Is Walnut Import Liberalization Benefical or Harmful to Japan ?

Suzuki, Nobuhiro
Faculty of Agriculture, Kyushu University

https://doi.org/10.5109/4728

出版情報：九州大学大学院農学研究院紀要. 51 (1), pp.173-180, 2006-02-01. Faculty of Agriculture, Kyushu University
バージョン：
権利関係：

J. Fac. Agr., Kyushu Univ., **51** (1), 173–180 (2006)

Is Walnut Import Liberalization Beneficial or Harmful to Japan?

Nobuhiro SUZUKI*

Laboratory of Quantitative Analysis of Agribusiness Organization, Division of Industrial Organization of Agribusiness, Department of Agricultural and Resource Economics, Faculty of Agriculture, Kyushu University, Fukuoka 812–8581, Japan

(Received October 28, 2005 and accepted November 16, 2005)

The import tariff rate for walnuts in Japan is 10%, which is significantly higher than tariffs for other nuts imported to Japan. This report examines the question of whether walnut import liberalization is beneficial or harmful to Japan. The answer is walnut import liberalization benefits Japan. A simulation model is developed which considers the competition between the US and China in the Japanese shelled walnut, shelled sweet almond, and pistachio markets. Tariff elimination of walnut imports to Japan would have increased U.S. exports by 4.7% and generate a gain of 397 million yen for Japanese users in 2002. There are virtually no negative effects on Japanese walnut growers because there are only a few farmers specialized in walnut production and specialized farmers have their own niche markets completely separated from imports. Our results also reveal that the promotion money collected from U.S. walnut growers is effective in increasing U.S. exports to Japan. Specifically, we estimate the incremental gains to U.S. walnut growers to be over three times higher than the incremental promotion costs.

INTRODUCTION

The import tariff rate for walnuts in Japan is 10%, which is significantly higher than tariffs for other nuts imported to Japan. Moreover, since 1994 there has been a gradual reduction in tariff rates for all nuts except walnuts, which remains at 10%, and macadamia nuts, which remains at 5%. In this article, we address the question of whether import liberalization for walnuts is beneficial or harmful to Japan. In addressing this question, we focus on welfare impacts on the two parties impacted by trade policy: consumers and growers. Specifically, we estimate how much Japanese walnut users and consumers will gain and how much growers will lose from lower import prices due to tariff elimination.

To measure these gains and losses due to tariff liberalization, an econometric model is developed that incorporates competition among exporters, and competition between walnuts and other nuts. Based on the discussion in the next section, we exclude the Japanese domestic walnut supply and prices in the model because the domestic supply covers only less than one percent of the total walnut demand in Japan and there is no significant competition between domestic and imported walnuts. The model explicitly considers competition between exporters from the United States and China because these two countries account for almost all walnut imports to Japan. The model also includes the two main substitutes for walnuts in Japan: sweet almond and pistachio nuts, which are imported from the United States. The econometric model is then used to simulate three scenarios: (1) tariff elimination for all countries, (2) tariff elimination for only China, and (3) tariff elimination for only the United States. In addition, our model incorporates promotion variables into the import demand equations to account for the impact of U.S. export promotion on demand. Hence, a secondary objective is to estimate the effectiveness of the check-off money from California walnut farmers.

JAPANESE DOMESTIC WALNUT SUPPLY SITUATION

As shown in Table 1, Japanese domestic walnut supply (in-shell and shelled walnuts) has been decreasing over time. In 1986, Japan produced 548 tons of walnuts, which fell to 101 tons in 2002. In 2002, the domestic supply of 101 tons was less than 1% of total walnut imports (10,247 ton). Put differently, over 99% of Japanese walnut demand (10,348 tons) is met by imports.

Table 1. Domestic Walnut Supply in Japan

	Total Production (t)	Market Supply (t)	Nagano's Production (t)	Nagano's Share (%)
	[a]	[b]	[c]	[a]/[c]
1986	861	548	550	63.9
1987	897	558	580	64.7
1988	869	577	590	67.9
1989	565	365	300	53.1
1990	787	502	490	62.3
1991	702	456	460	65.5
1992	662	374	450	68.0
1993	622	319	430	69.1
1994	593	305	400	67.5
1995	441	221	265	60.1
1996	442	223	278	62.9
1997	407	197	247	60.7
1998	311	152	188	60.5
1999	346	221	240	69.4
2000	n.a.	n.a.	n.a.	n.a.
2001	204	100	180	88.2
2002	243	101	200	82.3

Source: Fruits and Vegetables Division, Ministry of Agriculture, Forestry, and Fisheries

* Corresponding author (E-mail: suzukino@agr.kyushu-u.ac.jp)

