Agricultural Economics Report No. 317 April 1994

JAPANESE WHEAT IMPORT DEMAND

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Acknowledgements

The authors wish to acknowledge the contribution of clerical and professional staff of the Department of Agricultural Economics. Special thanks go to Charlene Lucken for her editorial suggestions and Shelly Swandal who helped prepare the manuscript. We also would like to express our sincere thanks to Dr. D. Johnson, F. Dooley, and W. Wilson for their comments and suggestions. This study was completed under International Trade Grant No. 90-34192-5675 (ND 5004).

Table of Contents

List of Tables

Table of Figures

Highlights

Japan is one of the largest wheat importing countries, accounting for about 6 percent of world total wheat imports in the 1980s. However, Japan has set quotas on imports of wheat to protect domestic wheat production. Recently, Japan agreed to convert import quotas to tariff-rate-quotas (TRQ) and expand its import quotas. Also, Japan will reduce its state-trading mark-up on wheat. As a result, foreign wheat producers' access to the Japanese wheat market is expected to increase. With increasing access to the Japanese wheat market, wheat exporters are interested in the extent of their competitiveness in the Japanese wheat market.

When estimating wheat import demands, wheat is often assumed to be a single commodity. However, wheat is divided into hard red winter (HRW), hard red spring (HRS), white, soft, and durum wheat on the basis of varieties, planting time, and end uses. In addition, wheat supplied by different countries is differentiated by quality, transfer costs, and etc. in the world market.

The objective of this paper is to determine Japanese import demand for wheat differentiated by type and country of origin and to evaluate implications for U.S. wheat exports.

The AIDS model was used to estimate Japanese wheat import demands. Unlike previous studies on Japanese wheat import demand, this study disaggregated wheat in terms of wheat classes (HRW, HRS, SRW, white, and durum) and country of origin (U.S., Canada, and Australia).

The Wu-Hausman test suggests that group expenditure in the AIDS is endogenous. A weak separability test indicates that durum wheat is separable from other types of wheat in the Japanese wheat market.

Estimated own-price elasticities indicate that price changes in the Japanese wheat market affect U.S. HRS wheat the most. This implies that changes in wheat prices under the Uruguay Round GATT agreement on agriculture could affect the market shares of U.S. HRS wheat more than those of other wheat classes.

HRS wheat has the strongest competitive relationship with Canadian wheat in the Japanese wheat market. HRS wheat also has a competitive relationship with HRW wheat. A competitive relationship also exists between Canadian and Australian white wheat.

Estimated expenditure elasticities indicate that with increasing Japanese expenditures on wheat imports, the market share of U.S. HRS wheat will increase the most. The market share of U.S. white wheat will also increase with increasing Japanese expenditures on wheat imports, but not as much as U.S. HRS wheat.

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INTRODUCTION

Japan is one of the largest wheat importing countries, accounting for about 6 percent of world total wheat imports in the 1980s (Table 1). However, Japan has set quotas on imports of wheat to protect domestic wheat production. Recently, Japan agreed to convert import quotas to tariff-rate quotas (TRQ) and expand its import quotas. Also, Japan will reduce its state-trading mark-up on wheat. As a result, foreign wheat producers' access to the Japanese wheat market is expected to increase. With increasing access to the Japanese wheat market, wheat exporters are interested in the extent of their competitiveness in the Japanese wheat market.

Table 1. World Wheat Import and Japanese Wheat Import and Production in Volume: 1000 MT, 1965-1990

Year	Japan			World Total Import
	Import(%)[1]	Production(%)[2]	Total	
65	3645.1(6.1)	1233(25.3)	4878.1	59993.7
70	4684.6(8.0)	475 (9.2)	5159.6	58692.3
75	5654.2(8.4)	241 (4.1)	5895.2	67438.2
80	5682.3(6.4)	583 (9.3)	6265.3	88099.1
85	5509.6(5.9)	874(13.7)	6383.6	93839.9
88	5723.7(5.3)	1021(15.1)	6744.7	108547.7
89	5578.5(5.6)	985(15.0)	6563.5	99376.5
90	5474.2(5.7)	952(14.8)	6426.2	96615.1

[1] The percentage is Japanese share of the total world wheat imports.
[2] The percentage is the domestic wheat's share of the total wheat supply to Japan.

