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White Wheat is an important agricultural commodity which is produced in the Pacific Northwest but which is consumed primarily in overseas markets. On average, twenty percent of the White Wheat produced in the states of Oregon, Washington and Idaho each crop year is destined for consumption in Japan, and the costs of the marketing services which are employed to transform White Wheat into edible consumer products can significantly affect farm prices.

From farms in the Pacific Northwest, White Wheat moves through country elevators to export elevators for export sale. Japanese trading companies purchase wheat fob the U.S. and sell wheat cif Japan to the Japanese Food Agency. The Food Agency establishes annual import quotas and resells wheat to Japanese millers. Millers use White Wheat

to produce soft and medium strength flours for sale to bakeries and noodle factories. Millers also produce mill feeds for sale as animal feed. The soft flours are used for producing sponge cakes, bisquits and other confectionary products, while Japanese noodles are made from the medium flours. Finally, the White Wheat products are marketed to consumers primarily through grocery stores and restaurants.

Using data from 1968 to 1978, the average monthly prices of one bushel's worth of White Wheat at each major level in the marketing chain between the Pacific Northwest and Japan were determined, and the marketing margins and the total farm-retail price spread were estimated. A significant section of this thesis is concerned with the estimation of the increases in terminal and country elevator margins made possible through efficiencies of scale in blending wheat for test weight and dockage. In 1978, average White Wheat farm prices in the Pacific Northwest were \$3.23 per bushel, average track prices were \$3.62, average export prices were \$3.67, average import prices were \$4.56, average resale prices were \$7.90, average mill prices were \$11.24 and average retail prices on one bushel's worth of dried udon noodles were \$26.84.

In addition, the elasticities of price transmission between Pacific Northwest White Wheat farm prices and prices in the marketing channel were calculated. The elasticity of price transmission is the percent change in prices at the i^{th} marketing level over the percent change in farm prices. The elasticities of price transmission between track and farm prices and between export and farm prices were found to be about .9, with less than a one-month lag time. Between import prices and farm prices, the elasticity was about .6, with a six-month adjustment period required. There is no relationship between prices in Japan and U.S. farm prices, even with twelve months' lag time allowed. The principle conclusion of this thesis is that consumer demand theory can not be used to specify an econometric model designed to explain short run changes in Japanese import demand for U.S. wheat.

An Economic Analysis of the White Wheat Marketing System Between the Pacific Northwest and Japan

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CHAPTER 1

INTRODUCTION

Many people in the Pacific Northwest wheat industry have little knowledge or false ideas about the operations of the marketing firms which transform whole grain wheat in a farm field into edible consumer products sold domestically and overseas. Even the knowledge of many people directly involved in exporting U.S. grain does not often extend beyond the elevator spout when the goods are loaded onto an ocean vessel. However, White Wheat, a particular class of wheat, is an important agricultural commodity in Oregon, Washington, and Idaho, and the wheat marketing system can directly affect farm prices.

About ninety percent of the wheat grown in the Pacific Northwest is White Winter Wheat [43]. Further, about seventy percent of all White Wheat grown in the U.S. comes from the Pacific Northwest [44]. The White Wheat from Oregon, Washington, and Idaho had an average farm value of approximately $500 million in 1977 and represents about fifteen percent of the farm value of all agricultural products produced in the three states [37].

During the 1977/78 crop year, over ninety-six percent of Pacific Northwest White Wheat exports went to Asian and Middle Eastern countries [40]. Japan consumed twenty-seven percent of White Wheat exports from Pacific Northwest ports, and Japan, Korea, and Iran together accounted for seventy-nine percent of White Wheat exports during that crop year [40]. Since 1969, about eighty-nine percent of the White Wheat produced in the Pacific Northwest has been exported [43]. This heavy reliance on exports is a distinguishing characteristic of the Pacific Northwest White Wheat industry and is one important reason why market research specific to this wheat class and geographic region is necessary.

In contrast, only about sixty percent of Hard Red Winter, forty-eight percent of Soft Red Winter, forty-six percent of Hard Red Spring, and about forty-five percent of Durum wheat production is exported each year from the U.S. [44]. However, most work concerned with the determination of grain prices treats U.S. wheat as a homogeneous commodity, and the models commonly used to explain wheat demand are driven by factors affecting the large volume classes, such as Soft Red and Hard Winter. Consequently, most economic studies dealing with wheat demand and marketing have only a general application to conditions in the Pacific Northwest White Wheat industry. Certainly prices in Portland for White Wheat are affected by national and world conditions which affect supply and demand for all grains. However, separate demands exist for each variety of wheat, and specific market research dealing with wheat by class is needed.

Description of Wheat Classes

Wheat can be divided into fourteen biological species of which three--club, common, and durum--account for almost all of the wheat grown commercially worldwide [48]. Different wheat classes can be distinguished by three commercial features. First, there are winter and spring varieties. In Canada and the northern United States, harsh winters force farmers to plant in the spring and then harvest in the summer and fall of the same calendar year. However, in areas below the South Dakota-Nebraska border, wheat can survive the winters after being planted in the fall. The winter wheats are harvested in the summer of the following calendar year.

Another way to classify wheat is by the softness or hardness of the wheat kernel. Soft wheats are grown in moist areas and contain only six to eleven percent protein, but yields tend to be higher than for hard wheats. The low protein content in soft wheat causes a weak molecular structure within the endosperm portion of each grain, and the resulting flour is easy to knead into dough. However, soft wheat flour produces poor loaf volume in leavened bread so its uses are confined to unleavened breads, cakes, pastries, crackers, noodles, and cookies [10].

Hard wheats come from the common species and contain ten to seventeen percent protein. The higher protein content makes for a stronger flour capable of rising when made into bread. Durum is a

Table 1. Pacific Northwest Wheat Production and Exports.

Crop Year	All Wheat Production	White Wheat Production	White Wheat Exports
	Million Bushels		
60/61	101.6	Not Available	114.2
61/62	85.5	NA	85.1
62/63	102.9	NA	96.8
63/64	111.3	NA	105.2
64/65	124.5	NA	93.9
65/66	134.5	NA	94.7
66/67	130.3	125.2	118.7
67/68	169.2	162.6	143.1
68/69	139.1	128.9	90.3
69/70	140.6	129.3	109.1
70/71	134.0	126.2	105.4
71/72	164.9	139.1	100.3
72/73	178.5	158.8	147.9
73/74	142.5	126.1	114.8
74/75	197.7	179.7	178.8
75/76	224.9	201.4	191.2
76/77	224.7	204.8	172.6
77/78	160.9	147.3	158.3
78/79	206.1	189.1	172.4

Source: Pacific Northwest Wheat Report, ESCS, U.S.D.A. Various Issues.

super hard species of wheat with protein levels of fourteen to seventeen percent, and is grown mostly in North Dakota and Canada. This class is usually made into macaroni and other semolina products.

The third commercial feature by which wheat classes can be distinguished is the color of the kernel, which is either red or white. Even color is an important marketing consideration as people like to use what they are used to. Soft White Wheat from the Pacific Northwest is said to have an advantage in the Indian import market over other soft wheats, including Soft Red from the eastern U.S., because of color.

There are hundreds of different varieties of wheat grown commercially in the U.S., and the quality of each is judged in terms of its suitability for a particular end use. Wheat grains vary greatly in chemical composition and include not just starch but also proteins, minerals, ash, and vitamins. Each of these things affect how the wheat is processed, the end uses for which it is suitable, and its nutritive value. Therefore, while consumers hear of a surplus of wheat in general, individual processors need to be concerned about the availability of the particular variety they use.

Five major market classes of wheat are produced in the U.S., and the supply and disappearance of each, in recent years, is shown in Table 2. Hard Red Winter averages about fifty percent of annual U.S. wheat production, and Hard Red Spring accounts for about twenty percent. Both hard classes are grown mostly in the dry Great Plains states. Soft Red Winter is grown east of the Mississippi and accounts

Table 2. Estimated U.S. Wheat Supply and Disappearance by Class.

June/May Crop Year	Hard Red Winter	Soft Red Winter	Hard Red Spring	Durum	White	Total
	Million Bushels					
1973/74						
Carry in	285	25	212	45	30	597
Production	957	159	328	79	182	1,705
Total Supply (incl. imports)	1,242	184	541	125	213	2,305
Exports	775	27	245	45	125	1,217
Domestic use	297	134	209	47	61	748
1974/75						
Carry in	170	23	87	33	27	340
Production	879	288	293	81	255	1,796
Total Supply (incl. imports)	1,049	311	382	114	283	2,139
Exports	510	136	130	47	195	1,018
Domestic use	311	138	151	41	45	686
1975/76						
Carry in	228	37	101	26	43	435
Production	1,053	343	326	123	290	2,135
Total Supply (incl. imports)	1,281	380	428	150	333	2,572
Exports	581	165	160	52	215	1,173
Domestic use	323	159	150	45	58	735
1976/77						
Carry in	379	57	116	53	60	665
Production	976	336	411	135	284	2,142
Total Supply (incl. imports)	1,355	393	528	190	344	2,810
Exports	418	181	124	41	186	950
Domestic use	332	140	154	57	65	748
1977/78						
Carry in	605	72	250	92	93	1,112
Production	992	350	398	80	216	2,036
Total Supply (incl. imports)	1,597	422	649	173	309	3,150
Exports	535	197	156	62	174	1,124
Domestic use	431	154	158	44	62	849
1978/79						
Carry in	631	71	335	67	73	1,177
Production	836	202	379	134	247	1,798
Total Supply (incl. imports)	1,467	273	714	202	320	2,976
Exports	610	95	232	72	185	1,194
Domestic use	437	151	158	44	67	857
Carry out	420	27	324	86	68	925

Source: Wheat Situation, Economics, Statistics and Cooperatives Service, U.S.D.A., Various issues.

for about thirteen percent of U.S. production. White Wheat predominates in the Pacific Northwest and averages about eleven percent of U.S. production. Finally, Durum is concentrated in North Dakota and represents about six percent of the total.

Within the class of White Wheat, there are four sub-classes. Hard White makes up a very small percentage of Pacific Northwest production. The dominant sub-class is Soft White which is often mixed with a third sub-class, White Club, to produce the fourth sub-class, Western White. Western White must contain between ten and ninety percent Club Wheat and between ten and ninety percent of any other kind of White Wheat. Soft White and Western White are especially good for producing certain types of noodles and for producing crackers and premium cake flours in the U.S. White Club, when not used to make Western White, is used in ice cream cones, pastries, and cookies.

Western White evolved as a separate sub-class largely because inland elevators in the Pacific Northwest were not large enough to segregate the Soft White, Hard White, and White Club as they came in off the farms [10]. By the time the wheat reached Portland, most of it had been mixed into Western White anyway. Following World War II, representatives of the Pacific Northwest wheat industry sold the Japanese on the virtues of Western White as both a noodle and pastry wheat. Australia also offers a soft white wheat for export, but the blending of Soft and Club White Wheat enabled this region to differentiate its product in the market place.

The Role of Japan as a Western White Wheat Customer

Japan, because of its consistent and voluminous purchases, is one of the most important White Wheat customers for the Pacific Northwest. Japan has taken between eighteen and thirty-eight percent of total White Wheat exports from the Pacific Northwest each crop year since 1961 [40]. Importantly, Japan is a dependable cash customer who buys consistently each crop year. Other important customers such as Iran, India and Pakistan are far less consistent in their purchases. Korea is a large customer like Japan, but requires some PL 480 and other concessional aid in paying for its imports.[1] About twenty percent of Korea's 1978 crop year imports were under PL 480 programs, and in the 1977 crop year, about twenty-nine percent of Korea's imports were under PL 480 [40].

