S. trade with Asian markets.

Conclusions. The trade environment for fruits and vegetables has changed dramatically over the past decade and further change is likely. The report concludes with a discussion on shifts in consumer preferences and demographic characteristics, trade agreements, information technology, and the structure of the global fruit and vegetable market, which will have critical implications for fruit and vegetable trade.

Chapter 2

An Overview of Global Trade Patterns in Fruits and Vegetables

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Global trade flow in fruits and vegetables is shaped by geographic proximity, trading arrangements (often related to proximity), historical and political elements, and climate, among other factors. This trade has grown rapidly since the 1980s. Its growth has been accompanied by changes in the commodity composition and spurred by interregional commerce—varieties and seasons for fruits and vegetables vary from country to country, stimulating trade.

Global Expansion and Changes in Commodities Traded

International trade in fruits and vegetables—in particular, many new and newly traded commodities—expanded rapidly over the past two decades, while also undergoing a marked change in the products demanded. According to Food and Agriculture Organization (FAO) data, the average value share of fruits and vegetables (including pulses and tree nuts) in global agricultural exports increased from 11.7 percent in the period 1977-81 to 15.1 percent in 1987-91 and reached an alltime high of 16.5 percent in 1997-2001. Meanwhile, fruit and vegetable juices more than doubled their share of total global export value for fruits and vegetables, from 3.6 percent in 1967-71 to 8.7 percent in 1997-2001. Similarly, the share of vegetables and their products increased from 26.0 to 32.7 percent, while that of fruits and their products (excluding juices) declined from 48.5 percent to 39.1 percent (table 2.1).

The aggregate growth in trade masks significant differences in trends among individual fruits and vegetables, particularly for many nontraditional products. Some commodities—mangos, frozen potatoes, single-strength orange and apple juices, fresh mushrooms, garlic, sweet corn (prepared or preserved), and avocado—achieved, or were close to, a double-digit growth rate in their exports during 1989-2001. In comparison, the export growth rate for many traditional products during the same period was relatively low. Typical examples were oranges (1.1-percent export growth rate), canned pineapples (0.4 percent), and canned mushrooms (0.6 percent). Even the popular concentrated orange juice (2.6 percent) and apple juice (4.5 percent) had growth rates lagging far behind their double-digit growth competitors, single-strength juices. These developments are related to factors such as increased global income, changing policies, and remarkable technological innovations in production, storage, and transportation.

Among more than 160 items listed in the FAO definition of the international fruit and vegetable trade, bananas are the most important commodity by

Table 2.1—Composition and growth of world fruit and vegetable exports[1]

	Growth rate	Composition of export value	
	1989-2001	1967-71	1997-2001
		Percent	
Fruits and derived products	4.2	48.5	39.1
Vegetables and derived products	5.2	26.0	32.7
Nuts and derived products[2]	4.5	10.5	9.0
Fruit and vegetable juices	7.1	3.6	8.7
Pulses and derived products	3.6	4.7	3.9
Roots, tubers, and derived products	2.6	5.0	6.0
Others	-1.4	1.7	0.6
Total fruit and vegetable exports	--	100	100

-- Not available.

[1] The product groups in the table are according to the classification of the Food and Agriculture Organization (FAO). FAO's definition of fruits and vegetables includes more than 160 items, representing a broad range of products.

[2] This category also includes four oil-bearing crops and their products—coconuts and dessicated coconuts, olives (fresh and preserved), and prepared peanuts.

Source: Calculated based on FAOSTAT database by the FAO of the United Nations.

value, followed by tomatoes, grapes, and apples. The top fruit and vegetable exports, with an individual average value share larger than or equal to 1 percent during 1999-2001, are listed in table 2.2, along with their individual growth rates during 1989-2001. The table also includes sweet corn (prepared and preserved) and mangos, although their value share was less than 1 percent, because of their high export growth rate during the period.

Trade Dominated by a Few Regions

Although the available data show that about 320 countries (roughly divided between importers and exporters) participate in global trade in fruits and vegetables, trade is not evenly distributed. A few regions—basically high-income regions—dominate world commerce in fruits and vegetables. The largest importers of fruits and vegetables are the EU, the United States, and Japan. High-income regions are also among the largest exporters, led by the EU and the United States. Some developing countries are large exporters, however, including Mexico and China. While the United States is the foremost exporter of fruits and vegetables in the world if intra-EU trade is excluded from the data, it is not the largest producer. That position belongs to China, although China plays a much smaller role in world trade than the United States because of internal consumption of its fruits and vegetables. Recently, however, China has become a more important trader.

This study uses data from the Global Agricultural Trade System (GATS), prepared by USDA's Foreign Agricultural Service to identify major players and trade flows for global trade in fruits and vegetables; GATS, in turn, uses data from the U.N. Trade Statistical Office (USDA, FAS GATS). It classifies commodities of the global fruit and vegetable trade into six categories. In terms of export value, the market share for each of the six during 1999-2001 was as follows: fresh fruit (30.6 percent), fresh vegetables (20.3 percent), processed fruit and vegetables (30.3 percent), fruit and vegetable juices (9.0 percent), tree nuts (6.1 percent), and pulses (3.6 percent). Because of the relatively minor role played by tree nuts and pulses, discussion will be

Table 2.2—Growth rate and market share for world fruit and vegetable exports

	Export value share	Export volume growth
	1999-2001	1989-2001
	Percent	
Bananas	6.3	4.5
Tomatoes	4.3	5.3
Grapes	3.5	5.2
Apples	3.5	3.6
Potatoes, frozen	2.8	11.2
Oranges	2.6	1.1
Chilis and peppers, green	2.3	7.1
Orange juice, single-strength	2.3	13.9
Potatoes	2.2	0.7
Tangerines, mandarins, clementines, and satsuma	2.0	5.4
Orange juice, concentrated	1.9	2.6
Beans, dry	1.7	4.1
Tomato paste	1.6	4.9
Pears	1.4	5.8
Lettuce	1.3	4.9
Peaches and nectarines	1.2	3.3
Cashew nuts, shelled	1.2	3.9
Cucumbers and gherkins	1.2	3.7
Almonds, shelled	1.1	4.7
Strawberries	1.1	5.7
Lemons and limes	1.0	4.2
Mushrooms, fresh	1.0	11.1
Onions, dry	1.0	4.4
Cantaloupes and other melons	1.0	7.8
Sweet corn, prepared or preserved	0.6	9.3
Mangoes	0.6	12.6
Others*	49.5	--
Total	100	--

-- Not available.

* Others include nearly 140 minor fruits and vegetables.

Source: Calculated based on FAOSTAT database by the Food and Agriculture Organization of the United Nations.

limited to the other four major categories. In addition, this chapter investigates the trade flows of only the top 30 exporters and importers for each category, on the basis of their average trade value during 1999-2001. During this period, the top 30 traders represented 92 to 95 percent of global trade for various categories of fruits and vegetables.

Three major trade regions—for both exporters and importers—are evident among these top traders: the EU, the NAFTA area, and Asia (East, Southeast, and South). In addition, two special regions—Southern Hemisphere countries and banana-exporting countries—are important in the global trade of fruits and vegetables. For this discussion, the Southern Hemisphere countries consist of Argentina, Australia, Brazil, Chile, New Zealand, Peru, and South Africa, while the banana-exporting countries include Colombia, Costa Rica, Côte d'Ivoire, Ecuador, Guatemala, Honduras, and Panama. Although the Philippines are also an important banana exporter, with neighboring

Asian countries as the dominant markets, the present discussion covers the Philippines in the Asian group.

As shown in table 2.3 and figures 2.1 (2.1a-2.1d) and 2.2 (2.2a-2.2d), the EU, NAFTA, and Asia are major destinations and sources of supply in the global trade of fruits and vegetables, while the banana-exporting countries and the Southern Hemisphere countries are important suppliers of fresh fruits. The group of Southern Hemisphere countries is also a major supplier for juices.

To establish general trade flows, the top traders in each commodity group are classified basically along the lines of these major trading regions. Only the top 30 traders for each commodity group are included, and each commodity group for exports and imports has a different set of top participants. Thus, the countries in each trade group are mostly different among commodity groups and between exporting and importing groups. For example, the Asia trade group for juice exports includes China, the Philip-

Table 2.3—Destination of exports and origin of imports by top 30 trading countries for fruits and vegetables, 1999-2001 average[1]

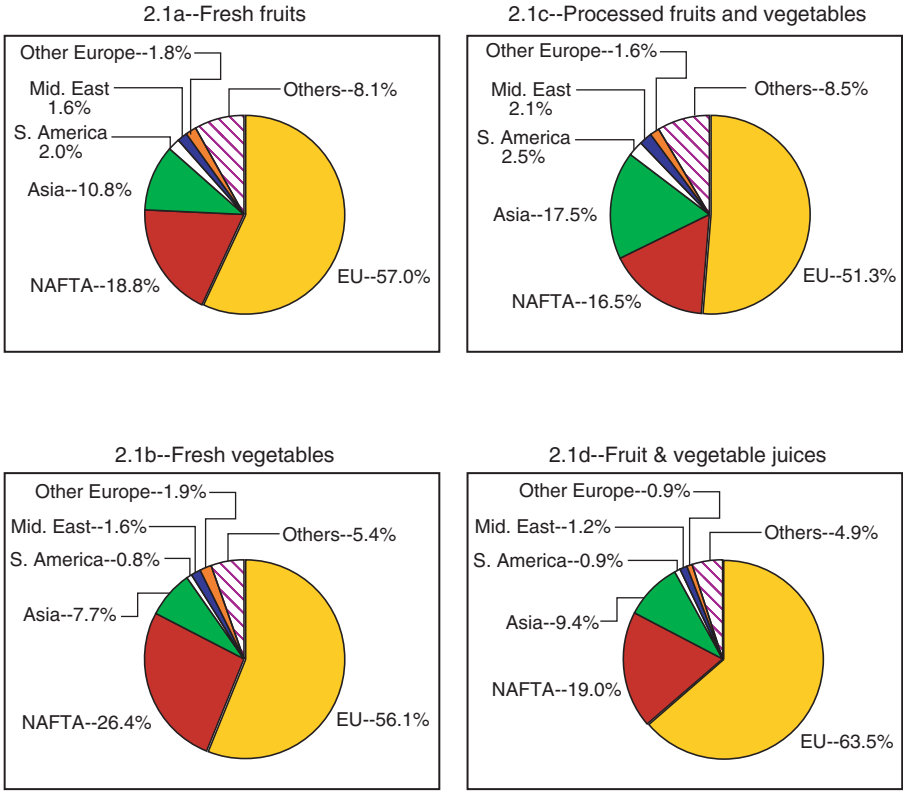
	Fresh fruits	Fresh vegetables	Processed fruits & veg.	Fruit and veg. juice
		$ million		
Export value[2]	19,469	13,165	19,017	5,697
		Percent		
Destination of exports				
EU	57.0	56.1	51.3	63.5
NAFTA	18.8	26.4	16.5	19.0
Asia	10.8	7.7	17.5	9.4
South America	2.0	0.8	2.5	0.9
Middle East	1.6	1.6	2.1	1.2
Non-EU Western Europe	1.8	1.9	1.6	0.9
Others	8.1	5.4	8.5	4.9
Total	100	100	100	100
		$ million		
Import value[2]	23,243	13,620	19,722	5,993
		Percent		
Origin of imports				
EU	31.4	55.2	40.9	35.1
NAFTA	13.1	23.4	17.0	14.1
Asia	6.1	7.4	22.5	6.1
Southern Hemisphere[3]	19.1	4.1	5.2	32.2
Middle East	3.2	2.6	5.2	3.2
Banana-exporting countries[4]	20.3	0.4	1.7	1.5
Others	6.8	7.0	7.5	7.7
Total	100	100	100	100

[1]Only the top 30 importers and exporters in the global fruit and vegetable trade are shown in tables 2.4 and 2.5; therefore, total export and import values do not match.
[2]Includes intraregional trade.
[3]Southern Hemisphere countries include Argentina, Australia, Brazil, Chile, New Zealand, South Africa, and Peru.
[4]Banana-exporting countries include Colombia, Costa Rica, Côte d'Ivoire, Ecuador, Guatemala, Honduras, and Panama.

Source: Calculated based on data from USDA, FAS Global Agricultural Trade System.

Figure 2.1

Destination of fruits and vegetables exported by the world's 30 top exporters, 1999-2001 average



Source: Table 2.3.

pines, and Thailand, but the Asia trade group for juice imports includes Hong Kong, Japan, South Korea, and Singapore (tables 2.4 and 2.5).

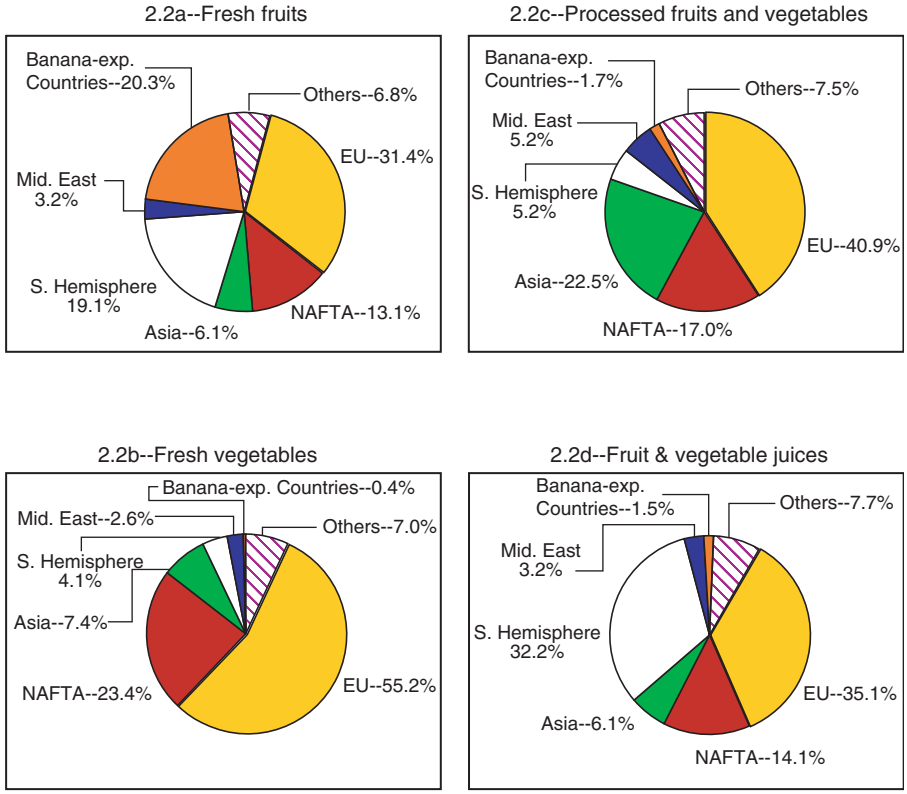
The trade flows for the banana-exporting countries are relatively straightforward. The world's top 30 fresh fruit importers purchased one-fifth of the value of their total fresh fruit imports during 1999-2001 from the group of the banana-exporting countries (table 2.3 and fig. 2.2-a). With 86 percent of their fresh fruit exports consisting of bananas, the banana-exporting countries accounted for nearly 60 percent of the market value in global banana exports. In contrast, the relatively recent emergence of the Southern Hemisphere countries in the global trade is dynamic and involves several products. Before discussing global trade flows in fruits and vegetables with regard to the three separate regions (the EU, NAFTA, and Asia), some background on the Southern Hemisphere countries is in order.

Southern Hemisphere Countries: Important Suppliers for Off-Season Fresh Fruits

With a crop production cycle opposite to that of the Northern Hemisphere, the Southern Hemisphere exporters, whose summers come during Northern Hemisphere winters, play a vital role in making the year-round supply of fresh fruits possible. These countries have taken advantage of the seasonal

Figure 2.2

Origin of fruits and vegetables imported by the world's 30 top importers, 1999-2001 average



Source: Table 2.3.

differences to expand their exports, particularly for many temperate-climate fruits. The market for off-season fruit imports in the Northern Hemisphere continued growing in the 1990s, after a fast expansion in the 1980s, as several Southern Hemisphere countries boosted their fruit production. During 1999-2001, Southern Hemisphere fresh fruit shipments accounted for 19 percent of the value purchased by the world's top 30 fresh fruit importers (table 2.3 and fig. 2.2a). Two major destinations for these fresh fruit exports were the EU (43 percent) and NAFTA (24 percent, mainly to the United States). Other important destinations included Asia (16 percent, mainly to East Asia) and South America (8 percent).

Thus far, no country in the region has succeeded in topping Chile as the region's leading exporter; Chile accounted for nearly 35 percent of the value of fresh fruits exported by the Southern Hemisphere countries in 1999-2001. Next to Chile is South Africa, chiefly targeting the EU and accounting for nearly one-fifth of the market share of the region's fresh fruit exports. Other important fresh fruit suppliers from the region included New Zealand and Argentina, together accounting for nearly another third of the market share.

The United States and the EU are Chile's predominant destinations for its fresh fruit exports, accounting for 42 and 21 percent, respectively, of the country's fresh fruit exports during 1999-2001. Although nearly 60 percent of these exports to the United States were grapes, which constituted close to

Table 2.4—Top 30 world exporters of fruits and vegetables, 1999-2001

Exporting group	Fresh fruits	Fresh vegetables	Processed fruits & veg.	Fruit and veg. juices
EU	Belgium	Belgium	Belgium	Austria
	France	France	Denmark	Belgium
	Germany	Germany	France	Denmark
	Greece	Greece	Germany	France
	Italy	Ireland	Greece	Germany
	Netherlands	Italy	Italy	Ireland
	Spain	Netherlands	Netherlands	Italy
		Spain	Portugal	Netherlands
		United Kingdom	Spain	Spain
			United Kingdom	United Kingdom
NAFTA	Canada	Canada	Canada	Canada
	Mexico	Mexico	Mexico	Mexico
	United States	United States	United States	United States
Asia	China	China	China	China
	Philippines	India	India	Philippines
	Thailand	Korea, South	Indonesia	Thailand
		Malaysia	Philippines	
		Thailand	Thailand	
Southern Hemisphere	Argentina	Argentina	Argentina	Argentina
	Australia	Australia	Australia	Australia
	Brazil	New Zealand	Chile	Brazil
	Chile	Peru	New Zealand	Chile
	New Zealand		Peru	South Africa
	South Africa		South Africa	
Banana-exporting countries	Colombia	Guatemala	Costa Rica	Costa Rica
	Costa Rica			Ecuador
	Côte d'Ivoire			
	Ecuador			
	Guatemala			
	Honduras			
	Panama			
Others	Israel	Egypt	Hungary	Belize
	Morocco	Hungary	Morocco	Hungary
	Poland	Israel	Poland	Israel
	Turkey	Jordan	Turkey	Poland
		Kenya	Yugoslavia	Switzerland
		Morocco		Saudi Arabia
		Poland		Turkey
		Turkey		

Source: Calculated based on data from USDA, FAS Global Agricultural Trade System.

Table 2.5—Top 30 world importers of fruits and vegetables, 1999-2001

Exporting group	Fresh fruits	Fresh vegetables	Processed fruits & veg.	Fruit and veg. juices
EU	Austria	Austria	Austria	Austria
	Belgium	Belgium	Belgium	Belgium
	Denmark	Denmark	Denmark	Denmark
	Finland	Finland	Finland	Finland
	France	France	France	France
	Germany	Germany	Germany	Germany
	Ireland	Greece	Greece	Greece
	Italy	Ireland	Ireland	Ireland
	Netherlands	Italy	Italy	Italy
	Portugal	Netherlands	Netherlands	Netherlands
	Spain	Portugal	Portugal	Portugal
	Sweden	Spain	Spain	Spain
	United Kingdom	Sweden	Sweden	Sweden
		United Kingdom	United Kingdom	United Kingdom
NAFTA	Canada	Canada	Canada	Canada
	Mexico	Mexico	Mexico	Mexico
	United States	United States	United States	United States
Asia	China	Hong Kong	China	Hong Kong
	Hong Kong	Indonesia	Hong Kong	Japan
	Indonesia	Japan	Japan	Korea, South
	Japan	Malaysia	Korea, South	Singapore
	Korea, South	Singapore	Singapore	
	Singapore			
Others	Argentina	Algeria	Argentina	Australia
	Brazil	Brazil	Australia	Botswana
	Czech Republic	Czech Republic	Brazil	Czech Republic
	Norway	Norway	Norway	Israel
	Poland	Poland	Poland	Norway
	Russian Federation	Russian Federation	Russian Federation	Poland
	Saudi Arabia	Saudi Arabia	Saudi Arabia	Russian Federation
	Switzerland	Switzerland	Switzerland	Saudi Arabia
				Switzerland

Source: Calculated based on data from USDA, FAS Global Agricultural Trade System.

70 percent of U.S. imported grapes during 1999-2001, Chile also accounted for virtually all U.S. imports of fresh plums, peaches, and cherries. In comparison, three-fourths of Chile's fresh fruit exports to the EU were grapes, apples, and pears.

During 1999-2001, more than half of the fresh fruits exported by the Southern Hemisphere countries were temperate-climate fruits such as grapes, apples, and, to a much lesser degree, pears. About two-thirds of apples exported by the Southern Hemisphere countries came from Chile and New Zealand, while Chile and Argentina were the dominant suppliers for grapes and pears. Geographic proximity is particularly important for those Southern Hemisphere countries that export fresh fruits to Asia and South America. For example, the Asian market is important to exporters in Australia and New Zealand, who shipped almost no horticultural products to South America, while South America is a more important market than Asia for Argentina, Brazil, and Chile.

In addition to fresh fruits, the group of Southern Hemisphere countries is a major supplier for fruit juices, accounting for nearly one-third of the import value for juices purchased by the world's top 30 importers during 1999-2001 (table 2.3 and fig. 2.2-d). Orange juice (mainly frozen) accounted for more than 70 percent of the region's juice exports, with apple juice (11 percent) a distant second. Led by Brazil (exporting mainly frozen orange juice), the region shipped more than half of its juice exports to the EU. NAFTA (to which it shipped 28 percent, mainly to the United States) and Asia (to which it shipped 13 percent, mainly to Japan) were the second and third destinations. Brazil accounted for nearly three-fourths of the region's juice exports, while Argentina (shipping mainly apple and grape juices) was the second largest exporter in the region (11 percent of the exports). Other countries had a share of less than 6 percent each.

EU Trade: Dominated by Intraregional Trade Flows

The EU is the leading destination as well as source of supply in the global fruit and vegetable trade. During 1999-2001, the 15 member countries of the EU accounted for nearly half of the world's imports and over 40 percent of the exports. While nearly all its members are among the major importers of fruits and vegetables, not all are major suppliers. Major exporters include Spain, the Netherlands, Italy, Belgium, France, and Germany.

As shown in table 2.6, EU trade of fruits and vegetables consists mainly of intra-EU trade among its member countries, accounting for 78 to 88 percent of exports and 50 to 85 percent of imports, depending on product groups, during 1999-2001. The EU, however, also relied on extraregional suppliers for many horticultural products, particularly fresh fruits and juices. In addition, while varying considerably among products and partners, a substantial share of extra-EU fruit and vegetable imports is from countries benefiting from preferential treatment for some portion of that trade. Other trade flows with limited or no preferences, however, are also inevitable because adequate alternative supplies are not available.

For juice imports, slightly more than half were from extra-EU trade; in particular, the EU trade group depended for 28 percent of its juice imports on the Southern Hemisphere countries, mainly frozen orange juice from Brazil. EU juice imports from other regions were relatively insignificant—less than 6 percent from NAFTA and 3 percent from Asia (table 2.6).

