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The Japanese Market for Oranges

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Abstract

Japan is a large market for U.S. oranges, and most of Japan's orange consumption is supplied by U.S. exports. Orange consumption and imports grew until 1994, but have declined since. Demographic shifts are linked to changing orange consumption: older birth cohorts eat more oranges, and younger ones eat fewer oranges; within each cohort, consumption increases with age. Income changes appear not to be major factors in the decline in orange consumption, but price changes appear to be potentially important. A downward trend in consumption, not explained by the demographic variables, prices, or income, may continue in the future.

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Keywords: Japan, oranges, citrus, age/period/cohort analysis, orange markets.

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Outlook Board

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Introduction

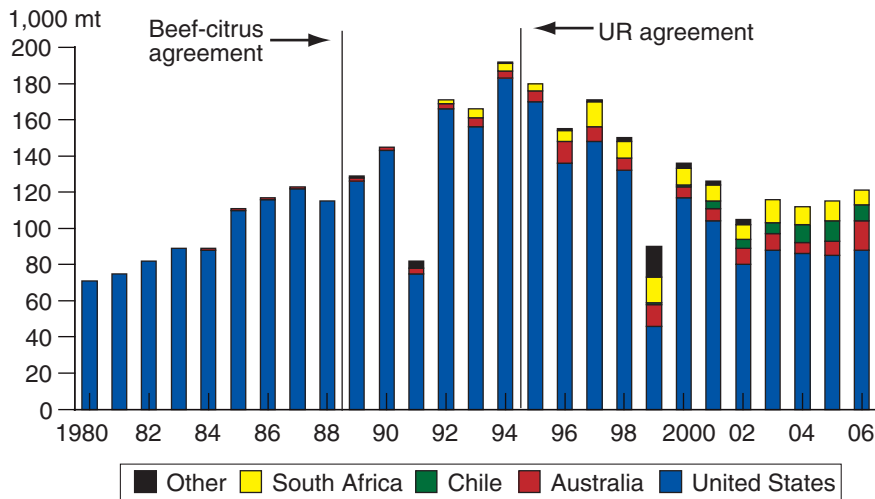
Japan is one of the largest foreign markets for U.S. oranges, behind Canada, China (including Hong Kong), and sometimes Korea. The United States is the chief supplier of oranges to the Japanese market, with imports from the United States far exceeding supplies from Japan's own production and imports from other countries. In 2006, the United States shipped almost 100,000 tons of oranges, worth over \$70 million, to Japan.

In the late 1980s, Japan was the largest foreign market for U.S. oranges. A key accomplishment of the 1988 Beef-Citrus Agreement between Japan and the United States was to end Japan's quota on orange imports. U.S. orange exports to Japan peaked in 1994-95. However, in recent years, trade volumes have been below the export levels of the late 1980s and early 1990s (fig.1), despite lower tariffs negotiated in the Uruguay Round (1995).

Aggregate U.S. orange exports to all foreign markets have generally been between 500,000 and 700,000 metric tons per year since 1990 (fig. 2). Export volume to Japan has decreased somewhat since 1994, so that the Japanese share of U.S. exports has decreased, with Japan falling from the first position in 1989 to third-largest destination in 2006 (and fourth-largest in 2005) (fig. 3).

This report investigates Japan's orange market, especially consumption, and factors that affect Japan's imports from the United States.

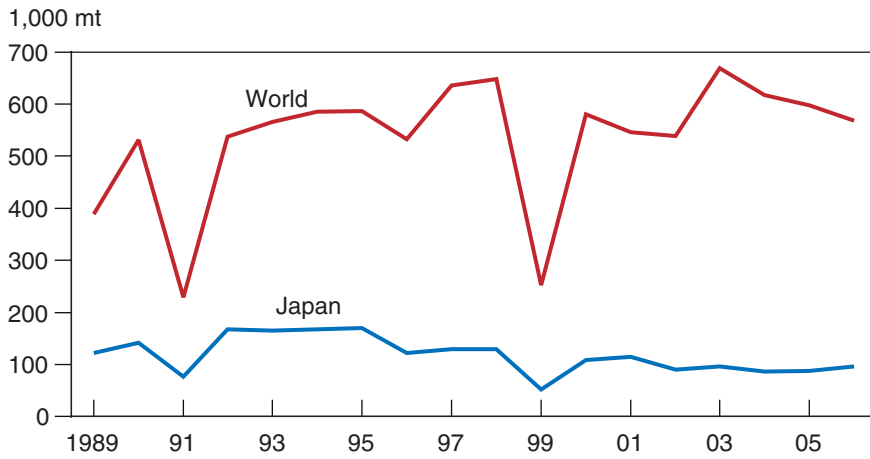
Figure 1
Japan's imports of oranges



Source: ERS, using World Trade Atlas and Japan trade books.