Table 2. The US and China's positions over Shelled Walnut Imports to Japan

	Shelled Walnut Imports to Japan (kg)				Share (%)			
	US	China	Others	Total	US	China	Others	Total
1988	1,643,222	2,078,082	59,510	3,780,814	43.5	55.0	1.6	100
1989	1,624,336	1,406,467	30,000	3,060,803	53.1	46.0	1.0	100
1990	1,989,856	1,365,468	5,600	3,360,924	59.2	40.6	0.2	100
1991	2,634,974	1,325,904	20,500	3,981,378	66.2	33.3	0.5	100
1992	3,595,179	1,711,787	19,987	5,326,953	67.5	32.1	0.4	100
1993	4,600,257	1,862,809	6,000	6,469,066	71.1	28.8	0.1	100
1994	4,820,892	2,059,216	1,230	6,881,338	70.1	29.9	0.0	100
1995	6,861,036	1,631,156	23,200	8,515,392	80.6	19.2	0.3	100
1996	6,862,602	2,246,915	460	9,109,977	75.3	24.7	0.0	100
1997	6,158,167	2,345,094	500	8,503,761	72.4	27.6	0.0	100
1998	6,809,933	1,737,733	9,628	8,557,294	79.6	20.3	0.1	100
1999	6,940,199	1,596,191	5,660	8,542,050	81.2	18.7	0.1	100
2000	8,199,784	1,192,445	12,258	9,404,487	87.2	12.7	0.1	100
2001	7,269,433	1,559,551	16,886	8,845,870	82.2	17.6	0.2	100
2002	8,447,324	1,461,119	26,310	9,934,753	85.0	14.7	0.3	100
2003	8,303,890	1,266,673	24,361	9,594,924	86.5	13.2	0.3	100

Source: Japan Exports and Imports, Ministry of Finance.

Table 3. Import Prices of Shelled Walnuts, Shelled Sweet Almond, and Pistachio Nuts

	CIF Prices (yen/kg)				Tariffs (1+Rate)				CIF Prices with Tariffs (yen/kg)				CIF Prices with Tariffs (China=100)			
	US Walnuts	China Walnuts	Almond	Pistachio	US Walnuts	China Walnuts	Almond	Pistachio	US Walnuts	China Walnuts	Almond	Pistachio	US Walnuts	China Walnuts	Almond	Pistachio
1988	520.7	379.7	444.8	628.2	1.1	1.1	1.04	1	572.8	417.7	462.6	628.2	137.1	100.0	110.8	150.4
1989	586.0	392.9	497.6	696.0	1.1	1.1	1.04	1	644.6	432.1	517.5	696.0	149.2	100.0	119.8	161.1
1990	614.2	417.4	566.1	710.4	1.1	1.1	1.04	1	675.6	459.1	588.8	710.4	147.2	100.0	128.2	154.7
1991	585.0	395.4	441.3	580.5	1.1	1.1	1.04	1	643.5	435.0	458.9	580.5	147.9	100.0	105.5	133.5
1992	580.4	388.4	484.0	605.6	1.1	1.1	1.04	1	638.4	427.2	503.3	605.6	149.4	100.0	117.8	141.8
1993	633.3	385.9	494.4	506.0	1.1	1.1	1.04	1	696.6	424.5	514.2	506.0	164.1	100.0	121.1	119.2
1994	561.6	345.4	548.4	413.6	1.1	1.1	1.04	1	617.8	379.9	570.3	413.6	162.6	100.0	150.1	108.9
1995	432.9	273.3	435.7	388.8	1.1	1.1	1.037	1	476.2	300.6	451.8	388.8	158.4	100.0	150.3	129.3
1996	656.6	355.5	732.9	480.8	1.1	1.1	1.035	1	722.2	391.1	758.6	480.8	184.7	100.0	194.0	122.9
1997	748.0	459.5	663.5	582.2	1.1	1.1	1.032	1	822.7	505.4	684.7	582.2	162.8	100.0	135.5	115.2
1998	684.7	468.1	603.3	632.2	1.1	1.1	1.029	1	753.2	514.9	620.8	632.2	146.3	100.0	120.6	122.8
1999	517.9	372.5	468.3	518.3	1.1	1.1	1.027	1	569.7	409.7	481.0	518.3	139.0	100.0	117.4	126.5
2000	427.1	362.5	332.3	558.6	1.1	1.1	1.024	1	469.8	398.7	340.2	558.6	117.8	100.0	85.3	140.1
2001	635.5	409.7	383.1	511.5	1.1	1.1	1.024	1	699.1	450.7	392.3	511.5	155.1	100.0	87.0	113.5
2002	595.4	465.1	401.9	579.1	1.1	1.1	1.024	1	655.0	511.6	411.5	579.1	128.0	100.0	80.4	113.2
2003	549.5	441.5	426.7	576.9	1.1	1.1	1.024	1	604.5	485.7	437.0	576.9	124.5	100.0	90.0	118.8

Source: Japan Exports and Imports, Ministry of Finance.

The main reason for declining domestic production is there are only a few growers specialized in walnut production in Japan. Most domestic production comes from growers with only one or two walnut trees on the edge of their field or garden. As the walnut trees become taller, their management becomes more difficult. In particular, walnut trees are prone to insects (such as *Hyphantria cunea*) and some diseases (such as sooty mold). If growers do nothing to prevent this, insects and diseases will spread over all their field jeopardizing other crops. Therefore, a choice a lot of growers have made is to cut down the walnut trees. Another problem is instability and volatility of production caused by frost in April, which is also a reason for cutting walnut trees.

Growers specialized in walnut production have their own niche markets which are completely separated from imports. An official from a cooperative explained the following situation. There are several growers specialized in walnut production in the official's town, with total annual production about two tons equally split between in-shell and shelled marketings. Shelling is done by hand, and if the shelled shape is symmetric, it can be sold to special bakeries. If the shape is not good, it is sold to soba noodle restaurants serving "walnut soba noodles." The average selling price of shelled walnuts for such special utilization is about 2,000 yen per kilogram, or four times higher than import prices. Thus, these growers have their niche markets completely differentiated from imports. According to the cooperative spokesman, there is no competition between these producers and imports at all since the niche market is so small.