Source: United Nation, FAO Trade Yearbook and Production Yearbook, various issues.

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When estimating wheat import demands, wheat is often assumed to be a single commodity. However, wheat is divided into hard red winter (HRW), hard red spring (HRS), white, soft, and durum wheat classes on the basis of varieties, planting time, and end uses. In addition, wheat supplied by different countries is differentiated by quality, and transfer costs in the world market (Penson and Babula; Honma and Heady; Johnson et al.).

Armington developed a trade flow model to differentiate import demands by source. However, most studies on wheat trade flow models have assumed that wheat is differentiated only by country of origin. Therefore, demand studies of wheat differentiated only by source are still aggregate analyses. The wheat demand analyses overlook variation of each different type of wheat demand. Wilson estimated Japanese wheat import demand differentiated by classes and source using the transcendental logarithmic function. All of his estimates for prices and expenditure were statistically insignificant.

The objective of this paper is to determine Japanese import demand for wheat differentiated by type and country of origin and to evaluate implications for U.S. wheat exports.

Disaggregated import demand by source can be estimated using the Armington trade model. However, the Armington model is based on strong assumptions of homotheticity within group utility functions and separability among different sources. These assumptions have been rejected in empirical studies (Winters; Alston et al., 1990a; Seale et al.). Alternatively, the almost ideal demand system (AIDS) and Rotterdam models have been widely used to estimate import demands differentiated only by source (Winters; Alston et al., 1990a; Haden; Lee et al.; Seale et al.; Theil). In preliminary estimations, the AIDS specification fit Japanese import data for wheat better than the Rotterdam specification. Therefore, the AIDS is used.

The remainder of this paper is organized as follows. The second section introduces the Japanese wheat market. The methodology is discussed in the third section. The data are explained in the fourth section. The fifth section presents the empirical results. The summary and conclusions are presented in the sixth section.

Japanese Wheat Market

From 1965 to 1975, Japanese wheat production declined from about 25 percent to 4 percent of its wheat supply (Table 1). In the mid-1970s, world wheat prices rose more than threefold because of a sharp increase of USSR wheat imports and world oil shock. Since that time, Japan gradually increased its wheat production to about 15 percent of its wheat supply in the late

1980s by adapting the price support program and import quotas set by the Japanese Food Agency (JFA) (Alston et al., 1990b; Egaitsu). The JFA imports wheat at world prices and sells to domestic millers at higher prices (Table 2).

Table 2. Japanese Wheat Prices and Import Prices

Year	Government		Exchange Rate[1]	Import Prices (c.i.f.)	
	Purchase Price	Resale Price			
	— Yen per ton —		Yen/Dollar	Yen/mt	$/mt
1960	35820	33730	360	23760	66
1965	45220	32850	360	24840	69
1970	57180	32330	360	24480	68
1975	102150	44740	297	58509	197
1980	178400	60780	227	53118	234
1985	184867	68917	239	42542	178
1986	182717	68917	169	26871	159
1987	173750	64767	145	20880	144
1988	165750	60433	128	23168	181
1989	159950	57200	138	29256	212
1990	153717	54300	145	26825	185

[1] Yearly average.

Source: Monthly Statistics of Agriculture, Forestry, and Fisheries (MAFF), Japan and International Financial Statistics, IMF.

The tax revenues from wheat imports are used to purchase domestic wheat at the support price, which is higher than the import price and the government resale price (e.g., the support price was about 5 times higher than the c.i.f. import price in 1990). Figure 1 shows the wheat distribution channels in Japan. The JFA does not import wheat directly from exporters. Instead, the JFA designates the authorized trading companies to import wheat. Then the JFA purchases imported wheat from the trading companies and sells all imported wheat to the domestic millers.