Figure 2

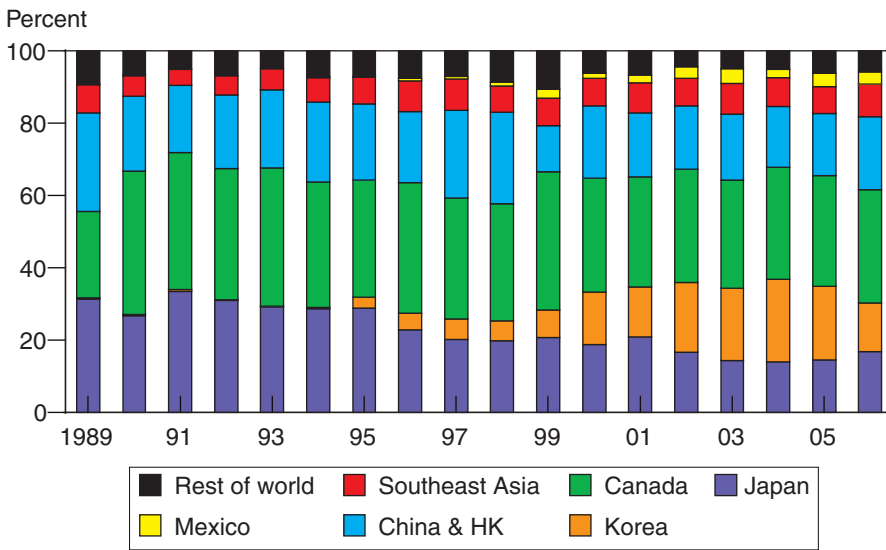
U.S. orange export volume



Source: USDA, Foreign Agricultural Service, Foreign Agricultural Trade of the United States database.

Figure 3

Share of U.S. orange export volume, by destination



HK = Hong Kong.

Source: USDA, Foreign Agricultural Service, Foreign Agricultural Trade of the United States database.

Japan's Citrus Industry

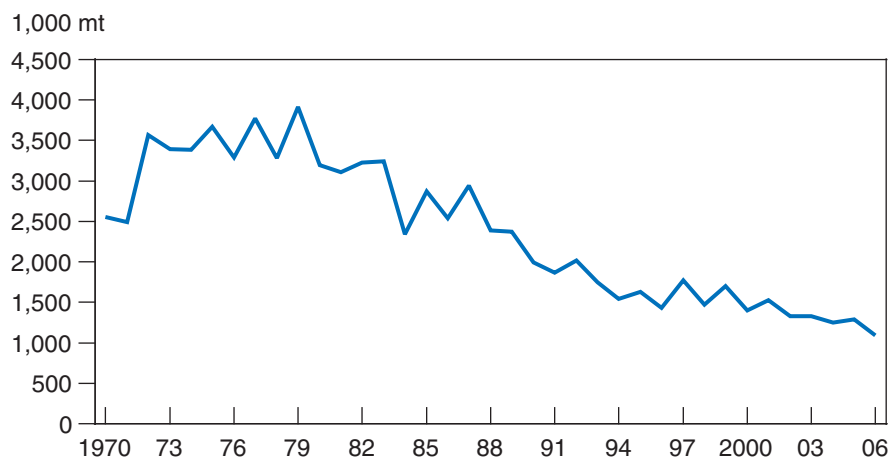
Japan has a long history of citrus production. However, navel orange production is only 13,000-18,000 tons annually from about 1,000 hectares (2,500 acres) of orchard. Production of mandarins, called mikan or unshu mandarins in Japan, is much more significant. Japan raises over 1 million tons each year on over 50,000 hectares. Production of other citrus fruits (natsudaikai, hassaku, iyo tangor) is over 200,000 tons each year, from about 13,000 hectares. Aside from the navel oranges, none of these fruits is a conventional orange, and thus less than 20,000 tons of Japanese production competes directly with imported oranges.

Production of most citrus fruits in Japan has been declining. Mikans peaked in 1975 at 3.7 million tons (fig. 4), but have since declined to less than one-third of that volume. Production of other citrus has fallen significantly in the last 5 years; navel orange production has declined in each of the last 5 years.

Japanese production has declined in part because of government programs to reduce mikan output after overproduction in the 1970s and in part because of rising farm costs and stagnant sale prices, which have led many farmers to shift land and labor from oranges to other activities. Also, the Beef-Citrus Agreement (implemented in 1989-91), ended the orange import quota. The 3-year average mikan production of 1989-91 was 1.749 million tons, 20 percent less than the average for 1986-88. This coincided with a rise in orange imports, suggesting that the imported oranges substituted for mikan and other Japanese citrus fruit in that period.

Japan's orange imports in recent years have ranged from 100,000 to 120,000 tons. Of this, the United States has supplied about 75 percent. U.S. oranges account for about two-thirds of Japan's market supply, with Japan's own production plus imports from other countries making up the rest.

Figure 4
Productions of mikans, Japanese tangerines



Source: USDA, Foreign Agricultural Service, Production, Supply, and Distribution database.