For the above reasons, we can consider that there is no significant competition between domestic and

imported walnuts in the Japanese market and walnut tariff elimination will have no negative impacts on Japanese domestic supply.

IMPORT DEMAND COMPETITION MODEL

Walnut imports are divided into two categories: inshell and shelled since 1988. Because about 97 to 99% of recent walnut imports to Japan are classified into the shelled category, we focus on shelled walnut imports after 1988. As shown in Table 2, 99.7 to 99.9% of total shelled walnut imports comes from the two countries: the US and China. The US share has been increasing over time, or 44% in 1988 to 87% in 2003, while the CIF prices of imports from the US are much higher than China's prices, raging widely from 18% higher in 2000 to 85% higher in 1996, as shown in Table 3.

We should incorporate competition between the US and China over the Japanese walnut market into our model. Considering the huge import price differences between the two countries, imported walnuts from the two countries are not homogeneous. There is some product differentiation, and they are imperfect substitutes for each other.

In addition, we should consider competition between walnuts and other nuts. The other major nuts are sweet almond and pistachio nuts. As shown in Table 3, shelled sweet almond prices and pistachio prices with tariffs are usually lower than the US walnut prices and they are more close to China's walnut prices. Because too many variables makes our analysis unstable with data only after the year 1988, we incorporate total imports and whole average prices of these two nuts, instead of using country-by-country data. Actually, as 98% of shelled sweet almond and 89% of pistachio nuts come from the US, we can consider that total data stands for the US data.

As other factors influencing Japanese walnut import demand, we consider the US promotion activities for Japan and consumers' income level in Japan. Because the California Walnut Commission is collecting promotion money from walnut farmers, we can use the amounts of check-off money utilized for promotion in Japan as a proxy variable for promotion activities. We consider only one-period carry over effects of promotion activities because of annual data. The California walnut check-off money used in Japan may affects Japanese demand for Chinese walnuts and other nuts, too.

Thus, our model structure using double-log functions with constant elasticities, can be described as follows.

Equation (1) for the US walnut import demand:

$$\text{LOG}(QWUSN) = C(11) + C(12)*\text{LOG}(PWUS*TW) + C(13)*\text{LOG}(PWC*TW) + C(14)*\text{LOG}(PAT*TA) + C(15)*\text{LOG}(PPT) + C(16)*\text{LOG}(EXPN) + C(17)*\text{LOG}(CWCN) + C(18)*\text{LOG}(CWCN(-1))$$

Equation (2) for Chinese walnut import demand:

$$\text{LOG}(QWCN) = C(21) + C(22)*\text{LOG}(PWUS*TW) + C(23)*\text{LOG}(PWC*TW) + C(24)*\text{LOG}(PAT*TA) + C(25)*\text{LOG}(PPT) + C(26)*\text{LOG}(EXPN) + C(27)*\text{LOG}(CWCN) + C(28)*\text{LOG}(CWCN(-1))$$

Equation (3) for almond import demand:

$$\text{LOG}(QATN) = C(31) + C(32)*\text{LOG}(PWUS*TW) + C(33)*\text{LOG}(PWC*TW) + C(34)*\text{LOG}(PAT*TA) + C(35)*\text{LOG}(PPT) + C(36)*\text{LOG}(EXPN) + C(37)*\text{LOG}(CWCN) + C(38)*\text{LOG}(CWCN(-1))$$

Equation (4) for pistachio import demand:

$$\text{LOG}(QPTN) = C(41) + C(42)*\text{LOG}(PWUS*TW) + C(43)*\text{LOG}(PWC*TW) + C(44)*\text{LOG}(PAT*TA) + C(45)*\text{LOG}(PPT) + C(46)*\text{LOG}(EXPN) + C(47)*\text{LOG}(CWCN) + C(48)*\text{LOG}(CWCN(-1))$$

where dependent variables are
QWUSN=per capita shelled walnut quantity imported from the US;
QWCN=per capita shelled walnut quantity imported from China;
QATN=per capita import quantity of shelled sweet almond;
QPTN=per capita import quantity of pistachio nuts,

and common explanatory variables are
PWUS=shelled walnut CIF(cost, insurance and freight) price imported from the US;
TW=1+tariff rate for shelled walnuts;
PWC=shelled walnut CIF price imported from China;
PAT=shelled sweet almond CIF price;
TA=1+tariff rate for shelled sweet almond;
PPT=shelled pistachio CIF price;
EXPN=average per capita expenditure;
CWCN=Japan promotion dollars (per capita) collected from California walnut farmers;
CWCN(-1)=*CWCN* in the previous year. LOG represents natural logarithm, and * implies multiplying the variables. More detailed explanation for variables is shown in Tables 8 and 9.

Because the explanatory variables are common for all four equations, the best estimation method would be the Seemingly Unrelated Regression in this case. Variables are omitted when estimated coefficients are not significantly different from zero. The final estimation results are as follows. More detailed figures are shown in Table 10. Because the Japanese income level data is not yet available for the year 2003, the estimation period is from 1988 to 2002, except for Equation (2) in which the *EXPN* variable was omitted.

