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Growth in horticultural trade: Japan's market for developing countries

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ABSTRACT

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This paper explores possibilities and opportunities of expansion of horticultural exports from developing countries through an investigation on a rapidly growing market, Japan, as an example among major promising markets. In this paper six horticultural commodities are selected to analyze, emphasizing on exports from developing countries.

Observations on Japan's horticultural imports make us presume that consumers differentiate products by place of production. Therefore, import behavior is considered in a two-stage budgeting procedure. The second-stage demands for imports from different sources are specified in an almost ideal demand system (AIDS) model and estimated statistically as well as the first-stage import demand equations. The estimated second-stage AIDS equations show that the magnitude of own-price coefficients varies with the source of imports and so does that of expenditure coefficients. Therefore, the characteristics of import demand on a commodity basis, which are captured by the estimates of the first-stage import demand equations, are not equally transmitted to the demand for imports by source in each commodity.

The estimated coefficients of the first-stage import demand and the second-stage AIDS equations were combined to obtain the total effects of price and income changes on imports by source. The calculated own-price elasticities are greater than one in absolute value in ten of the 15 cases and so are the calculated income elasticities in twelve cases. The large elasticities promise suppliers that they benefit from Japan's income growth and that they increase their earnings if they can reduce the price by lowering their costs.

However, factors in non-price competition also play import roles in the import growth. In this paper, the importance of sales promotions by exporters and preshipment inspections was indicated in the cases of mangoes and cut flowers. Other factors such as market structure and public infrastructure for post-harvest activities were also discussed.

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INTRODUCTION

International trade in horticultural commodities such as cut flowers, fruits, and vegetables has been expanding more rapidly than trade in other agricultural commodities. Although at present horticultural trade is dominated by developed countries in both demand and supply, the rapid growth in international markets has attracted many developing countries' attentions because future expansion of agricultural exports from developing countries is recognized to lie in the area of horticultural commodities. Expanded horticultural exports are expected to contribute to agricultural diversification, employment opportunities, and foreign exchange earnings in developing countries. Despite their increasing importance, little research has been conducted on horticultural products. For understanding the current state of horticultural trade and its future prospects, detailed country studies are needed.

In this paper, we focus our attention on one rapidly expanding single market, Japan, and examine the structure of import demand for selected horticultural commodities, emphasizing imports from developing countries. Japan is not only increasing the volume but also expanding the range of horticultural commodities that it imports. However, trade statistics are not disaggregated enough to cover most of the new commodities in detail. Given this limitation and consideration of importance for developing countries, we selected six commodities: pineapple (fresh), mangoes (fresh), avocados (fresh), bamboo shoots (prepared or preserved), ginger (not preserve in preservative solutions), and cut flowers (including buds). Major foreign suppliers who export at least one of these commodities to Japan are Thailand, the Philippines, Mexico, China (mainland), Taiwan, the United States, and The Netherlands.

Table 1 shows the growth rates of Japanese imports of these commodities by country from 1979–81 to 1987–89. The annual growth rates of import value measured in Japanese yen were higher than 10% for ten of the 15 trade flows listed in Table 1 during the period. But the growth rates were not uniform. For example, mangoes as a whole had a high rate of import growth in Japan, but the imports from individual countries show quite different growth rates. In the case of bamboo shoots, even the direction of growth is different between Taiwan and other suppliers. Foreign suppliers may be more interested in the value growth rates measured in U.S. dollars. During the period of 1979–81 to 1987–89, the Japanese yen was appreciated by 62% so that the growth rates of import value in U.S. dollars were further higher by 5.9% in annual rate than each of the value growth rates expressed in Japanese yen. Therefore, all the

foreign suppliers enjoyed U.S. dollar earnings by horticultural exports to Japan at higher rates than those in Table 1.

