White Wheat Marketing Margins Between the Pacific Northwest and Japan

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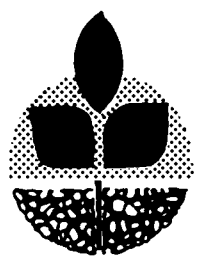

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ABSTRACT

There are seven major steps in the marketing channel which connects Pacific Northwest white wheat farms with Japanese consumers, and the costs of performing each marketing function can be substantial. In 1978, the average retail price of a bushel equivalent of white wheat products in Japan was $26.84, and the average farm price for white wheat was $3.23. Thus the total marketing margin in 1978 averaged $23.61. Also, in 1978, processors in Japan received 70 percent of each consumer dollar spent on white wheat products.

This report contains additional information about the relationship between white wheat farm and retail prices. Using estimates of the elasticity of price transmission, it can be concluded that farm level demand for white wheat is not derived in the short run from consumer demand for white wheat products. It can also be concluded that country elevators, domestic transportation firms, and export elevators are trying to earn constant percentage markups on the wheat they sell.

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WHITE WHEAT MARKETING MARGINS BETWEEN THE PACIFIC NORTHWEST AND JAPAN

Terry Townsend and Michael V. Martin

INTRODUCTION

Why do white wheat prices in the Pacific Northwest attain the levels seen by farmers? Why are prices not higher, or lower? How much does a Japanese consumer pay for products made from wheat grown in the Pacific Northweat? These are some of the questions that will be addressed in this report.

Wheat requires a great deal of processing, and the marketing margins between retail prices and farm prices are large. Consequently, the cost of marketing services can exert a strong influence on farm incomes from wheat production. Also, long distances, tariffs, and non-tariff barriers to international trade cause marketing margins to be particularly significant in the white wheat industry of the Pacific Northwest, since almost 90 percent of all production is exported each year [7].

In 1978, the average retail price of a bushel equivalent of white wheat products in Japan was $26.84, and the average farm price for white wheat was $3.23. Thus, the total marketing margin in 1978 averaged $23.61. In 1968, the marketing margin averaged $4.45. Most of the growth in the marketing margin between 1968 and 1978 occurred in Japan at the milling, baking and retailing levels. Indeed, in 1978, processors in Japan received 70 percent of each consumer dollar spent on white wheat products.

This report contains additional information about the relationships between white wheat farm and retail prices. From this information, it can be concluded that farm level demand for white wheat is not derived in the short run from consumer demand for white wheat products. It can also be concluded that country elevators, domestic transportation firms, and export elevators are trying to earn constant percentage markups on the wheat they sell.

Following in this report are more detailed estimates of white wheat marketing margins along with an explanation of how the estimates were made.

Included also is an analysis of the relationships between prices in the white wheat marketing chain.

White wheat was chosen as the commodity for study because it is the dominant class of wheat being produced in the Pacific Northwest. The end products for which white wheat is most often used include oriental noodles cakes, and biscuits. To estimate the retail-farm price spread, a single end use on which data were available was selected; Japanese dried udon noodles met the needs of this study. First, dried udon noodles are made from a simple recipe of flour, water, and salt. Second, Japan is an important Pacific Northwest white wheat customer, consuming about 20 percent of each year's production [9]. Therefore, the Japanese market has considerable influence on white wheat farm prices. Moreover, dried udon noodles are important enough in the Japanese diet that statistics on retail prices are maintained by the Japanese government.

DESCRIPTION OF THE MARKETING SYSTEM AND DATA

Figure 1 summarizes the marketing process by which white wheat is commonly moved from farms to consumers in Japan. White wheat comes off farms as soft, club, or hard white wheat, and is transported to country elevators where it is sold at the farm price.[1/] The wheat is transported to export terminals where it is sold at the track price by the country elevator operators to the exporting companies. In the country and export elevators the wheat is blended to produce western white wheat of No. 2 or better grade, and then loaded onto a vessel designated by the buyer.[2/] The buyer is a Japanese trading firm who pays the f.o.b. coast (free on board the vessel at the export terminal) export price to the exporting company.[3/]

[1/] Five major classes of wheat are grown commercially in the United States: hard red, soft red, durum, hard spring, and white. White wheat is the dominant class in the Pacific Northwest. In addition, white wheat is divided into four subclasses which include soft white, club, hard white, and western white.