White Wheat has made up about twenty percent of Japan's total wheat imports and about thirty-three percent of its U.S. wheat imports since the 1960's [44]. In the 1978/79 crop year, Japan imported about 117.6 million bushels of wheat from the U.S., 47.8 million bushels from Canada and 36.7 million bushels from Australia [36]. Of Japan's U.S. wheat imports, about 44.1 million bushels were Western White, 33 million bushels were Hard Spring, and 40.4 million bushels were Hard Winter [36]. Almost all of Japan's wheat imports from Canada were of 13.5 percent protein Hard Spring Wheat. Australia's exports to Japan consisted of about 14.7 million bushels of thirteen to fourteen percent

[1] P.L. 480 is a federal law which provides for the export sale of many U.S. agricultural products on a concessional or extended credit basis.

Table 3. Pacific Northwest White Wheat Exports by Destination.

Crop Year	Iran	India	Pakistan	Korea	Taiwan	Japan	Philip-pines	Latin Amer.	Other	Total Exports
	Thousand Bushels									
60/61	---	46,182	13,733	4,868	4,599	22,908	1,854	3,445	16,581	114,170
61/62	---	34,848	13,301	5,363	4,947	20,682	2,559	1,065	2,553	85,096
62/63	--	40,385	19,981	8,765	3,993	17,920	4,115	1,567	968	96,855
63/64	---	38,739	9,814	6,639	3,767	34,094	2,401	1,131	6,309	105,155
64/65	983	32,243	19,427	4,087	5,606	26,971	2,971	1,194	0	93,873
65/66	2,421	45,837	2,774	4,942	5,265	27,881	2,838	1,337	947	94,690
66/67	3,529	50,327	13,131	10,790	4,727	29,593	3,326	885	1,187	118,749
67/68	---	58,294	19,986	18,909	7,792	24,877	4,020	1,465	1,431	143,134
68/69	---	27,532	3,925	24,376	6,094	23,255	2,347	1,951	903	90,334
69/70	---	29,957	14,844	21,546	6,648	28,728	3,032	1,166	1,091	109,111
70/71	3,613	14,558	6,384	30,264	8,360	31,593	5,677	2,168	2,108	105,406
71/72	15,579	4,003	5,400	34,005	4,150	20,624	3,923	1,208	11,030	100,270
72/73	11,874	2,604	9,018	29,144	4,190	46,244	3,882	1,865	38,449	147,880
73/74	11,108	860	4,569	26,349	8,703	43,148	3,357	1,377	12,628	114,803
74/75	37,851	30,702	19,307	37,809	4,008	36,840	3,222	1,050	5,364	178,786
75/76	2,815	89,195	7,463	34,181	3,816	40,840	5,277	610	7,649	191,229
76/77	32,779	32,827	---	44,349	4,354	41,436	6,762	442	6,906	172,640
77/78	39,747	250	16,008	41,687	4,488	43,499	7,567	262	4,750	158,319
78/79	37,694	---	33,789	38,819	4,612	39,553	6,712	350	6,898	172,451

Source: Grain Market News, Weekly Summary Livestock, Poultry, Grain and Seed Division, U.S.D.A.

Table 4. P.N.W. White Wheat Exports Under PL 480 and C.C.C. Credit.

Country	June 76-May 77			June 77-May 78		
	Cash	PL 480	CCC Cr.	Cash	PL 480	CCC Cr.
	1000 Bushels					
Asian	2,372	---	---	9,042	1,268	5,625
India	24,805	8,022	---	---	250	---
Indonesia	531	5,197	18	659	472	---
Iran	32,719	---	---	39,049	---	698
Japan	41,436	---	---	43,499	---	---
Korea	21,969	12,904	9,476	12,993	8,145	20,549
Latin and Central America	442	---	---	262	---	---
Philippines	6,200	---	562	5,431	160	1,976
Taiwan	4,354	---	---	4,488	---	---
Bangledesh	---	1,573	---	---	---	---
Others	---	---	---	977	2,776	---
TOTAL:	134,888	27,696	10,056	116,400	13,071	28,848

Source: Pacific Northwest Grain Market News, Oregon Department of Agriculture Livestock, Poultry, Grain and Seed Division.

Table 5: Annual Japanese Wheat Imports by Supplier

					U.S.					
Crop year	Argentina	Australia	Canada	Other	Hard Red Spring	Hard Red Winter	Soft Red Winter	White	Durum	Total
					1000 Metric Tons					
63/64	Ø	512	1,309	Ø	Ø	1,075	Ø	928	Ø	3,824
64/65	19	443	1,433	56	NA	NA	NA	NA	NA	NA
65/66	Ø	363	1,285	Ø	NA	NA	NA	NA	NA	NA
66/67	Ø	431	1,620	Ø	172	1,144	2	818	14	4,201
67/68	Ø	612	1,098	6	NA	NA	NA	NA	NA	NA
68/69	18	1,147	1,247	74	339	876	Ø	633	12	4,346
69/70	8	980	1,068	34	478	1,046	10	782	39	4,445
70/71	Ø	821	1,029	Ø	790	1,221	2	860	49	4,772
71/72	Ø	1,466	1,388	Ø	441	1,132	14	561	42	5,044
72/73	80	717	1,364	24	NA	NA	NA	NA	NA	NA
73/74	32	472	1,692	3	508	1,331	14	1,174	22	5,248
74/75	33	963	1,187	Ø	793	1,287	1	1,003	31	5,298
75/76	Ø	1,052	1,601	4	713	1,526	1	1,077	32	6,006
76/77	Ø	1,076	1,321	Ø	651	1,338	Ø	1,128	51	5,565
77/78	NA	NA	NA	NA	703	1,241	18	1,197	66	NA

Source: World Wheat Statistics, International Wheat Council, 1978, 28 Haymarket, London, SW1Y 45S and Wheat Situation, E.S.C.S., U.S.D.A., various Issues.

protein wheat and 22 million bushels of Australian Soft White. Japan produces domestically only about four percent of the wheat it needs, and most of its domestic production is soft wheat. Of interest to White Wheat farmers is the observation that over the period of time from 1968/69 to 1977/78, White Wheat from the Pacific Northwest has maintained its share of the Japanese import market. On average about 20 percent of the White Wheat produced each year in the Pacific Northwest is consumed by Japanese people, mostly in the form of udon noodles, biscuits, and sponge cakes. Consequently, an analysis of the mechanisms which translate information about Japanese demands for these products into farm level demand for wheat will contribute to the general knowledge of the factors affecting White Wheat prices.

The Role of Marketing Margins in Determining Farm Prices

An inter-regional trade model as shown in figure 1 can be used to depict the effects on farm prices of changes in the costs of marketing wheat. Given the supply and demand curves for wheat in the exporter's market, an equilibrium price of P_p would result. At prices above P_p, farmers will produce more wheat than would be consumed locally. The potential excess supply that would be available for trade on world markets, if produced, is represented in the trade market.

In the importer's market, the supply of wheat and demand for wheat would be in equilibrium at price P_c. At prices below P_c, demand by consumers will exceed domestic supply, and a market for imported wheat will exist. The excess demand curve is also shown in the trade

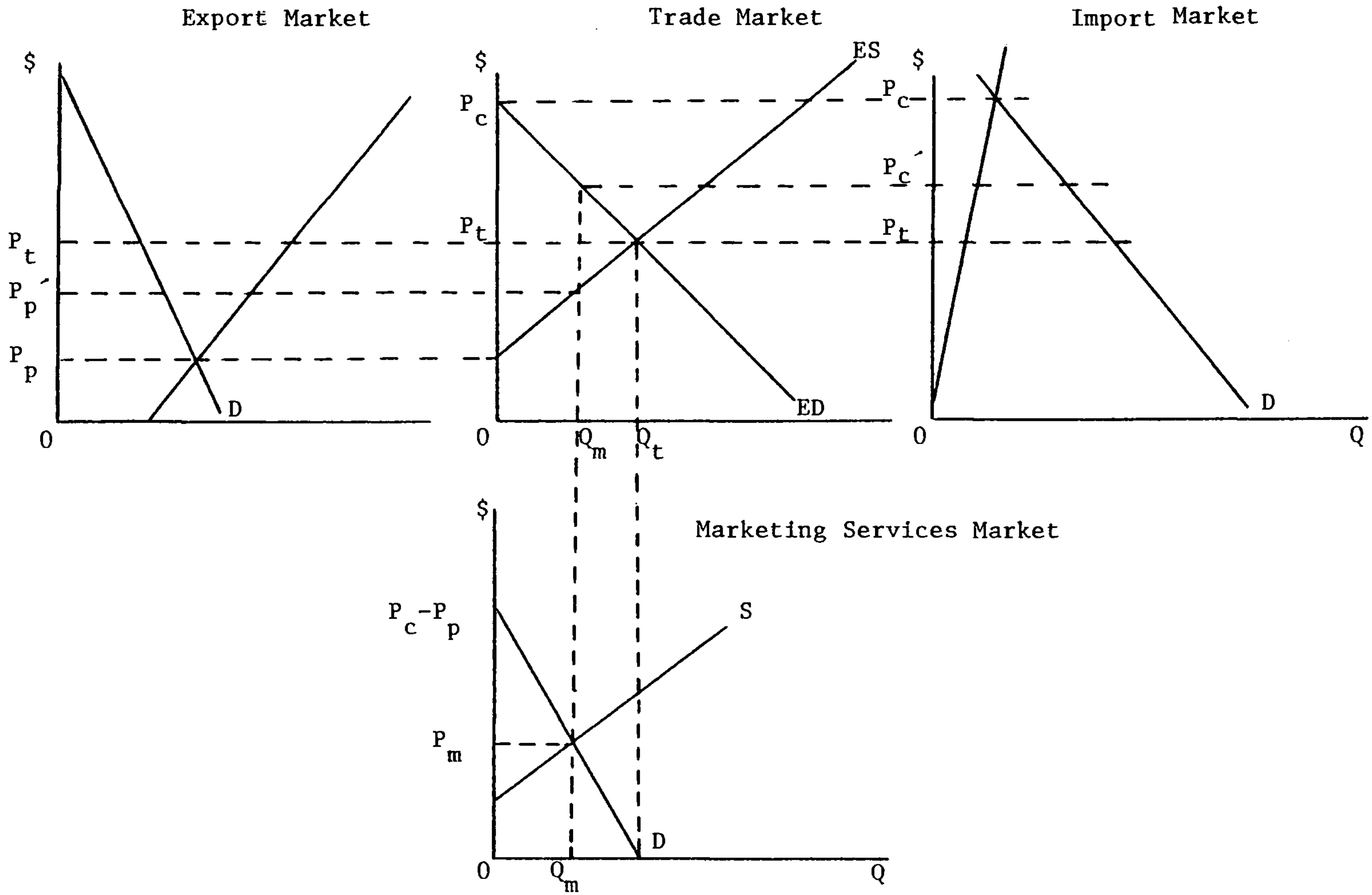

Figure 1. Inter-regional Trade Model

market. If free trade is allowed between regions, and if marketing costs are zero, the world price for wheat will be P_t, and OQ_t wheat will be traded between the producing and consuming markets.

However, transaction costs in world trade are greater than zero. For Pacific Northwest White Wheat, the cost of storing, transporting, handling, blending and grading, communicating between buyers and sellers, milling, wholesaling, baking, and retailing all contribute to the costs of marketing wheat between farmers and consumers.