The growth in import value is due to a combination of import quantity growth and import price changes. Table 1 summarizes movements in both quantity and price. It is important to note that not only import quantities but also import price movements differ by source of supply within each commodity. This implies that products from different sources may have

TABLE 1

Japan's import growth rates and price changes of six horticultural commodities by origin for 1979–81 to 1987–89 (%)^a

Commodity and origin	Growth rate of imports in		Import price ^c change rate	Import value share, 1987–89
	Value ^b	Quantity		
(1) Pineapples				
Philippines	–0.2	2.5	–2.6	90.8
Taiwan	14.7	7.4	6.3	8.9
Total	0.6	2.7	–2.1	100.0
(2) Mangoes				
Philippines	22.1	27.6	–4.3	72.5
Mexico	4.0	7.6	–3.2	25.2
Total	14.5	20.2	–4.7	100.0
(3) Avocados				
Mexico	13.2	26.4	–10.6	22.2
USA	14.1	22.2	–6.7	77.3
Total	13.9	22.9	–7.5	100.0
(4) Bamboo shoots				
Thailand	46.4	41.1	2.7	12.9
China	46.3	54.9	–5.9	64.2
Taiwan	–6.3	–8.1	–0.9	22.2
Total	11.7	11.1	–0.3	100.0
(5) Ginger				
Thailand	33.7	44.5	–6.4	2.3
China	3.3	12.0	–8.7	43.9
Taiwan	11.3	10.6	0.7	43.5
Total	6.6	10.9	–3.4	100.0
(6) Cut flowers				
Thailand	14.8	21.6	–5.2	32.5
Taiwan	5.8	12.8	–5.8	11.2
Netherlands	84.2	93.0	–8.1	27.3
Total	16.7	18.6	–1.4	100.0

^a Compounded per annum rates for the changes from 1979–81 average to 1987–89 average.

^b Import values are c.i.f. import values.

^c Import prices are c.i.f. unit values in Japanese yen adjusted by tariff rates.

Source: Japan Tariff Association, *Japan Exports and Imports: Commodity by Country* (various issues).

each own market and may have to be examined individually. Also the degree of product differentiation and substitutability among imports vary by commodity and should be examined in an empirical analysis. In the following, we discuss how to analyze imports by source which behave differently for the same commodity. Then, we statistically examine the structure of Japanese demand for horticultural imports.

A TWO-STAGE IMPORT DEMAND MODEL

We have observed differences in Japan's import behavior not only across commodities, but also across the sources of supply for each commodity. This makes us presume that consumers differentiate products of horticultural commodities by place of production. This presumption of product differentiation by place of production seems reasonable because horticultural products are characterized by a diversity of varieties and production seasons in supplying countries. In dealing with Japan's import demand for horticultural commodities, therefore, it seems appropriate to adopt the theoretical framework of a two-stage budgeting procedure in import behavior, in which products are distinguished by their place of production and are not perfect substitutes.

In the two-stage budgeting procedure, first, the amount of expenditure for all imports of a commodity, say mangoes, is determined assuming that this commodity is weakly separable from all other kinds of commodities in consumer's utility function. Then, in the second stage, the expenditure determined in the first stage is allocated among the imports coming from different supplying countries, say mangoes from The Philippines, mangoes from Mexico, and so on. Based on this two-stage budgeting hypothesis, the demand for imports of a commodity by source can be expressed as a function of the import prices by supplying country and the total expenditure on the imports of this specific commodity.

In specifying the second-stage demand equations for imports by source, a complete demand system is desired. We employ an almost ideal demand system (AIDS) of Deaton and Muellbauer (1980a,b) to estimate the parameters in the second-stage demand. In the AIDS specification, the budget share of imports of a commodity from source i is given by:

$$w_i = \alpha_i + \sum_{j=1}^n \gamma_{ij} \ln p_j + \beta_i \ln(M/P) \quad i = 1, \dots, n \quad (1)$$

where w_i is the expenditure share of source i in total imports of this commodity, p_j is the price of imports from source j , M is total expenditure on imports of the commodity from all sources, and P is the aggregate price

index defined as:

$$\ln P = \alpha_0 + \sum_k \alpha_k \ln p_k + \frac{1}{2} \sum_j \sum_k \gamma_{kj} \ln p_k \ln p_j \quad (2)$$