Figure 2 shows the Japanese wheat supply and demand under the price support program. P_s is the wheat support price for wheat producers, P_i is the wheat import price, and P_w is the government sale price for domestic millers. Under quotas, $\overline{Q_1Q_2}$ is the amount of imported wheat. The area *bcde* is the government's net revenue from importing wheat at P_i and selling the imported wheat to millers at price P_w. At price P_w, the total

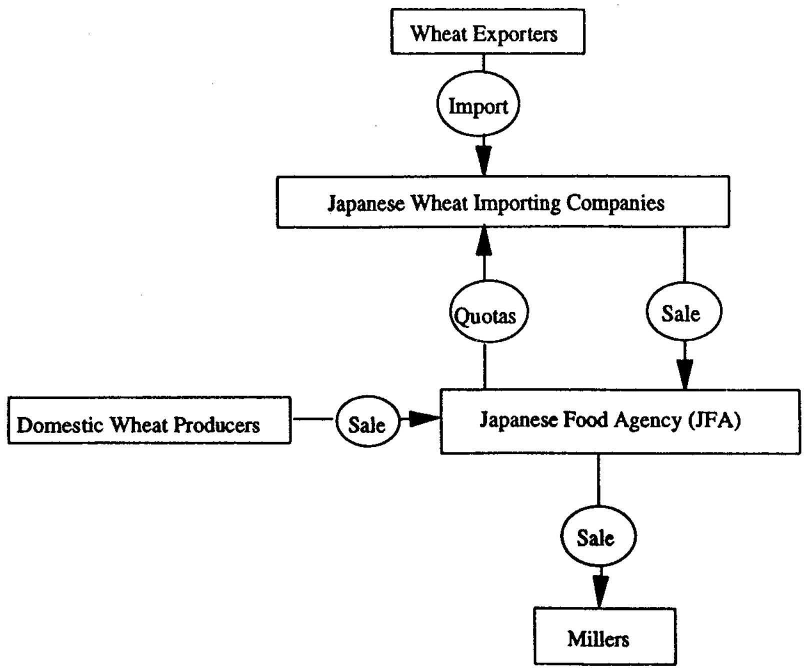

Figure 1. Japanese Wheat Distribution Channel to Millers

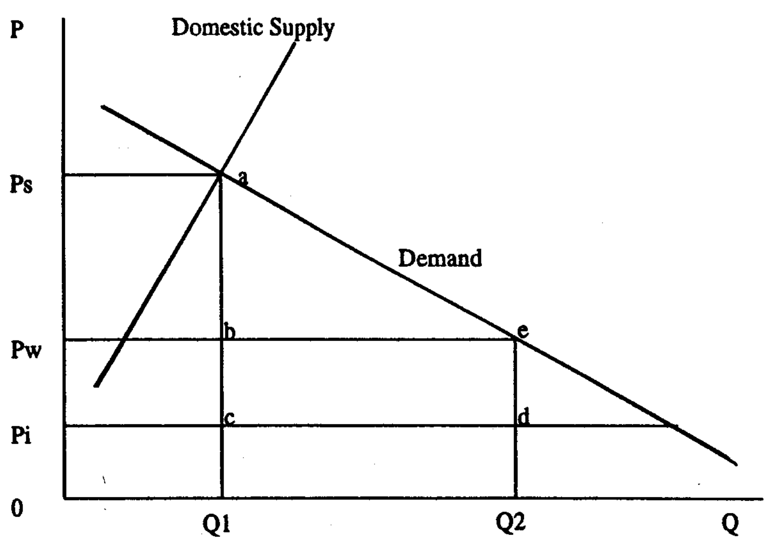

Figure 2. Japanese Wheat Import Quotas and Domestic Wheat Support Price

amount of wheat demanded is $\overline{0Q_2}$ and that supplied domestically is $\overline{0Q_1}$. The net revenue from wheat import (i.e., area *bcde)* is used to cover the cost of the government subsidy to wheat producers at support price P_s (P_sP_wba). Therefore, the net cost of the wheat price support program depends on the size of areas *bcde* and P_sP_wba. For example, if area *bcde* is equal to area P_sP_wba, the subsidy program is budget neutral, indicating that the revenue from wheat imports covers the government expenditure for the subsidy program. Under the Uruguay Round GATT agreement, the import quota will be converted to TRQ, which allows more flexibility in terms of the quantity of wheat imported by Japan.