For fresh fruits, the EU trade group purchased nearly half of its imports from its members, but also purchased nearly one-third of its fresh fruit imports from the banana-exporting and Southern Hemisphere countries, importing a nearly equal share from each region (table 2.6). Bananas accounted for more than 80 percent of the fresh fruits imported by the EU from the banana-exporting countries, with Costa Rica, Ecuador, Colombia, and Panama the major suppliers. Apples, grapes, and pears represented more than half of the fresh fruits imported by the EU from the Southern Hemisphere countries, with South Africa, Chile, New Zealand, and Argentina the major suppliers. Among them, South Africa was the leading supplier, accounting for a 35-percent share of the fresh fruits imported by the EU from the Southern Hemisphere coun-

Table 2.6—Major trade flows in the global trade of fruits and vegetables, 1999-2001 average

	EU trade group[1]												
	Destination of exports					Origin of imports							
						Percent							
	EU	NAFTA	Asia	Others	Total	EU	NAFTA	Asia	S. Hemis.[2]	Banana[3]	Mid. East	Others	Total
Fresh fruits	85.7	1.4	0.4	12.6	100	49.3	2.0	0.5	18.0	17.3	3.9	9.0	100
Fresh vegetables	87.3	2.4	0.7	9.6	100	85.2	0.4	0.7	1.7	0.1	2.5	9.4	100
Processed fruits & veg.	78.0	6.5	1.9	13.6	100	64.3	3.9	10.5	3.4	1.2	7.1	9.5	100
Fruit and veg. juices	87.5	3.8	2.5	6.2	100	49.3	5.7	3.3	28.1	1.2	3.2	9.2	100

	NAFTA trade group[1]												
	Destination of exports					Origin of imports							
	EU	NAFTA	Asia	Others	Total	EU	NAFTA	Asia	S. Hemis.[2]	Banana[3]	Mid. East	Others	Total
Fresh fruits	6.6	55.3	32.1	6.0	100	3.3	33.9	1.5	24.0	34.7	0.3	2.3	100
Fresh vegetables	0.9	90.5	6.3	2.3	100	6.8	86.1	0.6	3.7	1.2	1.1	0.5	100
Processed fruits & veg.	11.5	48.9	29.8	9.8	100	15.3	46.1	21.5	5.4	4.9	2.8	3.9	100
Fruit and veg. juices	18.2	46.9	22.7	12.1	100	8.1	29.9	11.3	41.4	3.7	0.9	4.7	100

	ASIA trade group[1]												
	Destination of exports					Origin of imports							
	EU	NAFTA	Asia	Others	Total	EU	NAFTA	Asia	S. Hemis.[2]	Banana[3]	Mid. East	Others	Total
Fresh fruits	1.6	2.9	85.7	9.8	100	0.9	33.9	39.7	17.8	5.8	1.2	0.7	100
Fresh vegetables	6.6	2.3	79.1	12.0	100	4.0	19.8	58.1	15.4	0.0	0.5	2.3	100
Processed fruits & veg.	23.8	14.4	53.3	8.5	100	4.8	27.3	61.2	4.2	0.2	1.2	0.9	100
Fruit and veg. juices	31.5	35.5	20.1	12.9	100	11.4	33.7	12.0	37.6	0.0	4.0	1.3	100

[1]The traders included in each trade group are not necessarily identical among commodity groups and between exporters and importers (see tables 2.4 and 2.5 for more details). Each commodity group for exports and imports includes only 30 top traders, but they are representative of global trade in fruits and vegetables.

[2] S. Hemis. = Southern Hemisphere countries (Argentina, Australia, Brazil, Chile, New Zealand, South Africa, and Peru).

[3] Banana = Banana-exporting countries (Colombia, Costa Rica, Côte d'Ivoire, Ecuador, Guatemala, Honduras, and Panama).

Source: Calculated based on data from USDA, FAS Global Agricultural Trade System.

tries during 1999-2001. Historical and political closeness as a member of the British Commonwealth led South Africa to target its fresh fruit exports to the EU, even during the decade of world sanctions against the country's apartheid policy. In contrast, the North American market only opened fully for South African business in the mid-1990s.

NAFTA Trade: Extraregional Trade Flows Important

NAFTA is also an important destination and source in the global trade of fruits and vegetables, accounting for 13 to 24 percent for varying groups of exports and 17 to 26 percent for imports during 1999-2001. Among the three NAFTA members, the United States is the leading importer, with Canada lagging far behind and Mexico relatively insignificant. The United States is also the leading supplier among the three for all commodity groups except fresh vegetables, for which Mexico is the leading exporter.

Intraregional trade in NAFTA is also important for the fruit and vegetable trade, particularly for fresh vegetables. As shown in table 2.6, more than 90 percent of NAFTA fresh vegetable exports and 86 percent of NAFTA fresh vegetable imports derived from intra-NAFTA trade during 1999-2001. For

other commodity groups, however, extraregional trade was, in general, more significant than intraregional trade for NAFTA.

Fresh Fruits

While intra-NAFTA trade accounted for slightly more than one-third of its fresh fruit imports, the NAFTA trade group depended more than any other trade group on Southern Hemisphere countries and banana-exporting countries as its major sources of supply. Together, these two regions supplied nearly 60 percent of fresh fruit imported by NAFTA during 1999-2001 (table 2.6). During this period, 80 percent of fresh fruit imports by NAFTA from the banana-exporting countries were bananas, while about 45 percent of fresh fruit imports from Southern Hemisphere countries were grapes.

In addition to shipping 55 percent of NAFTA exports within the region, NAFTA exporters shipped nearly one-third of their fresh fruit exports to Asia during 1999-2001, mainly to affluent markets in East Asia, particularly Japan. Oranges, apples, grapefruit, grapes, and cherries accounted for nearly 80 percent of these exports. In comparison, NAFTA shipped only 7 percent of its fresh fruit exports to the EU because of high seasonal tariffs and preferential agreements, with grapefruit accounting for nearly 30 percent of these exports.

Juices

NAFTA depended on the Southern Hemisphere countries for more than 40 percent of its juice imports during 1999-2001, while intra-NAFTA trade accounted for about 30 percent (table 2.6). Frozen orange juice, almost totally from Brazil, made up 43 percent of juice imports from the Southern Hemisphere countries, followed by apple juice (28 percent) and grape juice (12 percent). In addition to the Southern Hemisphere countries, the EU (mainly for apple juice, and, to a much lesser degree, grape juice) and Asia (mainly for pineapple juice and, to a much lesser degree, apple juice) had shares of 8 and 11 percent, respectively, in the NAFTA market.

In addition to the juice exports going to intra-NAFTA countries—nearly half the juice exports—Asia (particularly Japan) and the EU were major destinations. About 60 percent of NAFTA's juice exports to the EU was orange juice (mainly frozen). Another 19 percent was grapefruit juice; for which the EU was the leading destination. In comparison, NAFTA's juice exports to Asia were relatively diversified, with frozen orange juice, grape juice, grapefruit juice, and apple juice accounting for nearly 60 percent of the exports.

Processed Fruits and Vegetables

Extraregional trade is also important for processed fruits and vegetables exported by NAFTA, accounting for slightly more than half its processed fruit and vegetable trade during 1999-2001. Asia, and to a much lesser degree the EU, were two major destinations for this extra-NAFTA trade (table 2.6). One-third of processed fruits and vegetables exported from NAFTA to the EU consisted of dried prunes and raisins. In comparison, nearly a third of processed fruits and vegetables exported to Asia were frozen potatoes, while other processed potatoes, sweet corn, raisins, and dried prunes accounted for another 30 percent. Japan was the leading desti-

nation, with a share of nearly one-fifth of the processed fruits and vegetables exported globally by NAFTA, while the United States supplied over 60 percent of these exports.

Of processed fruits and vegetables imported by NAFTA, Asia supplied 22 percent, the EU 15 percent, and intra-NAFTA trade about 46 percent. Olives (prepared or preserved) were the leading processed fruit and vegetable import from the EU, accounting for 35 percent. Prepared or preserved pineapples (almost all from tropical Southeast Asian countries) made up 30 percent of the imports from Asia, and mushrooms and truffles (dried, prepared, or preserved) another 14 percent. China supplied slightly more than one-fifth of NAFTA's mushroom imports.

Asia: Intraregional Trade Important for Fruit and Vegetable Exports

Except in the processed category, Asia accounted for 6 to 7 percent of global exports of fruits and vegetables and 8 to 11 percent of imports during 1999-2001. Asia is a relatively important trader in the processed category, accounting for 18 percent of imports and 23 percent of exports. Because Asia is a vast, diverse continent in land, labor, climate, and economic development, it tends to have a different set of participants as major importers or exporters. For example, China, and to a lesser degree tropical Southeast Asian countries such as Thailand and the Philippines, are its main exporters. In contrast, though China and Southeast Asian countries have shown market potential, affluent Asian markets that are land-scarce and have high labor costs, like Japan and South Korea, are the main Asian destinations for global exports of fruits and vegetables.

Intra-Asia trade played a substantial role for the Asia trade group, particularly for exports. A distinguishing characteristic of fruit and vegetable exports by this group is China's dominant role, particularly in the intraregional Asian market. China is a top exporter for all the commodity groups. Except for juices, most of its exports were shipped to neighboring Asian markets, ranging from nearly 70 percent for processed fruits and vegetables to nearly 80 percent for fresh vegetables during 1999-2001. At the same time, except for fresh fruits, Japan alone accounted for 60 to 80 percent of China's fruit and vegetable exports to Asia. As a result, China is a dominant competitor in the Asian fruit and vegetable markets, particularly for the United States in the Japanese market.

The Asia trade group, however, also depends strongly on extraregional sources for horticultural imports, particularly for juices and fresh fruits (table 2.6). For juice imports, intra-Asia trade accounted for only about 12 percent during 1999-2001. The Southern Hemisphere countries, NAFTA, and to a much lesser degree the EU, supplied most of the juices imported by the Asia trade group—a market share of 9 percent of global juice imports. For fresh fruit imports, extraregional trade accounted for slightly more than 60 percent, with NAFTA—and to a lesser degree the Southern Hemisphere countries—the dominant suppliers. However, unlike the EU and NAFTA countries that depend on the banana-exporting countries for

banana imports, the Asian banana imports come mainly from intraregional trade, principally with the Philippines.

For imports in other commodity groups, extraregional trade is still substantial, although intraregional trade is slightly more important. For example, extra-regional imports accounted for 42 percent of processed fruit and vegetable imports, with NAFTA the dominant supplier. Thirty-nine percent of the fresh vegetable imports were also from outside the Asian region, mainly from NAFTA and, to a lesser degree, the Southern Hemisphere countries (primarily Australia and New Zealand). A unique characteristic of the Asia trade group is its strong dependence on the NAFTA countries (mainly the United States) for imports, ranging from 20 percent of its fresh vegetables to 34 percent of its fresh fruits and juices during 1999-2001 (table 2.6).

Chapter 3

Basic Determinants of Global Trade in Fruits and Vegetables*

*A number of U.S. Department of Agriculture economists contributed to this chapter, including Linda Calvin, William Coyle, Sophia Huang, David Kelch, Shirley Pryor, Anita Regmi, and Matt Shane of the Economic Research Service and Thomas Worth of the Risk Management Agency.

The volume, price, and direction of trade flows change over time, reflecting the dynamic nature of demand and supply in fruit and vegetable markets. This chapter explores the basic determinants of trade and the factors that have combined to shape trade patterns in fruits and vegetables. Basics such as climate, proximity, and seasonality have not changed much over time, but technology has advanced substantially. In combination with trade agreements and changing consumer preferences as incomes rise, a more global market has been created, providing consumers with an expanding array of fruits and vegetables.

Supply-Side Factors: Climate, Location, and Growing Season

The most basic factors determining the international supply of horticultural products are climate, proximity to the major importers, and growing season. Other important factors include a country's supply of suitable land and human capital and its infrastructure for exploiting its resources and marketing potential.

Production Tied to Climate

Horticultural crops have quite diverse production and storage attributes. Some can be grown in a variety of climates and locations, while others can be grown in only a few places. Some, such as apples or potatoes, can be stored but many must be consumed or processed soon after harvesting. This makes geographical distance important in determining trade patterns of fruits and vegetables, compared with patterns for the major field crops.

The EU, North America, and Japan account for over 80 percent of the world's demand for imported fresh fruits and vegetables. Although some high-income countries, such as the United States and the EU nations, have suitable climates for producing many kinds of fruits and vegetables, none has the ability to meet all its domestic needs. International trade has expanded consumer access to a variety of fruits and vegetables during seasons when they are not domestically produced.

Trade Tied to Proximity of Markets

Distance is another factor that determines trading partners. Although transportation costs have declined significantly over the last 20 years, they are still an important barrier for exporters. Most of U.S. fresh produce imports come from its neighbors—Canada and Mexico.

Regional trade agreements also significantly affect patterns of trade because of lower tariffs. For example, NAFTA and the formation of the EU reinforce the tendency of the large tomato producers in North America and Europe to export mainly to neighboring countries. Where transportation costs claim a smaller share of a product's final value, there tends to be a larger geographical spread for importers. Processed tomato products, for example, are storable with little spoilage. Lower spoilage and less handling reduces transportation costs as a proportion of total costs and provides processed tomatoes with a wider geographical market than fresh tomatoes.

These observations for tomatoes apply to fruits and vegetables overall: for fresh fruits and vegetables, where transportation costs are large, countries tend to import from the closest producers. Imports of processed goods are more geographically dispersed because transportation costs are lower as a portion of total costs.

Seasonality and Price

Seasonality is an important feature of the global trade in fruits and vegetables. Countries in the Southern Hemisphere can produce during the Northern Hemisphere's winter season. In addition, in the Northern Hemisphere, the southernmost countries can produce some fruits and vegetables earlier in the spring or later in the fall than countries farther north. The seasonal pattern has changed over the last 20 years. Improvements in production methods, as well as the development of more varieties of fruits and vegetables, have allowed growers in the Northern Hemisphere to expand their production seasons.

U.S. grape trade provides a good example of seasonality. The United States receives nearly 90 percent of its fresh grape imports, mainly from Chile—and to a much smaller degree from Mexico—January through April. Meanwhile, the United States ships 85 percent of its grape exports, mainly to its NAFTA neighbors and East Asian countries, during August through November (fig. 3.1).

The growing volume of seasonal trade to the United States has had a price-smoothing effect on fruits and vegetables throughout the year, in part because of marketing agreements with wholesalers that supply retailers with products year-round. The importance of exchange rates can also be an important factor in the movement of prices (see box, "Exchange Rates and Horticultural Trade"). Advances in transportation and the handling of fruits and vegetables have extended the distance and shortened the time that previously defined the market reach of many commodities.

Technology Aids Trade in Fresh Produce

Technology has been at the forefront of changes making fresh fruits and vegetables available to consumers globally, at an affordable price. Advances in transportation, in combination with other technological developments that have complemented the progress in transportation, have helped reduce delivery time, maintain product quality, and cut shipping costs. In recent decades, it has become easier for shippers to deliver horticultural products to purchasers thousands of miles away, with no substantial loss in freshness.

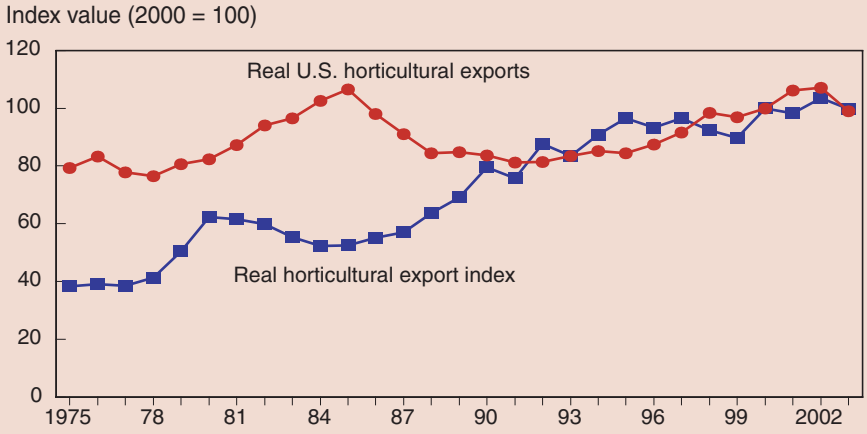
Exchange Rates and Horticultural Trade

Since the seminal article by Ed Schuh in 1974,[1] economists have generally agreed that exchange rates play an important role in creating the competitive environment for U.S. agriculture. Since that time many studies have attempted to determine the impact of exchange rates and the variables that affect exchange rates (e.g., monetary and fiscal policy) on agricultural trade, as well as on domestic prices and input markets. A recent publication[2] reviewed the literature on this topic and provides a useful array of approaches and results for various commodities. Of the 29 studies reviewed, 19 concluded that exchange rates played an important role in agricultural trade.

Most of the studies concentrated on grains, oilseeds, or total agricultural exports. However, two of the studies did look at the effect of exchange rates on U.S. horticultural exporters. A 1991 study[3] of the U.S. onion trade for the 1976-85 period found that devaluation of the Mexican peso, particularly when it was allowed to move freely against the U.S. dollar, did result in higher U.S. imports of onions from Mexico. A 1998 study[4] of the export of Mexican melons (watermelon, honeydew, and cantaloupe) to the United States increased significantly as a result of the 1994-95 devaluation of the Mexican peso against the U.S. dollar.

Although many factors affect agricultural trade, exchange rates frequently play a major role in the competitiveness of U.S. agriculture exports. This is particularly true for agricultural commodities that are highly traded. While the magnitude of the impact of exchange rates on trade will vary by commodity, it is likely that the responsiveness of agricultural exports will be inelastic. That is, for a 1-percent change in the exchange rate, U.S. exports of agricultural commodities are likely to change by less than 1 percent. It is also likely that an exchange rate change will have an impact on domestic prices. If the U.S. exchange rate appreciates, then downward pressure is exerted on U.S. commodity exports and domestic commodity prices.

Real U.S. horticultural exports and trade-weighted U.S. exchange rate



Source: USDA, ERS.

Continued on page 19

Continued from page 18

Most exchange rate studies focusing on agricultural commodity exports use a trade-weighted measure of exchange rates (see figure on page 18). ERS maintains a unique dataset of agricultural commodity exchange rates, often used to evaluate any exchange rate impact.[5] Trade-weighted exchange rates could be derived for any of a variety of commodities such as apples or tomatoes, or for any agricultural product. Since U.S. horticultural trade is highly concentrated, the trade of only a few countries will enter into determining the combined trade-weighted exchange rate index for horticultural products. The horticultural markets of Canada, Mexico, Japan, China, Hong Kong, and Taiwan account for approximately two-thirds of U.S. horticultural exports. For U.S. imports, 70 percent come from Canada and seven countries in Central and South America. Nevertheless, the problem remains that there are large numbers and varieties of traded horticultural commodities grown in various countries. Because of the number of commodities involved and the difficulty obtaining comparable price and quantity data, there has been very little research on the impact of exchange rate changes on individual horticultural commodity exports. Thus, there is a clear need for further work in this area.

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[1] Schuh, G.E. "The Exchange Rate and U.S. Agriculture." *American Journal of Agricultural Economics*, Vol. 57, February 1974, pp. 1-13.

[2] Kristinek, Jennifer J., and David P. Anderson. *Exchange Rates and Agriculture: A Literature Review*. Agricultural and Food Policy Center, Texas A&M University. February, 2002.

[3] Espinoza-Arellano, J.J., S. Fuller, and J. Malaga. "Analysis of Forces Affecting Competitiveness of Mexico in Supplying U.S. Winter Melon Market," *International Food and Agribusiness Management Review* 1, no. 4, 1998, pp. 495-507.

[4] Fuller, S.F., O. Capps, Jr., H. Bello, and C. Shafer. "Structure of the Fresh Onion Market in the Spring Season: A Focus on Texas and Its Competition," *Western Journal of Agricultural Economics*, no. 16, Dec. 1991, pp. 405-16.

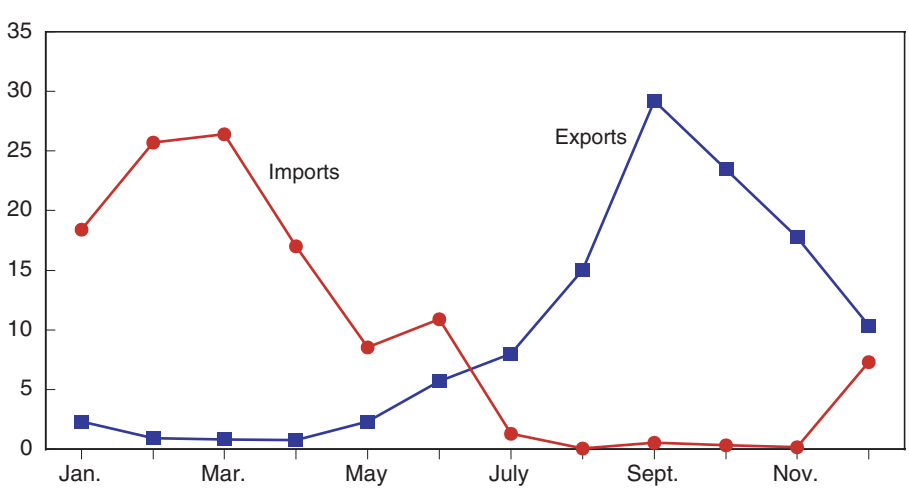
[5] This exchange rate dataset is now available on the Internet at *www.ers.usda.gov/data/exchangerates/*.

The feasibility of long-distance trade in perishable products will likely increase further as shipping technologies continue to improve.

In particular, advances in controlled atmosphere (CA) technologies have extended the shelf life of perishable products and continue to improve product quality and variety on a worldwide basis. With CA, products hold up better during transportation. CA technologies allow operators to lower the respiration rate of produce by monitoring and adjusting oxygen, carbon dioxide, and nitrogen levels within a refrigerated container. In this way, CA can slow ripening, retard discoloration, and maintain freshness of perishables like lettuce, asparagus, peaches, mangoes, and avocados that would not remain fresh during ordinary refrigerated ocean transport. Some sophisticated CA systems are combined with systems that maintain relative humidity—a crucial factor for some produce such as grapes, fruit with pits, and broccoli—and that control levels of ethylene, a naturally occurring gas that accelerates the ripening of fresh fruits and vegetables.

Figure 3.1

Monthly distribution of U.S. grape trade, average 1989-2001



Source: USDA, ERS.

In addition, satellite technologies—particularly global positioning systems, which are becoming increasingly available and less expensive—enable shippers to track their cargo around the world electronically. Other electronic technologies enable shippers and carriers to monitor quality, reduce risk (and costs) of liability claims, and shorten cargo delivery time. Information technology has also resulted in the development of remote monitoring systems for refrigerated containers, which transmit and collect performance information electronically so that physical checks are not required while the container is stacked in the hold or on the dock. The remote system may also activate an alarm, helping minimize losses when problems arise.

Changing Demand Stimulates Fruit and Vegetable Trade

Consumer demand is allied to rising incomes, urbanization, and the associated increases in levels of information and education. Largely through education, for instance, health issues have increasingly influenced consumer preferences for fruits and vegetables. A familiar example of health information is the Food Guide Pyramid—the diagram of nutritional recommendations developed by the U.S. Departments of Agriculture and Health and Human Services—which advises Americans to eat five to nine servings of fruit and vegetables per day. Various other campaigns seek to inform consumers of health benefits associated with fruit and vegetable consumption (Handy et al., 2000). These campaigns, and publicity about scientific studies that affirm the benefits of eating fruits and vegetables, have spurred greater consumption and trade; Americans are eating more fresh produce.

It is expected that per capita expenditure on fruits and vegetables will increase more than for any other product group from 2000 to 2020 (Blisard, et al., 2002). In 2001, per capita consumption of fresh vegetables and melons totaled 217.9 pounds, up 33 percent from 1980. Similarly, in 2001 per capita consumption of fresh fruit totaled 98.0 pounds, up 11 percent over the same period.

Demand for variety and convenience has increased along with consumption. The typical grocery store carried 345 produce items in 1998, compared with 173 in 1987 (Calvin and Cook et al., 2001). The new items are both exotic imports, such as clementines and passion fruit, and variations on standard products such as an increasing number of tomato varieties, many of which are also imported. By 2000, however, the introduction of new produce items was down to 192, compared with a high of 545 in 1996 (Harris, 2002).

Changing consumer preferences are also evident in the year-round availability of items once thought seasonal, with U.S. consumers willing to pay the higher price for imported out-of-season fresh products. For example, table grapes are now available all year. California supplies of summer and fall grapes are augmented with grapes from Chile and Mexico during the winter and spring, with minor amounts from several other countries. Table grapes are now considered a staple, and consumption has increased for the California product as well as imports. Per capita consumption of grapes grew from 4 pounds in the 1980 season to 7.6 pounds in 2001, an increase of 90 percent. Over the same period, total fresh fruit consumption increased 11 percent. Year-round availability undoubtedly accounts for some of the increase in consumer demand. In other cases, imports have substituted for domestic production. One sector of the California grape industry is facing this concern, since Mexican producers across the border compete in the same season.

The demand for year-round supplies has created market niches for nontraditional sources. If a country can supply a critical market niche when supply is low and prices are high, then it may have a viable industry even if it is exporting for a relatively short period. For example, beginning in the mid-1990s the Guatemalan raspberry industry capitalized on two short market windows in the spring and fall between the Chilean and California raspberry seasons (Calvin et al, 2002).

Growing consumer demand in other countries is also fueling trade. Real per capita income grew on average by almost 100 percent among all countries in the last four decades (The World Bank, 2001). The large gains in per capita income levels have resulted in significant changes in global food consumption patterns, especially in middle-income developing countries. Studies show that fruit and vegetable consumption is positively correlated with income growth. Wealthier middle-income countries are most likely to upgrade their diets to include more fruits and vegetables as income levels increase (Regmi et al., 2001; Regmi and Dyck, 2001). In addition, research suggests that besides income and price, other demographic variables also determine the rate and composition of changes in food consumption (Regmi and Dyck, 2001). For example, unpublished 1998 ERS data indicate that urban consumers in China consume 38 kg more fruit and vegetables per capita per year than rural consumers. Similarly, FAO data from the 1980s indicate fruit and vegetable consumption to be generally greater in urban areas across all developing countries (FAO, 1993 and 1994). Given their rapid rate of urbanization and income growth, middle-income countries appear to be promising future markets for fruits and vegetables.