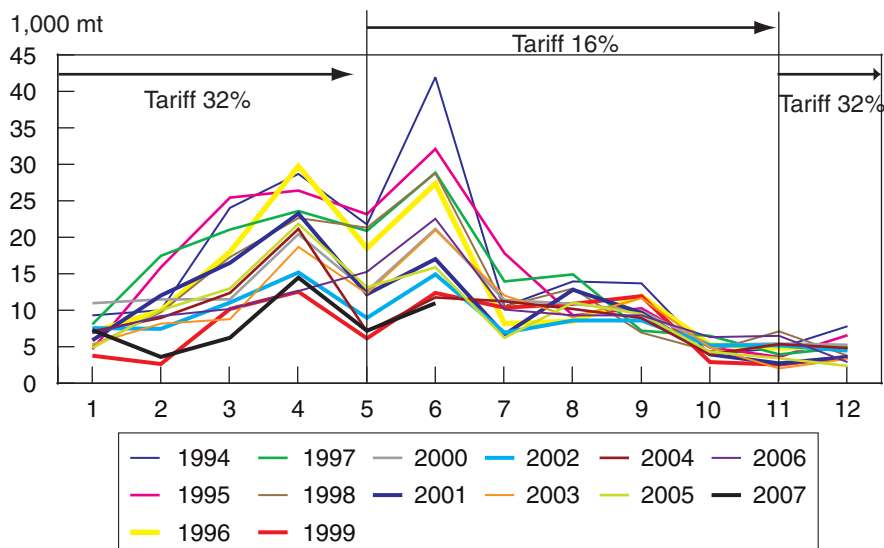
Japan's Import Rules for Oranges

Before 1989, oranges could be imported into Japan only under an import quota, with a tariff that varied by season. From June 1 through November 30, the tariff was 20 percent of the value of the imported product. From December 1 through May 31, during the peak marketing months for Japan's mikans and oranges, the tariff rose to 40 percent. The Beef-Citrus Agreement raised the quota (above the 126,000-ton level of 1987) according to the following schedule: 148,000 tons in 1988, 170,000 in 1989, and 192,000 tons in 1990. On March 31, 1991—the end of Japan's 1990 fiscal year—the quota was eliminated. Tariffs remained at 40 percent and 20 percent, according to the season, for all countries, including the United States. In the Uruguay Round, Japan agreed to drop the seasonal tariffs to 32 percent (December-May) and 16 percent (June-November) over 1995-2000, with the final reduction effective March 31, 2001. These tariffs remain in place as of 2008.

The seasonal tariffs provide a strong incentive to import from June to November. Import data show that June imports are usually the highest. April is the second-highest peak (and is within the higher tariff period), but imports always decline in May, presumably because traders delay shipment until the lower tariff applies. After June, Northern Hemisphere oranges are generally out of season. The pattern is the same both for all orange imports (fig. 5) and for imports from the United States (fig. 6).

For imports from non-U.S. sources, however, the heaviest months are August and September (fig. 7). Most non-U.S. imports are from Southern Hemisphere countries (Australia, Chile, and South Africa) which can supply oranges when Japanese and U.S. oranges are out of season. Imports from non-U.S. sources have grown since the mid-1990s (fig. 1). In years

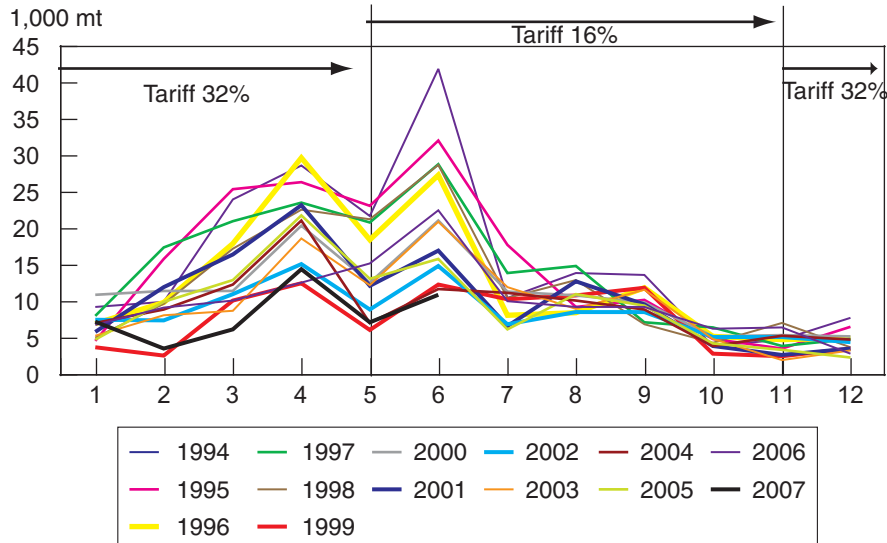
Figure 5
Japan's orange imports peak in April and June



Source: ERS, using World Trade Atlas.