METHODOLOGY

An important question is whether we can use theoretical demand systems, such as the AIDS and Rotterdam models, for demand analysis of wheat. In general, wheat is used to produce wheat flour, which is a major ingredient of noodles, pasta, cakes, and bread. This implies that wheat should be treated as an input of wheat products and that demand for wheat should be specified as a derived demand, a specification of the demand model by maximizing processors' profit. This is also true for wheat imported from other countries in an open economy.

However, when a country controls its imports by imposing import quantity restrictions, the country could allocate its expenditure between domestic and imported goods (i.e., block independence between domestic and imported goods). The country's import decision could be based on minimizing expenditure on imports under given a level of utility (i.e., two-stage budgeting theory) rather than maximizing the processors' profit. In this case, import demand should be specified as a demand specification of consumer goods.

The Japanese Food Agency determines the quantity of wheat the country should import on the basis of domestic demand for wheat and production. Japanese import demand for wheat, therefore, is specified demand for consumer goods rather than derived demand.

Almost Ideal Demand System (AIDS) Model

The AIDS specification (Deaton and Muellbauer) of demand is

$$(1) \quad w_i = \alpha_i + \sum_j \gamma_{ij} \ln p_j + \beta_i \ln \frac{E}{P^*} + \varepsilon_i$$

where w_i is the expenditure share of imports from source i; p_j is the price of imports from source j; E is the total expenditure on imports in a group in concern; and P^* is a price index defined as

$$(2) \quad \ln P^* = \alpha_0 + \sum_i \alpha_i \ln p_i + \frac{1}{2}\sum_i\sum_j \gamma_{ij} \ln p_i \ln p_j \, .$$

this nonlinear price index makes the system nonlinear. To make the model linear in parameters, equation (2) is replaced with Stone's price index defined as

$$(3) \quad \ln P^* = \sum_i w_i \ln p_i \, .$$

However, using Stone's price index causes a simultaneity problem caused by the dependent variable (w_i) appearing on the right-hand side of the AIDS model. To avoid the simultaneity problem, the lagged share has been used for P^* (Eales and Unnevehr).

The theoretical demand restrictions associated with the AIDS are expressed in equations 4 through 6 as follows:

(4) $\sum_i \alpha_i = 1$, $\sum_i \gamma_{ij} = 0$, *and* $\sum_i \beta_i = 0$ *for the adding-up restriction*;

(5) $\sum_j \gamma_{ij} = 0$ *for the homogeneity restriction*; *and*

(6) $\gamma_{ij} = \gamma_{ji}$ *for the symmetry restriction*.

Unrestricted estimation of equation (1) automatically satisfies the adding-up restriction (Deaton and Muellbauer). The restrictions of homogeneity and symmetry can be imposed and tested on equation (1).

Uncompensated and compensated price elasticities of the AIDS model are calculated in equations 7 and 8, respectively:

$$(7) \quad \epsilon_{ij} = -\delta_{ij} + \frac{\gamma_{ij}}{w_i} - \beta_i\left(\frac{w_j}{w_i}\right) \, ,$$

$$(8) \quad \epsilon^*_{ij} = \epsilon_{ij} + w_j + \beta_i\left(\frac{w_j}{w_i}\right) = -\delta_{ij} + \frac{\gamma_{ij}}{w_i} + w_j$$

where $\delta=1$ for $i=j$, and $\delta=0$ otherwise. The average expenditure shares are used for expenditure shares (w_i). The variances of uncompensated and compensated price elasticities are calculated by applying variance operator as

$$(9) \quad Var(\epsilon_{ij}) = \frac{1}{w_i^2} Var(\hat{\gamma}_{ij}) + \frac{w_j^2}{w_i^2} Var(\beta_i) - 2\left(\frac{w_j}{w_i^2}\right) Cov(\hat{\gamma}, \beta) \, ,$$

$$(10) \quad Var(\epsilon^*_{ij}) = \frac{1}{w_i^2} Var(\hat{\gamma}_{ij}) \, .$$