The Drive To Globalize Markets in Fruits and Vegetables

Year-round consumer demand for high-quality fresh fruits and vegetables is a critical influence in global changes in the fruit and vegetable trade. Without trade in fresh fruits and vegetables, consumers in temperate climates would face long winters with very limited supplies of fresh produce. While some fresh crops can be stored for a few months, such as apples and potatoes, more perishable products like strawberries and tomatoes would be available in much smaller quantities, if at all. Variety is also important. Without trade, temperate countries would not have tropical fruit such as bananas and tropical countries would not have deciduous fruit like apples.

Even when weather or biology is not a barrier to production in a particular country, there are many other economic reasons for trade in produce. In some cases it is cheaper and more efficient to produce a commodity in a foreign country, so production shifts geographically. For example, much of the U.S. fresh green onion and frozen broccoli supply is now imported from Mexico because the cost of labor is lower in Mexico and preparing these products for market is labor intensive; green onions are formed into bunches by hand and some types of broccoli, such as spears for freezing, are cut by hand. Some U.S. firms have shifted operations to Mexico because of the lower labor costs, and local Mexican firms have also developed their own industries.

In other cases, restrictions on production in one country may lead to increased production in other countries without the same constraints. For example, new cranberry production in the United States is severely constrained by the 1972 Clean Water Act's wetland usage rules. Canada's wetland use regulations for agriculture were less restrictive than those of the United States, allowing the industry there to grow rapidly in the mid-1990s in response to high demand across the border (Calvin, 1997). Some U.S. strawberry growers have transferred production to Baja California, Mexico, partly because of the difficulty in overcoming restrictions to expanding winter production in the Los Angeles area.

Transportation costs have also forced countries to import products rather than buying from domestic sources that might be more distant. For example, Seattle is closer to the large greenhouse tomato industry in British Columbia than to the closest major U.S. greenhouse in Colorado. Trade also occurs when there are unexpected declines in domestic production; tomato exports from the United States to Mexico are generally in response to shortfalls of what is a staple commodity in that country. U.S. tomato exports to Mexico are small and highly variable.

Technological developments have changed the profitability of exporting certain produce items and contributed to the growth of trade. For example, transportation advances, as discussed above, have made it cost-effective to ship more perishable products to U.S. markets from abroad. High-value but fragile products, such as asparagus from Peru and raspberries and cherries from Chile, are shipped by airfreight to U.S. markets. Improvements in communications have made these international transactions easier. The streamlining of phytosanitary barriers through technology has opened new

markets for many products. Mexican avocados are now shipped to 31 States during a 6-month period under a strict phytosanitary plan, after years of being barred from the United States.

Declining trade barriers, including bilateral and multilateral trade agreements, harmonization of sanitary and phytosanitary regulations, and dispute settlements under the auspices of the World Trade Organization (WTO), have also fostered more trade. The fast export growth of U.S. produce to Asia between the mid-1980s and mid-1990s is a good example. During that period, the high trade barriers for horticultural imports in Asia were lowered substantially through bilateral and multilateral negotiations. For example, after completing liberalization of lemons and grapefruit and the partial liberalization of oranges in 1977, Japan eventually dismantled its quota system for fresh oranges on April 1, 1991. Another example is that U.S. trade agreements, such as the Caribbean Basin Initiative and the Andean Trade Preference Act, have eliminated most agricultural tariffs on imports from those countries. Peru is now one of the largest producers and exporters of asparagus in the world. Thanks to its open access to the U.S. market, Peru supplied 47 percent of U.S. asparagus imports in 2001, compared with 10 percent in 1990.

Despite the improvement in the overall trade environment for fruits and vegetables, there are still high tariffs and other nontariff barriers to trade. One of the most common nontariff barriers is comprised of the various anti-dumping rules (see box, "Anti-dumping Cases Involving Produce") that countries can and do invoke to avoid the influx of imports. Anti-dumping practices affect the patterns of trade in fruits and vegetables and remain a threat to the trade of some commodities in some countries.

Implications of Globalization for the Produce Industry

With fewer constraints and lower transaction costs, firms can design strategies for optimization of sourcing on a global level, not just on a national level. Being a player in an international arena requires more resources than being a player in a national market, but may be necessary to stay competitive in domestic markets. Some types of firms will be better able than others to adapt to the challenges.

Several types of firms handle fresh produce imports. Traditional importers have no domestic production ties and may or may not have production ties in the country of origin. They are mainly marketers. Some U.S. importers are the marketing arms of large producers in other countries. Others are large multinational firms with brand name recognition such as Del Monte, Chiquita, and Dole. Some large U.S. grower/shippers have also developed import ties to augment their domestic production. Many of these firms have expanded the number of countries from which they import to ensure year-round supplies and the wide range of products that retail buyers desire.

U.S. firms have several options in using foreign production to help expand their season. For one, a U.S. firm may grow a product on its own farms in a foreign country for sale in the U.S. market. This kind of investment provides

Anti-dumping Cases Involving Produce

Dumping is defined as selling a good in another country at less than its "normal value." Anti-dumping laws provide a means to impose additional duties to compensate for this unfair trade. However, economists have long argued that anti-dumping rules are generally used to protect an industry (Kerr, 2001; *Michigan Law Review*, 1982; Barichello, 2002; Regmi, 2000). This discrepancy derives from the difference between what lawyers and economists consider dumping and how dumping laws compare prices between two countries. An industry could win a dumping ruling against a foreign country, but economists might not consider that dumping had occurred. Many economists think that the problems with anti-dumping laws are particularly serious for perishable agricultural products (*Michigan Law Review*, 1982).

Defining normal value is the key to anti-dumping law. The U.S. Department of Commerce allows three different methods to calculate normal value. Findings of whether dumping occurs can vary with the methodology used (Bredahl et al, 1987). First, the Department of Commerce can compare the price in the U.S. market with the price in the foreign market. Second, in those cases where there is no domestic market in the foreign country, the department can compare the price in the United States with the price in a third-country market. The third option is to compare the U.S. price with a constructed cost of production in the foreign market. The department also uses the constructed cost-of-production method when home-market or third-market sales have been made at prices below total cost of production over an extended period that will not allow recovery of all costs within a reasonable period. These conditions would hold if more than 20 percent of sales over a 1-year period were below the cost of production. With perishable agricultural commodities, many firms sell below total cost of production, perhaps for extended periods. At harvest time, if the price exceeds the variable harvesting and marketing costs, it makes sense to sell since the grower can recoup some of the production costs even if the price does not cover total production costs.

Economists expect to see different prices for U.S. commodities and imported commodities under various conditions. Price differentials could occur if foreign firms could price-discriminate. If a firm has some degree of market power and faces different price elasticities in different markets that can be separated, it can maximize profits by selling at a lower price in a market with a higher price elasticity of demand. In such a case, the consumers in the lower price market are more price-sensitive than those in the higher price market. Price discrimination is legal and common in the United States. A foreign firm employing this same profit-maximizing strategy in its sales to the United States could be found guilty of dumping.

Different prices in different countries would also occur if firms could potentially use a predatory pricing strategy. This is a short-run strategy where a firm would sell below marginal cost in a foreign country to undercut its competitors. If the targeted firms exit the industry, the predatory firm, now with some degree of market power, could raise prices. Domestic antitrust laws regulate this problem within the U.S. and anti-dumping laws regulate the problem across national borders. However, predatory pricing is rare because it is less costly to develop a degree of market power through mergers and acquisitions (Kerr, 2001).

a high level of control over the quality of the product. A U.S. firm might also have a joint venture with a firm in a foreign country to produce a crop to be sold in the United States. In some cases, U.S. firms may merge with a foreign supplier. Many U.S. shippers and grower/shippers also market for foreign growers and charge a sales commission. Some U.S. grower cooperatives have foreign members who must also meet the organizations' domestic production standards.

Suppliers must develop relationships with reliable foreign growers to provide produce. A high level of integration is essential for success in a multicountry operation because of problems of coordination and quality control. Suppliers may travel frequently to foreign production regions to cement the relationship with their growers. The suppliers may send agronomists to check on production and crop conditions. Some firms have staff living in foreign countries.

The stakes are high for procuring products from another country. If the product does not arrive on time or has quality problems and cannot be sold, the U.S. supplier may not have adequate supplies for its customers, a serious problem in the competitive produce industry. On the other hand, selling a substandard product may damage the firm's reputation. The stakes are also often high for the foreign producer. Many foreign countries have very specialized produce industries, geared almost exclusively towards exports. If products are not acceptable in the U.S. market, the producers often have few alternative markets and must sell at lower prices. For example, some of the products grown in Mexico for export to the United States, such as bell peppers, cherry tomatoes, and eggplant, have virtually no domestic market.

The example of U.S. grape grower/shippers illustrates some of the issues to be considered in importing grapes from other countries. (These same issues are relevant for other types of produce importers.) Grower/shippers have several options when confronted by the increasing importance of imports. They can maintain the traditional model of growing for their season and marketing their own output and perhaps that of some of their neighbors. Alternatively, some California grape firms have become year-round suppliers by expanding beyond their traditional California base to import grapes from Chile and Mexico. Many retailers prefer to do business with a firm that can supply all their grape needs on an annual basis instead of shifting from firm to firm as different production areas come into season. Operating on a year-round basis allows firms to gain economies of scale and spread fixed costs over a large volume of the product. Most California grapes are shipped from June to December, leaving facilities idle for half the year if a firm sells only domestic grapes. Year-round supply strategies also benefit shippers by maintaining their marketing presence with buyers all year. However, coordinating supplies from Chile or Mexico demands more capital and risk-bearing capabilities than are usual in domestic marketing alone. Not all firms have the wherewithal, or the desire, to become international grape suppliers.

Large foreign suppliers are following the same trend in integration and coordination in reverse. For example, some large Mexican and Chilean winter suppliers are expanding into production or joint ventures in the United States and other countries to provide a year-round supply for their U.S.

buyers. Some foreign growers have vertically integrated by acquiring marketing operations in the United States. These growers already have direct control over the quality of their produce; vertically integrated operations give them better ability to market their fruits and vegetables. For example, many of the shippers located in Nogales, Arizona, where winter vegetables from Mexico enter the United States, are really just the marketing arms of large Mexican growers. In the 1996/97 season, 63 percent of the tomatoes in Nogales were sold by these vertically integrated, Mexican-owned firms (Calvin and Barrios, 1998).

Impact of Retail Consolidation on the Produce Industry

Consolidation in the retail sector, both in the United States and in many countries around the world, also has an impact on the supplier/buyer relationship. Large retailers desire large volumes of consistent products to provide uniformity across all their stores, which may be more easily supplied by larger shippers. Recent research has shown that retailers buying a select group of produce items acquired 91 percent of the volume from their top four suppliers (Calvin and Cook et al., 2001).

Retailers are also increasing their demand for differentiated products. For example, an apple can be marketed in many different ways to appeal to a wide customer base. A retailer may want an apple for which a specific firm provides third-party certification for compliance with good agricultural practices or a particular type of packaging, an unusual variety, a special kind of storage, or a particular production system, such as organic. Product differentiation has an important impact on international trade because it requires increased coordination between shipper and buyer as shippers provide more specialized products for particular buyers.

Globalization of markets is likely to continue as the basic factors of supply combine with technological developments and lower trade barriers to meet consumer preferences to shape and create trade flows. Innovative financial arrangements across borders and flexible global sourcing have combined to provide markets with high quality and a wide variety of fresh produce year-round to consumers around the world.

Chapter 4

The Role of the European Union in Fruit and Vegetable Trade

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The EU is the largest importer of fruits and vegetables in the world, even when intra-EU trade is excluded. In 2000, the EU imported $12.2 billion in extra-EU fruits and vegetables and had a $7 billion trade deficit. EU production is seasonally limited by its climate. With its large and relatively affluent population, and that population's demand for high-quality fresh fruits and vegetables year-round, the EU is dependent on imports.

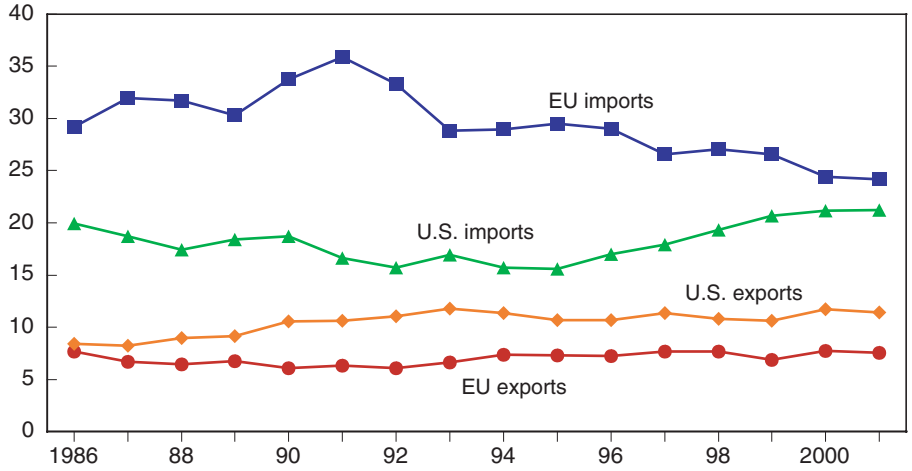
The EU, however, is a customs union (a grouping of countries that have a common tariff for third countries), and the fruit and vegetable sector has a common market organization (CMO) with policy mechanisms and trade agreements in place to stabilize markets. This chapter discusses how these policies effectively manage the flow of produce to EU markets without upsetting the domestic demand and supply balance and how EU producers are protected by this import regime. Although EU average bound tariffs appear relatively low by world standards, the seasonal nature of tariffs and trade arrangements have serious implications for U.S. fruit and vegetable exports to the EU.

The EU accounted for about 25 percent of world import value and 8 percent of world export value in 2000, if intra-EU trade is excluded (fig. 4.1). Intra-EU

Figure 4.1

EU* and U.S. value share of world trade in fruits and vegetables

Percent



* excluding intra-EU trade.

Source: FAOSTAT database by Food and Agriculture Organization, United Nations.

trade by itself accounted for 28 percent of world import volume in 2000 and 31 percent of export volume. In comparison, the United States had a share of about 21 percent of world import volume in 2000 if intra-EU trade is excluded from world trade figures. The United States imported 19 percent of the world's fruit and vegetable value in 1990, while the EU imported 34 percent; since then, the net import value gap between the EU and the United States has narrowed from $9.3 billion in 1990 to $4.1 billion in 2000. (All trade data referred to in this chapter exclude intra-EU trade unless otherwise stated.)

EU imports are diverse, and they are important to numerous exporters. For example, bananas, oranges, orange juice, apples, and fresh grapes in 2000 or earlier comprised about 28 percent of EU fruit and vegetable imports by value (table 4.1). But the EU also imported over $100 million in each of the following commodities from external markets: apple juice, almonds, avocados, olive oil, grapefruit, lemons and limes, mangoes, pears, pineapples, pistachios, potatoes, raisins, and tomatoes. To underscore the global importance of EU imports, the EU accounted for over 50 percent of the world's import value of almonds, apples, grapefruit, lemons, oranges, orange juice, olive oil, pears, pistachios, potatoes, raisins, tomatoes, and peeled tomatoes.

EU exports in 2000 were dominated by olives (olive oil and preserved olives comprise about 20 percent of EU exports by value), tomatoes (tomato paste, tomatoes, and peeled tomatoes comprise 12 percent), and oranges (8 percent). In the same year or earlier, EU potatoes, apples, peppers, grapes, onions, and peaches each had over $100 million in exports. Olives and olive oil account for about $1 billion in exports and tomatoes and tomato products for about $600 million.

The United States imported nearly $1 billion of EU fruits and vegetables in 2000, led by olive oil, olives, citrus juice, apple juice, tomatoes, and peppers. It exported over $1.2 billion to the EU, led by almonds and raisins. The U.S. trade surplus with the EU in horticultural products in the early 1990s—about $500 million—shrank over the decade to less than $200 million in 2001 (table 4.2). The EU shipped increasing quantities of fresh and processed produce to the United States, while U.S. exports to the EU largely stagnated. Devaluation of the euro[1] by over 40 percent relative to the U.S. dollar from 1995 to 2000 led to more price-competitive EU products in U.S. and world markets

EU import value of fruits and vegetables remained steady in the 1990s, while intra-EU trade was up 17 percent. Import volume reflects the trend more dramatically: intra-EU trade was up 35 percent, while extra-EU imports fell by nearly 12 percent. Over the same period, world trade increased 36 percent vs. 46 percent for U.S. imports. EU world export volume increased by 161 percent, narrowing the EU's trade gap from $9 billion to $7 billion from 1990 to 2000, while the U.S. deficit increased from $1.3 billion to $2.7 billion. EU export value was up 75 percent compared with a world export increase of 40 percent during the period. EU export increases were broadly based, led by apples, oranges, tomatoes, potatoes, olive oil, preserved olives, and grapes. The relative weakness of the euro and strong world demand for fruits and vegetables led to the increase in EU exports.

[1] The euro is the single currency in circulation among 12 of the 15 EU member states that are the subject of this report (Sweden, Denmark, and the United Kingdom do not participate). One euro equaled 0.875 U.S. dollars in 2002.

Table 4.1—Major extra-EU trade in fruits and vegetables, 1992-2000

	1992	1993	1994	1995	1996	1997	1998	1999	2000
					$ million				
Imports:									
Total F&V imports	13,824	11,072	12,764	14,153	14,459	12,947	13,231	13,437	12,154
Bananas	2,495	1,984	2,287	2,392	2,366	1,977	1,880	1,917	1,749
Orange juice	980	682	812	966	1,021	689	914	998	791
Oranges, tangerines, clementines	693	548	608	709	760	665	601	592	442
Grapes	332	311	345	401	366	395	449	460	435
Apples	919	403	472	598	684	568	559	621	422
Almonds	378	340	491	478	714	547	460	405	354
Apple juice	259	185	181	307	309	302	238	259	339
Olive oil, total	167	156	307	443	299	335	192	431	302
Raisins	323	331	329	344	353	336	323	318	288
Pineapples	178	150	157	199	205	200	194	192	216
Pineapples, canned	304	236	235	200	267	243	252	258	212
Grapefruit	277	230	240	283	266	213	238	218	193
Pistachios	330	263	241	273	299	279	137	198	188
Pears	323	199	188	236	214	209	227	212	184
Tomatoes	165	155	130	152	152	120	162	155	147
Avocados	141	113	125	153	135	122	112	139	128
Potatoes	197	152	167	356	254	106	171	195	113
Lemons and limes	98	69	132	166	173	124	115	142	108
Exports:									
Total F&V exports	3,286	3,514	4,471	4,989	5,107	5,185	5,301	4,830	5,134
Potatoes	549	462	497	642	935	843	702	629	981
Chilis and peppers	254	303	415	397	407	407	387	382	420
Tomatoes and products	296	255	295	327	389	413	389	377	402
Oranges, tangerines, clementines	133	148	192	224	229	244	277	270	287
Pears	79	114	142	154	178	201	186	198	253
Dried mushrooms	191	196	194	281	254	247	295	235	239
Olive oil	123	110	164	146	171	122	104	81	226
Olives	48	89	138	241	306	243	203	181	218
Lemons and limes	185	177	223	294	199	226	251	240	209
Orange juice	83	118	184	227	235	267	260	213	189
Apple juice	67	76	110	115	139	140	107	148	184
Grapes	174	189	273	243	229	206	200	184	166
Peaches	73	102	93	102	115	127	139	156	133
Apples	54	86	91	86	104	114	108	86	97
Potatoes, frozen	28	39	57	63	61	81	108	78	91

Source: FAOSTAT database by Food and Agriculture Organization, United Nations.

The EU import results are partly due to Spain's full integration into the EU's CMO for fruits and vegetables by 1995, along with the abolition in 1993 of internal EU borders that significantly lowered shipping time and costs of perishables between EU member states. The Spanish share of exports to the EU increased substantially during the 1990s (fig. 4.2). Spain had captured about 16 percent of the EU fruit and vegetable import market by 1989 and increased its share to 22 percent in 2000, 4 years after full EU integration. The EU had to modify its trading arrangements with the Mediterranean basin countries in North Africa and the Middle East to accommodate Spain in the EU without disrupting Mediterranean trade entirely (Grethe and Tangermann, 1998b).

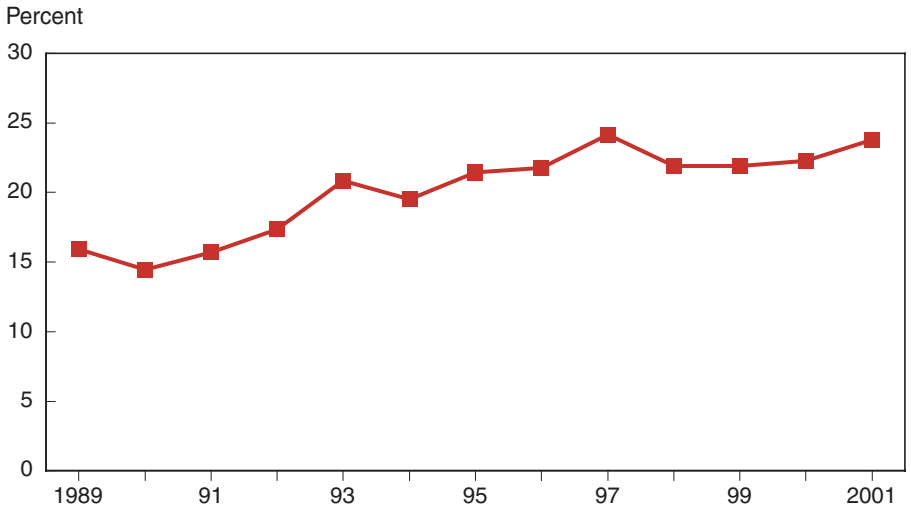
Table 4.2—EU/U.S. trade in fruits and vegetables, 1991-2000

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
						$ million					
U.S. exports to EU:											
Fresh fruit	177	181	145	143	151	164	173	172	165	151	134
Fresh veg.	29	28	20	24	21	25	33	35	31	30	23
F&V prep.	499	488	485	533	487	533	431	434	379	313	344
F&V juice	49	69	89	101	116	110	140	133	154	147	129
Tree nuts	338	345	348	441	613	749	580	597	472	480	493
Total	1,093	1,112	1,088	1,242	1,388	1,581	1,357	1,372	1,201	1,120	1,123
U.S. imports from EU:											
Fresh fruit	29	17	21	26	27	41	67	67	157	120	130
Fresh veg.	78	84	121	138	157	189	218	272	239	129	208
F&V prep.	313	384	316	382	399	410	415	446	492	436	491
F&V juice	140	134	130	137	119	146	147	111	91	94	65
Tree nuts	30	16	12	13	11	13	18	11	12	9	12
Total	590	635	600	696	713	799	865	907	991	788	906

Source: FAOSTAT database by Food and Agriculture Organization, United Nations.

Figure 4.2

Spain's export value share of intra-EU fruit and vegetable imports



Source: FAOSTAT database by Food and Agriculture Organization, United Nations.

The import dependency of the EU in fruits and vegetables is 10 to11 percent of what it consumes. Demand factors in the EU have helped lead it to this trade position. The EU population of 377 million is relatively elderly (23 percent over 60 years of age, compared with 16 percent in the United States), highly urbanized (78 percent, compared with 76 percent in the United States), and relatively affluent (EU purchasing power is equal to 72 percent of U.S. purchasing power). Therefore, per capita demand for fruits and vegetables is high in the EU. However, population growth and economic growth are low, and with fruit and vegetable output expanding in the EU, demand for fruit and vegetable imports from external sources is likely to increase only marginally.

Future imports will most likely come through preferential agreements with other Eastern European countries, the Euro-Mediterranean agreements, and the Cotonou Agreement (replacing the Lome Convention with 77 countries), and perhaps through the newly signed "everything but arms" (EBA) agreement with 48 of the least-developed countries (LDCs). The agreement with the LDCs allowed fruit and vegetable imports to enter the EU without any tariff or seasonal restrictions from March 1, 2001. Most important, perhaps, all products must meet strict EU sanitary and phytosanitary measures that could prove restrictive (Hasha, 2001).

Internal Organization of the EU Market

The EU Commission, through its Agriculture Commissioner, determines the market policy of fruits and vegetables. Management of markets is carried out by the commission in accordance with EU rules and with the advice of the Management Committee for Fresh Fruits and Vegetables. The CMO for fruits and vegetables is principally implemented through producer organizations (POs), especially since the policy reform of 1996 and modifications in 2000 (Commission of the European Communities, 2000). The common policy and market management applies to all fruits and vegetables except the following: olives, potatoes, wine grapes, bananas, and sweet corn. These commodities have their own regimes, but the basic principles of the Common Agricultural Policy (CAP) still apply: to protect domestic markets and producers' income while satisfying demand.

Bananas and olives are commodities that have required special programs—bananas because of the EU's dependence on banana imports and its formal ties to former colonies, and olives because of agroclimatic conditions and excess supply. A contentious banana dispute was resolved in the WTO in 2001 after years of litigation between the EU and U.S. companies and Latin American exporters, with the EU trying to protect imports of former colonies. The olive oil regime costs the EU budget more than all other fruits and vegetables combined. The olive sector is treated particularly well because of its contribution to employment in labor surplus regions and because of the environmental role that olive trees play in the Mediterranean region of Europe. Wine is not considered a part of the fruit sector in this article—suffice it to say there is an expensive CAP program for wine grapes and wine (estimated at $1.4 billion in 2002).