Equation (1):

$$\text{LOG}(QWUSN) = -79.435 - 0.478*\text{LOG}(PWUS*TW) + 6.120*\text{LOG}(EXPN) + 0.393*\text{LOG}(CWCN) + 0.121*\text{LOG}(CWCN(-1))$$

(-11.7) (-2.87) (12.3) (5.34) (1.73)

R-squared=0.954 Adjusted R-squared=0.936 DW=1.17

Equation (2):

$$\begin{aligned}LOG(QWCN) = {} & 0.671*LOG(PWUS*TW) - 0.709*LOG \\ & (1.67) \qquad\qquad (-2.40) \\ & (PWC*TW) + 0.407*LOG(PAT*TA) \\ & \qquad\qquad (2.04) \\ & + 0.299*LOG(CWCN) - 0.305*LOG(CWCN(-1)) \\ & (2.71) \qquad\qquad (-2.95)\end{aligned}$$

R-squared=0.690 Adjusted R-squared=0.578 DW=2.05

Equation (3):

$$\begin{aligned}LOG(QATN) = {} & 18.840 + 0.289*LOG(PWC*TW) \\ & (3.87) \quad (2.04) \\ & -0.382*LOG(PAT*TA) - 0.938*LOG(EXPN) \\ & (-4.24) \qquad\qquad (-2.72)\end{aligned}$$

R-squared=0.582 Adjusted R-squared=0.468 DW=1.10

Equation (4):

$$\begin{aligned}LOG(QPTN) = {} & 70.513 + 0.973*LOG(PAT*TA) \\ & (3.82) \quad (2.92) \\ & -1.491*LOG(PPT) - 4.548*LOG(EXPN) \\ & (-3.43) \qquad\qquad (-3.68)\end{aligned}$$

R-squared=0.556 Adjusted R-squared=0.434 DW=1.10

Estimated coefficients means elasticities, or Equation (1) implies that a 1% reduction of imported US walnut prices will generate 0.48% increases in Japanese demand for the US walnuts. Chinese walnuts, sweet almond, and pistachio nuts will have no significant effects on US walnut demand in Japan. This seems consistent with the fact that the US walnut prices are much higher than other nut prices. Japanese consumer income level will have very positive effects on the US walnuts. A 1% increase in the CWC (California Walnut Commission) check-off money will increase the US walnut exports to Japan by 0.51%, including one-year carryover effects.

Equation (2) implies that a 1% reduction of imported US walnut prices will generate 0.67% decreases in Japanese demand for Chinese walnuts, a 1% reduction of imported Chinese walnut prices will generate 0.71% increases in Japanese demand for Chinese walnuts, and a 1% reduction of imported almond prices will generate 0.41% decreases in Japanese demand for Chinese walnuts. Thus, Chinese walnuts are more sensitive to prices of other nuts compared to the US walnuts. The results indicate that simultaneous elimination of 10% walnut tariffs for both China and the US will have only small increases in Chinese walnut imports to Japan because about 7.1% increase are almost cancelled out by 6.7% decreases. Japanese consumer income level will have no significant effects on Chinese walnuts while it has very positive effects on the US walnuts. This is consistent with the fact that the US walnut prices are much higher than Chinese prices. A 1% increase in the CWC check-off money will decrease China's walnut exports to Japan by 0.006%, by canceling out positive and negative effects for two years.

Equation (3) indicates that a 1% reduction of imported Chinese walnut prices will generate 0.29% decreases in Japanese import demand for sweet almond, and a 1% reduction of imported sweet almond prices will generate 0.38% increases in Japanese import demand for sweet almond. Sweet almond might be a inferior good because Japanese consumer income level will have negative effects on Japanese import demand for sweet almond.

Equation (4) indicates that a 1% reduction of imported sweet almond prices will generate 0.97% decreases in Japanese import demand for pistachio nuts, and a 1% reduction of imported pistachio prices will generate 1.49% increases in Japanese import demand for pistachio nuts. Pistachio nuts might be also a inferior good because Japanese consumer income level will have negative effects on Japanese import demand for pistachio nuts.

SIMULATION ANALYSIS OF TARIFF ELIMINATION

Because tariff elimination will increase the US and Chinese walnut exports to Japan, the US and Chinese walnut price may rise due to tighter supply and demand. We should incorporate walnut supply functions in the US and China into our simulation model in order to capture such price changes. However, the share of the US exports to Japan in the US total walnut production is only two to three percent, and the Chinese percentage is much smaller. Therefore, we can regard Japan as a "small country" in terms of walnut imports. Thus, using only the estimated four demand Equation (1) to (4), we can simulate the effects of tariff elimination on Japanese users of imported nuts and foreign exporters.

We set three scenarios: simultaneous tariff elimination for all countries and all nuts under a possible WTO agreement; preferential tariff elimination only for Chinese walnuts under a possible East Asian Free Trade Agreement; preferential tariff elimination only for the US nuts under a possible Japan-US Free Trade Agreement. In the third scenario, the US nuts include shelled walnuts, shelled sweet almond, and pistachio nuts because most imported almond and pistachio nuts come from the US. We simulate the situation that tariffs were zero in each year since 1988 until 2002.