The estimated variances are used to evaluate the statistical significance of the elasticities.

The expenditure elasticity is

$$\eta_i = 1 + \frac{\beta_i}{w_i} . \tag{11}$$

The variance of expenditure elasticities is

$$Var(\eta_i) = \frac{1}{w_i^2} Var(\beta_i) . \tag{12}$$

Endogeneity Test

When estimating demand systems, such as the AIDS, the expenditure variable may be endogenous because the variable is used to compute the dependent variable (Attfield; Edgerton; LaFrance). If a right-hand side variable in a regression equation is endogenous, the variable is correlated with the error terms, causing estimates to be biased and inconsistent.

The Wu-Hausman test can be used to test the null hypothesis that the expenditure variable in a demand system is exogenous. Let θ be a consistent and asymptotically efficient estimator and θ^* be a consistent, but inefficient estimator under the null hypothesis. Then, the Wu-Hausman test statistic is

$$m = T(\hat{\theta}^* - \hat{\theta})[Var(\hat{\theta}^*) - Var(\hat{\theta})]^{-1}(\hat{\theta}^* - \hat{\theta}), \tag{13}$$

which has a chi-square distribution with degrees of freedom equal to the number of unknown parameters in θ. If m is larger than the critical value, then the null hypothesis of exogeneity is rejected.

In this study, θ is a seemingly unrelated regression (SUR) estimator and θ^* is a three stage least square (3SLS) estimator. Under the exogeneity assumption of right-hand side (RHS) variables of the demand system, SUR estimates are consistent and asymptotically efficient. If any of the RHS variables are endogenous, SUR estimates are no longer consistent or efficient, whereas 3SLS estimates are inefficient, but consistent.

As an alternative test, Hausman added a set of instruments for a regressor suspected to be endogenous to the model and tested that the estimated coefficients differ significantly from zero with an F test. If the estimated coefficients differ significantly from zero, the regressor is contemporaneously correlated with the errors, indicating that the variable is endogenous.

This test begins with specification of an expenditure equation as follows (Blundell)

$$(14) \quad \ln E = a + \sum_j \phi_j \ln P_j + b \ln P_{other} + g\, lnY + V$$

where Y is the total income (GNP is used here); P_{other} is prices for all other goods (CPI is used as a proxy); and V_t is the disturbance term. The disturbance term ε_i in the AIDS model is partitioned as

$$(15) \quad \varepsilon_i = \xi_i V + e_i$$

where ξ_i is a correlation parameter. It is assumed that e_i is independent of V. For the exogeneity test, equation (15) is substituted into equation (1). Testing ξ_i =0 is equivalent to testing that V is independent of ε_i, indicating that the expenditure is contemporaneously uncorrelated with ε_i. The residual of equation (14) is used for V. The Wald F-test is used to test ξ_i =0 for all equations in the AIDS model. This study uses both the Wu-Hausman and Alternative Wu-Hausman tests to examine the endogeneity of the expenditure variable in the Japanese wheat import model.

<u>Separability Test</u>

Weak separability holds when the marginal rate of substitution between any two goods in the same group is independent of goods consumed outside the group. Weak separability among wheat classes imported from different countries is tested as a part of specification of the model. Using weak separability allows a researcher to narrow the focus of study and to conserve degrees of freedom.