The EU reformed the CMO for fruits and vegetables in 1996 and reinforced that reform in 2000 by simplifying the regime and allocating more finances and responsibility to the POs. Council Regulation 2699/2000 grants the POs additional flexibility in spending and timing, enabling them to manage the intervention system for more adequately responding to market volatility. It remains to be seen whether the most recent changes will be effective (*AgraEurope Weekly,* November 2000). The commission would like to reduce dependence on intervention, but it may find success elusive because of the reliance of Mediterranean regions on withdrawal funds for income. With the exception of apples and cauliflowers, the intervention system for fruits and vegetables is geared almost completely toward Mediterranean products.

The EU establishes rules for withdrawing of fresh products from markets (they are either distributed to institutions that would not affect markets or are

destroyed) and providing financial aid for processed products for growers that have contracts with POs. Both fresh and processed products must meet EU quality standards or payment will not be made. Compensation for withdrawal of produce from markets is made if prices are deemed too low by the POs, and processing aid is also available to divert fresh produce. However, threshold volumes that determine penalties based on volumes withdrawn or processed are established and were set at national levels in 2000. If the threshold volume is exceeded for a given commodity, then compensation for withdrawal or processing aid is reduced the following year. Threshold volumes vary by commodity and by country (table 4.3).

For example, processing aid for 2001-02 was set at 34.50 euros/metric ton for tomatoes, with a community threshold of 8.25 million tons. Payment is made by the PO to the grower and the price of tomatoes for processing is negotiated between the PO and the processor. For peaches, the aid was set at 47.70 euros/metric ton, with a community threshold of 539,000 metric tons, while aid for pears was set at 161.70 euros/metric ton with a community threshold of 104,617 metric tons.

Withdrawals from the market have been ratcheted down from as high as 50 percent of the marketed volume and were scheduled to reach lower limits by annually reducing thresholds from 1996 to 2002. The thresholds are based on the average annual quantity marketed over the previous 5 years. For 2002-03 the limits are 5 percent for citrus, tomatoes, and cauliflowers, 6 percent for table grapes, 8.5 percent for apples, and 10 percent for other products. For some commodities (citrus, tomatoes, and pears), threshold levels were raised by 10 percent in order to meet increased demand, but production aid for these products was reduced to maintain budget neutrality (table 4.4). The EU still has fixed time periods for when processing aid is available and when products can be delivered to the processors.

Nonmembers of POs have access to withdrawal compensation, but compensation is reduced by 10 percent and handling costs are deducted. Since all production of PO members must go through the PO, it is easy to apply the trictions on compensation and financing. The PO is also to ensure that the grower adheres to good environmental practices.

Table 4.3—EU and national processing thresholds[1]

	Tomato	Peach	Pear	Orange	Lemon	Grapefruit	Small citrus[2]
				Metric tons			
EU	8,251,455	539,006	104,617	1,500,236	510,600	6,000	384,000
Greece	1,211,241	300,000	5,155	280,000	27,976	799	5,217
Spain	1,238,606	180,794	35,199	600,467	192,198	1,919	270,186
France	401,608	15,685	17,703	nr	nr	61	445
Italy	4,350,000	42,309	45,708	599,769	290,426	3,221	106,428
Holland	nr[3]	nr	243	nr	nr	nr	nr
Austria	nr	nr	9	nr	nr	nr	nr
Portugal	1,050,000	218	600	20,000	nr	nr	1,724

[1]Each EU member state is assigned a threshold quantity of produce that can be removed from the market, after which a penalty is applied to further withdrawals from the market.
[2]Includes tangerines, clementines, mandarins, and satsumas.
[3]nr = not relevant.

Source: Official Journal of the European Communities. Annex III, L 311/16. Dec. 12, 2000.

Table 4.4—Fruit and vegetable withdrawal compensation and processing aid*

	2000/01	1999/2000	1998/99	1997/98
		*Euros/Metric ton***		
Withdrawal:				
Cauliflowers	79.4	84.1	88.8	93.4
Tomatoes, field-grown	54.7	58	61.2	64.4
Oranges	141.3	142	142.6	143.3
Mandarins	142.6	148.9	155.2	161.5
Lemons	131.5	132.2	133	133.7
Table grapes	90.8	96.2	101.5	106.9
Apples	95.6	99.4	103.2	106.9
Pears	91.0	94.6	98.2	101.8
Peaches	124.5	131.2	139.2	146.5
Processing aid:				
Pineapple, preserved	1,119.27	1,400.26	1,441.14	1,539.17
Peaches, preserved	41.34	61.03	60.65	81.28
Prunes	683.89	799.76	813.60	802.61
Figs	266.30	293.35	277.57	279.86
Dried grapes (euros/hectare)	27.85	27.85	27.85	27.85

* Withdrawal compensation is a fixed amount of funds available to a Producer Organization (PO) that is to be used to take produce out of the market to stabilize prices. Processing aid is used by a PO to remove a product and cover the cost of a product that can be processed and stored to stabilize prices.
** One euro equaled 0.90 U.S. dollar in 2002.

Source: *CAP Monitor*, Agra Europe, London.

Financing of the intervention system derives from PO operational funds paid by grower-members and limited funds from the commission. A limit on funds available to growers is effectively set by the commission as follows: An operational program must be submitted by the PO and approved by the commission, and 50 percent of the operational funds must derive from the EU, up to a budget limit of 4.5 percent of a PO's turnover in the previous year and an EU spending ceiling of 2.5 percent of the total turnover of all POs.

By 2001, there were over 1,400 POs in the EU, handling over 40 percent of its fruit and vegetable production. However, the number and size of POs varies widely, as well as the amount marketed by the member states: POs in Belgium and the Netherlands each market about 70 percent of all fruits and vegetables in their countries, while France and Spain market only 50 percent and Italy only 30 percent. The commission hopes to increase the proportion of fruits and vegetables handled by POs through increased funding.

The financial aid to EU processors is intended to allow them to be competitive on world markets. Products eligible for processing aid are tomato products, peaches, pears, prunes, and dried figs. Canned pineapples also qualify, but under a special provision. Trends in world prices and costs are taken into account, and processing aid for tomatoes, peaches, and pears was reduced by 50 percent in 2000 compared with the mid-1990s because the global cost of raw materials had risen and because of the decrease in the euro exchange rate. Processors must have a contract with a PO to receive the production aid.

Withdrawal from the market is principally used for tomatoes, citrus fruit, peaches, and pears of marketable quality. Withdrawal can also be used for

apples, apricots, melons, nectarines, table grapes, watermelons, eggplants, cauliflowers, figs, and prunes. However, it is not used on a large scale because these are not perceived as Mediterranean products and hence do not receive the same political pressure for market support. This is a particularly sensitive issue in the EU because grains and animal products from northern members of the EU take up the majority of CAP funds. Northern member countries' support for Mediterranean products from southern members, in the form of fruits and vegetables and regional aid, is the quid pro quo for the southern support of northern products in CAP budget expenditures.

Peaches have had the highest withdrawal, at nearly 17 percent of EU's 1996 production; when measured by country rather than for the EU, over 40 percent of peaches was withdrawn in Greece in various years. If national threshold levels are enforced, then Greece could receive a much lower withdrawal rate over time and less financial aid unless it restricts production.

Processing aid reached 707 million euros ($660 million) in 2000, while withdrawal funds reached 800 million euros ($748 million) the same year. Overall intervention anticipated in 2002 was $1 billion for fresh produce and $828 million for processed products. Citrus is the primary recipient of processing aid by virtue of contracts with processors, comprising over one-fourth of the total aid allowed for processing. Processing aid is particularly important for tomato production; the EU paid aid money on 6.3 million tons of the 6.6 million tons processed in the 1998-99 season. Peaches have been canned under the processing aid scheme that led to numerous trade disputes with the United States and other peach exporters. Pears are also canned and benefit from processing aid.

Export Subsidies, Promotional Aids, and Other Financial Aid

The EU also provides export subsidies (principally for fruits), promotional aids for apples and citrus to alleviate market pressures, and structural funds to cut costs through modernizing and consolidating of fruit and vegetable markets. There are also small amounts of aid for storage for dried figs and sultanas, cultivation aid for grapes intended for dried grape production, and specific measures for products of regional importance that face international market pressure. For example, white asparagus for processing is currently receiving 500 euros/hectare, or $180/acre, for up to 9,000 hectares.

Export subsidies are used principally for fresh fruit and vegetables to alleviate internal market pressure, though they are used to a lesser degree than processing aid or withdrawal funds. Export subsidies were 98.4 million euros ($123 million) in 1996, and only reached $25 million in 2000, as reported to the WTO—the EU is allowed to spend up to $48 million on fruit and vegetable export subsidies according to WTO limitations. With the exception of some tomatoes, all export subsidies were used to move fruit onto the world market. The products eligible for export refunds in the EU are fruits (apples, lemons, oranges, peaches, nectarines, and table grapes) and some nuts, with tomatoes the only eligible vegetable. The EU has not come close to exceeding the quantity or value limits on export subsidies for fruits and vegetables according to its WTO commitments. Export refunds are allowed to compensate for the differ-

ence between world and EU prices, but subsidized exports had to be reduced by 21 percent by volume or 36 percent by value by 2000 from the 1986-90 level because of WTO commitments. The EU is evolving into a tendering system for fruits and vegetables, with a fixed budget amount for export refunds that would better reflect the different costs that operators incur.

Other support consists of promotional and restructuring funds. Promotional funds are reserved for EU apples and citrus, while restructuring funds largely go to Mediterranean countries to modernize their marketing structure. Expenditures on promotional and restructuring measures (such as grubbing up old olive and orange trees and consolidating marketing channels and wholesale markets), as well as other aids mentioned above, amounted to 312 million euros ($343 million) in 1998.

Standards Important in the EU

The standards set by the EU consist of three classes for all fruits and vegetables, from highest to lowest acceptable quality: Extra, Class I, and Class II. The standards include specifications for quality, size, labeling, packaging, and presentation. If produce does not meet these standards, then it is not allowed to be sold in the market, although enforcement of these standards is the responsibility of each member state. Farm-gate sales and products used for processing do not have to meet the standards. Standards used to be the principal instrument of market management in the EU before the reinforcement of the POs. Although standards continue to be instrumental in managing produce markets, grouping of products has a more dominant role.

Imports must also meet the classification standards set by the EU. EU inspectors are dispatched to the country of origin to inspect the facilities to ensure that EU sanitary and phytosanitary standards are met. In many cases, this has led to upgrading the produce sold in local markets (interview with Dr. Mordecai Cohen, Agricultural Affairs Counselor, Embassy of Israel). There are five large trading companies in the EU that dominate EU trade in fruits and vegetables and frequently have multiyear contracts with Mediterranean exporters. These EU trading companies are instrumental in insuring that produce destined for EU markets meets all EU standards during the EU's off-season and at the price and volume that will not trigger the prohibitive tariffs the EU has in place.

External Market Organization

The EU had to change its fruit and vegetable CMO to comply with the Uruguay Round Agreement on Agriculture (URAA; for a detailed account see Grethe and Tangermann, 1998a and b). The principal goal of the EU in the fruit and vegetable trade regime (and in all CAP regimes) was to protect its domestic producers by controlling import access and thus domestic prices. The EU effectively managed supply through preferential trade agreements and arrangements that allowed access through quotas with relatively low in-quota tariffs. The remaining market was managed through restrictive tariffs, mostly seasonal, with the Most-Favored-Nation (MFN) tariff rendered prohibitively high. In January of 1996, the new CMO for fruits and vegetables was introduced to implement General Agreement on Tariffs and

Trade commitments and prepare the EU for a more competitive international environment in the long term (Martin and deGorter, 1998).

The new entry price system essentially replicates the previous trade regime with mechanisms that have changed the names but not the functions. The EU's current entry price and tariff equivalent system is intended to meet the URAA commitment to replace the former reference price system and its variable levies. The new system uses tariff equivalents that are applied to the entry price, which effectively functions like the reference price, while the tariff equivalent functions like the variable levies utilized in the pre-URAA period.

The entry price system is similar to the pre-URAA EU reference price system because the EU used the highest weighted reference prices (arbitrary prices) during the 1986-88 base period as its "internal" price. The EU then used the intra-EU market price as its "external" price (less export refunds, if any were used) to determine the maximum tariff equivalent (MTE). This combination of "external" and "internal" price measurement is a method that allows tariffication to occur at high rates. The EU also established the internal price in this calculation as its minimum entry price (MEP), thus reflecting the reference prices that existed before the URAA. If the import price is at or above the MEP, the common customs tariff (CCT) is applied. If the import price is 92 percent or more of the MEP, a tariff equivalent will be applied to bring the import price up to the MEP plus the CCT (the tariff equivalent thus becomes a variable levy, as in the old system). If the import price is 91 percent or less of the MEP, the MTE will be applied on top of the tariff equivalent and the CCT. The imposition of the MTE would effectively prohibit any imports. (see *www.taric.com* for detailed EU tariff rates.)

Another complication in the new import system is that all calculations are made on a shipment-by-shipment basis. This could lead to problems of a practical nature in establishing a price, which means that invoices become more important than in the old system (Tangermann, 1997). In addition, an importer may choose one of three methods to calculate the entry price of the import to match against the MEP:

1. The standard import value that is calculated on a daily basis, by product and by origin, and published in the Official Journal of the EU,
2. The f.o.b. price of the products in their country of origin, and
3. The effective resale value of the shipment.

It is likely that EU importing companies will continue their role of calculating the best time and price for entry of imports into the EU just as they did under the old regime, because the new entry price system is even more complex than the reference price system.

Despite the new import system, it is unlikely that the volume of fruit and vegetable trade in the EU will be much changed, although rents derived from what is an effective quota system could be reallocated between importers and exporters (Grethe and Tangermann, 1998a). The effective quota system is most active during the EU off-season production, when imports are largely covered by agreements with other countries and groups

of countries who compete on the basis of quality for a given volume. These agreements contribute greatly to the apparent low tariff rates of the EU, but they occur within a quota with a low tariff, while out-of-quota tariffs are prohibitive. The average EU in-quota tariff was 6.2 percent for fruit tariff rate quotas (TRQs) and 5.2 percent for the vegetable TRQs, while the average over-quota tariffs were 42 percent for fruits and 56.4 percent for vegetables. However, these rates do not take into account the seasonal nature of the tariffs that greatly determine fruit and vegetable trade in the EU. Nevertheless, the EU looks to be more open than it is in reality because it had the lowest average bound tariffs of any region in the world with the exception of North America, but its imports are subject to severe seasonal restrictions to insure that EU internal prices are not affected.

Average annual bound tariffs were 21 percent for EU fresh fruits and 16 percent for fresh vegetables in 2000, compared with world averages of 56.1 percent for fresh fruits and 64.4 percent for fresh vegetables (USDA, ERS, Agricultural Market Access Database). Tariff exceptions are made for the 42 LDCs in the EBA initiative that have duty-free access to the EU year-round for fruits and vegetables and for the numerous preferential trade agreements and arrangements the EU has with neighboring countries and former colonies.

A more competitive EU fruit and vegetable sector may be emerging, as evidenced by the sector's declining use of export subsidies even while its exports grow. WTO notifications show that the EU spent $35.4 million on fresh fruits and vegetables and $5 million on processed fruit and vegetable export subsidies in 1998. The quantity subsidized was 763,000 tons, while the WTO limit was 820,000. The EU accounted for 50 percent of world export subsidies on fruits and vegetables that year. WTO commitments established the quantity and value of subsidized exports of fruits and vegetables the EU must meet from 1995 to 2000, and the EU easily met its commitments (World Trade Organization, 1999, 2000). The export quantity subsidized had to decrease to 753,400 tons in 2000, while the amount spent on export subsidies had to decline by nearly $28 million to $49 million in 2000, but the EU actually spent only $42 million. WTO notifications show that the EU spent $40.4 million on fruit and vegetable exports in 1998, half of what they were allowed to spend under WTO commitments in that year. By 2001, EU export subsidies to fruits and vegetables were $32.5 million.

Estimated total budget expenditures on the EU fruit and vegetable regime amounted to slightly more than $5.3 billion in 2001 (USDA, FAS. GAIN #E21046). However, over two-thirds of that budget is accounted for by olive oil and wine. The effective cost of the regime to consumers is very difficult to compute because of the difficulty in establishing a world price for each commodity over the entire year in order to calculate a price gap for all fruits and vegetables. Nevertheless, an attempt was made by Donovan and Krissoff (2001), who calculated EU support to fresh and processed fruits and vegetables (wine excluded) at $8.7 billion for the 1998-99 season.

Prospects for EU Policy and Trade

While the EU is the world's largest importer of fruits and vegetables, its imports are largely circumscribed by preferential trade agreements and

arrangements with other countries or groups of countries based on season and quality. The EU's large consumption of fresh fruits and vegetables will likely continue because of high income levels, a highly urbanized and aging population, and health concerns. Import access could be enhanced by WTO commitments but will likely be filled by countries in the Mediterranean agreements, candidates for EU enlargement, former colonies, and perhaps some of the 42 least-developed countries that were included in the recent EBA agreement with the EU. However, the recent trend in extra-EU imports is slightly negative, and extrapolation out to 2010 shows EU imports from outside the EU down by 10 million tons.

Internal changes in EU domestic policy have attempted to reduce reliance on its intervention system, particularly with regard to the condition that allows withdrawal of produce from the market. More flexibility has been introduced into the intervention system to make it more competitive, with less emphasis on intervention and more on processing the surplus produce.

EU exports of fruits and vegetables are not likely to be restricted by WTO volume or value limits on subsidized exports, since they have been considerably below their limits and are unlikely to exceed them. Imports into the EU will not likely increase much from those countries not included in trade agreements with the EU (such as the United States), as WTO market access commitments are easily met without including new trade partners. While EU average bound tariffs appear relatively low by world standards, the seasonal nature of tariffs and trade arrangements poses severe restrictions on increasing exports to the EU. Furthermore, MFN tariffs are mostly prohibitive, in light of the preferred access allowed those countries with special arrangements and agreements with the EU. Internal political pressure from the EU's Mediterranean member states to limit imports will remain intense.

Chapter 5

NAFTA Trade in Fruits and Vegetables

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NAFTA eliminated many tariffs and quantitative restrictions between the United States and Mexico on January 1, 1994, and provided for the progressive elimination of remaining tariffs and other trade barriers between the two countries over a 15-year period. It built on the Canada-U.S. Free Trade Agreement, which took effect in 1989 and was fully implemented by 1998. For horticultural crops, all NAFTA tariffs were to fall to zero in 2003 (or earlier), except for a few products.

All three members of NAFTA—the United States, Canada, and Mexico—are very important producers, consumers, and traders of horticultural products. The trade liberalization under NAFTA, combined with other factors such as income growth and exchange rate movements, has spurred horticultural trade among the NAFTA partners over the last several years. This chapter reviews production, consumption, and import and export trends for each of the countries in the partnership. Fruit and vegetable policies and regulations, and areas where there have been trade frictions among the NAFTA members, are also discussed.

NAFTA Region Exports

The United States, Mexico, and Canada accounted for 19 percent of the value of world fruit and vegetable exports during 1999-2001, with the three countries ranking 1st, 7th, and 10th, respectively, as exporters. In all three countries, there has been an expansion in all facets of fruit and vegetable exports in fresh and processed fruits and vegetables, fruit and vegetable juices, tree nuts, and pulses (figs. 5.1 and 5.2). In addition, intra-NAFTA exports have exceeded the growth in external or extra-NAFTA trade in the 1990s.

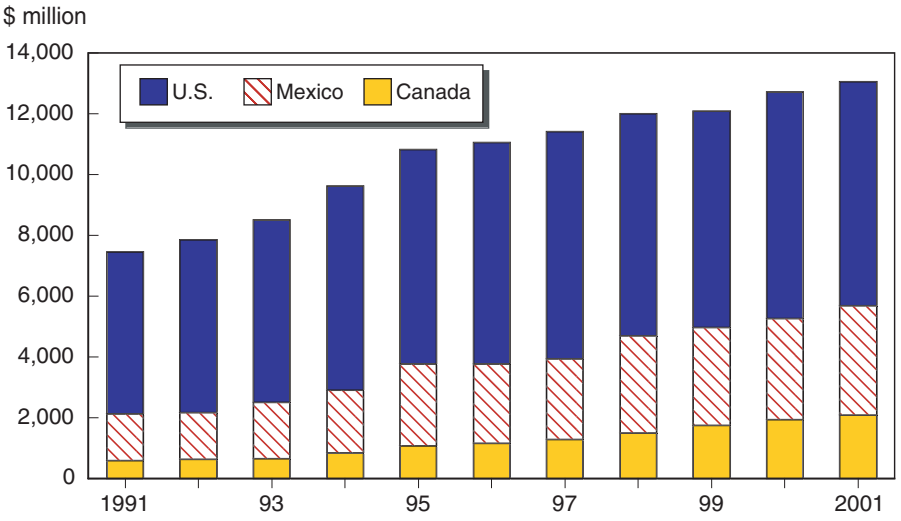
U.S. Fruit and Vegetable Production

The United States is a major producer and exporter of many fruits and vegetables. In 2001, U.S. fruit and vegetable production, concentrated mostly in the Southern and Pacific Coast States, totaled $25.7 billion. California and Florida dominate the U.S. vegetable industry, and California has by far the greatest number of farms and acres planted to fruits.

California and Florida produce the largest quantity of fresh market vegetables in the United States, leading the way in broccoli, carrots, celery, cucumbers, lettuce, onions, bell peppers, sweet corn, and tomatoes. Potatoes and onions are produced in many States, led by Idaho, Washington, Oregon, and Colorado.

Figure 5.1

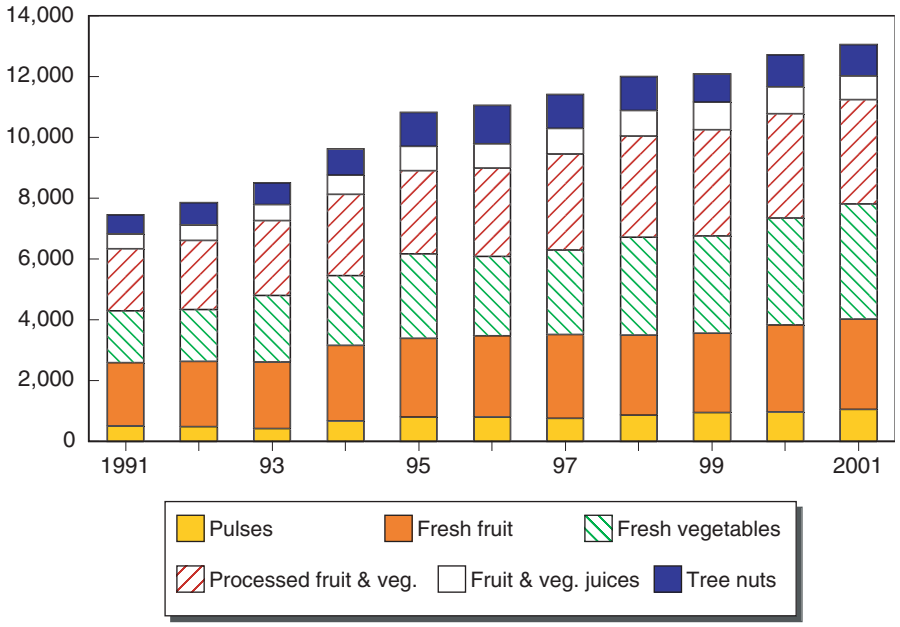
NAFTA fruit and vegetable exports by country



Source: USDA, FAS Global Agricultural Trade System.

Figure 5.2

NAFTA fruit and vegetable exports by commodity



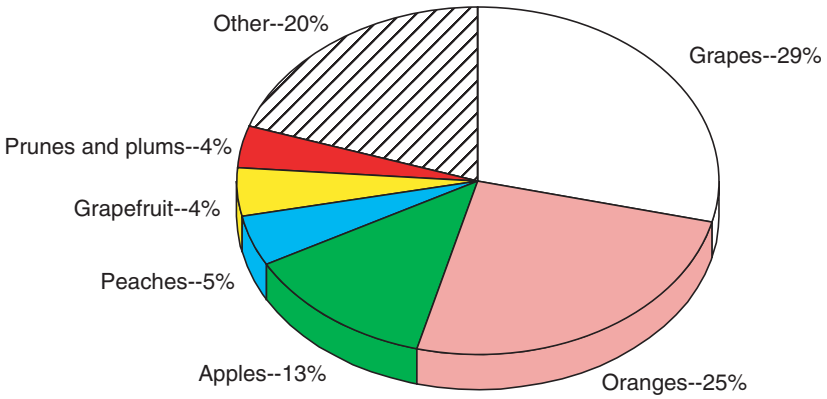
Source: USDA, FAS Global Agricultural Trade System.