[2/] Wheat grades range from No. 1, the best, to No. 5, and sample, the worst. Domestic wheat prices usually are stated in terms of No. 1 grade, and export prices usually are in terms of No. 2 or better. Grading criteria can be obtained from USDA, "Official U.S. STandards for Grain," Inspection Division, Federal Grain Inspection Service.

[3/] The buyer pays the freight and insurance on an f.o.b. sale.

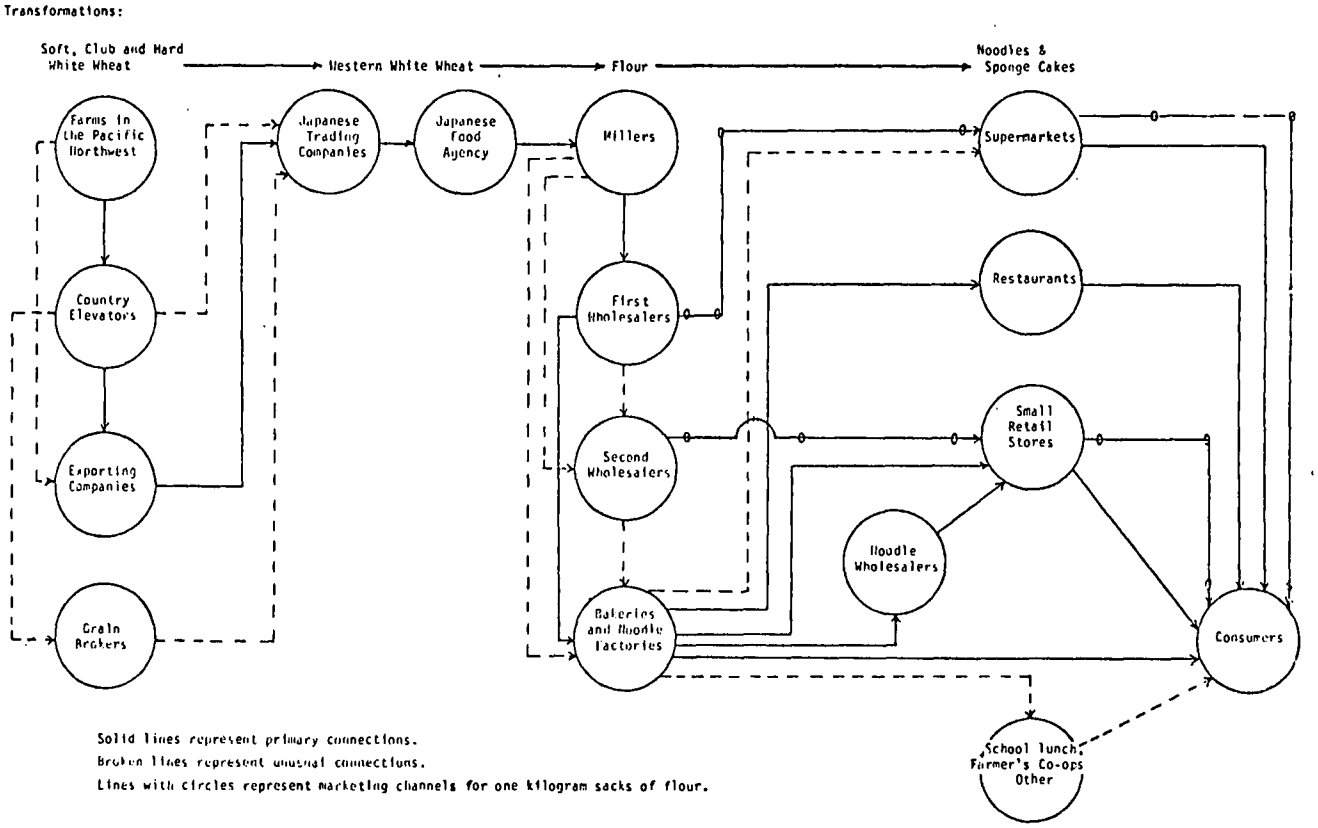

Figure 1. White Wheat Marketing Channel to Japan.

Eleven Japanese trading firms operate out of Portland, each licensed by the Japanese government to import grain [13]. The trading companies arrange the ocean freight and sell the western white wheat to the Japanese government at the c.i.f. Japan (cost, insurance, plus freight to the warehouse in Japan) import price, in yen.[4/] The Japanese government is represented by the Food Agency, which has as one of its duties the responsibility of insuring stable consumer prices and adequate supplies of wheat in Japan [5]. To do this, the Food Agency buys on the world market from the Japanese trading firms and sells to millers at the resale price, which can remain constant for years. The Food Agency also controls wheat supplies by setting annual import quotas and quarterly milling quotas. Japanese millers produce flours and mill feed, which are sold at mill prices, to wholesalers and factories. The mill feeds are fed to cattle, and the flours are made into consumer products in cake, cookie, and noodle factories before being sold at retail prices.