The results are shown in Table 4, 5, and 6. Table 4 shows percent changes in quantities imported. If all tariffs were eliminated, the US walnut imports would have increased by 4.7% each year. Increases in Chinese walnut imports would have been only 0.4% because of competition with the US walnuts nuts and almond. Almond imports would have decreased because effects of eliminating 10% Chinese walnut tariffs were larger compared to elimination effects of lower tariffs for almond. Pistachio imports would have decreased because of effects of eliminating almond tariffs, because pistachio prices would have no changes since tariffs were already zero for pistachio nuts.

Table 5 and 6 show benefits to Japanese users of

Table 4. Percent Changes in Import Volume Caused by Tariff Elimination

Case	Zero for all				Zero for China				Zero for US			
	US Walnuts	China Walnuts	Almond	Pistachio	US Walnuts	China Walnuts	Almond	Pistachio	US Walnuts	China Walnuts	Almond	Pistachio
1988	104.7	100.4	98.8	96.3	100.0	107.0	97.3	100.0	104.7	92.3	101.5	96.3
1989	104.7	100.4	98.8	96.3	100.0	107.0	97.3	100.0	104.7	92.3	101.5	96.3
1990	104.7	100.4	98.8	96.3	100.0	107.0	97.3	100.0	104.7	92.3	101.5	96.3
1991	104.7	100.4	98.8	96.3	100.0	107.0	97.3	100.0	104.7	92.3	101.5	96.3
1992	104.7	100.4	98.8	96.3	100.0	107.0	97.3	100.0	104.7	92.3	101.5	96.3
1993	104.7	100.4	98.8	96.3	100.0	107.0	97.3	100.0	104.7	92.3	101.5	96.3
1994	104.7	100.4	98.8	96.3	100.0	107.0	97.3	100.0	104.7	92.3	101.5	96.3
1995	104.7	100.4	98.6	96.5	100.0	107.0	97.3	100.0	104.7	92.4	101.4	96.5
1996	104.7	100.4	98.6	96.7	100.0	107.0	97.3	100.0	104.7	92.5	101.3	96.7
1997	104.7	100.4	98.5	97.0	100.0	107.0	97.3	100.0	104.7	92.6	101.2	97.0
1998	104.7	100.4	98.4	97.3	100.0	107.0	97.3	100.0	104.7	92.7	101.1	97.3
1999	104.7	100.4	98.3	97.4	100.0	107.0	97.3	100.0	104.7	92.8	101.0	97.4
2000	104.7	100.4	98.2	97.7	100.0	107.0	97.3	100.0	104.7	92.9	100.9	97.7
2001	104.7	100.4	98.2	97.7	100.0	107.0	97.3	100.0	104.7	92.9	100.9	97.7
2002	104.7	100.4	98.2	97.7	100.0	107.0	97.3	100.0	104.7	92.9	100.9	97.7

Table 5. Users' Benefits and Sellers' Losses from Tariff Elimination (nominal)

(Unit: Million Yen)

Case	Zero for all		Zero for China		Zero for US	
Country	US	China	US	China	US	China
1988	81.5	67.4	0.0	69.6	81.5	–51.6
1989	100.8	56.9	0.0	58.8	100.8	–43.6
1990	133.4	68.8	0.0	71.1	133.4	–52.8
1991	186.4	64.5	0.0	66.6	186.4	–49.4
1992	227.5	61.9	0.0	64.0	227.5	–47.5
1993	258.5	66.2	0.0	68.4	258.5	–50.8
1994	293.5	71.9	0.0	74.3	293.5	–55.1
1995	272.0	44.7	0.0	46.2	272.0	–33.8
1996	394.7	79.8	0.0	82.4	394.7	–59.7
1997	480.9	92.1	0.0	95.2	480.9	–67.9
1998	535.7	93.3	0.0	96.4	535.7	–67.8
1999	425.0	54.2	0.0	56.0	425.0	–39.0
2000	384.4	43.8	0.0	45.3	384.4	–31.0
2001	444.4	64.9	0.0	67.0	444.4	–46.0
2002	397.2	58.2	0.0	60.1	397.2	–41.2

Table 6. Users' Benefits and Sellers' Losses from Tariff Elimination (1995 price)

(Unit: Million Yen)

Case	Zero for all		Zero for China		Zero for US	
Country	US	China	US	China	US	China
1988	75.0	62.0	0.0	64.1	75.0	–47.6
1989	91.6	51.7	0.0	53.5	91.6	–39.7
1990	119.7	61.8	0.0	63.8	119.7	–47.4
1991	167.0	57.8	0.0	59.7	167.0	–44.3
1992	204.4	55.6	0.0	57.5	204.4	–42.6
1993	236.1	60.5	0.0	62.5	236.1	–46.4
1994	269.8	66.1	0.0	68.3	269.8	–50.6
1995	272.0	44.7	0.0	46.2	272.0	–33.8
1996	392.3	79.3	0.0	81.9	392.3	–59.3
1997	481.8	92.3	0.0	95.4	481.8	–68.1
1998	555.1	96.7	0.0	99.9	555.1	–70.3
1999	434.6	55.5	0.0	57.3	434.6	–39.9
2000	402.9	45.9	0.0	47.4	402.9	–32.5
2001	462.0	67.4	0.0	69.7	462.0	–47.8
2002	413.3	60.5	0.0	62.5	413.3	–42.9
Total	4577.7	957.9	0.0	989.6	4577.7	–713.0