According to the 1997 Census of Agriculture that included horticultural acreage, California accounted for 37 percent of fruit and tree nut farms and 50 percent of U.S. acreage in 1997. Other major producers included Florida (with 9 percent of both farms and acreage), Washington (with 6 percent of the acreage), and Georgia (with 3 percent of the acreage).

Grapes accounted for the greatest number of acres planted to fruits in 2001, followed closely by oranges and apples (fig. 5.3).

Figure 5.3

U.S. fruit areas, 2001



Source: National Agricultural Statistics Service, USDA.

Grapes are grown mostly in California and Washington, which together accounted for 95 percent of production in 2001. California supplies most of the oranges for the fresh market, while Florida provides most of them for the processing industry. Over the years, apple production has expanded in both Washington and California, while acreage and number of farms declined throughout the East and Midwest. Occasionally, harsh weather in the major Southern producing States such as Georgia and South Carolina has forced growers to reduce acreage in fruit crops like peaches.

California also dominates three of the six most important tree nut crops of the United States—almonds, walnuts, and pistachios—accounting for virtually all commercial production. Pecan production is greatest in Georgia, Texas, and New Mexico, which together account for 72 percent of U.S. production. Macadamia nuts are grown only in Hawaii. Hazelnut production is concentrated in Oregon. These six tree nuts accounted for a combined $1.3 billion of production and $975 million in exports in 2001.

Mexican Fruit and Vegetable Production

Mexico grows fruits and vegetables on about 4 percent of its agricultural land. Climate variation from tropical to temperate allows growers to produce a wide spectrum of fruits and almost any vegetable. About 20 percent of Mexico's fruit and vegetable production is exported, while the vast majority goes to the large and growing domestic market.

Production practices in Mexico for the export and the domestic markets are quite different. The export industries grow products to meet foreign-market consumer demand, retail preferences, and governmental restrictions (limits on chemical and pesticide residues, programs to deal with quarantine pests, etc.). The technology is quite similar to that used in the United States, as U.S. firms are active in the Mexican export industries. Producers for Mexico's domestic market tend to be more labor-intensive than in the United States and employ more traditional methods of cultivation and harvesting.

Figure 5.4 shows the Mexican states. Mexico's vegetable production is concentrated in Sinaloa, Zacatecas, Guanajuato, Chihuahua, and Mexico, with most export vegetables coming from Sinaloa. The winter fresh vegetable industry in Sinaloa is old and established. Its major products are tomatoes, cucumbers, bell peppers, eggplant, and squash. Sinaloa's fruit and vegetable crops are irrigated; there are dams in the mountains and no serious problems with water availability.

Noncitrus fruit production centers around the more temperate states of Michoacan, Chihuahua, Durango, Zacatecas, and Sonora, while citrus production is located in Veracruz, Colima, Michoacan, San Luis Potosi, Oaxaca, and Sonora.

Sonora is the most important state for export fruits, mainly grapes and melons. Unlike Sinoloa, it does have water problems because it relies on seriously overdrawn aquifers for irrigation.

Canadian Fruit and Vegetable Production

Although Canada's climate is not as conducive to growing fruits and vegetables as that of its NAFTA trading partners, its production and exports have been substantially rising. In 2000, Canada's fruit and vegetable exports totaled nearly $2 billion, just shy of a 50-percent increase from 4 years earlier. Technology has played a key role—greenhouses have been built in both eastern and western Canada, and tomato, cucumber, and pepper production and exports have expanded rapidly.

Figure 5.4
States of Mexico

The most important vegetable crops in Canada in terms of value are potatoes and tomatoes. Potato production has a long history and is an important part of the economy in several provinces, particularly Prince Edward Island and New Brunswick. Total output is valued at about $700 million per year. Potatoes are consumed and exported in large volumes, both fresh and as frozen french fries.

Tomatoes in Canada are now raised largely in modern greenhouses. In recent years, the greenhouse tomato industry has grown by more than 20 percent per year, with up to 50 percent of production destined for the United States. Almost all the exports originate from the provinces of Ontario and British Columbia, the heartland of Canadian greenhouse production.

Canada's most important fruit product, and most important fruit for export, is apples. Exports of fresh apples were valued at $54 million in 2000. Other fruit products are blueberries, raspberries, strawberries, cranberries, grapes, peaches, and cherries.

Policy, Regulation, and Marketing of Fruits and Vegetables in the NAFTA Countries

Fruit and vegetable crops in the United States, Mexico, and Canada do not benefit from any direct government payments such as price support programs. However, there are a variety of marketing and research programs that support the fruit and vegetable industries.

Canadian support for fruit and vegetable production is limited to generic programs such as scientific efforts to develop new technology. The U.S. and Mexican governments provide similar services, but also aid the fruit and vegetable industries through subsidized and preferential water allocations that have helped stabilize production levels. For some crops the United States also provides Federal crop insurance, and disaster assistance when warranted.

All three countries have marketing structures that help insure the maintenance of grades and standards. In Canada, potato growers participate in local organizations such as the Prince Edward Island Potato Board and the Saskatchewan Seed Potato Growers Association. Apple growers benefit from marketing and promotion agencies such as the Apple Growers of Ontario and the British Columbia Fruit Growers' Association.

In the United States, the USDA's Agricultural Marketing Service (USDA, AMS) administers marketing orders that enable growers to regulate market activities. The U.S. Agricultural Marketing Agreement Act of 1937 (AMAA) authorized marketing orders for certain fruit, vegetable, nut, and specialty crops. Marketing orders typically have grade, size, quality, and maturity requirements and include mechanisms that help balance supply and price over time. U.S. regulations also require that imports of certain fruits and vegetables comply with regulations that apply to U.S.-grown produce when domestic regulations are in effect.

In Mexico, an increasing proportion of fruit and vegetable production is marketed to foreign and domestic nontraditional markets that expect producers to closely monitor product characteristics like grade, size, and

quality. But most Mexican production relies on more "traditional" marketing methods, which leave the details of product selection and presentation to the wholesale market participants (Tropp et al., 2002). Wholesalers close to major population centers receive fresh produce from numerous small producers and their brokers and reassemble it for retail delivery. Relationships between producers and wholesalers, and between wholesalers and retailers, are typically informal and personal, with prices and terms of transactions set on a case-by-case basis.

In general, the traditional distribution system suffers from a lack of adequate cold storage warehouses and refrigerated delivery vehicles, as well as from poorly insulated and ineffective packing materials. These deficiencies can result in the loss or degradation of a substantial portion of the product. Tarrats Gavidia (1997) estimates that in the current marketing system as much as 50 to 60 percent of perishable agricultural products in Mexico are lost between harvest and the time the product reaches the final consumer.

NAFTA Fresh Fruit Exports

During 1999-2001, the United States (at $2.0 billion per year) and Mexico (at $696 million per year) ranked 2nd and 10th, respectively, in world fresh fruit exports. Canada's fresh fruit exports, 83 percent of which went to the United States, averaged $90 million per year over the same period.

About 42 percent of fresh fruit exported by the United States is destined for its NAFTA partners, mainly Canada. Nearly 40 percent of exports go to East Asia (Japan, South Korea, Taiwan, China, and Hong Kong). Other markets of significance include the EU and countries in the Association of South-East Asian Nations (ASEAN),[1] accounting for 9 and 6 percent, respectively, of U.S. fresh fruit exports.

Canada is the leading destination for U.S. fresh fruit, accounting for 31 percent of total U.S. fruit export value during 1999-2001. Grapes, melons, strawberries, oranges, and apples made up 63 percent of these exports. Japan, the second-largest market for U.S. fresh fruit exports, accounts for half of U.S. fresh fruit exports to the East Asia region. East Asia surpassed NAFTA as the leading market for U.S. fresh fruit exports from1994-97, before the Asian financial crisis took its toll. During 1999-2001, five fruits—oranges, grapefruit, cherries, grapes, and apples—accounted for nearly three-fourths of U.S. fresh fruit exports to the region. More than one-third of U.S. fruit exports to the EU consisted of grapefruit, while the leading U.S. fruit export to the tropical region of ASEAN were grapes and apples. Fresh fruit exports to Mexico, which received a 10-percent share of total U.S. fruit exports, were concentrated on apples, pears, and grapes, which together accounted for more than 80 percent of U.S. fruit exports to that country.

Mexico's fresh fruit exports expanded during the 1990s, increasing from $392 million per year in 1991-93 to $696 million per year in 1999-2001. Mexico's major fresh fruit exports include melons, mangoes, grapes, avocados, strawberries, limes, and bananas.

[1] ASEAN here includes Indonesia, Malaysia, the Philippines, Singapore, Thailand, and Vietnam.

NAFTA Fresh Vegetable Exports

During 1999-2001, the United States (at $1.2 billion per year), Mexico (at $1.9 billion per year), and Canada (at $446 million per year) all ranked among the top 10 countries in the world in fresh vegetable exports. During this period, more than 90 percent of fresh vegetables exported by the NAFTA countries represented intra-NAFTA trade: 65 percent to the United States, 23 percent to Canada, and 2 percent to Mexico. The only major extra-NAFTA exports were shipments to the East Asia region (6 percent), mainly by the United States.

U.S. fresh vegetable exports to East Asia grew markedly before the mid-1990s. Since then, however, growth has stalled. During 1999-2001, U.S. vegetable exports to East Asia were $197 million per year, up from about $90 million in 1991. Most U.S. fresh vegetable exports are destined for its NAFTA partners, with Canada taking 70 percent and Mexico 4 percent. U.S. fresh vegetable exports to Canada and Mexico include almost every type of vegetable sold in stores and used in the preparation of processed food products. U.S. vegetables exported to East Asia, however, are concentrated on a relatively small number of products, including broccoli, onions, asparagus, cauliflower, and celery.

Mexico and Canada send most of their fresh vegetable exports to the United States, which purchased 98 percent of Mexican exports and 94 percent of Canadian exports during 1999-2001. Mexico exports a wide variety of products, led by tomatoes, peppers, asparagus, onions, and cucumbers. In particular, Mexico is an important source of winter vegetables for the United States. Canada's principal fresh vegetable exports are tomatoes, potatoes, and peppers.

NAFTA Exports of Processed Fruits and Vegetables and Fruit and Vegetable Juice

The United States, Canada, and Mexico expanded exports of processed fruit and vegetables from less than $2.0 billion in 1991 to more than $3.4 billion in 2001 as all three countries recorded impressive gains. Nearly half of the processed fruit and vegetable trade was intra-NAFTA in 1999-2001, with more than 26 percent of the exports going to East Asia, nearly 11 percent to the EU, and 14 percent to other destinations.

All three NAFTA countries also had notable gains in exports of fruit and vegetable juices, from less than $520 million in 1991-93 to more than $850 million in 1999-2001. During 1999-2001, about 47 percent of fruit and vegetable juice exports were intra-NAFTA and more than 20 percent went to East Asia, nearly 18 percent to the EU, about 5 percent to Central and South America, and 9 percent to other destinations.

NAFTA Fruit and Vegetable Consumption

United States

In the United States, per capita consumption of fruits, nuts, vegetables, and melons totaled about 723 pounds in 2001. Vegetables and melons accounted for about 441 pounds and fruits and nuts for approximately 282 pounds.

Fresh-market vegetables and melons accounted for about half of all vegetable and melon use, with the other half going to the processing sector. The leading vegetables in terms of per capita consumption, all uses, and fresh consumption are shown in table 5.1.

Popular fruits are oranges (31 percent of per capita fruit consumption, all uses), apples (15 percent), grapes (16 percent), and bananas (9 percent). More fruit is consumed in the form of juice (43 percent) than as fresh fruit (35 percent), but growth in per capita consumption was stronger for fresh fruit.

Canada

In Canada, per capita consumption of both fruits and vegetables increased by about 12 percent during the 1990s. In 2001, Canadians consumed about 185 kg (408 pounds) of vegetables and 125 kg (276 pounds) of fruit per person. Leading vegetables were potatoes, lettuce, carrots, onions, tomatoes, and cabbage. The most popular fruits were bananas, apples, and oranges. Consumption of fruit juices increased by more than 27 percent during the 1990s (Agriculture and Agri-Food Canada, January 2004).

Mexico

In Mexico, per capita consumption of fruits averaged 113 kg (249 pounds) per person during 1999-2001. Popular fruits were oranges and mandarins, bananas, mangoes, coconuts, lemons and limes, apples, pineapples, and grapes. Leading vegetables were potatoes, tomatoes, and chili peppers. Per capita consumption of vegetables averaged 72 kg (159 pounds) during 1999-2001 (United Nations Food and Agriculture Organization).

NAFTA Imports

The NAFTA region is also an importer of fruits and vegetables (including intra-NAFTA imports), accounting for nearly 20 percent of the value of world horticultural imports during 1999-2001. The United States, the world's largest fruit and vegetable importing country, had a 14-percent share of the global market, and Canada, the eighth-largest importer in the world, had a 4-percent share. Mexico's share was 1 percent.

Figures 5.5 and 5.6 show total NAFTA imports of fruit and vegetable products from 1991-2001. Throughout the 1990s, fresh and processed fruits and vegetables accounted for the largest share of fruit and vegetable imports, with an 84-percent share during 1999-2001. Fruit and vegetable

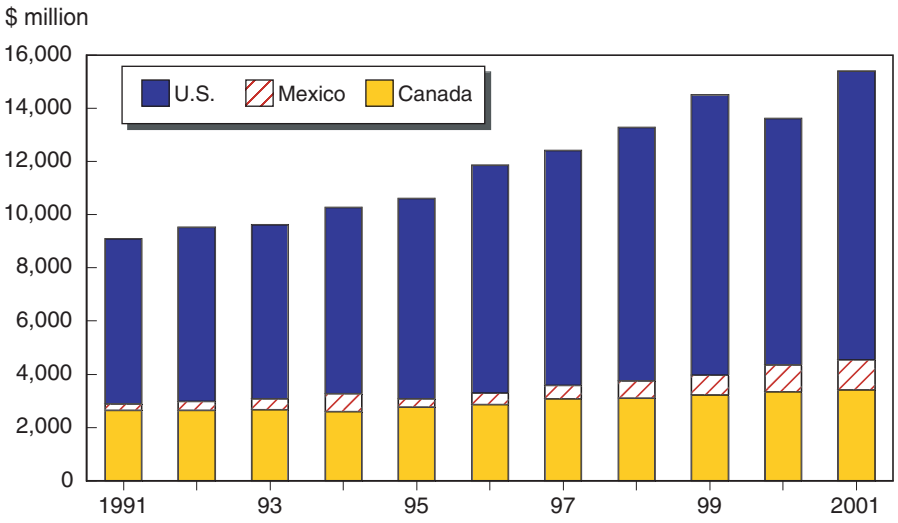
Table 5.1—U.S. per capita use of selected vegetables, 2001

Vegetable	Per capita consumption, all uses	Per capita consumption, fresh
	Pounds	
Potatoes	137.8	46.2
Tomatoes	82.9	17.4
Lettuce	31.8	31.8
Sweet corn	27.4	9.4
Onions	18.9	17.8
Carrots	14.0	10.6

Source: *Vegetables and Melons, Situation and Outlook Yearbook*, 2003.

Figure 5.5

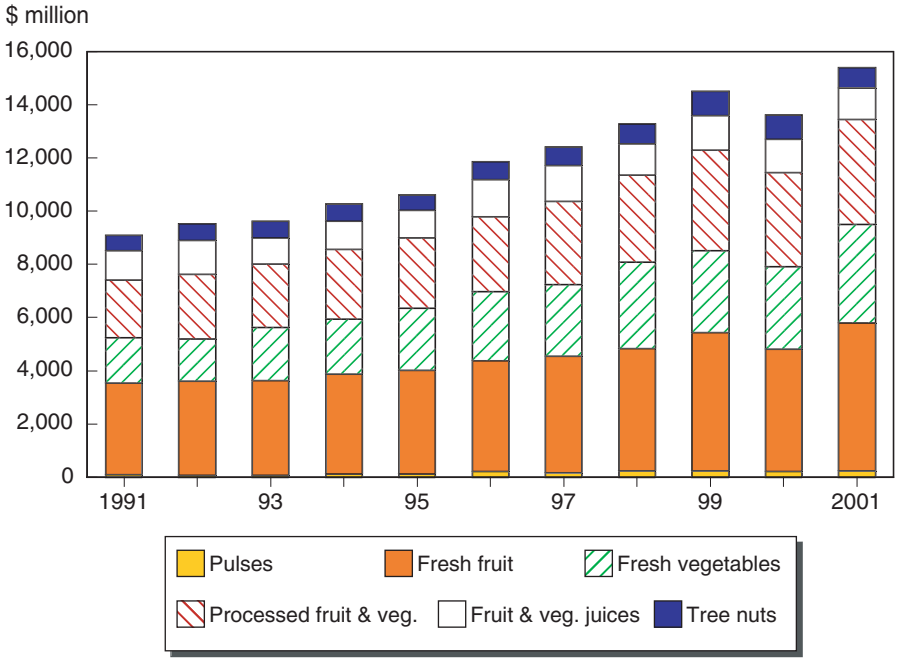
NAFTA fruit and vegetable imports by country



Source: USDA, FAS Global Agricultural Trade System.

Figure 5.6

NAFTA fruit and vegetable imports by commodity



Source: USDA, FAS Global Agricultural Trade System.

juices, tree nuts, and pulses imports accounted for 16 percent. All categories of imports showed steady growth during the 1990s, with imports of fresh vegetables increasing the most.

Fresh Fruit Imports

During 1999-2001, the United States (at $3.6 billion per year) and Canada (at $1.1 billion per year) ranked first and eighth, respectively, in world fresh fruit

imports. Mexico's fruit imports were $389 million per year. About 34 percent of fresh fruit imports by the NAFTA countries represent intra-NAFTA trade, while 22 percent come from Central American countries and 38 percent from other Southern Hemisphere sources. During 1999-2001, major fruits imported by the NAFTA countries included bananas (29 percent), grapes (18 percent), melons (8 percent), oranges, mandarins, apples, and citrus hybrids.

The United States is the predominant supplier of fresh fruits imported by its NAFTA partners, accounting for more than half of Canadian fruit imports and nearly three-fourths of Mexican imports during 1999-2001. The United States is also the primary destination for Canadian and Mexican fresh fruit exports. Mexican fruits account for about one-fifth of U.S. fresh fruit imports, while Canadian fruits account for merely 2 percent. Nearly half of U.S. fresh fruit imports from Mexico are grapes and melons. Although total fruit imports from Canada are minor, Canada dominates U.S. imports of cranberries, and Canada supplies about one-fifth of U.S. apple imports. In addition to its NAFTA partners, the United States purchases a substantial amount of fresh fruit from extra-NAFTA sources, particularly from Central American and Southern Hemisphere countries.

Similarly, Canada purchases a large share of fresh fruit from Central America and the Southern Hemisphere. Countries in these two regions accounted for 32 percent of Canadian fresh fruit imports during 1999-2001, compared with 57 percent from Mexico and the United States combined. In fact, about 60 percent of fresh fruit imports by all NAFTA countries come from Central America, South America, and other countries in the Southern Hemisphere. In comparison, the EU is a minor supplier, accounting for 3 percent of fresh fruit imports by the NAFTA countries. The EU, however, is the main source of mandarin oranges (including clementines and citrus hybrids) and fig imports, with a 60-percent and 42-percent share, respectively, of these two NAFTA fruit imports.

Central American and South American countries are the main suppliers for NAFTA's leading fruit import: bananas. During 1999-2001, nearly 90 percent of the region's banana imports came from Costa Rica, Ecuador, Colombia, and Guatemala.

The most important South American supplier of fresh fruits for the NAFTA countries is Chile, which exported $878 million of fresh fruit per year to the NAFTA countries during 1999-2001. Chilean fruit harvest schedules generally complement North American harvest schedules, so that winter imports from Chile help provide consumers in the NAFTA region with a year-round supply of fresh fruit. Chile has signed free trade agreements with Canada, Mexico, and the United States and now benefits from low U.S. tariffs on fresh fruit during the U.S. winter season. During 1999-2001, nearly 60 percent ($522 million) of NAFTA imports from Chile were grapes, followed by significant volumes of other fruits, including peaches and nectarines, apples, avocados, plums, pears and cherries.

Fresh Vegetable Imports

As with fresh vegetable exports, vegetable imports by the NAFTA countries mostly originated within the region, with intra-NAFTA trade accounting for

86 percent of trade during 1999-2001. Mexico supplied nearly half of these imports, while the United States provided 25 percent and Canada 13 percent. An additional 7 percent came from the EU, and Southern Hemisphere sources added another 4 percent.

The highest valued fresh vegetable imports by the NAFTA countries are tomatoes (29 percent), peppers (17 percent), onions (7 percent), and cucumbers (6 percent), followed by a wide variety of products that include asparagus, potatoes, lettuce, carrots, garlic, beans, and celery. The great majority of NAFTA fresh vegetable imports from the EU consists of greenhouse tomatoes and peppers. Southern Hemisphere countries supply significant volumes of only three items—asparagus, garlic, and onions.

During 1999-2001, the United States (at $2.1 billion per year) and Canada (at $802 million per year) ranked second and sixth, respectively, in global fresh vegetable imports, while Mexico's vegetable imports were just $100 million per year. The United States purchased 83 percent of its fresh vegetable imports from its NAFTA partners: 65 percent from Mexico and 18 percent from Canada. Similarly, Canada imported fresh vegetables primarily from the United States (84 percent) and Mexico (9 percent). Fresh vegetables from Mexico are mainly warm season ones like tomatoes, peppers, and cucumbers, imported during December-April. Rapid growth in the Canadian greenhouse tomato industry expanded Canada's share of U.S. tomato import value from 2 percent during 1991-93 to 20 percent in 1999-2001, while the import value share for Mexico declined from an average of 90 percent to 65 percent over the same two periods.

Processed Fruit and Vegetable and Fruit and Vegetable Juice Imports

Imports of processed fruits and vegetables by the NAFTA countries expanded from less than $2.2 billion in 1991 to nearly $4 billion in 2001. Mexico recorded a particularly impressive increase, from less than $80 million before 1991 to more than $350 million in 2001. About 46 percent of processed fruit and vegetable imports were intra-NAFTA in 1999-2001, with about 22 percent coming from Asia and 15 percent from the EU.

In contrast, the variation in fruit and vegetable juice imports by NAFTA countries was relatively small during 1991-2001, ranging from about $1 billion to $1.4 billion. About 70 percent of the imports were extra-NAFTA trade during 1999-2001, with nearly 50 percent of total imports coming from Central America, South America, and other Southern Hemisphere countries. Brazil is the leader among these countries, supplying 20 percent of the juices imported by NAFTA countries during this period.

Trade Frictions Among the NAFTA Countries

Differences in regulatory requirements among the NAFTA countries have led to some protracted disputes. A full discussion of agricultural trade disputes among NAFTA countries since 1990 is available in *Effects of North American Free Trade Agreement on Agriculture and the Rural Economy* (USDA, ERS, 2002, *www.ers.usda.gov/publications/wrs0201/*). Some of the more important issues regarding fruits and vegetables are highlighted below.

U.S. Tomato Imports from Mexico

Imports constitute a large proportion of the tomatoes for U.S. domestic consumption, and Mexico is the main source. During 1999-2001, U.S. imports of fresh tomatoes equaled 764,734 metric tons, valued at $740 million, with Mexico accounting for 82 percent by volume and 65 percent by value.

Prior to 1995, the general U.S. tariff on imported tomatoes was either 3.3 cents or 4.6 cents per kilogram, depending on the season. Under NAFTA, the United States gradually began to phase out these tariffs for fresh tomatoes from Mexico.

In April 1996, the Florida tomato industry charged Mexico with selling tomatoes in the U.S. market at prices below fair market value, thus materially injuring the U.S. domestic industry. In response, the U.S. Department of Commerce (DOC) initiated an anti-dumping investigation. However, on October 28, 1996, the DOC announced an agreement with principal Mexican producers/exporters to settle the dispute, and on November 1, the DOC suspended the anti-dumping investigation.

This agreement established a seasonal reference price, or minimum price, covering most fresh Mexican tomatoes exported to the United States. From October 23 to June 30, the minimum price for Mexican fresh-market tomatoes was $5.27 per 25-pound box ($0.2108 per pound). Later, a second seasonal reference price was established; from July 1 to October 22 the minimum price was $4.30 per box ($0.1720 per pound). This accounted for the difference in summer and winter market conditions.

In late spring 2002, a large group of Mexican producers pulled out of the suspension agreement. In July the agreement was terminated, the dumping case resumed, and the United States imposed preliminary anti-dumping duties. On December 4, 2002, the DOC and Mexican growers/shippers signed a new suspension agreement, and the anti-dumping case was again suspended. In the new suspension agreement, the reference prices remain unchanged from the previous suspension agreement. The two major changes in the agreement are mandatory participation for all Mexican growers/shippers selling to the United States and better enforcement to ensure that the minimum price is honored.