The theoretical restrictions of adding-up, homogeneity, and symmetry, respectively, require that:

$$\sum_i \alpha_i = 1, \quad \sum_i \gamma_{ij} = 0 \quad \text{and} \quad \sum_i \beta_i = 0; \quad \sum_j \gamma_{ij} = 0; \quad \text{and} \quad \gamma_{ij} = \gamma_{ji} \quad (3)$$

Using the price index from equation (2) often causes empirical difficulties, and it is common to replace P by a linear approximation in the form of Stone's (geometric) price index defined as:

$$\ln P^* = \sum_{k=1}^n w_k \ln p_k \quad (4)$$

We use the price index from equation (4). This model is called the "linear approximate almost ideal demand system" (Blanciforti and Green, 1983).

Given the total expenditure on imports, uncompensated price elasticities, η_{ij} , and expenditure elasticities, μ_i , treating expenditure shares as constant parameters in derivatives for elasticities, are calculated, respectively, as:

$$\eta_{ij} = -\delta_{ij} + (\gamma_{ij} - \beta_i w_j) / w_i \quad (5)$$

$$\mu_i = 1 + \beta_i / w_i \quad (6)$$

where δ_{ij} is the Kronecker delta.

In connection with the second-stage import demand system, the first-stage demand equation to determine the level of the expenditure variable, M/P , in equation (1), replacing P by P^* , is specified in the following manner:

$$\ln(M/P^*) = \tau_0 + \tau_1 \ln(P^*/PI) + \tau_2 \ln(PA/PI) + \tau_3 \ln(Y/PI) \quad (7)$$

where PA is the price of substitutes for the imports, Y is income of the importing country, and PI is the consumer price index of the importing country. Naturally, equation (7) is equivalent to the expenditure equation on total imports of the commodity if $\ln P^*$ is added on both sides of the equation.

STATISTICAL ESTIMATION

The second-stage AIDS equations and the first-stage demand equations were estimated for Japan's imports of six horticultural commodities using annual data. For the AIDS equations, data of import quantities and import values by commodity and by country of origin were obtained from the

Japan Tariff Association, *Nihon Boeki Geppyo* (Japan Exports and Imports; Commodity by Country). Import prices were calculated as import unit values adjusted for tariff rates, which were obtained from the Japan Tariff Association, *Jikko Kanzeiritsu Hyo* (Customs Tariff Schedules of Japan). The use of import unit values for import prices is justified for horticultural imports because most horticultural products are country or region specific in varieties and the composition of products in imports by source is not much changed. For example, mangoes from The Philippines are pelican mangoes but those from Mexico are apple mangoes, cut flowers from Thailand are orchids whereas cut flowers from Taiwan are mostly chrysanthemums, and so on. For the first-stage import demand equations, the prices of substitutes for imports are Japan's domestic consumer fruit price index for pineapples, mangoes and avocados, consumer vegetable price index for bamboo shoots, and consumer cut flower price index for cut flowers. These consumer price indexes and the total consumer price index were taken from the Management and Coordination Agency, *Shohisha Bukka Shisu Nenpo* (Annual Report on the Consumer Price Index). As a substitute price for ginger imports, the import price of another type of ginger, which is preserved in preservative solutions, is used, and the data were available in *Nihon Boeki Geppyo* mentioned above. National income and population were obtained from the International Monetary Fund (IMF), *International Financial Statistics*. Population data were used to convert the expenditure and income variables to a per capita basis.

The second-stage AIDS equations were estimated using iterative seemingly unrelated regressions (SUR) techniques with symmetry and homogeneity restrictions imposed. Because of the adding-up condition, the contemporaneous covariance matrix is singular. Following the standard procedure, one equation for the rest of the world in each system was arbitrarily deleted. The estimates are invariant to the equation deleted in the iterative SUR estimation. In cases where first-order autocorrelation in errors was found in the preliminary individual regressions, the first-stage regressions in SUR procedure were corrected for that and the variables in the system were replaced by their first-order transforms for the second-stage SUR procedure using the method developed by Berndt and Savin (1975).