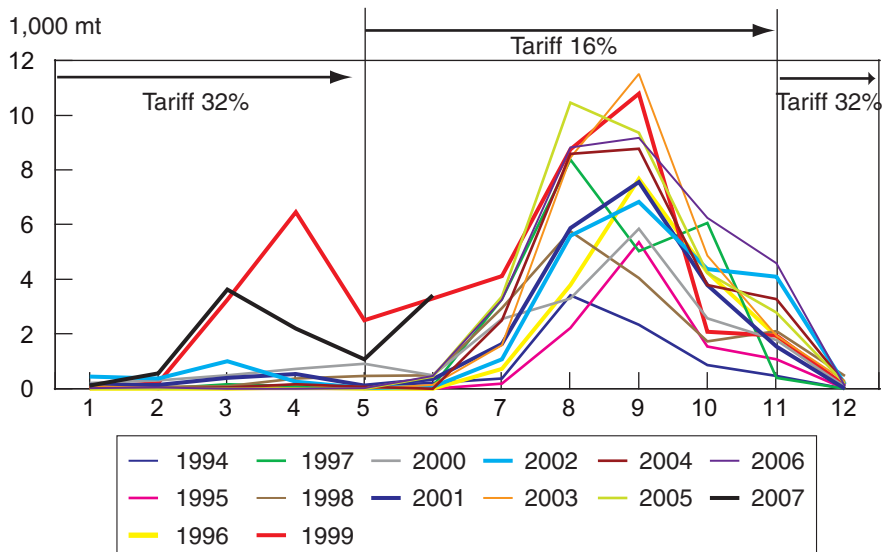
following poor U.S. harvests, such as 1999 and 2007, imports have also come from Spain and Israel, which have Northern Hemisphere crop calendars, to help offset supply shortages and satisfy consumer demand.

Figure 6
Japan's orange imports from the United States, by month



Source: ERS, using World Trade Atlas.

Figure 7
Japan's orange imports from all countries except the United States, by month



Source: ERS, using World Trade Atlas.

Japanese Citrus Consumption

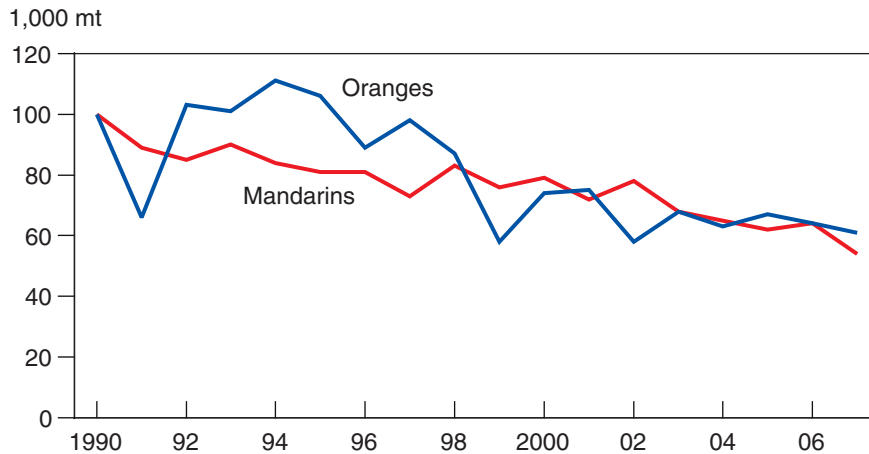
Japan's consumption of oranges grew through 1994, offsetting some of the decline in domestic citrus consumption (fig. 8). Since 1994, consumption of both oranges and Japanese citrus fruits has declined.

Japan's Family Income and Expenditure Survey (FIES), a monthly government survey of 8,000 households, records monthly household expenditures on oranges and quantities purchased. At-home consumption accounts for an estimated 70 percent of the total distribution of oranges in Japan (Ito). Orange consumption outside family households is difficult to measure directly. Restaurants, hotels, and other institutional eating places use oranges, and oranges are sometimes given as gifts—it is common in Japan to give large, perfect fruit as gifts. Oranges are also sold at convenience stores. The size and trend of the away-from-home market have not been determined.

Fresh oranges, apart from mandarins and other domestic citrus varieties, were first itemized by FIES in 1987. At-home consumption of oranges increased from 830 grams (g) per person in 1987 to 940 g in 1995 (from 1.8 lbs. to 2.1 lbs.), and then gradually declined to 641 g in 2000 and 533 g in 2005 (1.4 lbs. to 1.2 lbs.). At-home consumption of fresh fruit also declined, from 49.7 kg per person in 1975 (110 lbs.) to 36.4 kg in 1985 (80.2 lbs.), 31.7 kg (69.9 lbs.) in 1995, and 30.5 kg (67 lbs.) in 2005.