Mexican Apple Imports From the United States

On March 6, 1997, Mexico initiated an anti-dumping investigation against U.S. apples. The Secretariat of Commerce and Industrial Promotion (SECOFI) made a preliminary determination of dumping and imposed a preliminary duty. On March 19, 1998, the U.S. apple industry and SECOFI signed an agreement suspending this duty, and the U.S. industry agreed to comply with a minimum-price scheme. This agreement remained in force until August 2002, when Mexican growers requested that the reference price scheme be dropped and that a new anti-dumping investigation be undertaken. As a result of this investigation, Mexico now charges an anti-dumping margin of 46.58 percent on U.S. apples.

Phytosanitary inspection requirements for U.S. exports to Mexico have also disrupted trade. For a detailed discussion of individual cases, including apples, see *Effects of North American Free Trade Agreement on Agriculture and the Rural Economy* (USDA, ERS, 2002, *www.ers.usda.gov/publications/wrs0201/*).

U.S. Avocado Imports From Mexico

From 1914 to 1993, the United States prohibited fresh avocado imports from Mexico due to phytosanitary concerns. Since 1993, Mexico and the United States have implemented a series of measures designed to permit freer trade in fresh avocados while addressing phytosanitary concerns. Beginning in November 1997, avocados from certain growers in Mexican states that met stringent pest control requirements in production, packing, and transportation were allowed to be exported from November through February to 19 Northeastern and Midwestern States, along with the District of Columbia. These measures were taken to minimize the risk of introducing pests that could threaten the health of U.S. avocado groves. In October 2001, the list of States eligible to receive avocados from Mexico was expanded to include 12 additional States and the shipping season was extended to October 15 through April 15.

Canadian Potato Imports From the United States

Since 1984, Canada has imposed an anti-dumping duty against U.S. fresh potatoes into British Columbia. Potatoes imported between May 1 and July 31 are not subject to a duty. The Canadian International Trade Tribunal reviewed the anti-dumping duty in 2000, and decided it would continue for at least another 5 years.

NAFTA Region Conclusions

The countries that comprise NAFTA are very important producers, consumers, and traders of horticultural products. Both intra- and extra-NAFTA trade grew rapidly during the 1990s. The United States is a major producer and consumer of many fruits and vegetables and is the leading trade partner for both Canada and Mexico. However, extra-NAFTA trade is more important than intra-NAFTA trade for the United States, except in the case of fresh vegetables.

Fruit and vegetable crops in the NAFTA countries do not benefit from any direct government payments such as price support programs, but all three countries have marketing structures that help insure the maintenance of grades and standards. Nevertheless, differences in regulatory requirements among NAFTA countries can sometimes lead to protracted intra-NAFTA trade disputes.

Chapter 6

China's Fruit and Vegetable Trade

Dennis Shields and Sophia Wu Huang*

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Emerging developments in China's fruit and vegetable trade indicate that foreign producers could see increased competition from the world's largest producer. During 1999-2001, China ranked eighth in world exports of fruits and vegetables (including pulses and tree nuts) and reached more than six times the level of its imports.

But as the world's largest consumer of fruits and vegetables, with a growing appetite for high-quality produce, China is also an expanding import market (mostly fresh fruits and, to a lesser extent, processed products). The value of China's produce imports increased sevenfold between 1992 and 2001, making it one of the world's fastest growing import markets.[1]

A clear distinction can be made between trade in fruits and in vegetables. China is a large net exporter of fresh and processed vegetables. In contrast, the country imports more fruit than it exports. China's overall trade value and volume have been increasing in the last decade, and recent investment in the sector has resulted in competitive products and points toward a greater presence for China in global markets (Shields and Tuan, 2001). Trade flows, as well as shifts in supplier shares in China and third-country markets, provide an indication of how China's fruit and vegetable trade will help shape global trade and financial prospects for producers and traders around the world.

China's Export Value Resumes Growth

China's exports of fruits and vegetables rose from $2 billion in 1992 to $3.7 billion in 2001 (fig. 6.1). Growth stalled in the mid- and late-1990s as total volume (quantity) increased, while average prices declined due to competitive conditions in major markets. China's export volume of fruits and vegetables is about 1 percent of total domestic output.

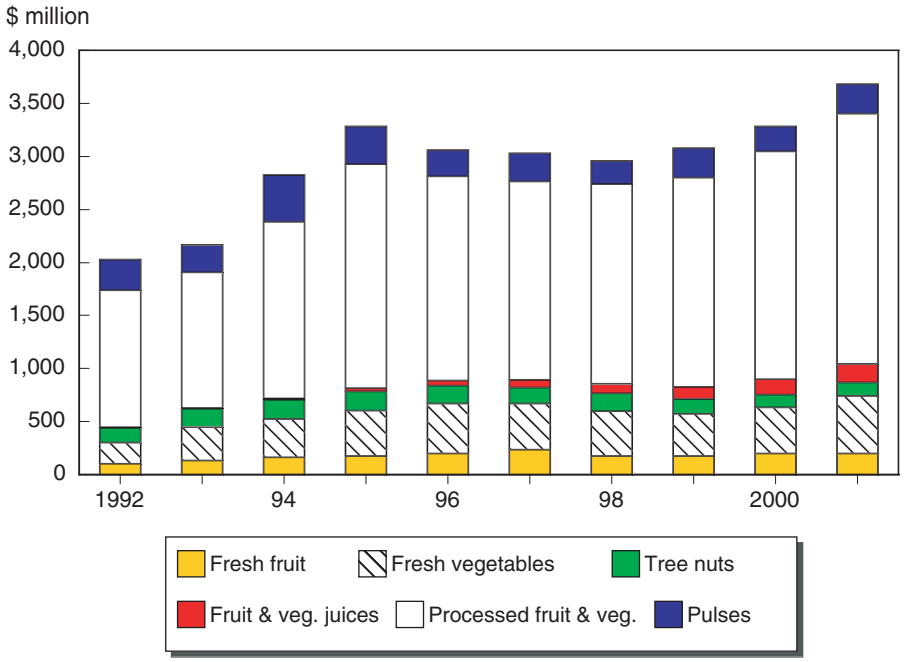
Processed products (including juice) account for more than two-thirds of China's fruit and vegetable export value (table 6.1). Leading products include vegetable mixes (not frozen), frozen vegetables, and mushrooms. Fresh vegetables—such as mushrooms, garlic, onions, and radishes—account for 14 percent of total horticultural exports. The balance is in pulses (8 percent), fresh fruit (6 percent), and nuts (4 percent).

Japan is the major market for processed products, absorbing nearly half of China's exports (fig. 6.2). In turn, China is easily Japan's number one supplier (see chapter 7 on Japan). The United States is the next-largest market, accounting for about 6 percent of China's total exports. Other key

[1] Trade data cited here are from the United Nations Trade Statistics, as reported by China and from compilations by World Trade Atlas. The country's imports are likely understated because official government statistics do not reflect "gray market" fruit and vegetable sales, which are channeled from Hong Kong into both nearby and far-inland markets.

Figure 6.1

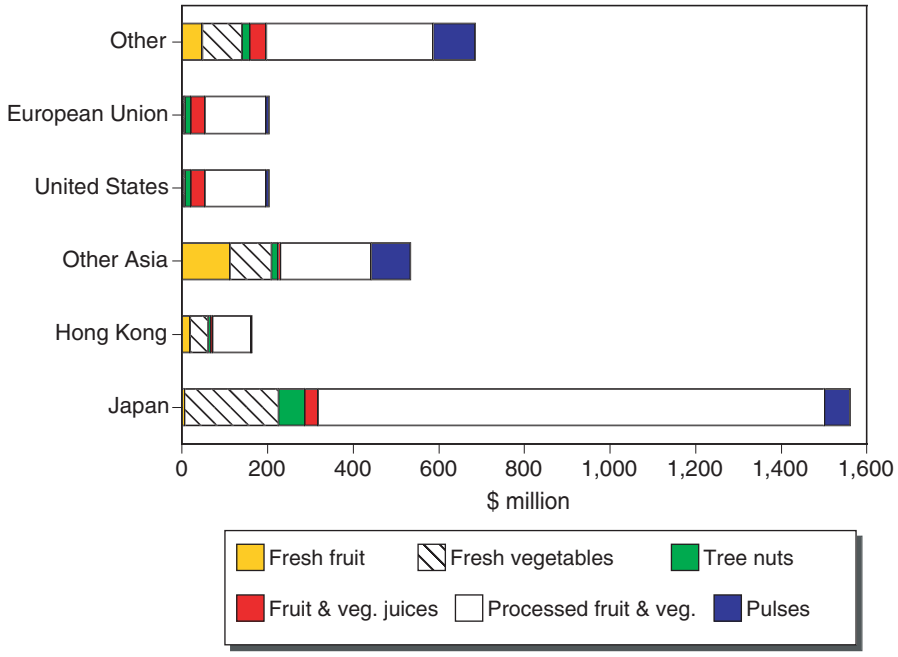
China's fruit and vegetable exports resume growth in 2000



Source: USDA, FAS Global Agricultural Trade System.

Figure 6.2

Japan is the dominant market for Chinese fruit and vegetable exports, average 1999-2001



Source: USDA, FAS Global Agricultural Trade System.

Table 6.1—China's trade in fruits and vegetables

China's exports of fruits and vegetables			China's imports of fruits and vegetables		
Item	Avg. value 1999-2001	Major markets	Item	Avg. value 1999-2001	Major suppliers
	$ Million			*$ Million*	
Total exports	**3,346**	Japan, Hong Kong, European Union	**Total imports**	**521**	S. America, Thailand, Philippines, United States
Fresh fruit	190		Fresh fruit	277	
Apples	91	Russia, Singapore, Malaysia, Indonesia	Bananas	136	Philippines, Ecuador, Colombia
Mandarins	40	Philippines, Malaysia, Canada, Indonesia	Grapes	31	United States, Chile
Pears	36	Malaysia, Indonesia, Singapore	Oranges	19	United States, New Zealand
			Apples	13	United States, New Zealand, Chile
Fresh vegetables	459		Fresh vegetables	4	
Mushrooms	114	Japan	Celery	2	United States
Garlic	109	Indonesia, Japan, Netherlands	Peas	1	New Zealand
Onions	47	Japan, Russia	Mushrooms	1	North Korea
Beetroot, radishes, etc.	21	Japan, South Korea			
Nuts	128		Nuts	32	
Chestnuts	63	Japan, Taiwan, Singapore	Pistachios	6	United States, Iran
Walnuts	23	United Kingdom, Japan, Canada	Cashew nuts	4	Vietnam
Pistachios	2	Hong Kong, United States	Coconuts	3	Vietnam,Thailand
Veg. & fruit juice	146		Veg. & fruit juice	16	
Apple juice	113	United States, Japan, Netherlands	Frozen orange juice	10	Brazil, United States, Israel
Processed veg. & fruit	2,161		Processed veg. & fruit	164	
Vegetable mixes (not frozen)	644	Japan, United States, South Korea, Hong Kong	Manioc (cassava)	71	Thailand, Indonesia, Vietnam
Frozen vegetables	314	Japan, Germany, United States, Netherlands	Potatoes (frozen)	19	United States
Mushrooms	301	Japan, Germany, Hong Kong, United States	Potatoes (not frozen)	5	United States, Belgium, United Kingdom
			Frozen sweet corn	4	United States, Hungary, Canada, New Zealand
Pulses	263		Pulses	27	
Kidney or white pea beans	117	Cuba, Italy, Pakistan, Turkey, Japan	Dried peas	19	Canada
Mung/black/green beans	75	Japan, India, United States, Vietnam	Mung/black/green beans	1	Myanmar, Thailand, Australia
Small red beans	30	Japan, South Korea			

Source: USDA, FAS Global Agricultural Trade System.

markets include Germany and the Netherlands, along with regional markets in Hong Kong, South Korea, Malaysia, and Singapore.

One of the fastest growing segments of China's processed produce exports is frozen vegetables, which increased more than fivefold between 1992 and 2001. If prepared frozen potatoes (mainly french fries) are excluded, China is the world's second-largest exporter of frozen vegetables after Belgium. Japan is the destination for more than three-quarters of China's exports, and China holds a 56-percent share in that market. If prepared frozen potatoes are included, however, China's global ranking slips to number five, while the United States ranks third. Although China has sharply increased its presence in Japan, Chinese frozen vegetables do not yet pose a serious challenge to U.S. frozen vegetables in Japan because each country ships different products. Japan's frozen vegetable imports from the United States, mainly prepared potatoes and sweet corn, meet with only a minimum challenge from China (Huang, 2002).

A larger share of China's fresh vegetable exports, which require short transit times and cost more to transport, stays within the Asia region—nearly 80 percent compared with 70 percent for processed products. Japan accounts for about half of China's fresh vegetable exports, while Hong Kong ranks second with a share of about 10 percent.

China has recently become a strong competitor in fresh vegetable markets that other suppliers, such as the United States, previously dominated. For example, it is now a major factor in the import market for fresh broccoli in Japan, which was until 2000 almost exclusively supplied by the United States. China's product quality is reportedly meeting customer preferences, and some Chinese growers/marketers contract with Japanese importers or sell on consignment, which makes the broccoli very price-competitive. Recent improvement in ocean freight service to Japan from China—which takes only 3-4 days compared with about 14 days from California—has been key to development of this trade flow (USDA, FAS, 2001a).

China's leading fresh fruit export is apples, and the country is by far the world's largest apple producer. Major markets include Russia for lower-priced apples and Southeast Asia (including Singapore, Malaysia, Indonesia, and the Philippines) and Hong Kong for higher-priced apples. U.S. apples have encountered significant competition from the Chinese products in Hong Kong and the Philippines, key U.S. export markets. In 1999, the cost of shipping apples from China to the Philippines was about 15 percent lower than shipping from the United States (Caron, 1999). Since then, the gap has likely widened as ports in China have expanded.

Up to one-half of China's apple trees have yet to reach maximum yields, so production is expected to keep expanding during the next 10 years. In addition, foreign investment is resulting in highly competitive operations. In the eastern province of Shandong, for example, a Singapore-based firm packs locally grown apples and pears for shipping to Southeast Asia and for the domestic market. Demand is strong in major cities such as Shanghai, located within a few hours' drive (USDA, FAS, 2000a).

Another indicator of China's growing presence in world markets for vegetables and fruits is its trade disputes with a number of importing countries. For example, Japan imposed quotas on leeks and fresh shiitake mushrooms in 2001 in response to rising imports from China. Similarly, following an investigation by the U.S. International Trade Commission of a massive import surge in 1993, the United States imposed anti-dumping duties on garlic from China. The European Union also has restrictions on imports of Chinese garlic.

These and other markets have domestic producers that are sensitive to import competition, and import surges can bring about retaliatory actions that severely limit trade. Now that China has joined the WTO, however, retaliatory action by other members will be subject to the WTO rules.

With these recent experiences in mind, traders and marketers shipping or sourcing from China may modify their marketing strategies to minimize policy changes that adversely affect trade. For example, when a U.S. anti-dumping investigation on apple juice was underway, China's apple juice producers met in 1999 to reportedly establish price floors to avoid similar problems in other markets. Based on trade data, unit values (prices) appear to have generally exceeded price floors, and in 2000 and 2001 quantity and value of total apple juice exports from China increased, compared with 1999.

Another sign of a potential change in marketing strategy involves China's exports to the United States of fresh onions, which have increased from essentially zero in the early 1990s to very modest levels in recent years. This pattern contrasts with sharp rises in the past for other products (e.g., garlic). While these shipments are not sufficient to affect the overall U.S. market, they are enough to draw attention to a potential competitor.

China's Rapid Import Growth Since the Early 1990s

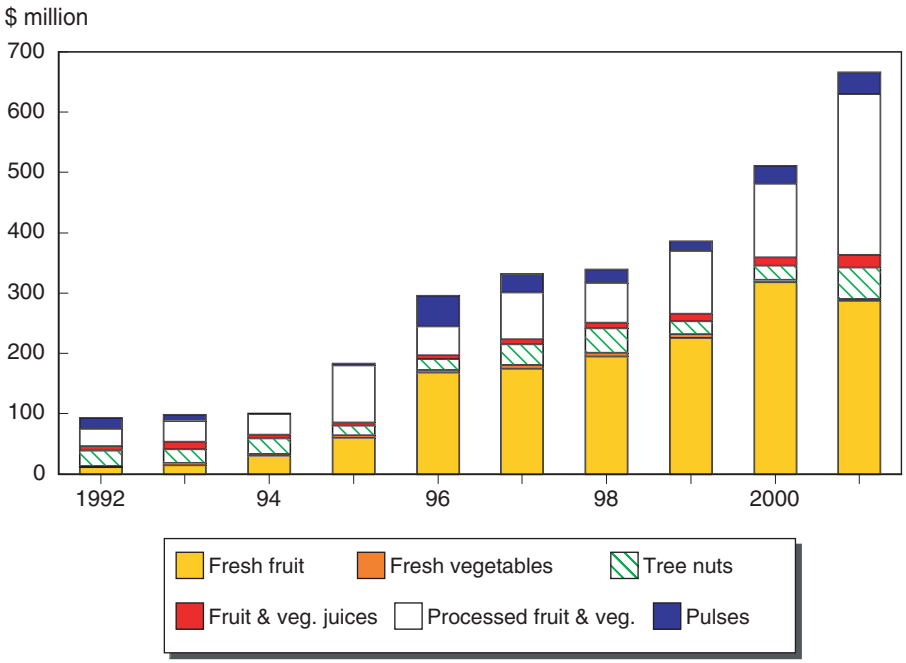
China's fruit and vegetable import market has been dynamic, increasing from less than $100 million in 1992 to more than $600 million in 2001 (fig. 6.3). Fresh fruit accounts for more than half of total imports, with processed products (including juices) accounting for one-third. Pulses, nuts, and fresh vegetables make up the balance. China imports produce mostly from Asia, United States, and South America (table 6.1 and fig. 6.4).

Total imports would have been greater in the absence of China's import tariffs, which were 30 or 40 percent for most fresh fruits and vegetables before China joined the WTO. Now that China is a WTO member, ad valorem duties in 2004 are 10 percent for apples and pears, 13 percent for grapes, and 12 percent for fresh citrus. Tariffs for most processed fruits and vegetables have also declined (USDA, FAS, 2001b; 2001c; 2002).

Underlying the rapid growth of imports is rising demand for a number of fresh fruits, including bananas (49 percent of fresh fruit imports during 1999-2001), grapes (11 percent), oranges (7 percent), and apples (5 percent). China produces all of these fruits, but the volume of high-quality products is not enough to satisfy growing demand, primarily in urban areas where incomes are rapidly rising.

Figure 6.3

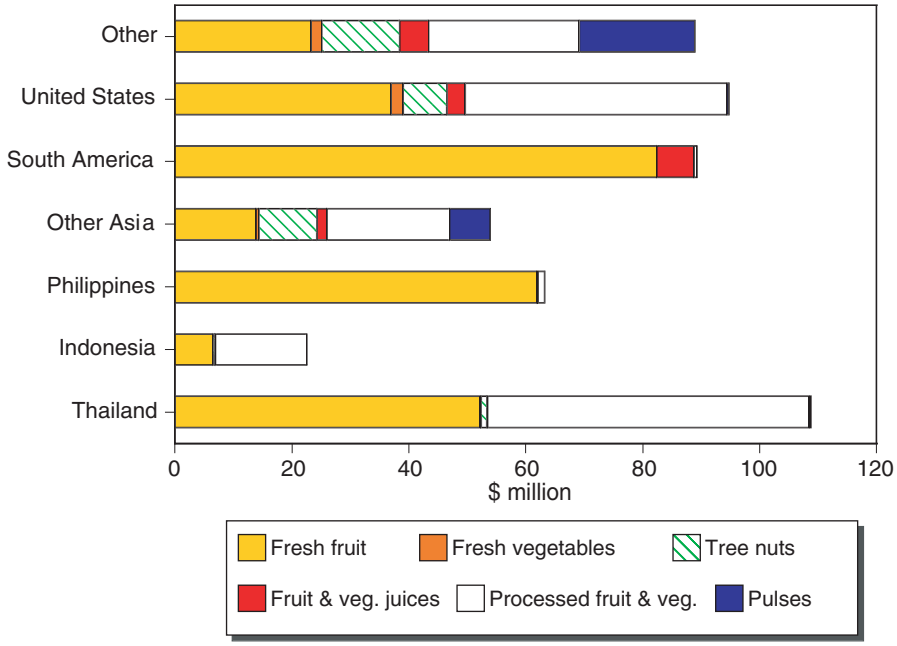
China's fruit and vegetable imports grew rapidly



Source: USDA, FAS Global Agricultural Trade System.

Figure 6.4

China fruit and vegetable imports, average 1999-2001



Source: USDA, FAS Global Agricultural Trade System.

Banana imports grew fairly quickly in the 1990s. Major banana suppliers include Latin American producers (Ecuador, and to a much lesser extent Colombia and Costa Rica) and Southeast Asia (the Philippines, and to a smaller degree, Indonesia, Vietnam, and Thailand).

In contrast, significant growth in other fresh fruit imports has occurred only since 1998. Grape imports grew from less than $3 million in 1998 to $34 million in 2001. Although the United States remains the largest supplier of fresh grapes, Chile is gaining a market share during the offpeak portion (January-April) of the U.S. shipping season, much like the shift that occurred in the U.S. market in the 1980s and 1990s. The U.S. shipping season corresponds with China's, so U.S. and Chinese grapes come into direct competition.

Fresh apple imports have seen somewhat slower growth—from less than $3 million in 1998 to about $17 million in 2001. The United States and New Zealand are the leading suppliers. Chile, the only other significant supplier, is a distant third. Some domestically produced high-quality apples previously expected to be marketed overseas (e.g., to Southeast Asia) are finding their way into Chinese markets because urban demand is strong.

China has historically barred orange imports for phytosanitary reasons. But this changed when the Agreement of U.S.-China Agricultural Cooperation went into effect in early 2000, paving the way for direct importation of U.S. citrus and other commodities (meat, poultry products, and wheat). The first direct shipment of U.S. oranges arrived in China in April 2000, although fresh oranges from California had been entering the country for many years, mostly through the "gray market" import channel (discussed below under the next heading). Foreign shippers now have direct access to large central and northern coastal cities. The quality difference between foreign and Chinese domestic products is substantial, and improving domestic quality through investment in cold storage and other marketing technologies will take time.

Official statistics reported $25 million in total fresh orange imports in 2001, up from just $1 million in 1998. The United States is a major supplier, accounting for over half of the market during 1999-2001. China harvests most of its citrus (mainly tangerines) in November and December, although some producers are reportedly switching to more late-harvest varieties. The limited post-harvest marketing practices—and inadequate cold storage facilities—currently result in import opportunities during the rest of the year. In addition, similar opportunities exist year-round for other varieties of citrus.

Processed fruit and vegetable imports (excluding juices) grew from less than $30 million in 1992 to more than $250 million in 2001. Major suppliers include Thailand, the United States, and other Southeast Asian countries. China's major imports from these Asian countries are manioc (cassava), mainly from Thailand, and a wide variety of prepared, preserved, or frozen vegetables and fruit mixtures from other Southeast Asian countries such as Indonesia and Vietnam. The United States ranks as the number two supplier overall, shipping mostly prepared frozen potatoes (mainly french fries), prepared or preserved potatoes (not frozen), and frozen sweet corn.

The juice import market is also undergoing rapid expansion, more than trebling since 1996 to nearly $22 million in 2001. Frozen orange juice is the leading product, accounting for more than half of juice sales. Brazil is the leading supplier, with nearly two-thirds of the market, while the remaining third is divided mostly between the United States and Israel. Frozen orange juice comprises nearly all of Brazil's shipments. Most of U.S. sales are orange juice, but other juices—including grape, vegetable, and grapefruit—are gaining ground.

Continued gains in juice imports depend on China's development of its domestic production capacity. The country is a large net exporter of juice, and production has expanded along with rising fruit output (e.g., apples). Overall juice consumption is relatively low, partly because cold beverages have become popular only recently (USDA, FAS, GAIN CH9630, 1999).

The import market for many fruits and vegetables is just beginning to take off. Suppliers are establishing positions in markets and building trading and customer relationships. As with any product or market, firms tend to maintain a competitive advantage if they enter markets early and demonstrate the capacity to deliver a high-quality product on a consistent basis.

Changes in Marketing Channels Encourage China's Imports and Exports

Developments in shipping are making China's vegetables and fruits more competitive in international markets. At the same time, these changes are reducing costs of shipping foreign products into China's domestic markets. Improvements in China's ports mean that imported fruits and vegetables can increasingly arrive in better condition and at lower prices than when transported overland from Hong Kong.

As a major transportation hub, financial center, and "free port," Hong Kong has long been a focal point for China's fruit and vegetable trade. As late as 1999, a relatively large share of Hong Kong's fresh fruit imports from the United States, for example, was re-exported to China: 46 percent of apples, 23 percent of grapes, and 19 percent of oranges (USDA, FAS, 2000b). Many distributors of imported fruit in China's major cities have business ties with Hong Kong firms.

Fruit and vegetable shipments to Hong Kong pass through one of two wholesale markets. Vessels are unloaded in the center of the harbor and tugboats transport products to the docks. Containers are also transferred directly onto smaller vessels for shipping to other ports in China.