To calculate the farm-retail price spread, the value of one bushel of western white wheat was determined at each of the six major stages in the marketing channel. The U.S. Department of Agriculture publishes weighted averages of winter wheat prices received by farmers at major country elevators in each state [10]. For this report, the farm prices received in Washington, Oregon, and Idaho were each weighted according to the proportion of white wheat produced in each state during the appropriate crop year. The result is an average farm price for winter wheat of all grades and classes produced in the region each year. Since soft white wheat is the dominant winter wheat class, this estimated price serves as an adequate approximation of white wheat farm prices.

The major shortcoming of these data is that they are not specific to No. 1 white wheat, and thus the calculated farm price (an average across all grades and less than the average price of No. 1 wheat) overstates the true margin between country elevators and export terminals. The error can be as large as two cents per bushel in years when average wheat quality declines significantly.

[4/] The seller pays the freight and insurance charges on c.i.f. sales.

Average Pacific Northwest track prices are published in "Grain Market News" [7]. Since export elevator operators blend western white wheat to contain about 15 percent club wheat and 85 percent soft wheat, it is necessary to weigh soft white prices by .85 and club prices by .15, and then sum the results to calculate a weighted average track price for western white wheat [3].[5/]

"Grain Market News" also publishes average export prices for No. 2 or better western white wheat f.o.b. coast. These prices are used as the prices charged to Japanese trading firms. The Japanese Food Agency maintains records on both c.i.f. import prices and resale prices for western white wheat [13]. The c.i.f. prices are reported in yen per metric ton, and must be transformed into dollars per bushel using average currency exchange rates each month.

Calculation of the value of the flour and byproducts produced from one bushel of white wheat at the miller's level and the retail level in Japan is possible. The Food Agency maintains records on mill and retail prices, and the approximate conversion ratio among wheat, flour, and dried udon noodles can be calculated. Dockage material (grain, chaff, and other non-wheat substances) and damaged kernels account for about 1.4 percent of each 60-pound bushel of wheat from the Pacific Northwest. When this material is cleaned out, an average of 59.2 pounds per bushel of millable wheat is available for processing [6]. The dockage and damaged material is saved and later blended with the bran left after the wheat is milled. All the unmillable material is eventually fed to animals in Japan.

The moisture content of western white wheat varies between nine and 11 percent, with the average being 9.5 percent of the cleaned wheat. To ease the grinding of the wheat kernels, millers "temper" the cleaned wheat by soaking it in water for several hours until the moisture content is raised to about 14 percent. On average, one bushel of tempered western white wheat weighs about 62.3 pounds.

[5/] The western white wheat subclass is produced by blending club and soft white wheat together. Western white must be composed of between ten and 90 percent club wheat and between ten and 90 percent any other type of white wheat. In practice, western white is about 15 percent club and 85 percent soft white.

As flour is produced during milling, much of the moisture remains in the bran and some evaporation occurs. Consequently, western white flour contains about 12.5 percent moisture, and the bran contains about 13 percent moisture.

The extraction rate is the percent of tempered wheat which can be milled into useable flour. Assuming an average extraction rate of 72 percent, 44.0 pounds of 12.5 percent moisture flour, and 17.2 pounds of other material at 13 percent moisture result from the milling process [6]. The .8 pounds of dockage and damaged material, when added to the 17.2 pounds of other material, result in 18 pounds of low grade flour and mill feeds which the miller can sell. Low grade flours make up about 5 pounds of this extra material and are used to make soy sauce, paste, fish food, and monosodium glutamate [6]. The remaining 13 or 14 pounds is fed to animals. The return to millers from the sale of low grade flour products does not differ greatly from the return on animal feeds. Therefore, the entire 18 pounds of other material can be priced as mill feeds when determing the value of one bushel of western white wheat in the marketing chain.