Goldman and Uzawa showed that a utility function is weakly separable if, and only if, the Slutsky substitution term S_{ik} can be expressed as

$$(16) \quad S_{ik} = \theta_{rs} \frac{\partial q_i}{\partial E} \frac{\partial q_k}{\partial E} \qquad \textit{for all } i \in r \textit{ and } k \in s$$

where θ_{rs} is a factor of proportionality, r and s are separable commodity groups, and i and k are goods in group r and s, respectively. For commodities i and j in group r and k in group s, the weak separability restriction is

$$(17) \quad \frac{S_{ik}}{\frac{\partial q_i}{\partial E} \frac{\partial q_k}{\partial E}} = \theta_{rs} = \frac{S_{jk}}{\frac{\partial q_j}{\partial E} \frac{\partial q_k}{\partial E}} \qquad \textit{for all } i,j \in r \textit{ and } k \in s.$$

Since θ_{rs} is unknown, the above hypothesis that the commodity group r is weakly separable from the commodity group s is equivalent to

$$(18) \quad S_{ik} \,/\, \left(\frac{\partial q_i}{\partial E}\right) = S_{jk} \,/\, \left(\frac{\partial q_j}{\partial E}\right) \qquad \textit{for all } i,j \in r \textit{ and } k \in s.$$

For the parameters of the AIDS model, the weak separability restrictions are

$$(19) \quad \gamma_{ik}\,(\beta_j + w_j) - \gamma_{jk}\,(\beta_i + w_i) + (w_i\,\beta_j - w_j\,\beta_i)\,(w_k - \beta_k \ln\frac{E}{P^*}) = 0$$
$$\textit{for all } i,j \in r \textit{ and } k \in s.$$

These restrictions are tested at the mean shares, using the Wald F-Statistics.

DATA

The sample statistics for wheat expenditure shares of Japan from 1965 to 1990 are summarized in Table 3. Most Japanese wheat imports consist of HRW and HRS wheat from U.S. and Canada, and white wheat from U.S. and Australia. Durum wheat account for only 1.3% of total wheat imports in value.

Table 3. Summary Statistics for Wheat Import Expenditure Shares of Japan: 1965-1990

	CWRS	US.HRS	US.HRW	US.Wht	ASW	US.Dur	Can.Dur
Mean	0.287	0.141	0.219	0.172	0.168	0.006	0.007
St.Dv.	0.042	0.044	0.024	0.031	0.043	0.004	0.009
Min	0.237	0.042	0.169	0.108	0.092	0.0	0.0
Max	0.407	0.208	0.269	0.236	0.274	0.011	0.031

Annual time series data from 1965 to 1990 were used. Wheat import data for Japan differentiated by import source (country of origin) and end uses were obtained from World Wheat Statistics, International Wheat Council and Canadian Wheat Board Annual Statistics. Wheat import quantities were in 1,000 metric tons, and wheat prices are f.o.b. prices in U.S. dollars per metric ton. The U.S. prices used this study were No. 2 dark northern spring wheat prices at Pacific ports for HRS wheat, No. 2 hard winter ordinary wheat prices at Gulf ports for HRW, No. 2 western white wheat prices at U.S. Pacific ports for WW wheat, and No. 3 hard amber durum wheat prices at lakes for durum wheat.

The Canadian hard spring and durum wheat prices were the No. 1 CWRS prices at the Pacific ports and the No. 1 CWAD at Thunder Bay, respectively. The Australian wheat prices were those for Australian standard white wheat. Japanese GNP in the U.S. dollar was obtained from International Financial Statistics (the International Monetary Fund).

EMPIRICAL RESULTS

The exogeneity test results of group expenditures are reported in Table 4. The Wu-Hausman test for each equation and the system reject the null hypothesis that the expenditure variable is exogenous at the 5-percent level of significance. The alternative Wu-Hausman F value is 2.83 with 6 and 126 degrees of freedom; and, thus, the null hypothesis is rejected. The results indicate that the total expenditure in the AIDS model cannot be treated as exogenous in this study.