The first-stage import demand equations were estimated separately using the ordinary least squares (OLS) method with correction for first-order serially correlated errors when necessary.

SECOND-STAGE EQUATIONS

The estimated second-stage AIDS equations are shown in Table 2. The AIDS model seems to capture the structure of Japan's import demand at

the second stage with large t -values, especially for the most of pineapples, bamboo shoots, and cut flowers. The own-price coefficients, which are the diagonal elements in the import price block in Table 2, are statistically significant at 10% level in eleven of the 15 equations. In some cases, cross-price coefficients are negative and may result in negative cross-price elasticities. This suggests complementarity between the respective products. But it is attributed in most cases to positive correlations between the prices of imports, especially from the major exporting country and from the rest of the world for each commodity.

It is noteworthy that the expenditure coefficients are significantly different from zero at 10% level in twelve of the 15 equations. This means that demands for the imports from different sources are mostly not homothetic and the import shares are affected by the total import expenditure. Those exporting countries who have significantly positive coefficients of the import expenditure variable gain the market shares as Japan's import market for the commodity expands, despite no changes in relative prices. On the other hand, those exporting countries who have significantly negative coefficients can not well take advantage of Japan's market growth. The countries in the former group are The Philippines in pineapples and mangoes, Thailand and China in bamboo shoots, Taiwan in ginger, and two developed countries, the USA and The Netherlands, in avocados and cut flowers, respectively. The latter group consists of Taiwan in pineapples and bamboo shoots, Mexico in mangoes and avocados, and China in ginger.

Strictly speaking from the demand theory viewpoint, unless the second-stage demand equations satisfy the homotheticity condition, they are not consistent with the assumption that imports of the commodity are weakly separable. However, even if the imports are weakly separable in consumer's utility function, the empirically estimated import expenditure coefficients can be different from zero by trader's behavior. For example, if traders benefit from an exporter for non-price factors, they may import from this source more than the proportional increases to the previous market share, which is a consequence of the weak separability, and sell the imports at lower prices than other imports of the commodity in wholesale or retail markets so as to clear the difference as long as the net benefits are positive.

The importance of non-price factors to determine the import shares must be emphasized in the business of Japan's horticultural trade. For example, sales promotions by exporters play significant roles. The success in mango imports from The Philippines was helped by aggressive marketing efforts by a couple of Philippine exporters, which included persuading the Japanese government to approve for their method of fumigation. Another example is the imports of cut flowers from The Netherlands. The Netherlands opened an office in Tokyo in 1985 to promote cut flower exports to

TABLE 2
AIDS model estimates of the second-stage demand system for Janan's imports of six horticultural commodities

Commodity and origin	Constant	Import price from				Import expenditure	R * * 2
		Country A ^a	Country B	Country C	ROW		
(1) Pineapples (1970–89) ^b							
(A) Philippines	−2.6439	−0.2978 (−6.09) ^c	0.3301 (6.95)		−0.0323 (−5.94)	0.3787 (9.45)	0.575
(B) Taiwan	3.5312	0.3301 (6.95)	−0.3227 (−6.97)		−0.0074 (−2.58)	−0.3668 (−9.39)	0.586
(2) Mangoes (1979–89)							
(A) Philippines	−0.4464	0.3734 (2.44)	−0.2760 (−1.88)		−0.0974 (−1.23)	0.2142 (8.27)	0.676
(B) Mexico	1.4557	−0.2760 (−1.88)	0.3055 (2.06)		−0.0296 (−0.61)	−0.2195 (−8.38)	0.665
(3) Avocados ^d (1980–89)							
(A) Mexico	0.7944	−0.1933 (−2.34)	0.2142 (2.57)		−0.0210 (−2.19)	−0.0985 (−2.68)	0.220
(B) USA	0.3088	0.2142 (2.57)	−0.1120 (−1.50)		−0.1022 (−3.20)	0.0922 (2.63)	0.225