From mills, noodle flour and mill feed are marketed through wholesalers, noodle factories, and retail outlets. Unfortunately, prices of flour and noodles at the wholesale and noodle factory levels are not available. However, the Japanese Food Agency does record monthly average retail prices of udon noodles and other wheat products [13]. There are approximately 1.02 kilograms of dried udon noodles made from each kilogram of noodle flour, and about 20.2 kilograms of noodle flour can be milled from one bushel of wheat [6]. Therefore, about 20.6 kilograms of dried udon noodles can be made from one bushel of western white wheat.[6/]

In calculating the farm-retail price spread, an attempt was made to account for the time required to pass each step in the marketing chain. This was done so the estimated value added could be computed on the same average bushel of wheat as it was transported through each stage of the marketing process. The purpose of this was to better estimate the true Japanese retail value of a given bushel of white wheat harvested in the Pacific Northwest.

[6/] One kilogram equals about 2.205 pounds.

For example, wheat leaving a farm in the Pacific Northwest in July is sold to exporting companies at the July track price -- usually for August or September delivery at the coast. In turn, the wheat is sold to a Japanese trading company at the July export price for September loading. The Food Agency purchase price, for the bushel of wheat that left the farm in July is reported as the September tender price.

Wheat that leaves the Pacific Northwest in September arrives in Japan in late September or early October, and is then resold to Japanese millers in December. That same wheat is finally sold at retail in January of the next year, about seven months after it leaves the farm. The farm-retail price spread is the difference between the farm price and the retail value of one bushel of wheat seven months later.[7/]

MARKETING MARGINS

The calculated average annual prices, marketing margins, and the proportions of each consumer dollar accruing at each marketing level are presented in Tables 1, 2, and 3. These averages were computed from the 132 monthly observations made January 1968 to December 1978. As the difference between retail and farm prices in Table 1 shows, the total white wheat marketing margin has grown steadily, from $4.45 in 1968 to about $23.61 in 1978. Over the same time period, the proportion of each consumer dollar received by farmers rose from about 22 percent in 1968, to 35 percent in 1973, and then fell steadily to about 14 percent in 1978. In 1978, average white wheat farm prices were $3.23 per bushel, and average Japanese retail prices per bushel equivalent of dried udon noodles were $26.84.

Table 2 indicates that the margins earned at each level of the marketing chain vary widely. The margin between track prices and farm prices averaged about 21 cents per bushel from 1968 to 1972, then increased to 28 cents in 1973, fell to 25 cents by 1976, and rose again to 39 cents per bushel, on average, in 1978. Before 1973, the difference between track prices and

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[7/] For a more detailed description of the Japanese white wheat marketing system see Circular of Information 690, May 1981, published by the Agricultural Experiment Station, Oregon State University.

Table 1. Average Annual Prices in the White Wheat Market Between the Pacific Northwest and Japan in Dollars per Bushel[a/]

Year	Farm	Track	Export	Import	Resale	Mill	Retail
1968.....	1.34	1.56	1.57	1.99	2.60	3.03	5.79
1969.....	1.27	1.46	1.47	1.93	2.62	3.09	6.06
1970.....	1.38	1.59	1.61	2.06	2.62	3.14	6.50
1971.....	1.46	1.67	1.70	1.90	2.70	3.30	7.32
1972.....	1.71	1.93	1.97	2.28	3.06	3.73	8.65
1973.....	3.47	3.75	3.90	4.98	3.48	4.30	11.07
1974.....	4.57	4.86	5.05	6.29	4.25	5.64	17.33
1975.....	3.69	3.96	4.03	4.93	4.15	5.52	17.06
1976.....	3.21	3.46	3.51	4.33	5.17	6.63	17.49
1977.....	2.59	2.89	2.94	3.73	6.17	8.86	20.59
1978.....	3.23	3.62	3.67	4.56	7.90	11.24	26.84

Table 2. Annual Average Marketing Margins in the White Wheat Market Between the Pacific Northwest and Japan in Dollars per Bushel [a/]

Year	Farm to track	Track to export	Export to import	Import to resale	Resale to miller	Miller to retail
1968.....	.21	.01	.44	.59	.41	2.69
1969.....	.18	.02	.47	.69	.46	2.84
1970.....	.21	.02	.43	.58	.48	3.07
1971.....	.21	.03	.23	.69	.57	3.70
1972.....	.22	.04	.13	.85	.63	4.43
1973.....	.28	.14	.23	-.91	.80	5.67
1974.....	.29	.19	1.09	-2.23	1.12	9.33
1975.....	.27	.07	1.17	-1.08	1.41	11.79
1976.....	.25	.05	1.01	0.00	1.31	10.97
1977.....	.31	.05	.77	2.12	2.16	10.62
1978.....	.39	.05	.73	2.60	3.04	13.15

[a/] The marketing margins originally were calculated for each month during the study period. The figures in this table represent the annual averages of those monthly calculations.