Table 7. Effectivenes of CWC Assessments

(Unit: Million Yen)

	Increased US Import Values	Farmers' gains	1% increae in CWC	Marginal Efficiency	Decreased China Import Values
	[a]	[b]=20% of [a]	[c]	[b]/[c]	
1989	5.05	1.01	0.46	2.19	–0.03
1990	6.69	1.34	0.43	3.10	–0.04
1991	9.35	1.87	0.53	3.55	–0.04
1992	11.41	2.28	0.51	4.47	–0.03
1993	12.96	2.59	0.49	5.26	–0.04
1994	14.71	2.94	0.79	3.75	–0.04
1995	13.63	2.73	0.79	3.47	–0.02
1996	19.79	3.96	0.81	4.87	–0.04
1997	24.11	4.82	0.90	5.33	–0.05
1998	26.86	5.37	1.43	3.76	–0.05
1999	21.31	4.26	1.22	3.50	–0.03
2000	19.27	3.85	1.27	3.02	–0.02
2001	22.28	4.46	1.48	3.02	–0.04
2002	19.91	3.98	1.14	3.50	–0.03

imported walnuts. Benefits to walnut users are measured by lower price merits multiplied by the average of import quantities between before and after tariff elimination, or users' benefits=(observed price − price without tariff) multiplied by (simulated import volume + observed import volume)/2. This definition is almost the same as increases in "consumer surplus."

Table 5 shows values in nominal terms. It indicates that Japanese users would have gained 397 million yen from tariff elimination of the US walnuts, and 58 million yen from tariff elimination of Chinese walnuts in 2002. If tariffs were eliminated only for China, Japanese users' gains would have been only 60 million yen from Chinese walnuts in 2002. If tariffs were eliminated only for the US, Japanese users would have had the same 397 million–yen gains from tariff elimination of the US walnuts, but they would have had no gains from Chinese walnuts in 2002. It should be noted that the negative figures in the last column in Table 5 are not losses of Japanese

users, but losses of China's exporters measured by (simulated import volume–observed import volume) multiplied by observed price.

Table 6 shows values in real terms deflated by wholesale food price indices set as 1995=100 in Japan. It indicates that Japanese users would have gained 4,578 million yen from tariff elimination of the US walnuts, and 958 million yen from tariff elimination of Chinese walnuts in total from 1988 to 2002.

Our simulation also suggests that simultaneous liberalization will be more beneficial to Japanese walnut users than preferential liberalization under regional free trade agreements.

PROMOTION EFFECTIVENESS

We also simulate effectiveness of promotion activities implemented by the CWC check-off money assessed on California walnut farmers. In Table 7, increases in imported values of the US walnuts associated with a 1% increase in the CWC money are compared with the amounts of the 1% increase in the CWC money. Because not all increased values belong to walnut farmers, we assume that only 20% of increased sales belong to farmers. The CWC promotion money is provided by the US currency, and we convert them into the Japanese yen applying 1 dollar=120 yen for all years in order to avoid effects of fluctuating currency appreciation.

In 2002, a 1% increase in the CWC money is 1.14 million yen and associated increases in import values of the US walnuts are 19.91 million yen. Assumed farmers' gains are 20% of 19.19 million yen, or 3.98 million yen. Then, marginal efficiency of the CWC promotion money for California walnuts is estimated at 3.50 in 2002. This means that the CWC promotion activities are very effective for California walnut farmers.

CONCLUSIONS

This report addressed the question as to whether walnut tariff elimination is beneficial to Japan or not. Our answer is that walnut import liberalization benefits Japan. A simulation model was developed incorporating competition between the US and China in the Japanese

Table 8. Model Variables

Variables	Definitions	Unit	Sources
cwc	Japan promotion dollars collected from California walnut farmers	dollar	California Walnut Commission
map	Japan promotion dollars provided by the USDA Market Access Program	dollar	California Walnut Commission
adt	cwc+map	dollar	California Walnut Commission
qwus	Shelled walnut quantity imported from the US	kg	Japan Exports and Imports, Ministry of Finance
vwus	Shelled walnut value imported from the US	1,000 yen	Japan Exports and Imports, Ministry of Finance
pwus	Shelled walnut CIF (cost, insurance and freight) price imported from the US	yen/kg	Japan Exports and Imports, Ministry of Finance
qwc	Shelled walnut quantity imported from China	kg	Japan Exports and Imports, Ministry of Finance
vwc	Shelled walnut value imported from China	1,000 yen	Japan Exports and Imports, Ministry of Finance
pwc	Shelled walnut CIF(cost, insurance and freight) price imported from China	yen/kg	Japan Exports and Imports, Ministry of Finance
pop	Total population in Japan	person	Japan Statistical Yearbook, Ministry of Public Management
wpif	Wholesale price index for food	1995=100	Wholesale Price Indices, The Bank of Japan
exp	Average per household expenditure	1,000 yen	Family Income and Expenditure Survey, Ministry of Public Management
n	Average persons per household	person	Family Income and Expenditure Survey, Ministry of Public Management
expn	Average per capita expenditure	1,000 yen	Family Income and Expenditure Survey, Ministry of Public Management
qat	Total import quantity of shelled sweet almond	kg	Japan Exports and Imports, Ministry of Finance
vat	Total import value of shelled sweet almond	1,000 yen	Japan Exports and Imports, Ministry of Finance
pat	Shelled sweet almond CIF (cost, insurance and freight) price	yen/kg	Japan Exports and Imports, Ministry of Finance
qpt	Total import quantity of pistachio nuts	kg	Japan Exports and Imports, Ministry of Finance
vpt	Total import value of pistachio nuts	1,000 yen	Japan Exports and Imports, Ministry of Finance
ppt	Pistachio CIF (cost, insurance and freight) price	yen/kg	Japan Exports and Imports, Ministry of Finance
qwj	Japanese domestic walnut supply	kg	Fruits and Vegetables Division, Ministry of Agriculture, Forestry, and Fisheries
ta	1+tariff rate for shelled sweet almond		Japan Exports and Imports, Ministry of Finance
tw	1+tariff rate for shelled walnuts		Japan Exports and Imports, Ministry of Finance
tp	1+ tariff rate for pistachio nuts		Japan Exports and Imports, Ministry of Finance
cwcn	cwc/pop·1000	dollar/1000 person	
qwusn	qwus/pop·1000	kg/1000 person	
qwcn	qwc/pop·1000	kg/1000 person	
qatn	qat/pop·1000	kg/1000 person	
qptn	qpt/pop·1000	kg/1000 person	