(4) Bamboo shoots (1973–89)							
(A) Thailand	–0.3485	0.0504 (0.89)	–0.0904 (–3.05)	0.0425 (0.73)	–0.0025 (–0.55)	0.0565 (1.90)	0.631
(B) China	–3.0671	–0.0904 (–3.05)	–0.1915 (–2.37)	0.2823 (2.99)	–0.0004 (–0.16)	0.4154 (4.98)	0.794
(C) Taiwan	4.4513	0.0425 (0.73)	0.2823 (2.99)	–0.3330 (–2.65)	0.0081 (0.31)	–0.4765 (–4.84)	0.817
(5) Ginger ^d (1973–89)							
(A) Thailand	–0.0267	–0.0165 (–2.02)	0.0042 (0.47)	0.0131 (1.36)	–0.0007 (–0.05)	0.0045 (1.72)	0.149
(B) China	0.7009	0.0042 (0.47)	–0.0675 (–1.06)	–0.0652 (–1.10)	0.1285 (1.77)	–0.2551 (–7.10)	0.798
(C) Taiwan	–0.4267	0.0131 (1.36)	–0.0652 (–1.10)	0.0290 (0.40)	0.0231 (0.34)	0.2751 (6.70)	0.791
(6) Cut flowers (1972–89)							
(A) Thailand	0.3166	–0.1735 (–2.19)	0.0417 (2.19)	0.0352 (0.87)	0.0966 (2.04)	0.0149 (0.90)	0.559
(B) Taiwan	0.4842	0.0417 (2.19)	0.3233 (24.10)	0.0192 (1.80)	–0.3842 (–27.29)	–0.0046 (–1.17)	0.948
(C) Netherlands	–0.0915	0.0352 (0.87)	0.0192 (1.80)	–0.1585 (–5.30)	0.1041 (4.94)	0.0649 (6.52)	0.559

^a Countries A, B, C are the countries designated as such in the first column, and ROW is the rest of the world.

^b Estimation periods are in parentheses.

^c Student *t*-values are in parentheses.

^d Equations corrected for first-order serially correlated errors.

Japan. Its activities include advice and consultation to florists about new varieties, different forms of display, and other services, which stimulated the demand for Dutch flowers. The Netherlands also started pre-shipping inspections of cut flowers in late 1985, which reduced the risk of exports being rejected on arrival by Japanese quarantine regulations. These factors may have resulted in non-homothetic expansions in exports of Philippine mangoes and Dutch flowers.

Elasticities calculated from the AIDS estimates and mean values of the import shares with respect to own prices and import expenditures are summarized in Table 3. All the own-price elasticities are of the expected sign except the two in mangoes from Mexico and in cut flowers from Taiwan that resulted in positive values. The calculated own-price elasticities are mostly large and nine of the 15 are greater than one in absolute value. Import expenditure elasticities reflect the sign of the expenditure coefficients in Table 2. If the expenditure coefficient is positive, the expenditure elasticity is greater than one. Correspondingly, nine expenditure elasticities are greater than one and six are less than one.

TABLE 3

Elasticities calculated from AIDS estimates of the second-stage import demand system

Commodity and origin	Uncompensated own-price	Expenditure on commodity imports
(1) Pineapples		
Philippines	-1.766	1.492
Taiwan	-2.057	-0.619
(2) Mangoes		
Philippines	-0.619	1.341
Mexico	0.093	0.373
(3) Avocados		
Mexico	-1.743	0.571
USA	-1.238	1.120
(4) Bamboo shoots		
Thailand	-0.101	2.071
China	-2.272	2.858
Taiwan	-0.985	0.339
(5) Ginger		
Thailand	-2.848	1.502
China	-0.898	0.423
Taiwan	-1.212	1.603
(6) Cut flowers		
Thailand	-1.548	1.046
Taiwan	0.785	0.974
Netherlands	-3.445	1.975

These elasticities are based on the conditional second-stage import demand system where the expenditure on imports is given. To see the total effects of price and income changes on imports from different sources, we have to know the parameters in the first-stage demand equations.