Table 3. Annual Average Percentage of Each Consumer Dollar Received at Each Level in the White Wheat Market Between the Pacific Northwest and Japan a/

Year	Farm	Track	Export	Import	Resale	Mill	Retail
1968.....	22	04	00	09	11	07	47
1969.....	22	03	00	08	12	08	48
1970.....	22	03	00	07	09	08	50
1971.....	21	03	00	03	10	08	54
1972.....	21	03	00	02	11	08	55
1973.....	35	03	02	02	- 08	08	58
1974.....	33	02	01	08	- 17	08	64
1975.....	21	02	00	07	- 06	08	68
1976.....	19	02	00	06	- 01	08	66
1977.....	14	02	00	04	11	11	57
1978.....	14	02	00	03	11	13	57

a/ Figures in this table represent the annual averages of monthly observations.

farm prices averaged between 3 and 4 percent of each consumer dollar spent, as shown in Table 3. After 1973, the proportion of the retail value of a bushel of white wheat earned by country elevators averaged 2 percent of retail prices.

The margin earned by U.S. exporters (Table 2) averaged 2 or 3 cents per bushel before 1973. In 1973, the difference between export and track prices rose to an average of 14 cents and, in 1974, it rose to an average of 19 cents. However, the export margin averaged a steady 5 cents per bushel from 1976 to 1978. As a percentage of each consumer dollar spent (Table 3), the export margin usually represents less than 1 percent. Even in 1973, the percentage of each consumer dollar going to U.S. exporters was only about 2 percent. Since 1974, the export margin has been less than 1 percent of the total retail dollar in most months.

The margins earned by Japanese trading firms and ocean transportation companies in delivering wheat to Japan c.i.f. were extremely erratic according to these data. The estimated margins earned (Table 2) vary between $.13 and $1.17, and no exact explanation can be given for the results. However,

variations could result from changes in ocean freight rates, changing exchange rates, hidden subsidies from the Japanese government, or perhaps the trading companies taking losses on some shipments to maintain their quotas with the Food Agency.

The margins earned by the Food Agency, through its resale operations, averaged about 68 cents per bushel from 1968 to 1972. During this time, the resale price in yen gradually was decreased by the Food Agency. However, from April 1973 until June 1976, the Food Agency actually subsidized imports by posting resale prices below the import prices. In 1977 and 1978, Food Agency margins were again positive, and accounted for about 11 percent of each consumer dollar spent on udon noodles, as shown in Table 3.

The marketing margins earned by millers, wholesalers, noodle factories, and retailers (Table 2) have risen steadily over the study period. Average margins earned by millers rose from 41 cents per bushel in 1968 to $3.04 per bushel in 1978. The average margins earned by firms beyond the milling level increased from $2.69 per bushel in 1968 to $13.15 per bushel in 1978. Importantly, Table 3 shows the margins earned by millers and retailers in 1978 combined to account for about 70 percent of each consumer dollar spent on udon noodles. This percentage was higher than the average in 1968 of about 54 percent. Before June 1977, millers received a fairly consistent 8 percent of each consumer dollar. However, in that month, the miller's share rose to 14 percent, and held at an average of 13 percent through December 1978. The proportion of each consumer dollar received by wholesaling, baking, and retailing firms rose to a high of 69 percent in February 1976. After that month, the retail proportion fell gradually to an average of about 57 percent.

There are several reasons why the proportion of each Japanese consumer's dollar received by Pacific Northwest white wheat farmers fell so sharply after 1975. First, the Food Agency raised its resale price in 1976. Secondly, the yen strengthened against the dollar between 1975 and 1978. In December 1975, the exchange rate was .32715 cents per yen. In December 1978, the exchange rate was .51038 cents per yen. This meant that, even if consumer prices remained steady in yen, the estimated prices in dollars rose. Between January 1977 and December 1978, the retail price in dollars for a

bushel equivalent of udon noodles rose about 53 percent -- from $18.52 to $28.39. However, the retail price in yen per kilogram of dried udon noodles rose only about 3 percent in that period. The January 1977 consumer price for dried udon noodles was 250 yen per kilogram. The December 1978 price was 257 yen per kilogram.

Yet, exchange rates and Food Agency resale prices do not account for all the decrease in the farmers' share of each consumer's dollar. There were no significant changes in the Food Agency's resale price in yen per metric ton between July 1976 and February 1980, yet retail prices of udon noodles in Japan still rose about 8 percent, in yen. So, other factors, including inflation and rising demand in Japan, must be contributing to the rise in consumer prices.