Produce arrives from all over the world: expensive pears from Japan; U.S. Red Delicious apples; Florida grapefruit; California oranges; Chinese Fuji apples; California Red Globe grapes; Chinese ponkan (a tangerine variety) from Guangdong and Guangxi; and Taiwanese ponkan. Chinese vegetables are also plentiful in Hong Kong wholesale markets, but most products are displayed with little or no packaging (e.g., in big baskets). Other vegetable imports include onions from Oregon and Washington, U.S. celery, carrots from Australia, okra from Singapore (by airfreight), and potatoes from Holland.

Shipments into China via Hong Kong generally go by one of three ways: through official trade with duties paid (small volume), smuggling to Chinese ports (small volume), or "gray channel" (large volume). Gray channel trade is documented and declared in some way, but "transportation" companies handle the product for a fixed fee to see that it passes through checkpoints. One major benefit of WTO accession is legitimization of this process that would make it less volatile—there are occasional government crackdowns against it (Ferris, 2000).

A large portion of gray channel trade is handled by the Nanhai Lishui wholesale market (and the Huadu market, to a lesser extent) in Guangdong province, adjacent to Hong Kong. The market, supported by the provincial and municipal governments, accounted for an estimated 75 percent of China's fresh fruit imports in 2000. Trucks arrive from all over China to pick up produce and transport it to wholesale markets throughout the southern region of the mainland, as well as to markets in Xi'an in central China, Qingdao on the east coast, and as far north as Beijing (all requiring at least a 2-day drive). The principal buyers of this fruit are supermarkets, hotels, restaurants, and small retailers, mainly individuals who sell fruit at kiosks and on the street.

While Hong Kong remains a key gateway for fruit and vegetable trade between China and the rest of the world, North China ports are becoming more attractive destinations. With expanded capacity, ports in Shanghai, Dalian, Xingang, and Qingdao are picking up volume as their costs have become competitive. The cost of shipping a container in 2000 directly to Dalian from Hong Kong, for example, was about 25 percent less than shipping it through Guangdong. Fees for transport and handling through the gray channel will adjust downward as legal channels develop and official tariff levels decline—and as a greater share of China's imports of fruits and vegetables shifts from shipments through Hong Kong to direct imports into North China ports, at lower costs to shippers and consumers.

Shipping patterns to China are indeed shifting, evident in the final destination of U.S. container shipments of fruits and vegetables to Hong Kong and other Chinese ports. The share of volume for China's other ports grew from less than 2 percent of the total in 1997 to more than 9 percent in 2000, with a steady gain each year. Hong Kong is still generally the first port of entry, but direct shipments are increasing rapidly. Shanghai is the leading alternative port, accounting for more than one-third of fruit and vegetable container shipments in 2000 (excluding Hong Kong) (AMS, 2001).

Many of China's ports are undergoing significant expansion to handle growing trade of all products, not just fruits and vegetables. Besides investing in infrastructure (e.g., cranes), ports are buying logistical systems to maximize throughput and shorten dock time to just 12-18 hours for the largest vessels. The skills of port operators and laborers are also being upgraded (Caron, 2001; Chan, 2001).

Most fruits and vegetables (fresh and processed) are shipped in refrigerated containers, which are usually transported a short distance inland by truck. The product is then transferred to other trucks for transport to its final destination in the country (Caron, 2001).

Another longer term benefit of WTO accession is likely to be new provisions for financing that encourage more direct shipments. Historically, private traders have been prohibited from opening letters of credit and must engage a state trading enterprise to help finance fruit and vegetable trade.

China's Prospects for Trade Growth

The lack of government involvement in marketing and pricing of fruits and vegetables has resulted in an integrated national market in China for a number of years. Price signals are readily transmitted across the country and throughout production and marketing chains, as evidenced by a price analysis conducted in 1996 (The World Bank, 1996). In the last decade, a large number of private distributors emerged, purchasing fruits and vegetables in regions of abundant supply and selling them in deficit regions.

With market information generally available across the country, many domestic producers and processors became aware of the same demand and set their sights on the same markets. Consequently, prospects for China's imports and exports of fruits and vegetables depend heavily on developments in the domestic market, namely, on how domestic supplies of high-quality fresh and processed products grow in response to market incentives within China. Supplies of most vegetables and fruits have expanded in the last two decades, particularly in the 1990s, because these crops have generally provided higher returns than field crops. While quality of the domestic product has improved during this time, most growers and marketers still focus on volume because consumers purchase by weight, not by the "piece" as in high-priced markets like Hong Kong (Ng, 2001).

Market incentives and demand in China are shaped by the usual factors, including growth in income and population. China's population is growing at about 1 percent annually (1991-2001 average), or nearly 12 million per year. Meanwhile, inflation-adjusted income per urban resident more than doubled from 1990 to 2001 (National Bureau of Statistics of China, 2002). The effect of higher incomes is particularly strong for fruit consumption, with expenditures increasing 1.58 percent for a 1-percent gain in income. In addition, expenditures on fruit by urban residents in the top 10-percent income bracket are twice the expenditures of those in the bottom 10 percent (The World Bank, 1996).

With a growing population and rising incomes pushing up demand, overall consumption of vegetables (excluding potatoes) and fruit has increased. For example, according to China's urban household survey, fruit consumption increased more than 25 percent during 1990-2001 (National Bureau of Statistics of China, 2002). Vegetables are an important part of many meals. Fruit is consumed in much smaller quantities, as part of a meal or as a snack, or purchased for gifts during Chinese New Year or other holidays. Overall supplies have generally kept up with demand in recent years, keeping price levels in check.

Over the next 5 years, supplies of fruits and vegetables may continue to grow faster than demand if planting incentives remain favorable relative to other crops. Although fruit and vegetable prices have been declining, field crop prices have been under even greater pressure in recent years as

domestic policies encouraged grain production. The field crop sector may be under additional price pressure from imports following China's accession to the WTO, which prohibits subsidized grain exports and curbs government policies that favor grain output.

China's vegetable and fruit export prospects are bolstered by relatively low costs of production, which are reflected in wholesale prices (costs-of-production data are not available for comparison.) In Beijing, for example, wholesale prices for fruits and vegetables are only one-tenth to one-third the level of prices in other countries. However, higher production and marketing costs associated with delivering high-quality produce can reduce the cost advantage implied by wholesale prices. Nevertheless, many private firms, including foreign investors who are taking advantage of China's low input costs (particularly labor), are expanding vegetable and fruit output and boosting overseas shipments. For example, an investor from Singapore recently built a large greenhouse/packing facility west of Qingdao (Shangdong Province in eastern China) to ship spinach, lettuce, melons, and celery to Japan and Singapore (Shields and Tuan, 2001).

Given this simple wholesale price comparison, it seems likely China will expand vegetable and fruit exports. However, several factors will dampen prospective export gains in the near term while encouraging imports. First, China currently offers only a few varieties of fruits and vegetables in large volume for the export market. High-quality products are available (e.g., fresh vegetables in Shandong), but volume is limited and generally predestined for a particular market (such as Singapore) where demand is considered sufficient to support an operation.

Second, the vegetable and fruit industry does not, in general, use grade standards (e.g., for uniform product size and appearance), which are essential for international trade. Some producing areas employ their own sizing standards, and nationally mandated standards for citrus are primarily concerned with size and not quality (USDA, FAS, 2000c). The lack of widespread use of grade standards will continue to encourage imports and dampen exports, although a number of private firms successfully export fresh and processed products based on customer specifications

Third, China does not make widespread use of basic marketing practices, such as modern packing and packaging techniques. The ample supply of labor (and associated low cost) slows adoption of capital improvements that would improve produce quality. In China's fresh deciduous fruit industry, for example, many distributors store fruit in ambient air, including in unimproved underground storage pits, which can lead to deterioration (USDA, FAS, 2000a).

Prospects for imports depend heavily upon: (1) market strength for vegetables and fruits not currently produced on a large scale in China, and (2) how domestic supplies change to meet that demand. Grapefruit, for example, is available primarily through imports. Should domestic citrus producers foresee a profit, some may establish additional grapefruit groves, affecting demand for the U.S. product. China currently produces a "Barbarian" grapefruit (Wu-Yu) in Zhejiang province, providing some domestic competition for Florida grapefruit (Ng, 2001).

Will China become a major competitor or will it become a significant market for U.S. vegetable and fruit producers? The answer is yes for both. Over the last decade, international competition from China is already a significant issue for U.S. producers of commodities such as garlic, apple juice, and walnuts. More commodities will likely be added to the list as investments in processing facilities continue to increase and firms take advantage of China's relatively low costs of labor needed to grow, harvest, and process products requiring special handling.

Moreover, the quality gap between Chinese and foreign products in international markets may well be closing. This means producers with higher costs will need to compete on the basis of reliability, consistency of product, service, and other nonprice factors. In markets like Japan, a U.S. brand name is valued and is often a significant selling point. It remains to be seen if Chinese products can achieve similar recognition.

While some fruits and vegetables from China, such as apples, are already very competitive in the Hong Kong market, they are a factor only immediately after the harvest season because China lacks cold storage and marketing capabilities. For grapes, pears, peaches, lettuce and tomatoes, some importers expect that it will be a few years before Chinese products can be competitive.

As for China as an import market, U.S. exports to China of products such as fruit juice and fresh citrus are rising and appear to be gaining a foothold. This is due in part to limited availability of domestic fruit during late spring/early summer. In the near term, growing demand, along with shortcomings in China's marketing and distribution system, will likely result in rising vegetable and fruit imports.

Chapter 7

Japan's Fruit and Vegetable Market

John H. Dyck and Kenzo Ito*

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Japan's fruit and vegetable markets are important not only to farmers and consumers in Japan, but to world trade. Stable, high levels of consumption in Japan require supplies from a changing array of farms around the world. The demanding quality standards in Japan's retail markets provide opportunities for specialized production techniques. Japan's phytosanitary controls rule out imports of some important vegetables and fruits; nevertheless, Japanese companies are increasingly contracting for horticultural supplies outside Japan. Within Japan, the previous system dominated by wholesale markets is being replaced by supply contracts with individual farmers or groups of farmers. The changes on the supply side of the market make Japan an interesting case study.

Japanese Fruit and Vegetable Consumption

Japan is a large market for vegetables and fruit. One indicator is the value of consumption; the total wholesale value of vegetables in 1999 was 2.56 trillion yen (about $22.49 billion) (MAFF). For the United States in the same year, the value of the 25 leading vegetables (shipping point basis) was $9.27 billion (NASS, 2002). Fruit and nut wholesale value in Japan was 1.58 trillion yen (about $14 billion) (MAFF). The high value of Japan's vegetable and fruit consumption reflects both high consumption per person and high prices for vegetables and fruits.

In 2000, Japan's consumers each ate about 101.9 kg of vegetables (MAFF). U.S. consumption per person in the same year was about 137 kg (potatoes excluded for both countries) (NASS, 2002). Japan's consumption has declined over the last quarter-century when measured in kilograms (Tanino, 1995). However, the decline appears to reflect a move away from heavy vegetables (such as Japanese radishes) towards lighter ones. On a caloric basis, consumption per person appears to have remained stable. Japan's leading vegetables by value are tomatoes, cucumbers, cabbages, Welsh onions (which resemble leeks), lettuce, and bulb onions. In addition, potato consumption, at 16.2 kg per person, is quite important (MAFF). Besides vegetables commonly used in the United States, Japan consumes those associated with Northeast Asian diets in substantial amounts: Japanese radishes, burdock roots, bamboo shoots, lotus roots, Chinese cabbages, fresh soybeans, taros, and shiitake and enokidake mushrooms (MAFF).

Japan's fruit consumption was 41.5 kg per person in 2000 The volume of fruit per person has hovered around 40 kg over the last 25 years. The caloric value of fruit consumption appears to have increased slightly. Leading fruits

by wholesale value are mandarin oranges, strawberries, apples, grapes, bananas, watermelons, pears, persimmons, and peaches (MAFF).

Retail marketing of vegetables and fruits in Japan emphasizes freshness and quality. Appearance and size are important characteristics. Produce is commonly packaged with labeling that advertises its origin. Japan's cooperatives, for example, usually highlight their names and locations on their produce packages, so that a consumer knows not just the prefecture, but even the town where the produce was grown. Since April 2000, fresh fruits and vegetables must be labeled with the country of origin (or prefecture, if the produce is domestic) (USDA, FAS, GAIN #JA9022, 1999; #JA1049, 2001).

Japanese Fruit and Vegetable Production

Vegetable production is extremely important to farmers in Japan, rivaling rice and livestock as a source of income. If fruit and vegetable output are combined, their sum is the largest source of farm income in Japan—32 percent of gross agricultural output (MAFF). Vegetable production tends to be small-scale and specialized. Japan's vegetable operations are typically set up to absorb the full-time labor of one, two, or three family members; the size of the operation is limited to what these workers can do, with part-time or occasional help from other family members or hired nonfamily members. A farm household will produce a few vegetables, or even only one type. Rice production is a common sideline activity or income source and is often contracted out by vegetable farmers, who reserve their labor for their vegetable crops.

For many vegetables, covered production is important. The most common coverings are vinyl houses, followed by glass houses and plastic tunnels. In 2000, 72 percent of tomatoes and sweet peppers, 69 percent of cucumbers, 45 percent of eggplants, and 34 percent of lettuce crops were grown in covered facilities (MAFF). Vinyl and glass houses usually include heating/ventilation machinery for climate control and systems to control fertilizer and pesticide application. Covered facilities typically produce higher yields than open-field vegetable production and provide the opportunity to raise crops over a longer season. Because Japan's main islands stretch almost as far from north to south as the continental United States, the nation's effective growing season for a vegetable is already long; with covered production, it is extended even more. Nevertheless, in the coldest winter months Japan's production of tender vegetables shrinks dramatically, creating an opportunity for imports from Southern Hemisphere and tropical countries.

Fruit production in Japan benefits from abundant water and a relatively mild climate, but suffers from high humidity, which encourages plant diseases. Temperate fruits such as apples and pears are grown in large volumes. Citrus fruit production is significant in and around the island of Shikoku. The main citrus product is the unshu mandarin orange. Japan's climate does not support significant commercial production of bananas and other tropical fruits, and pineapple production is small.

Like vegetable farmers, fruit farmers tend to be specialized. The multiyear planning horizon for orchard production reduces year-to-year flexibility.

Greenhouse production of certain fruits, such as melons and strawberries, has increased over the last decades and requires a large fixed investment. Local fruit cooperatives, tied to regional and national federations, have been very important, especially for apple production. The cooperatives provide packing, distribution, and marketing functions for member farmers.

Recent developments include efforts to streamline the marketing of domestic produce; initiatives by international trading firms to weave together a year-round, stable vegetable and fruit supply through direct contracts for domestic and imported production; and overhaul of Japan's organic produce marketing rules. Organic certification and labeling rules enacted in April 2001 have tightened the criteria that domestic producers must meet.

Japan's national and prefectural governments are highly interested in promoting vegetable and fruit production. Government goals include (Nagata, 1997):

- Development of Designated Vegetable Production Areas,
- Development of large-scale production areas of two or more villages,
- Development of new production areas, especially in upland fields,
- Promotion of greenhouse vegetable and fruit production, and
- A supply of high-quality seeds and seedlings.

At the national level, the government has budgeted large sums to subsidize production capacity and marketing efficiency. Subsidies are available for constructing facilities and acquiring machinery and technologies. These programs pay much of the cost for the construction and outfitting of modern packing plants, in particular.

Stabilizing prices is a major goal of Japan's vegetable and fruit sectors. Farmers fear volatile prices that could depress their main source of income. The government, through the Ministry of Agriculture, Forestry, and Fisheries (MAFF), wants to avoid price swings that would hurt farmers and seeks stable prices for consumers. Retail firms, while welcoming lower prices, also place considerable weight on price stability and do not like to risk sudden price hikes.

Several mechanisms operate to stabilize prices, or to correct the effects of volatile prices if they cannot be avoided. Each year MAFF surveys supply and demand conditions for four major vegetables—onions, cabbage, Chinese cabbage, and Japanese radishes (daikon)—and sets a target for the planted area of each. Given historical yields, the target area is expected to produce a volume that will satisfy domestic consumption without significant changes in prices. The target planting area is then divided up regionally and passed on to cooperative federations, which make prefectural targets. Finally, each local cooperative is assigned a target area and works with its farmers to achieve, but not exceed, that area. For 10 other vegetables, national producer groups are entrusted with the responsibility of stabilizing prices by coordinating planting decisions of their members. These associations (in addition to the producing groups of the four major vegetables) are

supported by the Vegetable Supply Stabilization Fund (VSSF) when prices or harvests are disappointing (Ito and Dyck, 2002).

Price compensation guarantees payments of a portion of the difference between current season wholesale prices and a moving average of prices in previous seasons, depending on a variety of factors (Ito and Dyck, 2002). For onions, potatoes, and cabbages, the VSSF makes advance purchases for stockholding, releasing stocks in case of market price spikes. MAFF also has the authority to subsidize cooperatives for shipping low-graded vegetables that are not usually shipped in order to dampen price increases. Producer groups for vegetables not included among the 14 handled by the VSSF receive government support for undertaking similar supply management plans. The Fruit Supply Stabilization Fund operates to plan production and stabilize prices for certain fruits, currently for citrus, apples, peaches (for processing), and pineapples (OECD, 1995).

Some large cooperative units also do autonomous planning, especially Hokuren, the Hokkaido cooperative federation. Hokuren tries to reach a targeted onion production level, set with regard to the MAFF area target and the prospective planting in other major Japanese production areas. In addition to volume, timing the release of onion stocks is a critical factor in Hokuren's planning. To maintain its onion supply to Japan's markets, Hokuren purchases imports from outside Japan when its own supplies are short of its targets.

The Government of Japan has undertaken several voluntary programs to pay farmers to remove land from rice cultivation and substitute other uses. The programs have been heavily structured, with goals or limits on the number of hectares accepted for subsidies for a given kind of production, such as vegetables. The goals or limits have been set in order to control the oversupply of produce from the diversified areas. The first diversification program resulted in the conversion of about 56,000 hectares from rice to vegetable production (not including potatoes) in the early 1970s. By the 1990s, about 100,000 hectares had been converted from rice to vegetable production, using the subsidies from various diversification schemes. This represents about 20 percent of the total vegetable area. In recent years, subsidies for planting vegetables have been less than those for some other crops (Ito and Dyck, 2002). Diversification for fruit has been less important than for vegetables.

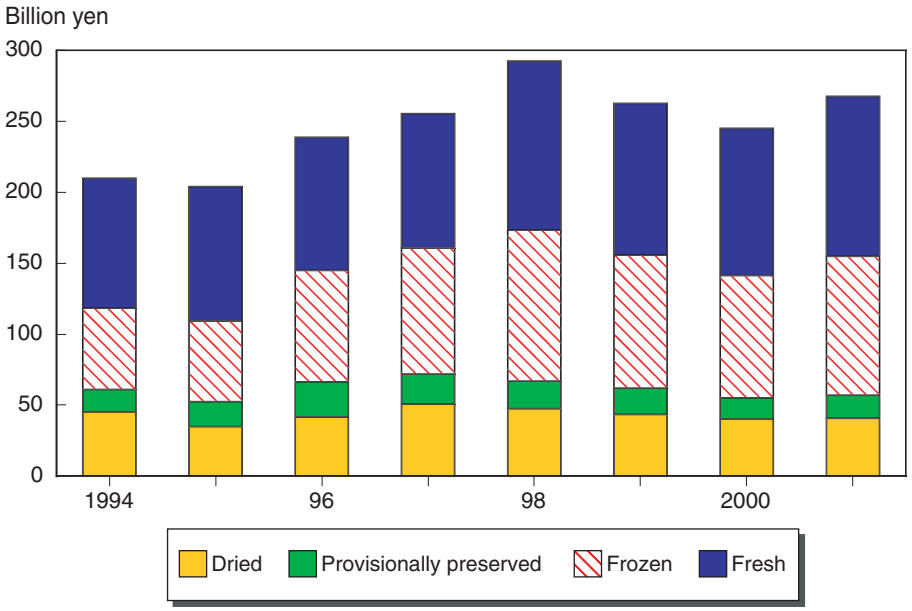
Japanese Trade in Vegetables

Japan's vegetable imports, $2.21 billion in 2000, grew by one-third in volume from 1997 to 2000 and remained constant in 2001.[1] The 1997-2000 rise in volume coincided with a decline in prices for most of Japan's vegetable imports and a decrease in the aggregate value of vegetable imports. Imports are distributed among four main categories: dried vegetables and beans; vegetables that are provisionally preserved so that they can be further processed; frozen vegetables; and fresh vegetables (fig. 7.1). While fresh vegetable imports have shown some growth in recent years, the import volume of frozen, dried, and provisionally preserved vegetables has not risen as much. Unit values for fresh vegetable imports (as an aggregate)

[1] Data on Japan's imports in the following pages comes from Japan Tariff Association, *Japan Exports & Imports*, as provided electronically by the World Trade Atlas.

Figure 7.1

Japan's vegetable imports



Source: Japan Tariff Association, *Japan Exports & Imports*.

dropped by one-third from 1997 to 2000 and volumes rose by 58 percent. For frozen vegetables, a 17-percent drop in unit values coincided with a 19-percent rise in the volume of imports for this period. Dried vegetable import unit values dropped by 20 percent from 1997 to 2000, but there was no increase in volume. The 42-percent decrease in provisionally preserved vegetable import unit value over the same years was accompanied by a 21-percent gain in volume.

Mushrooms are the leading imports, comprising 14 to 18 percent of the total value of Japan's vegetable imports. Frozen potato products, chiefly french fries, are the next largest import item, making up 9 to 11 percent of imports. Other imports are distributed over a wide range of vegetables (table 7.1).

China is the largest source of Japan's vegetable imports, supplying virtually all of the provisionally preserved vegetables, most of the mushrooms, half of the dried vegetables, and substantial shares of the fresh and frozen vegetables (fig. 7.2). China's share of Japan's imports has been rising, growing from 40 percent in 1994 to 50.7 percent in 2001.[2] Shares of other major exporters to Japan (except for South Korea) have fallen. China's leading frozen exports to Japan are green soybeans, taros, spinach, and mixed vegetables. The leading fresh vegetables from China are Japanese radishes, leeks, peas, and garlic. In 2001, Japan instituted proceedings under the WTO Agreement on Safeguards to impose import quotas on leeks (Welsh onions) and fresh shiitake mushrooms. The move was in reaction to rising imports of these commodities from China (Ito and Dyck, 2002).

Japan's imports from the United States, the second largest source of its vegetable supply, are concentrated in the fresh and frozen categories. Frozen

[2] See Huang, 2002, for a discussion of China's rising fresh/frozen vegetable exports to Japan.

Table 7.1—Japan's leading vegetable imports, 1996-2001 average volume, value, and unit value

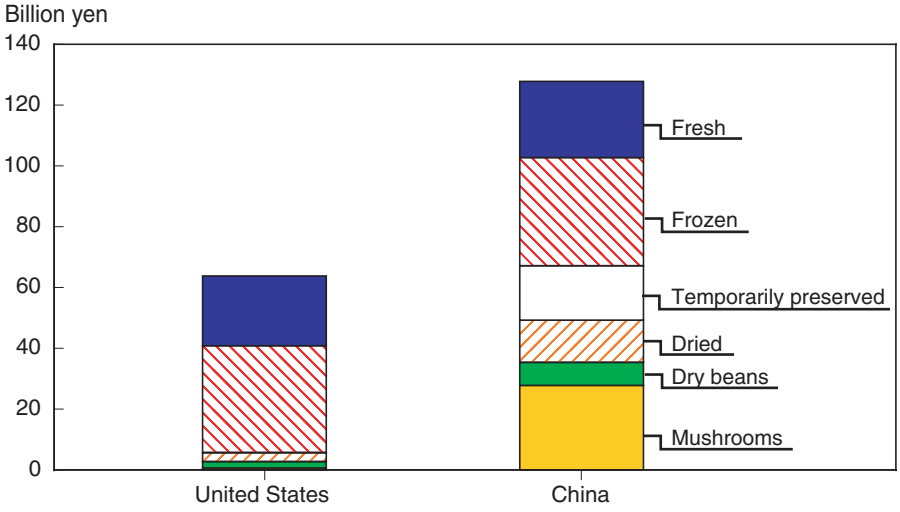
	Quantity	Value	Unit value
	Metric tons	*Bil. yen*	*Yen/kg*
Potatoes, processed, frozen	259,817	29.32	116
Mushrooms, fresh	37,202	26.04	754
Broccoli, fresh/chilled	80,337	14.34	182
Green soybeans, frozen	70,767	13.29	194
Mushrooms and truffles, dried	11,734	11.62	1,021
Asparagus, fresh/chilled	22,452	11.54	518
Pumpkins, fresh/chilled	138,465	10.70	77
Vegetable mixtures, provisionally preserved	90,242	10.32	111
Vegetable mixtures, dried	21,889	8.91	402
Onions and shallots, fresh/chilled	226,815	8.42	39
Taros, frozen	53,691	6.95	128
Sweet corn, frozen	49,483	6.83	140
Peppers, fresh/chilled	12,731	5.59	565
Burdock root, fresh/chilled	78,025	5.04	65
Mung beans, dried	51,606	4.64	91
Spinach, frozen	43,336	4.53	111
Beans, except soy, frozen	33,046	4.44	138
Peas, fresh/chilled	18,411	3.39	196
Cucumbers, provisionally preserved	50,673	2.86	55
Leeks, fresh/chilled	27,286	2.78	130
Bamboo shoots, dried	2,955	2.77	103
Garlic, fresh/chilled	27,298	2.72	934
Osmund (fern), dried	2,218	2.63	1,153
Adzuki beans, dried	28,061	2.17	80

Note: Average for burdock based on 1999-2001 data only.