Figure 8

Japan's consumption of mandarins and oranges; indexed, with 1990 = 100



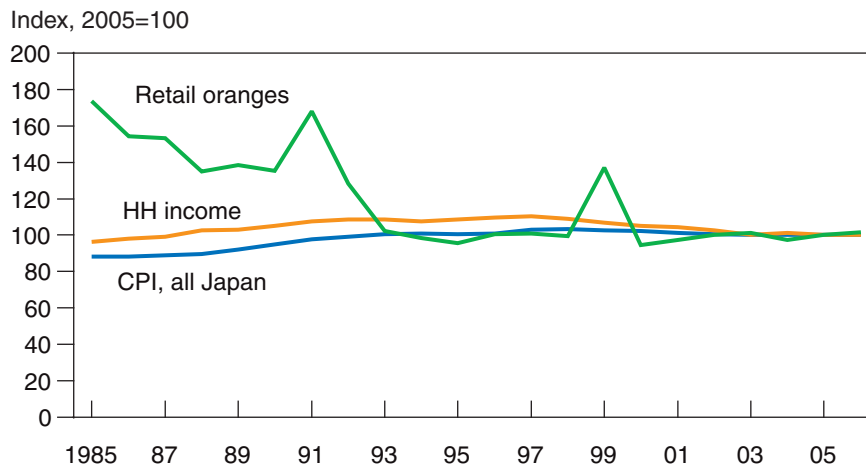
Source: USDA, Foreign Agricultural Service, Production, Supply, and Distribution database.

Factors Affecting Orange Demand in Japan

Economists normally look at price and income effects in assessing factors that shape the demand for specific foods. Over the last 15 years, there has been little change in prices or household incomes in Japan. The general consumer price level, as reflected in the consumer price index (CPI) has been fairly static since 1993. Average household incomes, adjusted for inflation, were about the same in 2006 as in the late 1980s. Incomes rose about 10 percent from 1985 to 1997, then dropped back in the next decade (fig. 9).

Throughout 1993-2007, import prices for oranges have been relatively stable, fluctuating in the range of 75-150 yen/kg (29-59 cents/lb.) and only spiking above 150 yen/kg in years when the U.S. orange crop suffered weather-induced losses (1999 and 2007) (fig. 10).

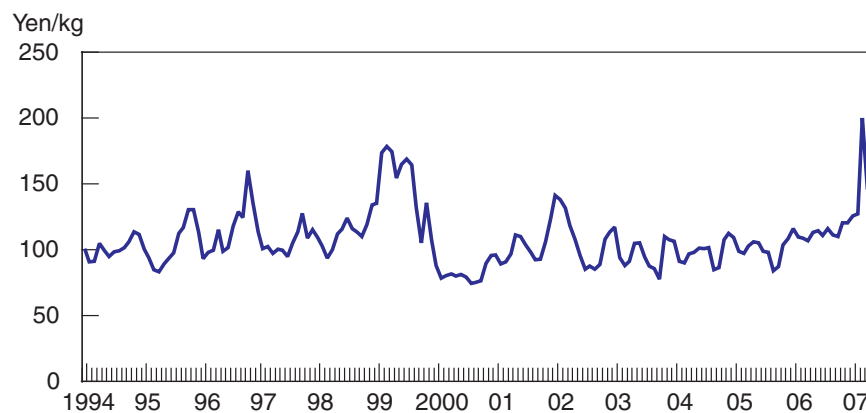
Figure 9
Japan: prices and incomes, 1985-2006



Notes: CPI = Consumer price index. HH = Household.

Source: ERS calculations using data from the Statistics Bureau, Ministry of Internal Affairs and Communication, Japan.

Figure 10
Orange import unit values, CIF, adjusted by CPI; Jan. 1994-Mar. 2007



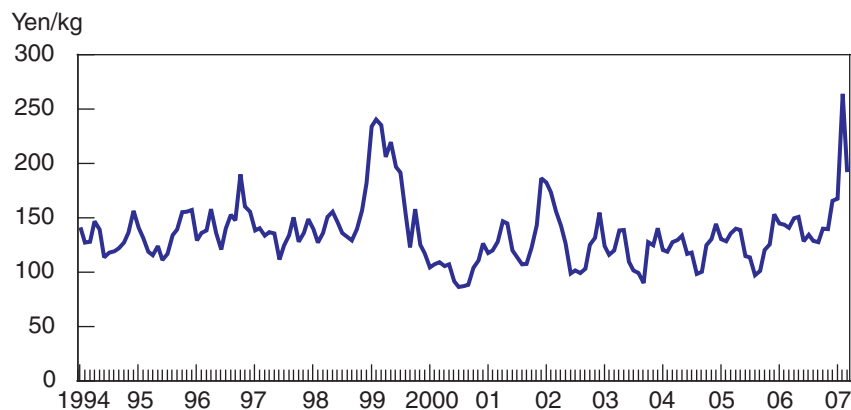
Source: ERS calculations using data from the Statistics Bureau, Ministry of Internal Affairs and Communication, Japan.