FIRST-STAGE EQUATIONS AND TOTAL ELASTICITIES

The estimated first-stage import demand equations are presented in Table 4. The dependent variable in the first-stage import demand equations is the expenditure on total imports divided by the import price index, which appeared in the second-stage equations as the import expenditure variable. Therefore, it is considered a quantity index of total imports of the commodity and the estimated coefficients are interpreted in the same manner as traditional demand equations by commodity.

The estimated import price elasticities are large for most commodities. The price elasticities of avocados and cut flowers are significantly greater than one, while the estimated elasticities of the other commodities are close to one. These values are clearly larger than the elasticities estimated for other agricultural commodities, [e.g., Behrman (1977), Bond (1987), Goldstein and Kahn (1985) and UNCTAD (1974)].

TABLE 4

OLS estimates of the first-stage demand equations for Japan's imports of six horticultural commodities

Commodity	Constant	Import price	Price of substitutes ^a	Income	R * 2
(1) Pineapples (1967–89) ^b	–2.013	–1.506 (–2.27) ^c	0.591 (0.61)	0.773 (0.77)	0.882
(2) Mangoes (1980–89)	10.993	–1.038 (–4.44)	0.324 (0.44)	3.546 (4.84)	0.984
(3) Avocados (1979–89)	–4.167	–1.648 (–5.82)	–0.899 (–0.53)	0.994 (0.78)	0.937
(4) Bamboo shoot (1965–89)	11.429	–0.752 (–2.04)	–1.023 (–1.17)	2.523 (4.97)	0.915
(5) Ginger (1970–89)	28.960	–1.720 (–2.92)	3.107 (4.66)	2.657 (1.28)	0.696
(6) Cut flowers (1969–89)	0.797	–2.134 (–7.02)	4.363 (3.66)	2.303 (3.38)	0.993

^a Consumer fruit price index for pineapples, mangoes and avocados; consumer vegetable price index for bamboo shoots; consumer cut flower price index for cut flowers; import price of preserved ginger in preservative solutions for ginger.

^b Estimation periods are in parentheses.

^c Student *t*-values are in parentheses.

The elasticities on substitute prices are not significantly different from zero except for ginger and cut flowers. This result indicates that the commodities in this study are specialties from abroad which are not substitutable for related domestic products.

Income elasticities also differ by commodity. Among the commodities having large income elasticities, mangoes, bamboo shoots, and cut flowers may be classified as luxury goods because their income elasticities are significantly larger than one.

The parameters estimated for the first-stage demand equations can be used to derive the total price and income elasticities of demand for imports by source, combining with the second-stage AIDS estimates. The total price elasticity, η_{ij}^* , and the income elasticity, μ_i^* , are respectively expressed as:

$$\eta_{ij}^* = -\delta_{ij} + (1 + \tau_1)w_j + (\gamma_{ij} + \tau_1\beta_i w_j)/w_i \quad (8)$$

$$\mu_i^* = \tau_3(1 + \beta_i/w_i) \quad (9)$$

where δ_{ij} is the Kronecker delta; γ_{ij} and β_i are parameters in the AIDS model; τ_1 and τ_3 are the price elasticity and the income elasticity in the first-stage equation; and w_i is the import value share.

Using the estimated parameters and mean values of the shares, the total elasticities of import demand by source with respect to own price and income were calculated. The results are shown in Table 5. All the own-price elasticities have the expected sign except mangoes from Mexico and cut flowers from Taiwan again. For the commodities whose first-stage price elasticities are greater than one, the total own-price elasticities in Table 5 are greater in absolute value than the AIDS model elasticities in Table 3, except pineapples from Taiwan and the two cases with wrong sign. There are ten of the 15 own-price elasticities that are greater than one in absolute value.