At a world price for wheat of P_t, importers and exporters could not afford to pay anything for the services needed to market OQ_t bushels. If there were no trade at all, a price of P_c-P_p could be afforded for the services of marketing one bushel of wheat. These extremes mark the intercepts for the curve representing the demand for marketing services. The supply curve represents the costs of marketing each quantity of wheat between producing and consuming regions. The equilibrium price and quantity in the marketing services market will determine the quantity of wheat that can be economically traded between regions, given the conditions of excess supply, excess demand, and the costs of marketing wheat. These marketing costs reduce wheat prices in the export market to P_p', raise wheat prices in the importing region to P_c', and reduce the quantity of wheat traded from OQ_t to OQ_m. This shows that even if the excess demand and excess supply curves between exporting and importing regions do not change, farm prices can still vary due to changes in the supply and demand for marketing services. Increases in the costs of purchasing marketing services will decrease prices received by Pacific Northwest White Wheat farmers below what they would otherwise have been.

If the excess supply curve is less elastic than the excess demand curve, a change in the costs of marketing services will cause farm prices to fall more than it will cause consumer prices to rise. The supply of an agricultural crop may be inelastic within each crop year. Further, since several substitutes for White Wheat products exist at the consumer level, the demand for White Wheat may be elastic relative to supply. Worldwide, rice and other classes of wheat substitute for White Wheat in certain situations. Consequently, changes in the costs of marketing White Wheat can have a significant effect on farm prices, and research into the marketing system can contribute to an understanding of the forces affecting farm incomes.

The elasticity of price transmission is one tool which can be used to analyze the marketing system [9]. It is measure of the responsiveness of price changes at the farm level to price changes at higher levels in the marketing chain. If a one percent increase in the price of Soft White Wheat in Portland is followed by a one 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. By comparing the changes in prices for White Wheat received by firms in the marketing channel each time period with changes in prices at the farm level each time period, the elasticity of price transmission can be estimated.

Objectives of this Thesis

The general purpose of this thesis is to describe how the retail level demand in Japan for products containing Western White Wheat is related to the farm level demand in the Pacific Northwest for Soft White, White Club, and Western White Wheat. This purpose will be fulfilled by achieving the following objectives:

1. The White Wheat marketing channel between the Pacific Northwest and Japan will be described, with attention given to institutions and processes which transform the grain into consumer products.
2. Using average monthly data from 1968 to 1978, the margins earned by marketing firms on each bushel of White Wheat handled will be calculated. The margins will then be analyzed to determine whether the relative shares of each consumer dollar going to each level in the marketing chain has changed over the study period.
3. The elasticities of price transmission between Pacific Northwest farms and major levels of the marketing chain will be computed and used to analyze the workings of the White Wheat marketing system.

Specific questions to be answered in this thesis include:

1. What are the marketing margins and the elasticities of price transmission between the farm and each major step in the marketing process?
2. Are the marketing margins changed by firms selling, handling, transporting and processing White Wheat established as a fixed percentage of retail prices or as a constant dollar amount on each unit of wheat sold?
3. What are the time lags between a price change on a White Wheat product in the marketing channel and a change in farm prices?
4. Is the farm level demand for White Wheat derived from retail level demand in Japan for White Wheat products?
5. Can consumer demand theory be used to specify a model being designed to predict Japanese import demand for U.S. wheat?

The remainder of this thesis will be devoted to answering these questions. A brief review of relevant literature is given in Chapter two, and the wheat marketing system between the Pacific Northwest and Japan is described in Chapter three. Chapters four and five are devoted to presenting the calculations of the marketing margins and the elasticities of price transmission. Finally, conclusions are presented in Chapter six.

CHAPTER II

LITERATURE REVIEW

Many studies of the world and the U.S. grain trade have been completed. Fox [6] in 1951, contributed greatly to the study of consumer demand for agricultural products by describing the demand and supply structures for several different agricultural products. The diagrams drawn by Fox helped to illustrate the interaction between firms in the marketing channel and the conditions under which demand functions need to be estimated, using systems of simultaneous equations rather than using single equation models.

Meinken's The Demand and Price Structure for Wheat [22], written in 1955, used a system of six simultaneous equations to describe the economic forces in the U.S. and the world which determine wheat prices and utilization. In explaining the construction of each of the six equations, Meinken described the world wheat economy and noted that one of the weaknesses of the model he developed was that all wheat was treated as a homogeneous commodity even though separate classes of wheat existed. In Meinken's model, Liverpool, England was used as the principle U.S. wheat export destination.

The first major study of the demand for individual classes of wheat was in a 1961 Ph.D. thesis by A.S. Kahlon [17], "The Domestic Demand and Price Structure for Different Classes of Wheat in the United States." Kahlon recognized that each major class of wheat represented a separate wheat market. The objective of his work was to fit separate demand functions for Hard Red Spring, Hard Red Winter and Soft Red Winter Wheat. Kahlon also estimated the elasticities and cross elasticities of demand between those three wheat classes at the miller's level in the U.S. He was unable to fit a simultaneous equation model explaining the price of each wheat class as a function of supply and demand because of limitations on the available data. Specifically, Kahlon was unable to determine free market supply equations since data on Commodity Credit Corporation carryover stocks did not reveal the quantities of each class sealed under long term storage. However, by examining changes in the annual averages of prices and quantities consumed for each of the three wheat classes studied, he was able to determine that Hard Red Winter and Hard Red Spring Wheats were competitive commodities, and also that Soft Red Winter and Hard Red Spring were competitive. Kahlon thereby established that all wheat classes do not comprise one homogeneous market for the purposes of demand estimation.

Another study which recognized the heterogeneous nature of wheat classes was a Ph.D. thesis by Yi Wang [46], written in 1962. In that thesis, twenty-six simultaneous equations were constructed depicting the demand for each of the five wheat classes as being functions of one price, the prices of other classes, percapita consumer income, and time. Further, separate demand equations were included for human consumption, feed, storage and export of each class. Since the number of variables in the full model exceeded the number of available observations, Wang was able only to estimate the coefficients of each demand equation separately using ordinary least squares. The price elasticity of demand for White Wheat was estimated to be -.98, and the income elasticity of demand was estimated to be negative. However, conditions have changed in world wheat markets since 1962. During the 1940's and 1950's, White Wheat and Soft Red Wheat sold at large discounts to hard wheats in world markets. Consequently, large amounts of White Wheat were exported to Europe as well as to Asia and the Middle East. Wang's model is constructed with Liverpool, England being the primary export destination, but almost no White Wheat goes to Liverpool today.

In 1967, Ju Chun Chai [4] focused on domestic demand for wheat for food by class. In Chai's model, domestic consumption of White Wheat was modeled as a function of its own price and quality, the prices and qualities of other wheat classes except Durum, consumer income, technology in the milling and baking industry, and urbanization. The estimated direct price elasticity of domestic demand for White Wheat was -.0125, and the estimated income elasticity was negative, for the period 1946 to 1963.

Few other studies of wheat demand by class have been completed. However, in a 1977 study dealing specifically with the price differential between hard wheat classes, Bale and Ryan [1] concluded that good estimates of relative hard wheat prices can be obtained from simple measures of protein content and supply. Using annual data from 1965 to 1974, they regressed the ratio of Hard Red Spring prices to Hard Red Winter prices against the supply of Hard Red Spring, the supply of Hard Red Winter, the protein content of Hard Red Spring and the protein content of Hard Red Winter. The end uses of the different Hard Red Wheat classes are very similar, and therefore the relative composition of a bread mix will depend solely on the relative price of each class. Bale's and Ryan's results indicate that relative supply will explain over 90 percent of the variation in relative Hard Red Wheat prices.

Several general descriptions of the U.S. and world grain economies have been written, including The Economics of World Grain Trade by Grennes, Johnson, and Thursby [12], and "The U.S. Wheat Industry" by Heid [13], 1977. Seevers [33] wrote "Pacific Northwest White Wheat Exports During the 1960's" in order to describe the destinations, quantities and methods of financing Pacific Northwest White Wheat exports. A 1974 publication by Heid, Menze, and Wirak [14] entitled, "Factors Determining the Price of White Wheat in the Pacific Northwest", is a notable descriptive work. Factors listed as affecting the demand for Pacific Northwest White Wheat include soft wheat stocks and crop prospects in Australia, currency exchange rates, cash and futures prices for other wheat classes, domestic demands for seed, flour and feed, wheat quality, the availability of storage, the availability of U.S. Government financing for foreign buyers, wheat target prices and "psychological factors". Another piece of descriptive work was a Master's thesis done by Kalmback [18], 1979, entitled "The Japanese Feed Grain and Soybean Markets: Descriptive Analysis and

Import Demand Function." Kalmback described the feed grain and soybean marketing systems within Japan and estimated an import demand function for those commodities.

Several Studies dealing specifically with wheat marketing in Japan have also been done. Lee [19], 1973, analyzed factors which determine the demand for wheat in Japan and Taiwan. Increasing incomes, increasing urbanization, changing tastes and preferences, wheat promotion activities such as school lunch programs, and declining prices of milled wheat relative to milled rice were cited by Lee as explanations for the increasing per capita consumption of wheat products in Japan. In his analysis, Lee determined that the cross price elasticity between flour consumption and retail rice prices in Japan was 0.33.

Greenshields [11], 1977, used annual data from 1960/61 to 1975/76 in a regression of per capita wheat consumption in Japan against real Western White Wheat resale prices, real GNP per capita and real brown rice prices. The objective of his research was to analyze the effect of an increase in Food Agency resale prices on U.S. wheat exports to Japan. Of importance to readers of this thesis, Greenshields assumed that Japanese import demand was a function of resale price levels. Greenshields' estimate was that total Japanese wheat imports would fall by 300,000 metric tons during the period July 1976 to June 1977 due to an average increase of 16.4 percent in Food Agency resale prices on July 1, 1976. Predicted wheat imports in the absence of resale price increases were 5,500,000 metric tons, and predicted wheat imports with the higher resale prices were 5,201,000 metric tons. Actual Japanese wheat imports in 1976/77 were 5,522,000 metric tons, according to International Wheat Council statistics [15]. From his model, Greenshields derived a price elasticity of demand for per capita wheat consumption with respect to Western White resale prices of -.54.

A May, 1979 paper by Gallagher, Bredahl and Lancaster [7] used data from 1960 to 1975 on Western White Wheat resale prices, Japanese wheat production, real income and a variable to account for the 1971 West Coast dock strike to explain quantities of U.S. wheat exports to Japan. Per capita Japanese import demand for U.S. wheat was found to be "relatively responsive to the wheat resale price". The elasticity of Japanese demand for U.S. wheat with respect to wheat resale prices was -.97. With respect to Japanese wheat supply, the elasticity of demand was -.43, and the income elasticity of demand for U.S. wheat was estimated to be -.34.

The analysis of White Wheat marketing margins in this thesis depends largely on the concepts of derived demand and the elasticity of price transmission. Bredahl, Meyers, and Collins [2], 1979, discussed the importance of the elasticity of price transmission in determining the elasticity of foreign demand for U.S. agricultural products. The resale price system of the Japanese Food Agency was given as an example of a case where the elasticity of price transmission between consumers and farmers should equal zero.

The concept of derived demand was used by Tomek and Robinson [35], 1972, to refer to demand schedules for inputs which are used in the production of final goods and services. "Derived demand differs from primary demand by the amount of marketing and processing charges per unit of product." According to Tomek and Robinson, "A derived demand curve can change either because the primary demand curve shifts or because marketing margins change. Empirically, derived demand relationships can be estimated, either indirectly by subtracting appropriate margins from the primary demand schedule, or directly by using price and quantity data which apply to the appropriate stages of marketing."