Table 9. Data Set

	cwc	map	adt	qwus	vwus	pwus	qwc	vwc	pwc
1986	400,867	4,008,674	4,409,541						
1987	278,920	2,611,204	2,890,124						
1988	544,145	2,072,883	2,617,028	1,643,222	855,598	520.7	2,078,082	789,145	379.7
1989	385,114	1,866,479	2,251,593	1,624,336	951,812	586.0	1,406,467	552,540	392.9
1990	359,776	2,426,939	2,786,715	1,989,856	1,222,162	614.2	1,365,468	569,908	417.4
1991	439,092	2,272,606	2,711,698	2,634,974	1,541,461	585.0	1,325,904	524,281	395.4
1992	425,353	1,878,196	2,303,549	3,595,179	2,086,468	580.4	1,711,787	664,834	388.4
1993	410,709	1,515,706	1,926,415	4,600,257	2,913,238	633.3	1,862,809	718,817	385.9
1994	654,345	1,162,786	1,817,131	4,820,892	2,707,646	561.6	2,059,216	711,182	345.4
1995	654,921	1,176,665	1,831,586	6,861,036	2,969,925	432.9	1,631,156	445,750	273.3
1996	677,449	1,119,303	1,796,752	6,862,602	4,505,688	656.6	2,246,915	798,876	355.5
1997	753,363	960,000	1,713,363	6,158,167	4,606,002	748.0	2,345,094	1,077,548	459.5
1998	1,189,115	724,827	1,913,942	6,809,933	4,662,843	684.7	1,737,733	813,381	468.1
1999	1,013,697	735,355	1,749,052	6,940,199	3,594,280	517.9	1,596,191	594,507	372.5
2000	1,062,121	892,790	1,954,911	8,199,784	3,502,023	427.1	1,192,445	432,229	362.5
2001	1,230,809	812,567	2,043,376	7,269,433	4,619,858	635.5	1,559,551	638,947	409.7
2002	947,544	735,755	1,683,299	8,447,324	5,029,760	595.4	1,461,119	679,534	465.1
2003	1,052,500	963,000	2,015,500	8,303,890	4,563,271	549.5	1,266,673	559,277	441.5

	pop	wpif	exp	n	expn	qat	vat	pat
1986	121,660,000	114.8	3,316,493	3.69	898,779			
1987	122,239,000	109.2	3,371,326	3.67	918,617			
1988	122,745,000	108.6	3,493,468	3.63	962,388	24,374,969	10,842,923	444.8
1989	123,205,000	110.0	3,592,205	3.61	995,071	23,079,779	11,484,947	497.6
1990	123,611,000	111.4	3,734,084	3.56	1,048,900	20,507,510	11,610,227	566.1
1991	124,043,000	111.6	3,925,358	3.57	1,099,540	22,887,408	10,100,146	441.3
1992	124,452,000	111.3	4,003,931	3.53	1,134,258	23,614,853	11,428,762	484.0
1993	124,764,000	109.5	4,022,955	3.49	1,152,709	21,618,207	10,687,539	494.4
1994	125,034,000	108.8	4,006,086	3.47	1,154,492	18,555,001	10,174,656	548.4
1995	125,569,000	100.0	3,948,741	3.42	1,154,603	22,522,468	9,812,629	435.7
1996	125,864,000	100.6	3,946,187	3.34	1,181,493	17,913,664	13,129,366	732.9
1997	126,166,000	99.8	3,999,759	3.34	1,197,533	18,445,003	12,238,301	663.5
1998	126,486,000	96.5	3,938,235	3.31	1,189,799	18,794,912	11,338,175	603.3
1999	126,686,000	97.8	3,876,091	3.30	1,174,573	17,298,427	8,101,109	468.3
2000	126,926,000	95.4	3,805,600	3.24	1,174,568	21,174,858	7,035,604	332.3
2001	127,291,000	96.2	3,704,298	3.22	1,150,403	23,946,198	9,173,329	383.1
2002	127,435,000	96.1	3,673,550	3.19	1,151,583	27,827,173	11,182,716	401.9
2003	127,524,000					28,734,545	12,262,362	426.7