Source: Japan Tariff Association, *Japan Exports & Imports*.

Figure 7.2

Japan's imports of vegetables from leading exporting countries, average 1996-2001



Source: Japan Tariff Association, *Japan Exports & Imports*.

potato products, fresh broccoli, fresh and dried onions, frozen and dried sweet corn, and asparagus are the leading commodities. New Zealand is the third most important supplier, exporting pumpkins, fresh onions, frozen sweet corn, and fresh peppers.

Seasonal differences are a factor in Japan's vegetable imports, especially of asparagus, with large Southern Hemisphere and tropical shipments from Oceania and Southeast Asia. Among the 10 largest suppliers to Japan, New Zealand, Thailand, and Australia have seasonal advantages. However, their market share, like that of most countries except China, tended to decline slightly over the 1994-2001 period.

Tariffs on most vegetables are 3 percent for fresh imports, 6 percent for frozen imports, and 9 percent for provisionally preserved and dried imports. Higher tariffs apply to potatoes and sweet potatoes, sweet corn, taro, some mushrooms, frozen and preserved burdock, and frozen peas and beans. The highest tariff is 12.8 percent for sweet potatoes (table 7.2).

These tariffs generally apply to both developed and developing countries. Dried vegetables are an exception: tariffs are zero for the least-developed countries, except for sweet corn, taros, shiitake mushrooms, and sweet potatoes. Fresh matsutake mushrooms and fresh burdock have a zero tariff for all developing countries.

Fresh onions are subject to a gate price system, under which importers of onions arriving with an import unit value below the gate price must pay the difference between the gate price and the import unit value. If the import unit value is low enough, however, a simple tariff (8.5 percent) is applied. If the import unit value is above the gate price, no tariff is applied. The system is designed to protect Japan's onions from competition from similarly priced imported onions, but not from very inexpensive or premium onion imports.

Japan has administered a quota on imports of dried beans and peas (except chickpeas and lentils) for many years. Within the quota, a tariff of 10 percent applies. Outside the quota (120,000 tons per year), the tariff is 354 yen/kg ($2,927 per ton in 2001). The quota protects domestic production, primarily of Azuki and kidney beans.

Besides the commodities affected by the quotas and the special case of onions, Japan's tariff regime does not constitute a major barrier to vegetable imports. Far more important are phytosanitary barriers that affect the imports of fresh vegetables. Imports of some vegetables are banned from most countries, including the United States, because of disease restrictions. Fresh cucumbers, eggplants, potatoes, and other important vegetables are not imported in large quantities because of these restrictions. Other vegetables are affected by fumigation requirements designed to kill insects and other pests at the arrival port in Japan. Fumigation often seriously damages the quality of the imported vegetables, especially if they are soft or light-colored. Lettuce and cauliflower have been particularly affected. Japan's officials fumigate whenever they see insects in a shipment, even if the insect is already endemic to Japan (Ito and Dyck, 2002).

Table 7.2—Tariffs on vegetables and fruits

	Fresh			Frozen			Provisionally preserved			Dried		
							Percent					
Vegetables:	1/	2/	3/							1/	2/	3/
Potatoes		4.3			8.5			9		12.8	10	0
Sweet potatoes		12.8			12			12.8			12.8	
Tomatoes		3			6			9		9	9	0
Onions 4/		8.5			6			9		9	9	0
Garlic and leeks		3			6			9		9	9	0
Cabbage and broccoli		3			6			9		9	9	0
Lettuce and spinach		3			6			9		9	9	0
Carrots and turnips		3			6			9		9	9	0
Burdock	2.5	0	0		12			12		9	9	0
Cucumbers		3			6			9		9	9	0
Peas and beans 5/		3			8.5			9			10	
Artichokes		3			6			9		9	9	0
Asparagus		3			6			9		9	9	0
Peppers and eggplants		3			6			9		9	9	0
Celery		3			6			9		9	9	0
Sweet corn		6			10.6			9			9 yen/kg	
Pumpkins		3			6			9		9	9	0
Lotus roots		3			6			9		9	9	0
Taros		9			10			9		9	9	9
Matsutake mushrooms	3	0	0		6			9		9	9	0
Shiitake mushrooms		4.3			6			9			12.8	
Other mushrooms		4.3			6			9		9	9	0
Fruits:	In-season			Out-of-season								
	1/	2/	3/	1/	2/	3/	1/	2/	3/	1/	2/	3/	1/	2/	3/
Bananas 6/	25	20	0	20	10	0		12			25/20		3	0	0
Dates		0						12			12			0	
Figs		6						12			12		6	5	0
Pineapples		17						23.8			12		7.2	7.2	0
Avocadoes 7/	3	3	0				12/7.2	12/3.6	0	12	10	0	3	3	0
Guavas and mangoes 7/	3	0	0				12/7.2	12/3.6	0	12	10	0	3	0	0
Oranges 6/		32			16			12			32/16			32/16	
Mandarins/tangerines		17						12			17			17	
Lemons		0						12			0			0	
Limes		0						12			0			0	
Grapefruit 6/		10			10			12			10			10	
Grapes 6/		17			7.8			12			12			1.2	
Melons		6						12			12			9	
Papaws/papayas 7/	2	2	0				12/7.2	12/3.6	0	12	10	0	7.5	7.5	0
Apples		17						12			12			9	
Pears		4.8						7			12			9	
Apricots		6						12			12			9	
Cherries 8/		8.5						13.8			17			9	
Peaches		6						7			12			9	
Plums		6						12			12			2.4	
Strawberries 7/		6						9.6/12			12			9	
Berries 7/		6						9.6/6			12			9	
Currants/gooseberries 7/		6						9.6/6			12			9	
Cranberries		6						12			12			9	
Kiwi		6.4						12			12			9	
Durians, rambutan, passionfruit, etc. 7/	5	2.5	0				12/7.2	12/3.6	0	12	10	0	7.5	7.5	0
Persimmons		6						12			12			9	

Notes:
Not an authoritative source for Japan's tariffs. For that, see Japan Tariff Association, *Custom Tariff Schedules of Japan*.

1/ If preferential tariffs exist, the column applies to developed country exports.

2/ If preferential tariffs exist, the column applies to developing country exports; if not, it applies to all countries.

3/ If preferential tariffs exist, the column applies to least-developed country exports.

4/ Tariffs are zero if the import unit value exceeds 73.7 yen/kg; 8.5 percent if the import unit value is less than 67 yen/kg; and the difference between 73.7 and the import unit value if import unit values lie between 67 and 73.7 yen/kg.

5/ A tariff-rate-quota is in effect for dried beans and peas. Within the quota, the tariff is 10 percent. Outside the quota, the tariff is 354 yen/kg.

6/ Seasonal tariffs apply to one or more of the processed categories (frozen, provisionally preserved, or dried), indicated by two tariffs separated by a /.

7/ Tariffs differ in one or more processed categories, depending on whether sugar has been added. The first tariff refers to product with sugar added, and the second to product without added sugar. Tariffs are separated by a /.

8/ Tariff in the frozen category is for sour cherries containing added sugar. Tariff on other cherries is 12 percent.

Source: Japan Tariff Association, *Custom Tariff Schedules of Japan*, 2002.

Future Prospects for Japan's Vegetable Trade

Japan's trade in vegetables is likely to grow in the future. Consumption will be flat or decline (as the population begins to decrease), but Japan's production is relatively high cost and vulnerable to international competition. Import penetration is already high in the provisionally preserved, dried, and frozen vegetable categories, but low among fresh vegetables. Fresh vegetables offer the principal opportunity for trade growth. The major barrier to their import is the existence of stringent phytosanitary barriers. Assuming that these barriers can be overcome, several factors influence the import potential of vegetables:

- Japan's consumers put a very high value on freshness. This is one of the main strengths of Japan's own vegetable production, which increases the probability of very fresh delivery. Among exporting countries, the emphasis on freshness gives a major advantage to the four economies geographically close to Japan: South and North Korea, Taiwan, and eastern China. North Korea lacks the infrastructure for large-scale trade. The other three economies are well-connected to Japan by shipping routes.
- Japanese consumers also emphasize the quality, visual perfection, and taste of vegetables. Again, this favors domestic producers, who know their customers well. Extra quality adds to both the cost and the riskiness of vegetable production. If a costly, high-quality vegetable is being produced just for one market (e.g., only for export to Japan), there is more risk than if it is produced for two or more markets. Economies with large domestic markets that offer a price premium for quality can provide a second market, additional to Japan. Examples are Taiwan, South Korea, the Netherlands, the United States, and a few other wealthy economies. This is less true for China.
- Naturally, other things being equal, Japan's consumers prefer lower prices. This favors exporting from regions such as eastern China, parts of Southeast Asia, and Mexico. To a lesser extent, exports from the United States, South Korea, and Taiwan also benefit from being priced lower than domestic produce in Japan.
- Tariffs vary by country of origin, in some cases. Japan applies tariffs bound under the WTO process to almost all countries, whether or not they are WTO members. The important exception is nearby North Korea, whose horticultural exports face significantly higher tariffs than exports from the rest of the world. Japan also grants two levels of preferential tariffs, chiefly for dried vegetables; developing countries can export these products to Japan with tariffs lower than the WTO bound tariffs, and a group of least-developed countries can sometimes export to Japan with no tariff at all (table 7.2). Among the main exporting areas, China, Southeast Asian countries, and South Africa benefited from preferential tariff treatment as developing countries (as of 2000), while the United States, the EU, South Korea, Taiwan, Australia, and New Zealand faced higher tariffs.
- Finally, stability of supply is very important to Japan's middlemen and retailers. This encourages them to diversify their sources of supply, in order to avoid being left without vegetables in the event of a weather

problem in one producing area. Firms also wish to avoid seasonal interruption of supplies. Thus, a supply network that includes imports as well as domestic production has advantages for distributors, because it reduces the risk from bad weather in Japan. Southern Hemisphere producers help provide diverse supply bases as well as offering vegetables in Japan's off-seasons.

These factors point to growing imports for Japan, particularly as production in eastern China achieves higher levels of quality. However, the insistence on freshness and quality is likely to support continued large-scale production in Japan itself indefinitely, and a gradual increase in imports and decrease in domestic production is much more likely than a sudden collapse of Japan's production.

Trade in Fruits

Japan's fruit/nut imports,[3] almost $2 billion in 2001, have grown slowly and erratically in volume over the last decade. The leading fruit imports, in volume and value, are bananas, grapefruit, lemons, and oranges (table 7.3). Kiwifruit and cherries are important high-value imports, and pineapples add a large volume. The leading nut imports are chestnuts and almonds.

Japan's fruit trade can be divided into five categories: nuts, dried fruit, provisionally preserved fruit, frozen fruit, and fresh fruit (fig. 7.3). Import quantities of nuts, dried fruits, and provisionally preserved fruits are fairly stable, but frozen and fresh fruit imports have been growing. Import growth in these categories is occurring because of the introduction of new fruits into wide use in Japan, supplied by imports; new uses of familiar fruits, especially of

[3] Data on Japan's imports in the following pages come from Japan Tariff Association, *Japan Exports & Imports*, as provided electronically by the World Trade Atlas.

Table 7.3—Japan's leading fruit and nut imports, 1996-2001 average volume, value, and unit value

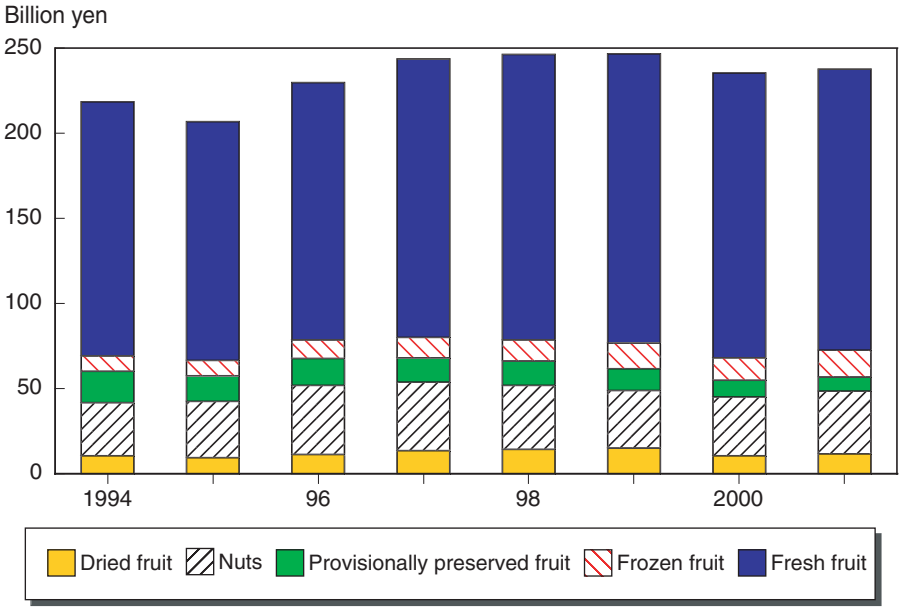
	Quantity	Value	Unit value
	Metric tons	*Bil. yen*	*Yen/kg*
Bananas	979,388	59.65	61
Grapefruit	258,312	27.02	105
Lemons	86,549	14.40	167
Oranges	125,632	13.92	114
Chestnuts	34,264	12.81	373
Cherries	14,223	10.96	792
Kiwifruit	41,220	10.51	255
Almonds	20,397	8.95	447
Other frozen fruit	30,653	8.50	279
Other fruits and nuts, provisionally preserved	39,520	8.27	211
Pineapple	98,264	5.63	57
Raisins	29,960	5.60	185
Strawberries, frozen	28,918	5.26	183
Walnuts	8,898	4.75	535
Prunes	18,491	4.64	250
Strawberries, fresh	5,141	4.32	845
Melons	33,781	3.78	112
Mangoes	9,162	3.08	337
Avocados	10,250	2.62	262

Note: Unit value is the average of annual unit values calculated for the 6 years 1996-2001.

Source: Japan Tariff Association. *Japan Exports & Imports*.

Figure 7.3

Japan's fruit and nut imports



Source: Japan Tariff Association, *Japan Exports & Imports*.

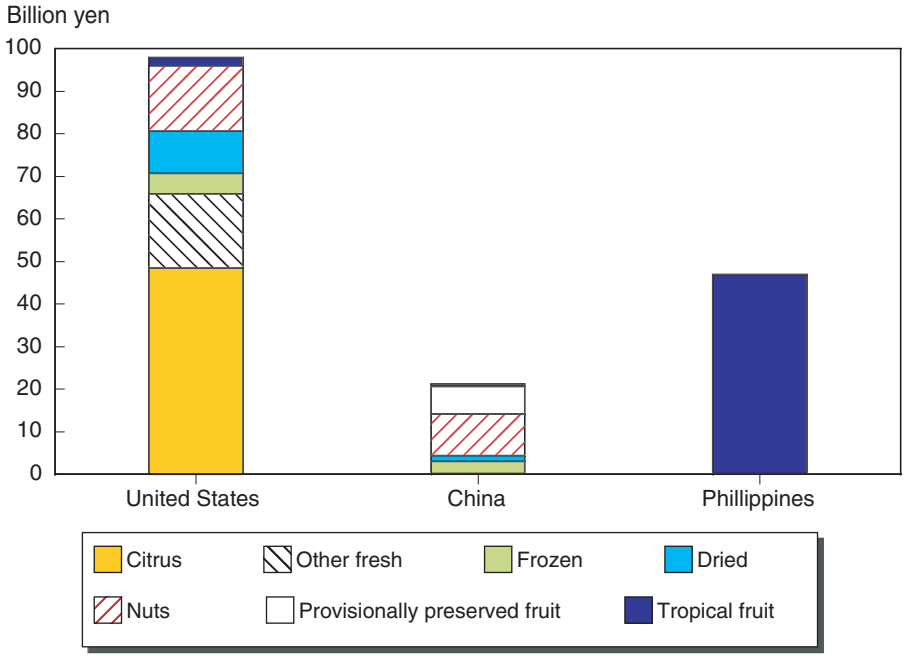
imported frozen fruit; imports of fresh fruit in the off-season; and competition that imports are giving to domestic products on price and quality.

The United States and the Philippines dominate Japan's imports, together supplying over 55 percent of the total value. Philippine exports are fresh tropical fruits, mainly bananas, followed by pineapples and mangoes (fig. 7.4). U.S. exports are diverse, spread across all the categories except provisionally preserved fruits. Citrus fruits, led by grapefruit, constitute over 40 percent of U.S. exports to Japan by value. Besides citrus, the United States is the leading supplier of other fresh fruits, frozen and dried fruits, and nuts.

Both the value of Japan's total fruit/nut imports from the United States and the share of total import value accruing to the United States have fallen in recent years. From 1994 to 2000, the U.S. share of fruit/nut imports fell by almost 9 percentage points, from 47 to 38 percent, although the share increased in 2001 to 39.8 percent. Japan's imports from South Korea and Taiwan also fell, but imports from the Philippines, China, Mexico, Ecuador, New Zealand, South Africa, and Chile each grew by more than 1 percent of Japan's total import value. From 1994 to 2000, imports from South Africa tripled in value, and those from Mexico and Chile doubled. Fruit imports from South Africa, Chile, and New Zealand increased in part because these countries have growing seasons opposite to Japan's. Increased imports from the Philippines and Ecuador were chiefly bananas. China's trade with Japan increased mainly because it displaced provisionally preserved fruit that previously was imported from Taiwan and South Korea. Preferential tariffs for developing countries are not as frequent as for vegetables. However, preferential tariffs apply to almost all the potential banana-supplying coun-

Figure 7.4

Japan's fruit and nut imports from leading countries, 1996-2001 average



Source: Japan Tariff Association, *Japan Exports & Imports*.

tries, reducing the effective import tariff to 10 percent out of season and 20 percent in season.

Imports supplement and compete with Japan's own fruit and nut production, especially of oranges, kiwifruit, cherries, and chestnuts. Trade in some fresh fruits important in Japan's diet is very small, that is, trade in apples, pears, peaches, persimmons, and mandarin oranges. This reflects both the strength of Japanese production and the phytosanitary barriers maintained by Japan.

Tariffs on fruits range from 0 to 32 percent (table 7.2), and are generally higher than for vegetables. No tariffs are collected on dates, lemons, and limes. Some fruits are tariff-free from the least-developed countries, and tariffs are sometimes lower for all developing countries than for imports from developed countries. Tariffs on fresh oranges, fresh grapes, and bananas are adjusted seasonally. Tariffs on oranges are 32 percent from December 1 to May 31, and 16 percent otherwise. Grape tariffs are 17 percent from March 1 to October 31, and 7.8 percent otherwise. Banana tariffs are 20 percent from October 1 to March 31, and 10 percent otherwise.[4] Besides grapes and oranges, tariffs are relatively high (17 percent) for fresh apples, mandarin oranges, and pineapples.

Aside from the tariff on oranges, the main barriers to fresh fruit imports into Japan are phytosanitary. Phytosanitary regulations protect against the introduction of diseases into Japan that could hurt domestic production. Japan's application of these regulations is very strict, requiring expensive protocols that farms in foreign regions, where a disease is known to exist, must follow in order to export to Japan. The protocols include onsite inspection by

[4] These tariffs apply to imports from developing countries. Higher tariffs apply to imports from developed countries, and imports from least-developed countries face a zero tariff.

Japan's authorities. Paying for the required changes in farm practice and inspections adds considerably to the cost of imported fruits in Japan, and makes them less competitive against domestic products. Japan also has refused to allow procedures agreed to for one variety of a fruit (or vegetable) to be recognized for other varieties of the same fruit. This means that separate testing and application procedures must be developed for each variety, adding to the expense of trade and delaying the beginning of trade in a given variety, sometimes for several years. In 2000, Japan agreed to allow most varieties of tomatoes, and all apple and nectarine varieties, to be imported following the protocols laid down for individual varieties prior to that date.

Future Prospects for Japan's Fruit Trade

Prospects for fruit trade vary significantly by category. Overall, consumption is unlikely to increase and may decrease; Japan's population growth has slowed to near zero, and the government projects that a population decline will begin before 2010. Import penetration for processed and simply preserved fruits is already high and may not grow in the future. The trade in fresh fruits is the most likely to grow. The main opportunities for growth are for the temperate fruits, including apples, pears, peaches, persimmons, plums, cherries, and strawberries. In those markets, if phytosanitary barriers are reduced or met, the same attributes demanded in vegetables will be important to increasing the flow of imports—freshness, quality and visual perfection, taste, price, and stability of supply.

Conclusions and Prospects for the Future of Fruit and Vegetable Trade

Trade in fruits and vegetables has become steadily more important over the last decades. The composition, volume, and direction of this trade have changed as incomes and insistence on quality have grown on the demand side, while technology and trade agreements have influenced the supply side. Lower prices and greater availability of produce year-round, in tandem with increasing incomes, have enhanced the array of fruits and vegetables in the global consumer's basket of goods. Other factors, such as concern for a healthy diet and improved handling and transportation, have furthered the globalization of fruit and vegetable trade.

Globalization of markets is likely to continue as the basic factors of supply combine with innovations in technology and lower trade barriers, enabling suppliers to meet the preferences of a more affluent clientele. Developed countries will continue to dominate global trade in fruits and vegetables, but new varieties will find their way into the diets of the relatively affluent everywhere.

High per capita income, seasonal variation in production, and an aging population's demand for quality fruits and vegetables will continue to make the EU a leading world importer. Because of its numerous preferential trade agreements with neighboring countries in the Mediterranean basin and former colonies, however, exports to the EU will not likely increase much from countries not included in the agreements (such as the United States). Meanwhile, EU exports of fruits and vegetables are not likely to be restricted by WTO volume or value limits on subsidized exports as EU members have easily met their commitments and are likely to continue to do so. Thus, continued surplus production of some fruits and vegetables in the EU could still be exported onto the world market with EU export subsidies.

Continued growth in the NAFTA market will allow for more fruits and vegetables to be both exported and imported by the United States. U.S. income growth will continue to stimulate fruit and vegetable imports even with a depreciating U.S. dollar. An appreciating U.S. dollar would inhibit exports in the short run, while stimulating imports. Trade growth in the fresh tomato market can be attributed to NAFTA, and lower barriers to trade will continue to allow imports to help fill the demand for high-quality fresh tomatoes in the United States. NAFTA is a good example of how a regional trade agreement can spur trade growth in fruits and vegetables; trade between the NAFTA members for all classes of fruits and vegetables exceeded the growth of exports and imports involving countries outside NAFTA.

In Asia, the geographical distribution of trade will likely continue to change as China becomes a larger importer and exporter and increases the quality

of its produce. China's trade in vegetables and fruits is increasing; its recent investment in the sector has resulted in competitive products and points toward a greater presence for China in global markets. At the same time, a growing internal demand, and shortcomings in China's marketing and distribution system, will likely result in rising vegetable and fruit imports, at least in the near term. In particular, if trade barriers are lowered or removed, China's consumption and trade of fruits and vegetables may increase.

Japan will continue to play an important role in the global imports of fruits and vegetables, in part because its domestic production is relatively high cost and vulnerable to international competition. Import penetration is already significant for provisionally preserved, dried, and frozen vegetables and for processed and simply preserved fruits. The trade in fresh produce, particularly fresh vegetables and temperate fruits such as apples, pears, peaches, persimmons, plums, cherries, and strawberries, offers the principal opportunity for growth. In those markets, if phytosanitary barriers are reduced or met, the attributes of freshness, quality and visual perfection, taste, price, and stability of supply will be important to raising the flow of imports. Developed countries, particularly the United States, will be important suppliers of increased Japanese imports because of the range and quality of their produce, although China is becoming an important competitor as its quality improves.

The global exchange of fruits and vegetables seems assured of an upward trend if current tariff barriers are substantially reduced. Growing regional trade agreements, an increase in negotiated bilateral free trade agreements, and further liberalization as a result of current WTO negotiations will also work to lower barriers to trade, allowing fruits and vegetables to enter markets once unattainable.

In the final analysis, it will be per capita income growth and freer trade—stimulating new technology and lowering prices—that enable a greater variety and quantity of fruits and vegetables to reach more markets than ever before. For the United States, the exchange rate will play an important role in variations in its positive long-term export trend. U.S. fruit and vegetable trade is in a good position to profit from higher exports through improved technology and marketing, while U.S. consumers will benefit from a greater volume and variety of fruits and vegetables at lower prices. However, the number of competitors in the global market is growing, with China the country most likely to compete for markets where the United States has traditionally been a major supplier.

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