George and King [9], 1971, described the marketing margins for agricultural products as being a combination of constant percentage spreads and absolute spreads. However, Gardner [8], 1975, concluded that no single mark-up pricing rule would accurately depict the relationship between farm and retail prices because prices move differently depending on whether shifts in supply or retail demand cause the price changes.

CHAPTER III

A DESCRIPTION OF THE PACIFIC NORTHWEST WHITE WHEAT MARKETING CHANNEL

Pacific Northwest White Wheat goes through three major transformations during the marketing process. Starting out as Soft, Club or Hard White Wheat in separate sub-classes, the wheat is blended into Western White, milled into flour and then used to make noodles or cakes. Figure two is a flow chart representing the major stages in the process of marketing White Wheat from the Pacific Northwest to Japanese consumers. A description of the marketing channel begins with the first movement of the wheat from farms in the Pacific Northwest. The wheat is transported by truck to country elevators where the blending of each sub-class begins. From the country elevators, it is shipped to terminal elevators for export. The terminal elevators, operated by the major grain trading companies, finish blending the Soft and Club Wheats to produce Western White and then load the new sub-class of wheat onto ocean-going vessels for shipment to Japan.

Japanese trading firms buy Western White Wheat, arrange for ocean transportation ann sell the wheat to the Japanese Food Agency. The wheat is off loaded from the vessel directly into warehouses in Japan, where Japanese millers then buy it from the Japanese Food Agency. Millers produce flours of precise quality characteristics by carefully blending various types of wheat and milling them. The flour, packaged in twenty-five kilogram sacks, is transported to warehouses owned by

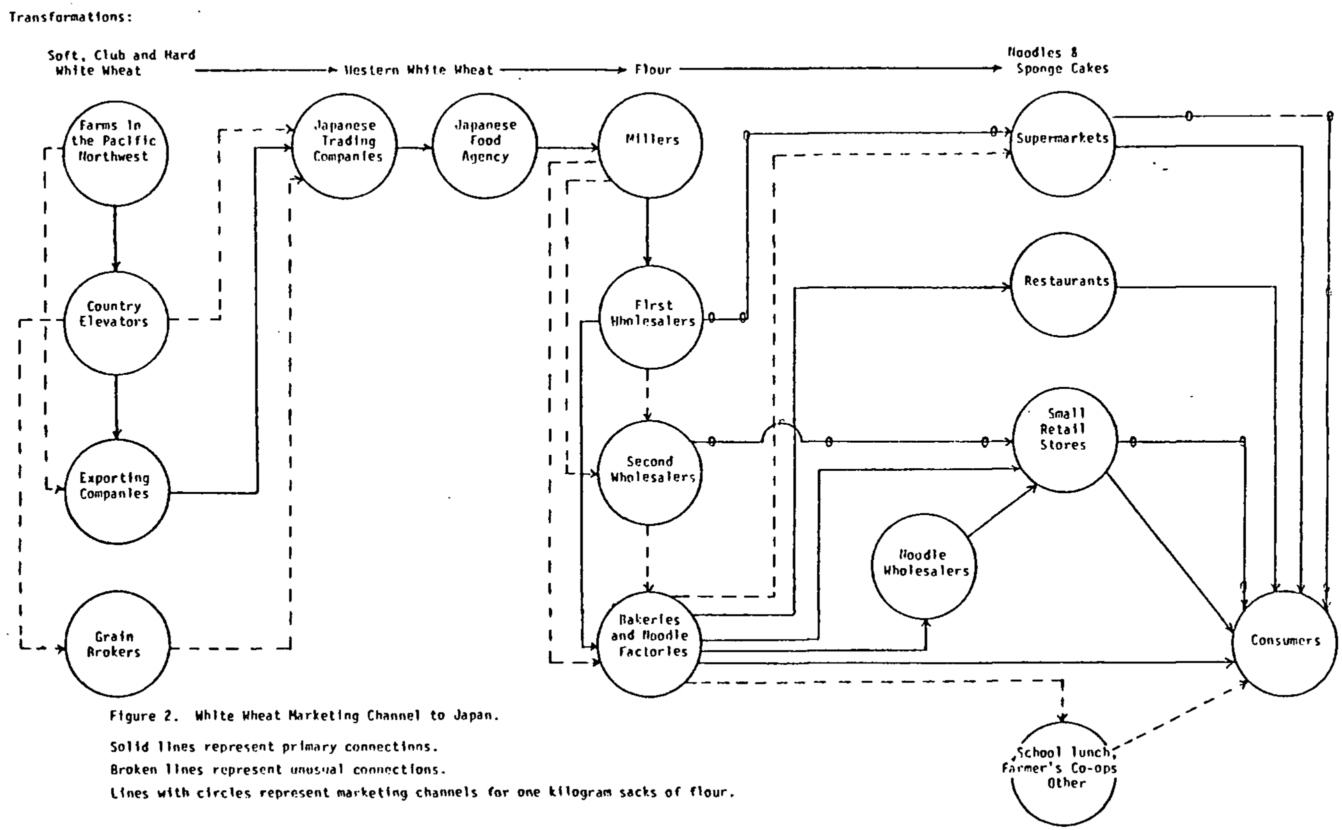

Figure 2. White Wheat Marketing Channel to Japan.

Solid lines represent primary connections.

Broken lines represent unusual connections.

Lines with circles represent marketing channels for one kilogram sacks of flour.

wholesalers. From the warehouses, one kilogram sacks of flour are sold to supermarkets and small retail stores, while twenty-five kilogram sacks of flour are sold to bakeries and noodle factories. The milled flour is combined with other ingredients in the bakeries and factories to finally produce biscuits, sponge cakes, and udon noodles. These products are then marketed to consumers through resturants, small grocery stores, noodle wholesalers, large supermarkets, and school lunch programs. The entire marketing process takes an average of seven months from the time the wheat leaves the Pacific Northwest farm, and by understanding each process performed in the marketing channel, an interesting perspective on the wheat industry can be gained. A brief discussion of the roles of the major actors in the White Wheat marketing chain is presented in the following material.

Farms

Approximately 5,695,000 acres are devoted to wheat production in Oregon, Washington, and Idaho, and of those acres, about 91 percent are devoted to White Wheat production [43]. About two-thirds of the White Wheat produced in the Pacific Northwest is grown in eastern Oregon, eastern Washington, and northern Idaho--all are areas serviced by the Snake-Columbia river system. Three counties in eastern Washington, Adams, Grant, and Lincoln supply about 70 percent of the Club Wheat production from the three state area [26].

Farmers make their planting decisions by the first week of each August and actually plant between October 10th and November 15th of each year. The wheat is harvested during the ensuing July and August of each crop year, and the process of moving the wheat into the export markets begins [10].

Country Elevators

Of the 327 million bushels of commercial grain storage capacity in the region, about 286 million bushels are supplied in country elevators and grain warehouses dotted all over the wheat-producing areas in the three states [41]. The commercial grain storage capacity in Oregon is about 52 million bushels; in Washington it is about 163 million bushels; and in Idaho there is about 71 million bushels of capacity. There are 23 elevators located along the Columbia and Snake Rivers with a total grain capacity of 13,317,000 bushels, which is included in the storage capacity figures for Oregon, Washington, and Idaho given above [4].

Country or sub-terminal elevators provide farmers with market information, facilitate the movement of grain from farms to export terminals, and provide storage facilities. Wheat moves to the country elevators by trucks either hired or owned by each farmer, although some cooperative elevators own their own trucks. When delivered for sale to an elevator, the wheat is weighed, samples are taken for grading inspections, and the farmer is paid 90 percent of the value of the wheat [10]. The balance owed to the farmer is calculated and paid after the grain has been graded. All wheat in the Pacific Northwest is priced out of Portland where the fair market value is determined through public trading in the Portland Grain Exchange, even though the actual quantity of wheat traded on the Exchange is small.

"Farm Prices", as reported by U.S.D.A., are the prices, in cents per bushel, paid to farmers for wheat delivered to a country elevator [37]. The prices are usually stated at each elevator as a number of cents to be discounted from the "track price" or the price paid for number one wheat delivered to the export elevator. Wheat that grades less than number one is discounted further, according to schedules determined by the major grain exporting firms.

In December of 1979, the farm price of number one Soft White Wheat around the Pendleton, Oregon area was 32 cents under the track price [23]. The 32 cent discount was determined by adding 23 cents for transportation, seven cents for handling and two cents commission for the grain elevator. There is a one-cent-per-bushel assessment on wheat which goes to the Oregon Wheat Commission to support research and promotional activities, but the farm price is calculated before the penny is assessed.

White Wheat destined for export to Japan can take as long as thirty days to arrive at the coast. When country elevators present a bill of lading showing the grain is on the way to the coast, the exporting firm pays the country elevator 90 percent of the value of the grain delivered to the export elevator [29]. Once the weight and grade of the shipment are determined by federal grain inspectors at the exporting ports, discounts for quality and dockage are figured, and the country elevator is paid the balance owed.

Many country elevators will not actually buy wheat from farmers until a specific customer has been found to whom the wheat can be resold. This means that the purchase and sale of a given delivery of wheat often occur simultaneously, and there is no need for a country elevator to hedge on wheat price movements. However, when this happens, the country elevator is still gambling on the cost of transporting the grain to the coast, since prices paid to farmers are "backed off" from the track price by an amount the elevator operator feels is sufficient to cover transportation and handling costs. Once the farmer is paid, there is no adjustment. Railroad freight rates, being regulated, are stable from day to day. However, barge and truck rates are not regulated and are subject to negotiation at each shipment. A one-cent-per-bushel change in the cost of transporting one 3,000 ton barge load of wheat to Portland would mean a gain or loss of about $1,000 to the country elevator operator.

Export Elevators

There are three export elevators in the Puget Sound area with a total capacity of 11.9 million bushels, and there are eight Columbia River elevators with a total capacity of 25.53 million bushels [21]. These elevators are operated by the major grain trading companies. Continental Grain Company operates elevators in Tacoma and Longview as well as a river sub-terminal at Pasco. Cargill operates export elevators in Seattle and Portland and sub-terminal elevators at Burbank, Arlington, and The Dalles. United Grain Corporation, which is now owned by Mitsui Company, operates elevators in Tacoma and Vancouver, Washington. Bunge operates elevators in Astoria and Portland. North Pacific Grain Growers, the region's only grain exporting co-op, operates an elevator in Kalama. Louis Dreyfus operates an elevator in Portland and a sub-terminal elevator at Windust. Columbia Grain Company, formerly Cook Industries and now owned by Marubeni-IIDA (America) Inc., operates the fourth Portland elevator.

Wheat can be imported into Japan only by Japanese trading companies licensed by their own government. The exporting firms in the U.S. sell most wheat to the Japanese trading companies fob vessel, loading weight, and grade final.[2] The sub-class of White Wheat sold to the Japanese is almost exclusively Western White Wheat, number two or better. The "fobbing charge" or the difference between the weighted average track price of White Wheat and the fob price for Western White Wheat represents the price charged by the exporting company for negotiating the sale with the Japanese trading firm, accepting the risks of price changes between the time a contract is written and the time the exporting firm can buy the wheat, assembling wheat in ship load quantities, storing the wheat until it is loaded aboard an ocean vessel, blending and cleaning the wheat to meet contract specifications, actually loading the wheat onto a vessel, and incurring the interest on the value of the wheat during storage [45].