	qpt	vpt	ppt	qwj	ta	tw	tp
1986	765,899	599,323	782.5	548,000	1.040	1.10	1
1987	2,739,295	1,537,353	561.2	558,000	1.040	1.10	1
1988	7,102,486	4,461,474	628.2	577,000	1.040	1.10	1
1989	6,487,078	4,515,114	696.0	365,000	1.040	1.10	1
1990	5,390,972	3,830,012	710.4	502,000	1.040	1.10	1
1991	9,488,598	5,508,444	580.5	456,000	1.040	1.10	1
1992	7,645,719	4,630,433	605.6	374,000	1.040	1.10	1
1993	6,677,364	3,378,732	506.0	319,000	1.040	1.10	1
1994	7,686,941	3,179,535	413.6	305,000	1.040	1.10	1
1995	8,564,876	3,330,032	388.8	221,000	1.037	1.10	1
1996	6,983,566	3,357,781	480.8	223,000	1.035	1.10	1
1997	5,123,628	2,982,825	582.2	197,000	1.032	1.10	1
1998	4,347,970	2,748,878	632.2	152,000	1.029	1.10	1
1999	3,314,436	1,717,820	518.3	221,000	1.027	1.10	1
2000	2,929,773	1,636,694	558.6	n.a.	1.024	1.10	1
2001	3,465,506	1,772,621	511.5	100,000	1.024	1.10	1
2002	2,695,154	1,560,868	579.1	101,000	1.024	1.10	1
2003	2,229,651	1,286,277	576.9		1.024	1.10	1

shelled walnut, shelled sweet almond, and pistachio markets. Tariff elimination of walnut imports to Japan would have increased US exports by 4.7% and generate 397 million yen gains for Japanese users in 2002. Japanese users would have gained 4,578 million yen in total at 1995 price levels from tariff elimination of the US walnuts from 1988 to 2002. Negative effects on Japanese walnut farmers will be virtually none because there are only few farmers specialized in walnut production and specialized farmers have their own niche markets almost completely differentiated from imports. This report also revealed that the promotion money collected from US walnut farmers is very effective for increasing exports to Japan, or farmers' incremental gains are over three times higher than their incremental costs.

Table 10. Estimated Results

	Coefficient	Std. Error	t–Statistic	Critical Level
C(11)	–79.435	6.779	–11.718	0.000
C(12)	–0.478	0.167	–2.872	0.006
C(13)	6.120	0.498	12.281	0.000
C(14)	0.393	0.074	5.335	0.000
C(15)	0.121	0.070	1.733	0.090
C(21)	0.671	0.402	1.671	0.102
C(22)	–0.709	0.296	–2.398	0.021
C(23)	0.407	0.200	2.036	0.048
C(24)	0.299	0.111	2.706	0.010
C(25)	–0.305	0.104	–2.947	0.005
C(31)	18.840	4.863	3.874	0.000
C(32)	0.289	0.142	2.038	0.048
C(33)	–0.382	0.090	–4.235	0.000
C(34)	–0.938	0.346	–2.716	0.009
C(41)	70.513	18.449	3.822	0.000
C(42)	0.973	0.333	2.922	0.006
C(43)	–1.491	0.434	–3.434	0.001
C(44)	–4.548	1.235	–3.683	0.001
Equation (1): LOG(*QWUSN*)=C(11)+C(12)*LOG(*PWUS*TW*)+C(13) *LOG(*EXPN*)+C(14)*LOG(*CWCN*)+C(15)*LOG(*CWCN(–1)*)				
R–squared	0.954	Mean dependent var		3.594
Adjusted R–squared	0.936	S.D. dependent var		0.578
S. E. of regression	0.146	Sum squared resid		0.213
Durbin–Watson stat	1.168			
Observations: 15				
Equation (2): LOG(*QWCN*)=C(21)*LOG(*PWUS*TW*)+C(22)*LOG(*PWC *TW*)+C(23)*LOG(*PAT*TA*)+C(24)*LOG(*CWCN*)+C(25) *LOG(*CWCN(–1)*)				
R–squared	0.690	Mean dependent var		2.573
Adjusted R–squared	0.578	S.D. dependent var		0.210
S.E. of regression	0.136	Sum squared resid		0.204
Durbin–Watson stat	2.053			
Observations: 16				
Equation (3): LOG(*QATN*)=C(31)+C(32)*LOG(*PWC*TW*)+C(33) *LOG(*PAT*TA*)+C(34)*LOG(*EXPN*)				
R–squared	0.582	Mean dependent var		5.136
Adjusted R–squared	0.468	S.D. dependent var		0.138
S.E. of regression	0.101	Sum squared resid		0.112
Durbin–Watson stat	1.102			
Observations: 15				
Equation (4): LOG(*QPTN*)=C(41)+C(42)*LOG(*PAT*TA*)+C(43)*LOG(*PPT*) +C(44)*LOG(*EXPN*)				
R–squared	0.556	Mean dependent var		3.773
Adjusted R–squared	0.434	S.D. dependent var		0.417
S.E. of regression	0.314	Sum squared resid		1.084
Durbin–Watson stat	1.095			
Observations: 15				

Notes. Estimation Method: Seemingly Unrelated Regression.
Sample: 1988 to 2003.