Several conclusions can be drawn from an examination of the margins. The total farm-retail price spread on white wheat is expanding rapidly, and the milling, baking, and retailing sectors are receiving most of the increase. Rising operating costs or rationing of wheat supplies by the Food Agency may be causing white wheat marketing margins in Japan to increase faster than margins in the Pacific Northwest. Milling, baking, and retailing operations are more labor intensive than farming, elevating, or transporting operations. Consequently, rising wages in Japan may have caused the supply of wheat products reaching Japanese consumers to decrease since 1975, relative to what supply would have been in the absence of wage increases. This would have caused prices in Japan to rise above what they would otherwise have been, and Japanese marketing margins may have been increased in the process.

A reduced supply of wheat products reaching Japanese consumers also could have been the result if the Food Agency had used the system of import quotas to restrict the quantities of wheat flowing to millers. With supply restricted, millers, bakers, and retailers could have raised prices on wheat products, thereby increasing their marketing margins.

The spread between import and farm prices is also increasing. In 1968, the farm-import price spread was 65 cents on average, and by 1978, it had grown to 133 cents. Normally, economists would presume that farmers had absorbed most of the increase in marketing costs because it is usually assumed that the supply of an annual crop is less elastic than the

demand.[8/] However, that may not be the case in the Pacific Northwest white wheat market due to the rigid import quotas established by the Food Agency, and because of an apparent increase in the quantity of on-farm storage in the Pacific Northwest.

RELATIONSHIPS AMONG WHITE WHEAT MARKET PRICES

Elasticities of price transmission were computed in order to better understand the relationships between margins earned at various levels in the marketing channel [1,2,4]. The computed values measure the responsiveness of price changes at the farm level to price changes at higher levels in the marketing chain and can be used to examine several current issues in grain marketing. If a 1 percent increase in the price of soft white wheat in Portland is followed by a 1 percent increase in the price of soft white wheat on the farm, then the elasticity of price transmission between the farm and Portland equals one. This relationship can be used to gain some insight into the conduct of firms in the marketing channel and whether Japanese import demand for white wheat is derived from consumer demand for white wheat products.

Characterization of the elasticity of price transmission as an economic tool rather than as a statistical relationship between market prices, presupposes that farm level demand is derived from consumer level demand for a given product. Consumers are assumed to translate their demands through retailers and wholesalers to producers by purchasing products which best satisfy consumers' wants, subject to budget constraints. Competitive markets and rational business practices are assumed to force businessmen in each marketing firm to purchase wheat as an input, so that the increased revenue from the use of an extra bushel of wheat equals the cost of a bushel of wheat. If these assumptions are met, prices offered to farmers represent the most that marketing firms can afford to pay for wheat products. As consumers' willingness to pay changes, farm prices change to stimulate greater or less production.

[8/] Another way of saying this is that economists usually believe consumers are in a stronger bargaining position than farmers. This is because a consumer can eat other products if one commodity increases in price, while a farmer is stuck with a production decision once inputs are purchased.

The actual measurements of the elasticities of price transmission in the white wheat marketing chain were made for monthly observations from 1968 to 1978. The percent change in average prices received at each level in the marketing chain was divided by the percent change in farm prices over the same time period. The length of time allowed for the prices to adjust was varied between one and 12 months. The appendix contains the formula used to make the elasticity computations.

If firms in the marketing chain are striving successfully to earn a set percentage markup on wheat or wheat products over their costs of purchase, then the elasticity of price transmission will approach 1.0. If marketing firms are striving instead for a constant margin of so many cents per bushel handled, the elasticity of price transmission will be less than 1.0. If the calculated elasticity of price transmission is greater than 1.0, marketing firms will be increasing their percentage markups. If the elasticity of price transmission is zero, retail and farm prices are unrelated.

Further, if the elasticity of price transmission is consistent and unequal to zero, it will serve as evidence that prices paid to farmers are determined by subtracting the costs of marketing services from prices paid by consumers for wheat products. An elasticity of price transmission equal to zero would indicate farm level demand is not derived from consumer's demand, and that marketing firms have the ability to control the prices they pay to firms lower in the marketing chain.

Because of the Food Agency resale pricing system, the total elasticity of price transmission between the retail level and the farm should be equal to zero. However, the elasticity of price transmission among Japanese import prices, U.S. export prices, track prices, and farm prices should approach 1.0.