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[2]Fob stands for "free on board the vessel" and means that title to the shipment is transferred to the new owner at the dock in the U.S. The Importer pays the ocean freight and insurance.

Sales contracts between the exporting firms and Japanese trading firms are written for delivery into an ocean vessel two to three months in the future. When a sale is agreed on, the exporting firm must begin buying wheat from the country immediately to allow enough time to assemble the grain. The Soft, Hard, Club, and Western White Wheat is assembled in the terminal elevators. Pacific Northwest Terminal elevators are put-through houses rather than storage houses. That is, the exporting firms purchase wheat from the country as close to the loading time as possible for the assembly of contract sales [10]. Inventory control is sufficiently precise that different types of wheat are segregated according to sub-class, test weight, other grading factors, and percent dockage. Since most export sales are on a fob vessel basis, the Japanese trading company is responsible for arranging the ocean transportation, and the buyer must notify the exporting company ten days in advance as to when the vessel will arrive at the dock and be ready for loading.

Purchasing grain from country locations is a continuous process, but a particular kernel of white wheat is probably not in storage in an export terminal at the time an export contract is consumated. Price risks are hedged, usually on the Chicago futures, although the Kansas City and Minneapolis exchanges are also used. The risks of hedging Western White Wheat are magnified by the fact that the futures markets trade in wheats of different classes being sold in largely different markets. Nevertheless, world market forces act upon all grain prices, and White Wheat is affected in varying degrees by the forces of supply and demand that affect Chicago prices. Therefore, traders do use the futures markets.

Japanese Trading Firms

Once loaded aboard the vessel, the wheat becomes the property of the Japanese trading firm, and the U.S. exporting firm is paid in full. There are 35 companies licensed by the Japanese Food Agency to import grain into Japan. Eleven of those companies operate offices in Portland, and with those eleven companies, all Pacific Northwest wheat exports to Japan are arranged [45]. The eleven companies receive quotas each April from the Food Agency, and each must import in the ensuing fiscal year the quantity of wheat, plus or minus ten percent of their quota, that has been specified. Each company is alloted a proportion of the import market based upon the business it conducted with the Food Agency the previous year. The quotas do not specify the quantities of each particular class or the origins of the wheat to be imported, but that is controlled by the Food Agency through the tenders which are offered each Tuesday evening, Portland time, in Japan.

The Japanese trading companies are unique in the marketing chain because their positions are secured by the Japanese government. Many other countries have government agencies which control grain imports and exports through direct dealings with exporters, but few other countries have the elaborate system of quotas and licenses that Japan has which guarantee an additional step in the marketing channel.

According to Food Agency records, 2,975,901 metric tons of wheat of all classes were imported by Japan from Pacific Northwest and Gulf coast ports in calendar year 1979. Table six shows the proportion of that total handled by each of the trading companies with offices in Portland. About seven percent of the imports were consigned to thirteen smaller trading companies which submited bids on the tenders held in Japan, but which worked through the Portland offices of the eleven major trading companies when actually buying the wheat. The figures show that the five largest trading companies import over 50 percent of the U.S. wheat destined for Japan. It should also be noted that the Japanese trading companies operate world wide buying and selling grain with all trading nations.

The services provided by the trading companies include the purchasing of grain from U.S. suppliers, selling grain to the Food Agency and to other customers, sending information about U.S. wheat markets to Japan, and the arrangement of ocean freight. As stated earlier, the trading companies buy wheat fob vessel in the Pacific Northwest. They sell wheat to the Food Agency cif Japan, in Yen.[3] Some of the Japanese firms have tried to buy wheat in the interior at the track price, but they are not considered very good at it yet [45]. Consequently, U.S. export firms still handle the wheat as far as the coast.

The major risks incurred by the trading companies include potential changes of the fob price, changes in the ocean freight rates, and

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[3]cif is a shipping term which means that the price quoted to the buyer includes the fob price plus insurance and freight to the destination.

Table 6. Proportions of Japanese Imports of U.S. Wheat Handled by Each Japanese Trading Firm in Calendar Year 1979.

Company	Proportion
Mitsui	12.0
Mitsubishi	11.9
Kanematsu	11.3
Nichimen	11.2
Itochu	9.5
Marubeni	8.4
Nissho	8.0
Toshoku	7.9
Sumitomo	5.4
Yuasa	3.8
Tomen	3.3
13 other companies	7.3
	100.0

Source: Japanese Food Agency Representative, Portland, Oregon.

fluctuations in dollars versus Yen exchange rates. Trading companies offer bids on each Food Agency Tender on the basis of their estimates of fob prices and the costs of handling and transporting the grain to Japan. Each tender is offered approximately two months before the Food Agency expects the cargo to leave the United States.

For instance, April tenders are held in February. The U.S. exporting firm would be expected to have the wheat ready for loading onto the vessel in April. It takes about fifteen days to make the ocean voyage between the Pacific Northwest and Japan, and the average time in port required to load and discharge cargo is ten to twelve days [3]. If the vessel left the U.S. during the first week of April, it would arrive in Japan during the third week of that month. However, the wheat could arrive during the second week in May if the ship did not leave until the end of April. The Japanese trading company is paid 70 percent of the cif value of the wheat upon presentation of a bill of lading to the Food Agency proving that the wheat is on the way to Japan. The final risk experienced by the trading companies is the possibility of weight or grade changes enroute to Japan. This risk is usually small with Western White Wheat, however disagreements do occur over sampling procedures and the interpretation of test results in Japan.

Food Agency

The Food Agency designates the port of entry for the imported wheat. There are approximately 16 major ports to which Western White is destined, and of these, Yokohama is the most important. About 45 percent of all Japanese grain imports go in through Yokohama. Warehouses and grain silos are located in the major ports and wheat is discharged directly into storage from the vessels.

Currently, the Food Agency is maintaining about a 2.6 months' supply of wheat in storage, even though the Japanese government actually desires to maintain only a 2.3 months' supply [45]. The 2.6 months' supply was built up during 1977 when the Japanese government tried to decrease its balance of payments surplus with the U.S. As of September, 1979, the Food Agency had 1,822,800 tons of wheat and barley in storage. About 90 percent of the stored wheat was in silos and the remaining ten percent was stored in sacks in warehouses. The Food Agency pays for this storage in private facilities, and less than half of the storage capacity in Japan is owned by milling companies.

Once the off loading from the vessel into storage has been completed, the job of the trading company is completed and the balance owed to it is paid after the weight and grade is validated. The cif price paid by the Japanese Food Agency to the Japanese trading company is thought to be the last price in the White Wheat marketing chain which is directly related by market forces to the farm price of Soft and Club White Wheat. It is reasonable to believe that the Japanese domestic grain market is insulated from world market forces by the Food Agency resale price on wheat sold to millers. The effects of this institutional arrangement will be examined in later chapters.

During World War II the Japanese government rationed available

1. Kitami
2. Otaru
3. Hakodate
4. Sendai
5. Yokahama
6. Tokyo
7. Chida
8. Mito
9. Takasaki
10. Utsunomiya
11. Tatehayashi
12. Shimizu
13. Nagoya
14. Yokkaichi
15. Osaka
16. Kobe
17. Mizushima
18. Hiroshima
19. Kanmon
20. Moji
21 Matsuyama
22. Sakaide
23. Hakata
24. Tosu
25. Chikuyoo
26. Kurume

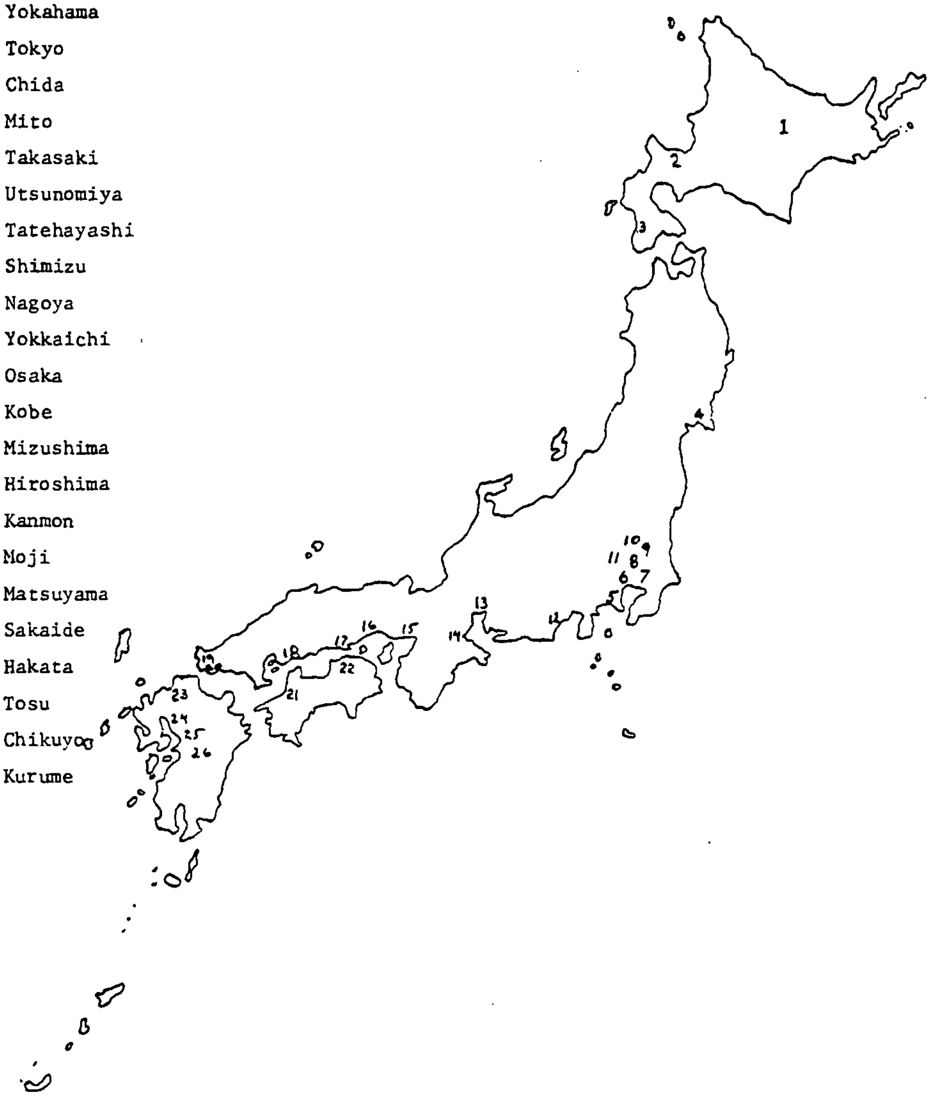

Figure 3. Major Ports and Milling Centers in Japan.

Source: Janapese Food Agency Representative, Portland, Oregon.

food supplies and the practice continued after the war. In 1952, the Food Control Law was passed. This law established the Japanese Food Agency which has since regulated the flow of imported wheat into Japan with the goals of stabilizing domestic food prices and protecting Japanese agriculture, while providing enough food for the Japanese people [16]. The regulation of grain imports is accomplished by the imposition of import quotas, import licensing procedures, and variable import levies. The specific rational for continuing to regulate the importation of wheat is that imported wheat competes with domestically grown rice and wheat in Japan. The Japanese government fears the possibility of interruptions in trade and so promotes the concept of food independence. The revenue gained by imposing a variable levy on wheat imports is used to support domestic rice and wheat farm prices so as to encourage domestic production.