Japan's tariff reductions as part of the Uruguay Round Agreement contributed to a slight reduction in the border value of oranges (import unit value plus tariff) after 1995 (fig. 11). However, retail prices for fresh oranges, which fell between 1987 and 1993, have shown little tendency to decrease since then (fig. 12).² Recent research found that orange consumption by Japanese households appears to be responsive to prices (a 1-percent decline in consumer price increased estimated quantity purchased by almost 1.4 percent). But the small change in orange prices (and household income) since 1993 limit any real effect on the purchasing decisions of Japanese households.

Another factor that could affect Japan's consumer demand for oranges would be substitution by a similar fruit. Retail prices for mikan, the closest substitute product for oranges, have not varied much since 1991 (fig. 12), nor have the relative prices of oranges and mikan. A decline in mikan consumption appears to coincide with an increase in orange consumption in 1990-94 (fig. 8), but orange and mikan consumption have both declined since then.

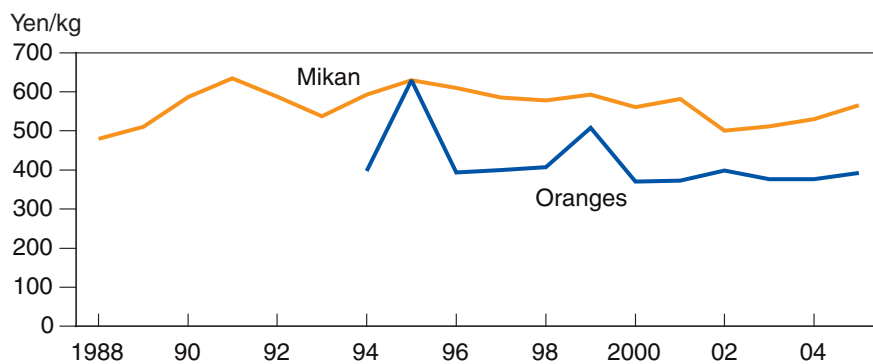
²Tokyo retail orange prices averaged 382 yen/kg in 2003-05, or about \$1.56/lb. This contrasts with an average U.S. retail price of \$.90/lb. in 2003-2005.

Figure 11
Import unit values, plus tariff, monthly data, Jan. 1994-March 2007, adjusted by CPI



Source: ERS, using World Trade Atlas and Japan trade books.

Figure 12
Retail prices of mikan and oranges in Tokyo, deflated by CPI, 1988-2005



Source: Monthly Statistics of Agriculture, Forestry and Fisheries and Statistical Yearbooks of the Ministry of Agriculture, Forestry and Fisheries.

Demographic Effects on Food Consumption

Japan has undergone a profound demographic shift in recent decades. Birth rates have fallen, life expectancy has risen, and as a result, Japan's population profile has aged. The birth rate slowed steadily in the 1990s and early 2000s, until the population began to decline in 2005, a phenomenon that is expected to continue.

Japan's 20th century history involved great upheavals and shocks, including urbanization, war, economic depressions, and booms. Generations, or cohorts, of Japanese people born in different decades have had quite different life experiences, and this may affect food consumption patterns.

Studies suggest that fresh fruit consumption rises as individuals age.³ This means that older people will eat more fresh fruit than younger people. In Japan, the population has aged significantly—while the general population is decreasing, the number of people over 60 is increasing—and this might lead to greater consumption of fresh fruits, like oranges.

Another demographic change is the increase in women's participation in the urban workforce in Japan. This has put pressure on at-home food preparation, which was traditionally done by women. In the case of oranges, this could mean that wives and mothers are less likely to peel oranges (and other fruits) for husbands and children. Women in younger cohorts are more likely to work outside the home than women in older cohorts.

Food consumption in Japan has changed a great deal in the last century. Income and import growth have allowed the Japanese to purchase a wider variety of foods, including some that would otherwise have been unavailable or too expensive in the past. Increased access to imports and greater productivity in the domestic food chain have led to lower prices for some foods. Income and price changes can explain some of the broad shifts in Japanese consumption over the 20th century.

However, the relatively small shifts in income and prices over the last 15 years do not seem highly important for continuing shifts in food consumption in Japan. Demographic effects may explain changes that economic effects do not. Using FIES data, research has assessed changes in Japanese food consumption over time and across a spectrum of age cohorts, finding that fresh fruit consumption has been highest in cohorts born in earlier decades, and lowest in those born most recently. Also, fresh fruit consumption increases with the age of an individual (Mori et al., 2006).

Recent research confirmed the same findings for oranges. As in the case of fresh fruits, the research found that (1) orange consumption is higher, the earlier the person was born (i.e., higher in older cohorts, lower in younger cohorts); and (2) that orange consumption increases as an individual ages, no matter when the person was born, although not at the same rate. In both cases, the effects are progressive and continuous, in general. Each cohort eats fewer oranges than the cohort immediately older than it, and orange consumption increases progressively with the age of an individual.

³For example, persons over 60 years of age in the United States were found to consume the largest amount of oranges, per person (Pollack et al.).