The following notation is used to label each calculated elasticity of price transmission in Table 4.

EFT = the elasticity between track and farm prices,

EFE = the elasticity between export and farm prices,

EFI = the elasticity between import prices in yen and farm prices,

EFID = the elasticity between import prices in dollars and farm prices,

EFR = the elasticity between resale prices in yen and farm prices,

EFM = the elasticity between millers' prices in yen and farm prices,

EFX = the elasticity between retail prices in yen and farm prices.

There are 132 months between January 1968 and December 1978. For each month of lag allowed in the calculations, one observation is lost, in addition to the observations lost because of missing data and the occurrence of zeros in some of the denominators. With a one month lag, mean values of EFT and EFE are close to 1.0, although the standard deviation of each mean is large.[9/] The means of EFI and EFID are both negative, indicating that the lag between export and import prices is at least two months long. The means of EFR and EFM are both close to zero, while the mean of EFX is approximately .6. The standard deviations of the means of all the elasticities, with the exception of EFM, are large. As the adjustment period is extended, the means of the elasticities at the track and export levels approach 1.0, the mean elasticity at the import level approaches a value between .5 and 1.0, and the mean elasticities at the resale, millers, and retail levels approaches zero. The standard deviations are small enough to reject the hypothesis at the 95 percent confidence level that the mean calculated elasticities at the track and export levels, with only one month's lag, equals zero. As the lag time increases to 12 months, the means of EFT and EFE are a bit higher than .9, but less than 1.0, in most cases. These results indicate that white wheat farm prices are directly influenced by the prices received by U.S. wheat exporters. As export prices rise or fall, the entire change is passed on to the farm level within six or seven months.

[9/] "Mean" and "standard deviation" are statistical terms used to describe a sequence of numbers. The mean is commonly used as the "average" and is obtained by summing the numbers in a sequence, and then dividing the sum by the number of numbers in the sequence. Standard deviation is a measure of how well the mean describes the sequence. If the numbers are clustered around the mean, the standard deviation is low. For example, the mean of the sequence of five numbers - 4,5,5,5,6 - is 5.0, and the standard deviation is .707. However, the sequence of five numbers - 0,1,5,9,10 - also has a mean of 5.0, but the standard deviation is 4.53. In this study, the standard deviation is said to be "large" when the sequence of elasticities of price transmission are so spread out that it is not clear whether the mean is acutally equal to 0.0 or 1.0, or some other figure in between.

Table 4. Elasticities of Price Transmission Between Farms in the Pacific Northwest and Various Levels in the Marketing Chain

Length of lag (months)		Track EFT	Export EFE	Import ¥ EFI	Import D EFID	Resale EFR	Millers EFM	Retail EFX
1	Mean	1.146	1.262	-.900	-.806	.236	-.019	.557
	Standard deviation	4.031	5.355	9.619	9.797	1.970	.799	4.426
	Missing cases	1	1	16	16	1	1	4
	Valid cases	131	131	116	116	131	131	128
		t=3.25	t=2.69			t=1.37	t=.27	t=1.42
2	Mean	.484	-26.130	.647	.369	.384	-1.550	-1.220
	Standard deviation	10.638	331.756	19.971	21.690	3.027	16.751	8.808
	Missing cases	3	4	19	19	3	3	7
	Valid cases	129	128	113	113	129	129	125
3	Mean	1.348	1.434	.538	3.002	-1.478	-.258	.401
	Standard deviation	4.404	4.199	14.420	31.577	16.121	2.463	5.820
	Missing cases	3	3	19	19	3	3	7
	Valid cases	129	129	113	113	129	129	125
4	Mean	.172	.190	1.996	.940	.226	.207	.123
	Standard deviation	6.229	5.834	16.747	8.780	2.035	2.224	3.669
	Missing cases	4	4	17	17	4	4	8
	Valid cases	128	128	115	115	128	128	124
5	Mean	.242	.457	1.338	1.776	-.408	-.225	.931
	Standard deviation	5.430	2.982	11.687	11.814	2.457	1.858	8.651
	Missing cases	5	5	19	19	5	5	9
	Valid cases	127	127	113	113	127	127	123
6	Mean	.799	.788	.285	.622	-.186	.035	.230
	Standard deviation	1.348	1.443	3.833	3.467	1.242	2.438	1.909
	Missing cases	6	6	22	22	6	6	10
	Valid cases	126	126	110	110	126	126	122
7	Mean	.980	.957	.676	.335	-.205	-.157	-.011
	Standard deviation	.873	.758	5.612	2.672	1.393	1.425	1.851
	Missing cases	7	7	23	23	7	7	11
	Valid cases	125	125	109	109	125	125	121
8	Mean	.967	1.028	1.379	.597	-.213	-.193	-.185
	Standard deviation	.778	.944	10.651	1.684	1.235	1.273	2.240
	Missing cases	8	8	24	24	8	8	12
	Valid cases	124	124	108	108	124	124	120
9	Mean	.980	1.009	.273	.590	-.270	.537	-.187
	Standard deviation	.688	.651	5.622	1.349	1.205	3.138	2.660
	Missing cases	9	9	23	23	9	9	13
	Valid cases	123	123	109	109	123	123	119
10	Mean	1.048	1.244	2.304	2.981	-.100	-.455	-.315
	Standard deviation	.923	2.704	20.282	22.332	1.217	2.325	3.650
	Missing cases	10	10	25	25	10	10	14
	Valid cases	122	122	107	107	122	122	118
11	Mean	.980	.997	.761	.875	.004	-.184	-.330
	Standard deviation	.918	.695	2.239	1.799	1.226	2.034	3.252
	Missing cases	11	11	27	27	11	11	15
	Valid cases	121	121	105	105	121	121	117
12	Mean	.880	.908	.590	.661	.055	.028	-
	Standard deviation	.613	.529	1.679	1.086	2.209	2.352	-
	Missing cases	12	12	27	27	12	12	-
	Valid cases	120	120	105	105	120	120	-