As explained earlier, the Food Agency purchases all wheat imports from licensed Japanese trading companies on a cif Japan basis, with the Food Agency designating the port of delivery, month of delivery, class, and grade of wheat in its tender. The cif price is said to be determined by the bids received from the trading companies at each tender. The Food Agency then sells the wheat to Japanese millers at "resale prices" which are fixed annually. Importantly, each miller receives a quota of soft, semi-hard, and hard wheat which it may purchase each quarter. The quotas are based upon past sales, expected changes in demand, and desired changes in wheat stocks, and they represent a guarantee by the Food Agency that the quota of wheat will be available to each miller at the resale price. This practice has a stabilizing effect on Japanese marketing system, as a major source of risk for millers is eliminated.

The Food Agency resale price is designed to stabilize consumer prices for wheat products at affordable levels while still allowing the government to purchase wheat from domestic farmers at high prices [16]. Between 1952 and 1972, the resale prices on imported wheats were gradually lowered as world grain markets were stable and the Food Agency could afford to reduce consumer prices. However, in 1973, when world wheat prices rose dramatically, the government resale price fell below the cif import price. Huge deficits occurred in the Food Control Account, and the Food Agency was forced to increase the resale prices by an average of 43.2 percent. Even then, the government was still subsidising imports until 1976, as the resale price was still below the import price. Resale prices were revised again in January and July of 1976 and in February of 1980. With each revision of resale prices, attempts are made to properly differentiate between the different classes and grades of imported wheat. Consequently, there is a separate resale price for each type of wheat. U.S. trade organizations expend a lot of energy making sure that U.S. wheats are priced "competitively" with Australian and Canadian wheats.

In actually determining the resale prices, several factors are taken into consideration by the Japanese government [16]. The retail prices of rice, changes in the costs of living for average families, the deficit or the surplus in the Food Control Account, and the desires of Japanese millers, among other things, affect the government's decisions.

Japan is self-sufficient in rice production and, in fact, now has over two million tons in storage. This quantity in storage is considered burdensom as spoilage occurs, and the costs of maintaining the storage are high. The surpluses have developed partly as a result of government programs to encourage wheat consumption for nutritional reasons. Bread has been served in school lunch programs since the 1950's. Perhaps just as influential has been the steady reduction in the ratio of the prices of wheat flour to the prices of milled rice.

However, the competitive relationship between wheat and rice is not exactly known. Wheat consumption may be increasing due to changes in tastes and preferences rather than due to changes in prices. The processing costs of wheat are greater than of rice, so even though the ratio of resale prices of wheat to rice may favor wheat, the retail prices of wheat products and rice may not favor wheat. Wheat products are now established parts of Japanese diets due largely to the success of promotional efforts such as demonstration kitchens and school lunches. Consequently, the Food Agency considers other factors, such as the balance in the Food Control Account, more important than the ratio of wheat to rice prices in setting wheat resale prices.[4] In the last few years, Japan has been trying to reduce the consumption of hard

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[4]The Food Control Account is the Food Agency's budget for making support payments to Japanese farmers.

wheats because it fears that people will eventually refuse to eat traditional breads made from Japanese soft wheats. The Food Agency has restricted imports, rather than setting higher resale prices, to reduce consumption [16].

The costs of living for Japanese families also affects the government's thinking on resale price revisions. One major purpose of the Food Agency is to maintain stable prices at levels people can afford.

The balance in the Food Control Account is of critical importance in setting the resale prices on wheat. Deficits in the account occur due to either rising world prices for imported wheat or to increased support payments to Japanese farmers. It is not politically acceptable for the Food Agency to sustain huge deficits several years in a row. Consequently, when world prices rose in the 1970's the resale prices were revised, but deficits still occurred between 1973 and 1976. Since 1976, annual increases in the prices the Food Agency pays to domestic farmers for rice and wheat have placed pressures on the Food Control Account. Farm prices in Japan are indexed and revised annually. In 1976, the price paid to Japanese farmers for one bushel of domestic soft wheat was about $10.36 per bushel, and the farm prices have risen since then. Support for Japanese rice farmers is equally strong, and the Food Control Account is continually pressured. Farm organizations in Japan are calling for a reduction in Japan's wheat imports of one million tons annually to force greater consumption of rice. The Agency is actually criticized in Japan for <u>subsidising</u> wheat imports because resale prices are lower than support prices paid to Japanese farmers.

However, Japanese consumers and flour millers would object to a large decrease in wheat imports. Also, the Japanese balance of payments surplus with wheat exporting countries would increase if they reduced imports.

The desires of Japanese millers are also considered in setting the resale prices on wheat. Of course millers want overall wheat prices to be low to stimulate wheat consumption. However, due to the stability of flour supplies and prices caused by the system of quotas allocated to each miller, it is difficult for millers, or others in the marketing channel, to pass on increased costs. The prices of other factors of production such as labor and transportation are not regulated in Japan and they rise independent of the price of wheat. However, the Japanese public is highly intolerant of price increases for wheat products when they know that wheat resale prices are controlled. Consequently, millers favor an occassional bump up in resale prices so that general price adjustments can be justified throughout the marketing chain.

Political factors also affect decisions regarding changes in the resale prices of wheat. This can be demonstrated by describing the process by which the Japanese Government reviews its resale pricing policy. The process can occur anytime during the year, but is normally included with the rest of the government's budget preparations. The Food Agency will prepare a draft of its recommendations regarding changes in the resale prices. The draft is sent to the Ministry of Finance and the Economic Planning Agency for comment. Following any revisions that are deemed necessary, the draft is then sent to the Rice Price Council for review. The Rice Price Council is a group of no more than twenty-five persons with expertise in the marketing of grain and in the management of the Japanese economy. Simultaneously, the government solicits comments from the political party in power, and from appropriate committees in the Japanese Diet. Final revisions are made to the draft, and then decisions are announced along with the rest of the government's budget for the coming fiscal year.

In addition to setting resale prices, the Food Agency affects the demand for Western White Wheat by controlling the quantities of wheat imported through quotas. The Food Agency's supply and demand program is planned six months in advance of the start of each fiscal year. The level of stocks, expected demand, agreements between Japan and exporting countries, Japan's balance of payments with exporting countries, domestic production, Japan's rice surplus, and the balance in the Food Control Account affect the quantities of wheat that the Food Agency decides to import each fiscal year.

The Food Agency does not specify the country of origin or the classes of wheat to be imported. Instead, a total quantity of imports is determined and then subtotals are specified for soft, semi-hard, and hard wheat. Flour millers are then given their quotas for each type of wheat -- soft, semi-hard, and hard.

Wheat purchases are managed by a monthly import plan. Millers may request particular types of wheat within their quotas, and these requests are incorporated into this plan. However, the miller's desires are only some of many conditions, such as an acceptable balance of payments surplus with a particular country, which must be met.

Japan has a shortage of storage capacity as evidenced by the fact that some wheat has to be stored in sacks in warehouses. Consequently, few different types of wheat can be imported. The monthly import plans are implemented through tenders held weekly. At each tender, the government specifies the class of wheat and country of origin, and then the Japanese trading firms submit bids.

Wheat consumption in Japan has been increasing at an annual rate of 100,000 tons. This is caused by population growth mainly, as per capita wheat consumption has not increased much since 1965 [16]. These increases in consumption are translated into increased imports, since Japan's domestic production of wheat is actually declining, and since Japan does not want to deplete its wheat stocks.

Millers

There are 232 flour milling companies in Japan [45]. Four of these companies operate 30 separate mills and produce two-thirds of the flour made in Japan. Those four companies are Nissin, Nippon, Showa, and Nitto. Of the four, Nissin is the largest and alone produces one-third of the flour in Japan from 13 separate mills. The Japanese cities of Chida, Yokohama, Nagoya and Kobe are the major milling centers.

The millers buy wheat quarterly, according to the quotas alloted to them by the Food Agency, at the resale prices plus the cost of

Table 7. Location of Major Japanese Flour Mills.

	Company			
Location	Nissin	Nippon	Showa	Nitto
Kitami	X			
Hakodate	X			
Utsunomiya	X			
Mito	X		X	
Tatebayashi	X			
Chida	X	X	X	
Yokohama	X	X	X	
Nagoya	X	X	X	X
Kobe	X	X	X	
Mizuskima	X			
Sakaide	X			
Chikugo	X			
Tosu	X			
Taru		X		
Takasaki		X		
Tokyo				X
Osaka		X		
Matsuyama		X		
Moji		X		
Kurume		X		

Source: Japanese Food Agency Representative, Portland, Oregon.

storage. The milling companies are charged 170 yen per metric ton per ten-day period for the storage on the wheat. Since the average quantity of wheat in storage maintained by the Food Agency is 2.6 months, or 78 days, the millers have to pay an average storage fee of 1,360 yen per metric ton of wheat. At an exchange ratio of .44963 cents per yen, that works out to about six dollars storage for each metric ton or about 17 cents per bushel.

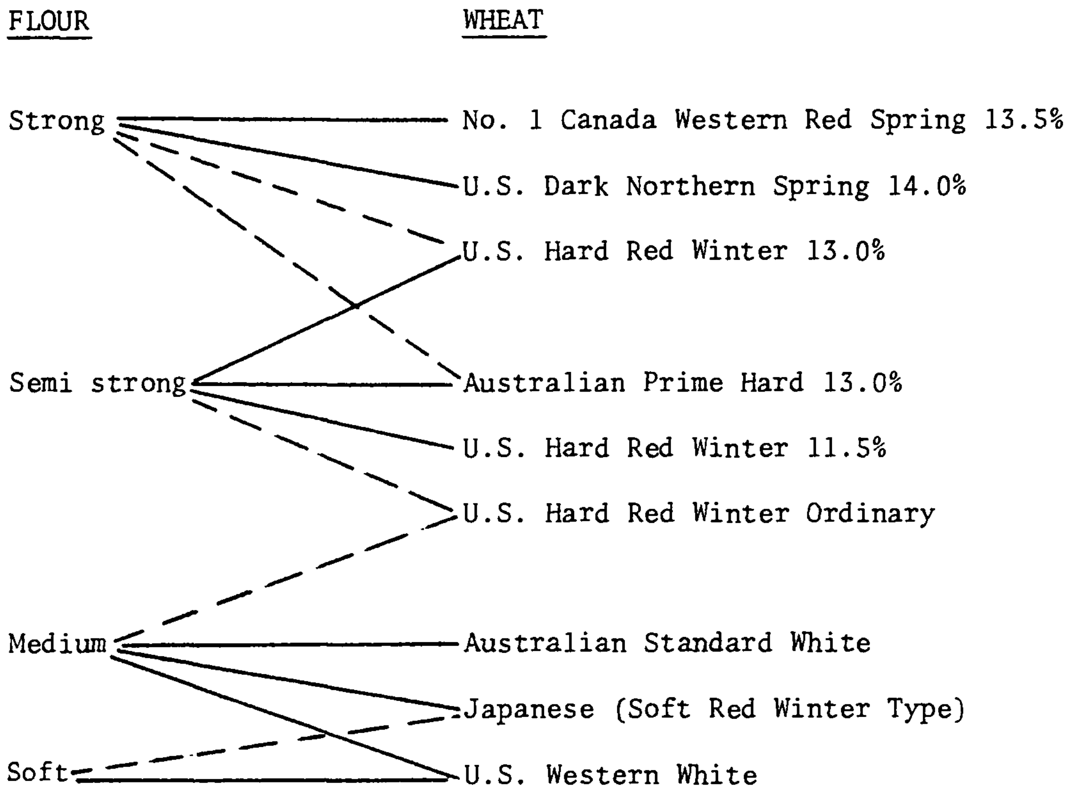
Millers also must pay the costs of transporting wheat from dockside warehouses to mills in the interior. Most of the large mills are located on the coast right next to the grain storage silos, so there are no transportation costs. However, several large mills are located in the interior, especially in the southern and northern islands, and wheat must be transported to them, usually by rail.