Table 4. Alternative Endogeneity Tests of the Expenditure Term in the AIDS Model

	Test Statistics	df	Critical Value (α=0.05)
Wu-Hausman Test[1] Results (χ^2 test):			
Canadian Hard Wheat	138.72	9	16.92
U.S. Hard Spring	94.68	9	16.92
U.S. Hard Winter	-365.72	9	16.92
U.S. White	115.32	9	16.92
System Test	285.52	36	50.00
Alternative Wu-Hausman Test Results (F-test):			
H_0: Exogenous Expenditure	3.45	6 126	2.2

[1] Using the AIDS model, this examines the differences in estimated parameters and standard errors between 3SLS and SUR, which are consistent, but inefficient under the null hypothesis, and consistent and asymptotically efficient under the null hypothesis, respectively. H_0: Exogenous Expenditure

Therefore, 3SLS is used for the estimations, for which the instruments include prices for imported wheat by Japan, Japanese consumer price index, and Japanese GNP. Homogeneity and symmetry are imposed on the AIDS model because the adjusted Wald F-tests are not rejected at the 5-percent level of significance.

Table 5 reports weak separability tests, using the AIDS model. Both the Wald chi-square test and the adjusted Wald

Table 5. Test Results[1] of Weak Separability

Separability	Wald Test	df	Critical Value (α=0.05)	Adjusted Wald Test	df1	df2	Critical Value (α=0.05)
Hard vs. Soft	13.83	4	9.49	2.73	4	123	2.45
Hard vs. Durum	2.47	2	5.99	0.97	2	123	3.07
Soft vs. Durum	0.14	1	3.84	0.11	1	123	3.92

[1] The adjusted Wald test statistic is

$$W^* = \frac{W/q}{MT/(MT-K)} \sim F_{\alpha,q,MT-K}$$ where q is the number of restrictions in the test, M is the number of equations in the system, T is the number of observations, K is the number of free parameters in the system, and W is the Wald statistic that is distributed as χ^2_q.

F-test reject the separability between hard wheat and soft wheat at the 5-percent level of significance, indicating that hard and soft wheat are not separable. In contrast, separability between hard wheat and durum wheat and that between soft wheat and durum wheat are not rejected at the 5-percent level of significance, indicating that hard and soft wheat are separable from durum wheat. Thus wheat classes included in this study are CWRS, HRS, HRW, White, and ASW.

Table 6 presents the parameter estimates of the AIDS model and the associated standard errors. System weighted R^2 is 0.64, indicating that the AIDS model explains 64 percent of the data variations.

The uncompensated and compensated price elasticities and expenditure elasticities of the AIDS model are reported in Tables 7 and 8. The uncompensated and compensated price elasticities are very similar to each other in terms of magnitude and statistical significance. All own-price elasticities are negative. The own-price elasticities for CWRS and HRS wheat are significant at the 5-percent level. The compensated elasticities for HRS and CWRS wheat are -4.90 and -1.53, respectively, implying that the effects of price changes are substantial on both of CWRS and HRS wheat.

Cross-price elasticities show competitive or complementary relations among products. Positive cross-price elasticities indicate competitive relations, while negative cross-price elasticities indicate complementary relations. As indicated by the positive and significant cross-price elasticities at the

Table 6. Parameter Estimates[1] of the AIDS Model for Wheat Import Demand in Japan:1965-90

	CWRS	US.HRS	US.HRW	US.Wht	ASW	EXP
Canadian Hard	-0.238	0.581	-0.338	-0.479	0.474	-0.304
	(0.224)	(0.149)	(0.097)	(0.140)	(0.276)	(0.098)
U.S. HRS		-0.579	0.194	0.203	-0.400	0.250
		(0.136)	(0.087)	(0.124)	(0.193)	(0.063)
U.S. HRW			0.156	-0.026	0.013	-0.027
			(0.102)	(0.104)	(0.175)	(0.046)
U.S. White				0.023	0.278	0.089
				(0.199)	(0.274)	(0.067)
Australian White					-0.366	-0.008

System weighted R^2 = 0.64

[1] Standard errors are in parentheses.