At the import level, the mean of EFID, with six months' lag, is about .6, with a standard deviation of 3.467. Because of the large number of observations, these statistics are sufficient to reject the hypothesis at the 95 percent confidence level that the mean EFID equals zero. A reasonable explanation of why this value is not closer to 1.0 is that Japan is only one of several white wheat customers. While import prices in Japan can be rising, market forces in other parts of the world can be pushing U.S. export prices down. There are no significant differences in the results obtained when import prices are measured in dollars rather than yen. This indicates that changes in the exchange rate between yen and dollars does not affect farm prices within a year. However, even though the results at the import level were not close to 1.0, as they were at the export and track level, the elasticity between import prices and farm prices is still greater than zero after a lag of six months. This could mean that Japanese import prices are determined months in advance of each tender.

The means of the computed elasticities at the resale, millers, and retail level are clearly smaller than those at the track and export level. With a one month lag, it is not possible to reject the hypothesis that the means of EFR, EFM, or EFX equal zero.

The evidence that the elasticity of price transmission at the track, export, and import levels is less than 1.0, but greater than .5, indicates that the marketing margins are likely a combination of percentage markups and absolute price spreads. However, the results at the track and export levels indicate that country elevators, domestic transportation firms, and export elevators are concentrating on earning percentage markups, and that these firms efficiently pass market information back to farmers. Also, since EFT, EFE, and EFI are less than 1.0, farm prices go up faster and come down faster than prices in the marketing channel. The large standard deviations of the means at the import level suggest that the margins earned by Japanese trading firms and ocean freight companies require additional study. The results at the resale, miller, and retail levels indicate that demand in the Pacific Northwest for white wheat is not derived within 12 months time from either Japanese consumer demand for white wheat products, or from Japanese millers' demand for western white wheat. This result indicates that use of consumer demand theory to specify a model to explain Food Agency import demand for U.S. wheat in the short run is not valid.

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APPENDIX

Calculation of the Elasticity of Price Transmission

The actual measurements of the elasticities of price transmission in the white wheat marketing chain were made for monthly observations from 1968 to 1978, according to the following equation:

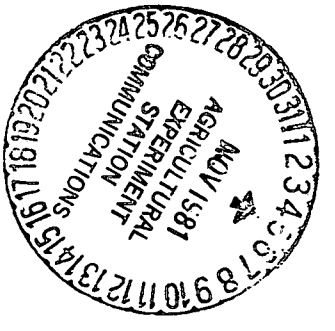
$$Eij = \left[\frac{M^i_t - M^i_{t-j}}{M^i_{t-j}}\right] \div \left[\frac{F_t - F_{t-j}}{F_{t-j}}\right]$$

where

Eij = the elasticity of price transmission between the ith marketing level and farms, given a lag of j months.

M = the average price received by marketing firms at the ith level in each time period.

F = the average farm prices of winter wheat in the Pacific Northwest.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