The magnitude of the own-price elasticities varies with the source of imports. It is natural to expect different own-price elasticities by source of imports because consumers consider products different if the sources are different even though the products have a common commodity name. Consumers can identify the source of products if the variety makes the products different in shape and color like the cases of mangoes and cut flowers. Furthermore, the retail stores in Japan follow certain labeling procedures to pass the information of the place of production to consumers, especially for specialties such as tropical fruits.

The calculated income elasticities also vary by source of imports. Income elasticities are greater than one in twelve of the 15 cases. Income elasticity of pineapples from Taiwan resulted in a negative value. But it is based on

an insignificant first-stage income elasticity of pineapples so that we can not judge it as an inferior good. Despite exporting a commodity with a large first-stage income elasticity, some countries have not experienced export growth as much as others as shown by their negative coefficient for import expenditure in the second-stage equation. Examples are Mexico in mangoes, Taiwan in bamboo shoots, and China in ginger. As Japan's per capita income continues to rise, mangoes, bamboo shoots, ginger and cut flowers are very promising as exports to Japan for all suppliers except those mentioned above.

The differences in price and income elasticities reported here may include the effects of traders who developed new sources of imports or shifted their partners from one country to another, especially in the course of the recent appreciation of Japanese yen. Most horticultural commodities are traded by relatively small traders, whose business is very volatile. As long as the small traders have freedom of exit and entry, they ensure the competitive nature of the market. The large price and income elasticities in Table 5 reflect such a market structure for horticultural imports into Japan.

TABLE 5

Total elasticities of Japan's import demand for six horticultural commodities by origin

Commodity and origin	Own-price elasticity	Income elasticity
(1) Pineapples		
Philippines	-2.346	1.153
Taiwan	-1.986	-0.478
(2) Mangoes		
Philippines	-0.652	4.756
Mexico	0.088	1.322
(3) Avocados		
Mexico	-1.828	0.568
U.S.A.	-1.795	1.114
(4) Bamboo shoots		
Thailand	-0.074	5.225
China	-2.113	7.209
Taiwan	-0.924	0.856
(5) Ginger		
Thailand	-2.857	3.460
China	-1.032	1.124
Taiwan	-1.738	4.259
(6) Cut flowers		
Thailand	-1.934	2.409
Taiwan	0.585	2.244
Netherlands	-3.594	4.549

CONCLUSION

Horticultural trade is one of the most urgent items on the agricultural trade research agenda because the accumulation of knowledge is so small, despite its increasing importance. We have examined Japan's imports as an example of rapidly expanding markets. The import demand analysis, which assumed product differentiation by country of origin, showed relatively large sensitivity of imports to price and to income changes in most cases, although the elasticities vary widely. The parameters estimated are considered to represent not only the characteristics of consumers' demand but also those of trader's behavior. We certainly need a formal model that expresses consistently the import behavior of traders combined with consumer preference and the structure of industrial organization in trade business. The research on horticultural trade is still at an infant stage and the study here is just a milestone for further research. Nonetheless, the empirical results obtained in this study contain very suggestive information to developing countries.

The estimated large price and income elasticities shed light on why many developing countries are interested in horticultural exports and justify a diversification policy emphasizing horticulture. It is believed that developing countries with abundant labor relative to capital and land have a comparative advantage in horticulture because horticultural production is generally labor-intensive. However, the cost advantage at the farm production level determines only a part of comparative advantage in horticultural trade. For horticultural commodities, about 70% of the final consumer price originates in the cost of processing, distributing, marketing, and transporting the product (Islam, 1990, p. 90). The proportion of post-production costs may be higher for those commodities which are transported by air, like cut flowers and fresh vegetables. In addition, these post-harvest activities are characterized by economies of scale stemming largely from the use of public infrastructure, such as airports, docking facilities and fumigation plants. Therefore, a key for a developing country to pursue their potential comparative advantage in horticulture is how efficiently and effectively it can organize such post-harvest facilities and services to exploit scale economies. The results derived in this paper suggest that such efforts to reduce the delivered cost of horticultural products will be rewarded.

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