Table 7. Uncompensated Elasticities[1] for Wheat Import Demand in Japan:1965-90

	CWRS	US.HRS	US.HRW	US.Wht	ASW	EXP
Canadian Hard	-1.51	2.15	-0.93	-1.47	1.81	-0.05
	(0.76)	(0.52)	(0.34)	(0.49)	(0.95)	(0.34)
U.S. HRS	3.55	-5.29	0.97	1.16	-3.08	2.75
	(1.03)	(0.95)	(0.63)	(0.89)	(1.04)	(0.44)
U.S. HRW	-1.49	0.89	-0.27	-0.10	0.08	0.88
	(0.44)	(0.39)	(0.47)	(0.48)	(0.78)	(0.21)
U.S. White	-2.90	1.10	-0.26	-0.95	1.51	1.51
	(0.82)	(0.71)	(0.63)	(1.17)	(1.56)	(0.39)
Australian White	2.80	-2.34	0.09	1.65	-3.15	0.95

[1] Standard errors are in parentheses.

Table 8. Compensated Elasticities[1] for Wheat Import Demand in Japan:1965-90

	CWRS	US.HRS	US.HRW	US.Wht	ASW	EXP
Canadian Hard	-1.53	2.14	-0.94	-1.47	1.80	-0.05
	(0.77)	(0.51)	(0.33)	(0.48)	(0.67)	(0.34)
U.S. HRS	4.35	-4.90	1.58	1.59	-2.62	2.75
	(1.04)	(0.95)	(0.60)	(0.86)	(1.34)	(0.44)
U.S. HRW	-1.23	1.02	-0.07	0.06	0.23	0.88
	(0.44)	(0.39)	(0.46)	(0.47)	(0.79)	(0.21)
U.S. White	-2.47	1.31	0.07	-0.69	1.77	1.51
	(0.81)	(0.71)	(0.60)	(1.15)	(1.29)	(0.39)
Australian White	3.08	-2.21	0.30	1.81	-2.98	0.95

[1] Standard errors are in parentheses.

95 percent confidence level, HRS wheat has the strongest competitive relationship with CWRS in the Japanese wheat market. HRS wheat also has a competitive relationship with HRW wheat. A competitive relationship also exists between CWRS and Australian white wheat. The negative and significant cross-price elasticities at the 95-percent confidence level indicate complementary relationships between CWRS wheat and both HRW and U.S. white wheat. The complementary relationships could be due to the blending of different types of wheat by millers (Wilson).

The expenditure elasticities are significant at the 5% level for all U.S. wheat (HRS, HRW, and U.S. white wheat), but are not significant for Canadian and Australian wheat. The expenditure elasticities for U.S. wheat classes are more elastic than those for Canadian and Australian wheat, indicating that Japan would increase imports of U.S. wheat as the country increases its import expenditures for wheat. This is especially true for HRS wheat, which has the highest expenditure elasticity (2.75).

SUMMARY AND CONCLUSIONS

The AIDS model was used to estimate Japanese wheat import demands. Unlike previous studies on Japanese wheat import demand, this study disaggregated wheat in terms of wheat classes (HRW, HRS, SRW, white, and durum) and country of origin (U.S., Canada, and Australia). The Wu-Hausman test suggests that group expenditure is endogenous. A weak separability test indicates that durum wheat is separable from other types of wheat in the Japanese wheat market.

Estimated own-price elasticities indicate that price changes in the Japanese wheat market affect U.S. HRS wheat the most. This implies that changes in wheat prices under the current GATT agreement could affect the market shares of U.S. HRS wheat more than those of other wheat classes. Estimated expenditure elasticities indicate that with increasing Japanese expenditures on wheat imports, the market share of U.S. HRS wheat will increase the most. The market share of U.S. white wheat will also increase with increasing Japanese expenditures on wheat imports, but not as much as U.S. HRS wheat.

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