Older cohorts die out, and are replaced by younger cohorts. Since the older cohorts in Japan (e.g., cohorts born in the 1930s and 1940s) eat more oranges than younger cohorts, as these older cohorts die out, average orange consumption drops. On the other hand, Japan has been rapidly aging, and orange consumption increases with age. The orange consumption of a typical person born in the 1960s, for instance, is higher now than it was 20 years ago. This effect tends to increase average orange consumption.

These two effects—cohort membership and aging—have opposite impacts on orange consumption and tend to offset each other. Thus, the gradual decline in orange consumption to date is not demographically straightforward. Cohort transition (the mortality of cohorts that ate more fruit at any age) in the next decades may have a negative effect on future orange (and fresh fruit) consumption.

Other Explanations for the Slow Decline of Japan's Orange Consumption

Demographic research, described above, was able to identify strong cohort and age effects on orange consumption. After these effects were accounted for, the remaining change in orange consumption could be examined for correlation with other factors. The change not explained by the demographic variables showed a downward tendency in the years since 1987 (when the data set began). In other words, orange consumption declined, year to year, in ways not associated with cohort membership or age.

With demographic effects removed, regression techniques tested FIES data to see if household income and consumer prices could explain changes in orange consumption. The tests failed to show significant income effects on orange consumption, (either for the whole period or subperiods within it). Examination of orange purchases by households of varying incomes within single years also found no connection between income level and orange purchases. The price of oranges was, however, a significant variable in the regression. Regressions on the data, without removing the demographic effects, showed roughly similar results, with no significant influence from income changes in recent years.

If demographic changes are important, but with opposite signs that make the net effect neutral, and price and income changes have been small (and, in the case of income, changes do not seem related to orange consumption), what other factors can be responsible for the drop in Japanese orange consumption?

One possibility is a shift from consumption of fresh products toward more convenient processed and packaged products, which are less perishable, and sometimes less expensive per unit (Ito). Regression analysis of orange consumption against expenditures on packaged drinks supports this. Packaged drinks (e.g., bottled green tea) are a significant variable. However, because packaged drink consumption shows a strong positive trend over time, it may just be an indication that some time-related trend (not necessarily packaged drinks themselves) might be causing orange consumption to decline.

However, the consumption of orange juice—a packaged, convenient product widely available in Japan, and a likely substitute for fresh oranges—has not shared in the popularity of some other packaged drink products (see box).

Another possibility is that other fresh fruits are substituting for oranges. Bananas and strawberries are considered easier to consume than oranges, and bananas are also less expensive (Hirata and Ito). In recent years, consumption of these fruits in Japan has not fallen as much as that of oranges and most other fruits. As with processed products, however, research has not established the likelihood of this kind of substitution.

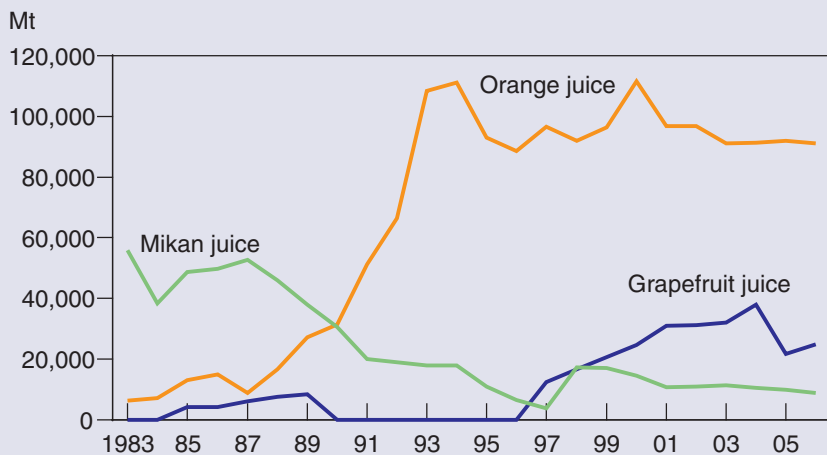
Orange Juice Consumption in Japan

Orange juice has some of the same taste and nutritional attributes that fresh oranges have, and is very convenient to consume. Orange juice, like oranges, is primarily supplied by imports in Japan.

Orange juice consumption grew rapidly from 1987 to 1994, but has stagnated since. Consumption of competing juices is unlikely to have caused orange juice use to stagnate. Juice from Japanese citrus varieties like mikan is domestically produced. The mikan juice market has declined considerably since the mid-1980s: consumption in recent years has been under 10,000 metric tons, compared with over 50,000 tons in the mid-1980s. Consumption of grapefruit juice (like orange juice, an import item) grew quickly until 2004 but has slumped since then, reportedly because hurricane damage in exporting areas has reduced supply (Ito, 2004). While grapefruit juice may have substituted for orange juice to some extent, much of its growth may have gone toward a new use: grapefruit juice is frequently mixed with alcohol and sold as a canned or bottled drink (Ito, 2003).