The quota received by each miller is based mostly on past sales. Although, the quotas may fluctuate from one quarter to the next depending on changes in stocks from the wholesale to the retail level [16]. The Food Agency tries to manage sales to millers so that there is a constant 1.2 months' supply of wheat and flour moving through the mills and warehouses to the noodle and cake factories. However, the quantity sold by the government each quarter does not equal the quantities consumed in those quarters because some products have seasonal demands. For instance, dry noodles are made in noodle factories between November and February each year and then put in storage for use during the entire year. During the summer, it is too humid to make dry noodles in Japan. So noodle factory demand for dry noodle flour is seasonal, and Food Agency wheat sales to millers must be adjusted during the fall and winter quarters. Flour millers produce as many as 200 different kinds of flours in four different categories including hard, semi-hard, ordinary, and soft [24]. Hard flours, made from U.S. Hard Red Winter (13%) and Hard Red Spring, Canadian Western, and Australian Prime Hard are used mainly in making bread. Semi-hard flours are made from U.S. Hard Red Winter (ordinary), U.S. Hard Red Spring (semi-hard), South Australian Hard (11.5) and Argentine Dulo, and are used mainly to make Chinese noodles. Australian Soft, American Western White and Soft Red Winter, and Japanese Soft Wheat are used to make pasta, crackers and Japanese noodles from ordinary flours. Soft flour is made entirely from U.S. Western White and is used in making biscuits, cookies, and cakes. There are definite trends in Japanese demand for wheat products. Japanese tastes are leaning toward noodles made from harder flours than has been used in the past. Consequently millers use larger quotas of hard and semi-hard wheats relative to soft wheats. Between 1964 and 1978, the production of hard flour increased from 772,000 metric tons to 1,451,000 metric tons, an increase of 88 percent [45]. During the same time period, the production of noodle flour increased from 1,022,000 metric tons to 1,328,000 metric tons, an increase of 14 percent, and the production of cake flour climbed from 402,000 metric tons to 558,000 metric tons, an increase of 39 percent.

From Mill to Retail

The most common route traveled by wheat flour in Japan is from the mill to a large wholesaler, to a baker or noodle maker, and on to

Table 8. Classification of Flour Milled in Japan by Type of Wheat Used.



Source: Seiichi Nagao, Manager of Quality Control and Assurance, and Manager of Cereal Science Research Laboratory, Nisshin Flour Milling Company, Ltd., Tokyo.

a retailer. Flour is usually packaged in 25 kilogram sacks for distribution to factories through wholesalers. Small amounts of flour are moved directly to bakeries and factories in bulk shipments by trucks. Very small amounts of ordinary soft flours containing Western White Wheat are packaged in one kilogram sacks for sale to consumers who make noodles, cakes and biscuits at home. There is also a role for "second" wholesalers in Japan who distribute small quantities of flour to small cake and noodle factories.

From one kilogram of ordinary flour, Japanese noodle makers can produce one kilogram of dried udon noodles, 1.34 kilograms of raw udon noodles, or 3.2 kilograms of boiled udon noodles [24]. The only ingredients in noodles besides the flour are salt and water. Normally, .02 kilograms of salt will be added to each kilogram of flour in producing noodles. The rest of the weight in udon noodles is water. From one kilogram of soft flour, 3.5 kilograms of sponge cake or 2.0 kilograms of biscuits can be made. These products require additional ingredients including eggs, butter, and milk, as well as salt and water [24].

Bakers distribute cakes and biscuits to supermarkets, restaurants, small retail stores, and to school lunch programs. However, most Japanese consumers buy their confectionary products directly from bakeries. Udon noodles require more processing so only about five percent of noodle factory sales are direct to consumers. Instead, two-thirds of dry udon noodle sales are marketed through noodle wholesalers to small stores and restaurants before reaching consumers. Raw udon noodles must be eaten within a week after they are made, so a smaller percentage are marketed through noodle wholesalers. From noodle factories, 27 percent of the raw udon noodles are marketed through restaurants, another 27 percent are sold through small retail stores, 13 percent go through supermarkets, and only 18 percent go through noodle wholesalers to small retail stores [45]. The final transformation of Western White Wheat occurs about seven months after the wheat left the farm when the cake, biscuit or noodle is actually served to a consumer.

Six major levels in the White Wheat marketing chain between the Pacific Northwest and Japan have been discussed. However, transportation systems, the availability of storage, and wheat and flour quality characteristics must also be investigated to understand the meaning of the margins earned by marketing firms. In addition, the role of the Portland Grain Exchange in establishing market values on grain traded in the Pacific Northwest needs to be noted.

Transportation

The transportation system in the Pacific Northwest has proven adequate overall to handle the quantities of White Wheat being marketed [21]. However, spot shortages of equipment during peak marketing periods can force shippers to use alternative and more expensive modes of transport. All grain is moved off farms to elevators by truck. However, from country elevators to the export elevators most grain travels by truck to river sub-terminals and then by barge to the export terminals. About 75 percent of the wheat grown in the Pacific Northwest travels to export by truck-barge combination, and the remaining 25 percent of the wheat traffic is split evenly between rail and truck [21]. Grain grown in other regions of the country and transited through the Pacific Northwest for export, travels mostly by rail.

Barges operate more cheaply per ton-mile than either the railroads or trucks. As the distance from Portland increases, the rate per mile of transporting grain down the Willamette Valley by truck or rail increases about twice as fast as the cost per mile of moving the grain by barge down the Columbia and Snake Rivers. The overlapping of the three modes of transportation gives farmers and elevator operators some flexibility in planning shipments toward the coast. However, shortages of transportation do develop during peak marketing periods. The percentage distribution by month of total grain marketing in the Pacific Northwest for calendar year 1977 is given in Table 9. The month of August sees the greatest volume of grain marketing of the entire year with 12 percent of the total. Also during that month, trucks haul the highest proportion of grain of any month of the year. As barges and railroads become congested, delays occur and more grain is moved by truck.

In normal marketing years, the 506 million bushel storage capacity and the existing transportation system in the region are adequate to handle Pacific Northwest production and exports. However, the increased movement of grain from states other than Oregon, Washington and Idaho has remained relatively stable in recent years. In the five-year period between 1975 and 1979, production of corn, oats, barley,

Table 9. Monthly Marketings of Pacific Northwest Grain in Calendar Year 1977.

% Distribution Between Modes	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual Total
	Percent												
Barge	56.5	65.9	63.1	67.3	65.4	57.9	64.8	48.1	45.0	52.5	56.7	65.2	59%
Truck	5.9	3.8	6.3	7.3	8.1	11.4	9.4	19.5	15.8	11.3	10.0	6.6	9%
Rail	37.6	30.3	30.6	25.4	26.5	30.7	25.8	32.4	39.2	36.2	33.3	28.2	32%
Total %	100	100	100	100	100	100	100	100	100	100	100	100	100
Monthly % of Annual Marketings	9.4	8.8	8.6	8.7	7.7	5.1	7.9	12.0	8.6	8.1	7.6	7.5	100%

Source: The Transportation System Serving Agriculture in the Pacific Northwest by Martin, McNamee, Casavant, Jones, 1979, Report No. 12 of the Northwest Agricultural Development Project.

all types of wheat, and rye has ranged from a low of 286,336,000 bushels in 1977 to a high of 375,841,000 bushels in 1978 [38]. Yet grain exports from Puget Sound and Columbia River ports have increased dramatically since 1975. In 1975 about 301 million bushels of grain were exported. In 1979, grain exports jumped to 560 million bushels. Significantly, Columbia River exports went from 234 million bushels in 1975 to 351.5 million bushels in 1979, an increase of about 50 percent, while Puget Sound grain exports went from 67 million bushels in 1975 to 208 million bushels in 1979, an increase of 210 percent [40].

Corn exports from the Midwest have increased dramatically through Puget Sound ports. Pacific Northwest corn exports went from zero in 1975 to 171 million bushels in 1979 -- all through Puget Sound ports [40]. Meat production in Pacific rim countries is increasing, thus causing a demand for U.S. feed grains. Simultaneously ocean freight rates and railroad rates now favor the Pacific Northwest as an export region over the Gulf for Asian destinations. The ports of Tacoma and Seattle are getting the largest share of transit grain for export because they have the better rail links with the Midwest and because they have installed equipment capable of handling corn [10]. Columbia River based exporters like North Pacific Grain Growers at Kalama are currently installing the equipment to handle corn.

The increase in grain exports through the ports of Astoria, Kalama, Longview, and Portland is largely due to increased movements of red wheat and sorghum from the Midwest and Montana to Asian nations. Columbia River red wheat exports grew from 93 million bushels in 1975

Table 10. Oregon, Washington and Idaho Grain Stocks as of January 1st.

	1975	1976	1977	1978	1979
	1,000 Bushels				
Sorghum	0	0	0	2,660	0
Wheat	149,244	177,775	209,827	172,739	180,705
Oats	6,267	6,694	6,217	6,284	6,619
Barley	34,805	45,969	45,372	44,126	60,374
Corn	4,559	4,281	5,487	9,001	10,626
Rye	-	150	72	56	74
Total:	194,875	234,869	266,975	234,866	258,398

Source: Crop Report, Crop and Livestock Reporting Service, U.S.D.A., Various issues.

Table 11. Oregon, Washington and Idaho Grain Production by Calendar Year

	1975	1976	1977	1978	1979
			1,000 Bushels		
Oregon					
Corn Silage	672	693	620	600	704
Corn Grain	935	900	1,140	1,235	1,100
Oats	4,000	3,850	5,200	4,200	4,160
Barley	8,850	7,360	8,930	9,250	8,000
All Wheat	57,480	60,301	47,620	51,925	57,310
Rye	297	168	125	175	168
Washington					
Corn Silage	1,200	1,292	1,280	1,430	1,144
Corn Grain	3,536	4,708	7,616	7,865	12,257
Oats	2,340	1,960	1,505	1,860	1,715
Barley	21,200	21,060	9,450	24,700	17,010
All Wheat	145,140	144,050	101,305	133,980	118,000
Rye	260	66	60	63	384
Idaho					
Corn Silage	1,425	1,539	1,602	1,499	1,521
Corn Grain	2,075	2,975	2,408	3,393	3,608
Oats	3,456	2,408	2,565	3,136	2,288
Barley	37,750	43,200	44,180	55,800	49,300
All Wheat	60,050	68,320	50,730	74,730	74,140
Rye	--	--	--	--	--
Total:	350,666	364,850	286,336	375,841	352,809

Source: Crop Production, E.S.C.S., U.S.D.A., Various issues.

Table 12. Pacific Northwest Total Grain Exports by Calendar Year.

	1975	1976	1977	1978	1979
	1,000 Bushels				
Columbia River Ports	233,821	256,585	225,966	319,930	351,500
Puget Sound Ports	67,139	82,293	50,585	109,267	208,361
Total:	300,960	338,878	276,551	429,197	559,861

Source: Grain Market News, Various issues.

to 171 million bushels in 1979, and sorghum exports grew from zero in 1975 to almost 15 million bushels in 1979. Montana is the principle origin of the red wheat being exported through the Pacific Northwest, and the Columbia River serves as a funnel to guide the grain to Columbia River export terminals.