The history of orange juice consumption in Japan roughly mirrors that of oranges: growth in the past, followed by stagnation (and some decline), despite Uruguay Round reduction in border barriers. Thus, it is unlikely that orange juice replaced fresh oranges in the Japanese diet.

Citrus juice consumption in Japan



Source: USDA, Foreign Agricultural Service, Production, Supply, and Distribution database

Conclusion

Japan remains an important market for U.S. orange growers, but consumption in Japan has been declining. Income and price changes in Japan have been small in the last decade, and do not appear to have significantly affected orange consumption. Research shows that people born in earlier decades have a stronger preference for oranges and fresh fruits than people born in recent decades. The passage of time thus means that the birth cohorts most likely to eat oranges are dying out. However, individuals eat more oranges as they grow older. Japan's population has shifted to an older age structure, which has helped orange consumption. In the last decade, the two effects have tended to cancel each other out.

Orange consumption has shown a significant tendency to decline each year, for the last decade, after age, cohort, price, and income effects are accounted for. This tendency could continue, although its causes are not well understood. If it does continue, as years pass and the cohort effect becomes stronger (as older cohorts disappear), orange consumption in Japan could suffer steeper drops.

Japan is important to the U.S. orange industry, and any decline in the Japanese market is an unfavorable development. Research shows that Japanese consumption is likely responsive to changes in orange prices. While orange prices in Japan have been fairly steady in recent years, prices might be reduced if Japan lowered its tariffs on orange imports. Another way to reduce prices could be to find ways to reduce the marketing margin that exists between arrival at the port and retail sale. If consumer prices reflected lower tariffs or lower margins, consumption would benefit.

References

- Caplan, Lois, "U.S.-Japan Agricultural Trade Issues," in *Pacific Rim Agriculture and Trade Report*, RS-88-3. United States Department of Agriculture, Economic Research Service. August 1988.
- Coyle, William, *The 1984 U.S.-Japan Beef and Citrus Understanding: An Evaluation*, FAER 222. United States Department of Agriculture, Economic Research Service. July 1986.
- Ferguson, J.J., *The Satsuma Tangerine*, Fact Sheet HS-195. Horticultural Sciences Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. March 1996.
- Government of Japan, Ministry of Internal Affairs and Communication, Statistics Bureau, *Family Income and Expenditure Survey*, various issues, Tokyo.
- Government of Japan, Ministry of Internal Affairs and Communication, Statistics Bureau, Retail Price Survey.
<http://www.stat.go.jp/english/data/kouri/index.htm>
- Government of Japan, Ministry of Internal Affairs and Communication, Statistics Bureau, Consumer Price Index.
<http://www.stat.go.jp/english/data/cpi/index.htm>
- Government of Japan, *Monthly Statistics of Agriculture, Forestry, and Fisheries*. Various issues.
- Government of Japan, *Statistical Yearbook of the Ministry of Agriculture, Forestry, and Fisheries, 2005-06*.
- Hirata, Jay, Sunkist Pacific, Ltd. personal communication, 2007.
- Ito, Kenzo, *Japan Citrus Annual Report, 2003*, JA3079. United States Department of Agriculture, Foreign Agricultural Service.
<http://www.fas.usda.gov/gainfiles/200312/146085348.pdf>
- Ito, Kenzo, *Japan Citrus Annual Report, 2004*, JA4093. United States Department of Agriculture, Foreign Agricultural Service.
<http://www.fas.usda.gov/gainfiles/200412/146118376.pdf>
- Ito, Kenzo, United States Department of Agriculture, Foreign Agricultural Service. Personal communications, 2006 and 2007.
- Japan Tariff Association, *Japan Exports and Imports, Commodity by Country*. Various issues.
- Mori, Hiroshi, Kimiko Ishibashi, Dennis Clason, and John Dyck, "Age-Free Income Elasticities of Demand for Foods: New Evidence from Japan," *The Annual Bulletin of Social Science*, Vol. 40, March 2006, Senshu University, Tokyo, Japan.
- Pollack, Susan L., Biing-Hwan Lin, and Jane Allshouse, *Characteristics of U.S. Orange Consumption*, FTS 305-01. United States Department of Agriculture, Economic Research Service. August 2003.
<http://www.ers.usda.gov/publications/fts/aug03/fts30501/>

United States Department of Agriculture, Foreign Agricultural Service,
Production, Supply, and Distribution database, accessed Sept.-Dec. 2007.
<http://www.fas.usda.gov/psdonline/>

United States Department of Agriculture, Foreign Agricultural Service,
Foreign Agricultural Trade of the United States (FATUS) database,
accessed Sept. 2007.
<http://www.fas.usda.gov/ustrade/USTExFatus.asp?QI=>

United States Department of Labor, Bureau of Labor Statistics, Consumer
Price Index-Average Price Data.
<http://data.bls.gov/cgi-bin/surveymost?ap>

World Trade Atlas. Official Export and Import Data of Japan. Global Trade
Information Service.