The ocean transportation system which moves grain to overseas destinations is a world apart from the domestic system of trucks, barges and trains. The three primary markets for chartering the dry bulk cargo ships in which grain is usually carried are New York, London and Tokyo. The vessels usually chartered for carrying grain range in size from 18,000 to 100,000 tons, and there are about 2,700 such vessels worldwide. Ships carrying grain do not move on regularly scheduled routes. Instead, these are "tramp" ships which charter their services from port to port. The Japanese trading companies must compete with dry bulk cargo shippers worldwide to secure the tonnage necessary to move White Wheat to Japan. In 1978, 387 million tons of coal and ore and 149 million tons of wheat were carried by ocean vessels worldwide [3].

Some grain sales are made on a cif basis, meaning that the U.S. exporter is responsible for the ocean freight to the buyer's port. However, this is rarely the case with grain sales to Japan. From 1974 to 1978, ocean freight rates had been relatively low. This is because the total tonnage generated by world trade in coal, ore and grain had actually decreased, while the total quantity of dry bulk cargo space increased due to the completion of ships which were started while freight rates were high in the early 1970's. As a result, inefficient ships were laid up, and ship building came to a halt. However, in 1979, the demand for dry bulk cargo space moved upward and freight rates have recovered.

Another factor affecting the freight rate is the speed with which a ship can be loaded and unloaded in port. An average dry bulk cargo vessel is worth about $10,000 to $12,000 per day, and ship owners must factor the total time cost of each voyage into the freight rate they are willing to accept for performing a particular service. The time allocated to loading and discharging is set in each charter agreement. If a ship has to spend a longer time in port than agreed to, the Japanese trading firms must pay the $10,000 to $12,000 daily market value of the ship in the form of demurrage to the ship's owner. On the other hand, if the ship is able to load and discharge in fewer than the alloted days, the Japanese trading firms are paid one-half the demurrage rate as compensation for time saved. A related factor is the speed with which a ship can sail. Ocean vessels have been operated at slower speeds in recent years to conserve energy, and the added sailing time has meant two to three extra days between the Pacific Northwest and Japan [36]. This has caused an increase of about two cents in the average per bushel cost of marketing White Wheat.

There are seven major grain exporting ports in the Pacific Northwest. They are: Seattle, Tacoma, Astoria, Longview, Kalama, Vancouver and Portland [4]. Due to the Snake-Columbia River system, over 70 percent of the wheat grown in Oregon, Washington, and Idaho is exported through Columbia River ports. However, due to excellent rail and air connections with the rest of the U.S. and since it is larger, Seattle is the major import port in the Pacific Northwest. As a result, ships often call Seattle first to discharge cargo, then call Columbia River ports to load wheat. However, the Port of Portland, being located on a river, has a navigable depth of only 40 feet. Some extremely large ships are unable to be fully loaded in Columbia River ports because of this limitation and, as a result, some ships take on wheat in Columbia River ports, then sail north to Puget Sound ports to top off before leaving the U.S.

Upon arrival in Japan, wheat is off-loaded into warehouses and silos for storage. The Japanese domestic grain transportation system incorporates both trucks and railroads. Wheat is occasionally moved to inland mills by rail, but since most mills are located on the coast, most grain is distributed to Japanese consumers by truck in the form of flour or processed products.

Storage

The availability of storage and government programs which affect the timing of farm marketings by encouraging or discouraging the use of storage, also affect the value of White Wheat moving through the marketing system. On-farm grain storage capacity in the Pacific Northwest, as of April 1, 1979, was estimated to be 179 million bushels, or about 87 percent of the 1978/79 wheat harvest. Commercial grain storage capacity for the three state region, including export terminals,

Table 13. Pacific Northwest Grain Storage Capacity as of April 1, 1978

	Total on Farm	Off Farm Commercial	Grand Total
		Bushels	
Idaho	81,614,000	71,490,000	153,104,000
Oregon	35,715,000	66,320,000	102,035,000
Washington	61,783,000	188,762,000	250,545,000
Total P.N.W.	179,112,000	326,572,000	505,684,000

Source: Grain Storage Capacity Survey, October 1978, A.S.C.S., U.S.D.A.

Table 14. Terminal Elevator Capacity in the Pacific Northwest.

Elevator	Capacity
Puget Sound	
1) Continental (Tacoma)	3,000,000 bushels
2) Cargill (Seattle)	4,200,000 bushels
3) United Grain Co. (Tacoma)	4,700,000 bushels
Columbia River	
1) Bunge (Astoria)	1,100,000 bushels
2) Continental (Longview)	5,000,000 bushels
3) N.P.G.G. (Kalama)	4,000,000 bushels
4) United Grain Corp. (Vancouver)	5,000,000 bushels
5) Cargill (Portland)	8,100,000 bushels
6) Bunge (Portland)	1,500,000 bushels
7) Louise Dreyfus (Portland)	2,000,000 bushels
8) Cook (Portland)	1,500,000 bushels
Total all Ports:	40,100,000 bushels

Source: "The Transportation System Serving Agriculture in the P.N.W.", Martin McNamee, Casquant, and Jones, Report No. 12, Northwest Agricultural Development Project.

was estimated to be 327 million bushels for a total storage capacity of 506 million bushels [41].

A decision to store wheat is made by farmers hoping for favorable cash price movements during the period of storage. If the rise in prices is greater than the costs of providing storage, including the opportunity costs of the value of grain unsold, the farmer has made a profitable decision. Commercial storage rates in the Pacific Northwest average close to two cents per bushel per month. In addition, the opportunity cost of capital to hold wheat with a farm value of $3.75 per bushel is 3.125 cents per bushel per month at ten percent interest. Given the interest rates and farm prices common today, a farmer must expect wheat prices to rise by at least five cents per bushel per month for the period of storage, or else he will sell at harvest.

Federal programs which support prices and encourage the holding of stocks also affect marketing decisions. The Department of Agriculture sets non-recourse loan rates, or price floors, on major agricultural commodities including wheat. Under this program, farmers may put their wheat into storage and receive a loan from the Commodity Credit Corporation for an amount equal to the loan rate times the number of bushels stored. If he wishes, a farmer can let the Commodity Credit Corporation keep the wheat as full payment on the loan, including interest. Consequently, the loan rate becomes a price floor since farmers will put all of their crop under loan rather than sell at market prices below the loan rate. In years when farm prices are below the loan rate, the quantities of wheat under loan increase, and the flow of wheat from farms to markets is reduced. However, the major characteristic of the loan program in the Pacific Northwest is that few farmers choose to participate since farm prices are substantially above the loan rate. The loan program affects only a small proportion of Pacific Northwest wheat production even in years with comparatively low farm prices. There are an estimated 30,000 farms in Oregon, yet fewer than 1,000 non-recourse loans are made in any one crop year.

Wheat under loan is not "released" by a decision of the Secretary of Agriculture until national average farm prices have risen to 150 percent of the loan rate. When prices rise that high, farmers have the option of selling their wheat and repaying the loan, or they can continue to leave the wheat in storage. If prices continue to climb to 185 percent of the loan rate, the loans are "called", meaning that farmers have 30 days to repay their non-recourse loans, presumably by selling their wheat. However, a farmer with adequate capital can repay the loan and still delay selling if prices are expected to rise even further.

The quantity of on-farm storage capactiy nationwide has risen drastically in recent years. Since 1977, U.S.D.A. has made storage payments of 25 cents per year per bushel to farmers who have placed their crop into three-year storage under Commodity Credit Corporation loan. U.S.D.A. has also made loans available to farmers wishing to construct new storage facilities large enough to hold two average years of production. These programs have also been made available to pro-

Table 15. Participation by Oregon Farmers in the Federal Non-recourse Loan Program.

Crop Year	Number of Non-recourse Loans in Oregon	Bushels of Wheat put under Loan in Oregon
1975	957	8,573,065
1976	178	1,800,384
1977	621	5,064,930
1978	245	1,899,311
1979	285	2,737,904

Source: George Potter, Agricultural Stabilization and Conservation Service, Portland, Oregon.

ducers of corn, barley, sorghum, and oats, and, as a result, the annual glut of farm marketings at harvest time has been less pronounced in recent years. In the 1964/65 crop year, about 50 percent of farm wheat marketing in the U.S. occurred in the months of June, July, and August [44]. By the 1976/77 crop year, only 40 percent of farm marketings occurred during those months. For the state of Oregon alone, an average of 23 percent of the wheat sold off farms in the 1977, 78, and 79 crop years moved during July, August, and September [28]. About 27 percent of Oregon farm marketings occurred in October, November, and December. Almost 29 percent occurred in the months of January, February, and March, indicating that farmers time their marketing decisions to defer taxes, and about 21 percent occurred in April, May, and June.

Congestion in export terminals in the Pacific Northwest caused by the handling of grain from Montana and the Midwest can decrease White Wheat track prices. As more Red Wheat and Corn move west for export, the storage capacity available for handling White Wheat is reduced. In calendar year 1975, 36 percent of the grain exported from Columbia River ports originated outside Oregon, Washington or northern Idaho [40]. By 1979, 50 percent of grain exports from Columbia River ports originated east of Idaho. For Puget Sound ports, transit grain accounted for 49 percent of 1975 grain exports and 100 percent of 1979 grain exports. Corn, Sorghum and Red Wheat have supplanted White Wheat as an export commodity leaving from Puget Sound ports.

Since almost all White Wheat exports go through Columbia River

Table 16. Percent of Oregon Wheat Sold Each Month in the 1977,78 and 79 Crop Years.

Year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Total
	Percent												
1976/77	4.2	2.3	10.3	9.6	8.6	9.6	15.6	9.0	8.1	6.1	9.6	6.9	99.9
1977/78	10.2	3.4	14.3	9.7	9.0	6.7	11.2	9.0	6.8	6.8	8.9	3.4	99.4
1978/79	4.0	3.0	16.7	8.4	11.3	8.4	10.6	8.1	7.8	7.2	9.0	5.4	99.9

Source: Ivan Packard, Oregon Wheat Commission, Pendleton, Oregon.

Table 17. Wheat: Percent of Farm Marketing in the U.S., by Months in Selected Years.

Year	June, July, August	Sept., Oct., Nov.	Dec., Jan., Feb.	Mar., Apr., May	Total
	Percent				
1964/65	49.6	19.0	17.2	11.7	97.5
1967/68	43.8	19.7	21.8	11.6	96.9
1970/71	41.4	23.0	21.2	11.5	97.1
1973/74	46.3	21.9	20.0	9.3	97.5
1976/77	39.8	20.1	20.4	14.9	95.2

Source: Wheat Situation, Economics, Statistics and Cooperatives Service, U.S.D.A., May, 1978.

Table 18. Exports of Grains not Produced in the Pacific Northwest through Columbia River and Puget Sound Ports by Calendar Year.

	1975	1976	1977	1978	1979
			1,000 Bushels		
Columbia River Exports:					
Corn	--	--	--	118	--
Sorghum	--	--	--	4,206	2,479
Soybeans	8	--	605	4	--
Hard Red Spring	24,976	26,645	35,288	51,236	68,731
Hard Red Winter	58,260	55,321	38,751	57,780	102,687
Soft Red	--	--	--	--	--
Durum	1,150	1,755	1,726	1,617	2,087
Puget Sound Exports:					
Corn	--	492	--	67,854	170,574
Sorghum	--	--	1,378	6,220	14,981
Soybeans	--	113	17	201	8
Hard Red Spring	20,219	24,749	19,198	14,167	19,862
Hard Red Winter	12,279	12,466	10,301	11,758	3,744
Soft Red	--	--	--	--	--
Durum	163	178	23	142	--
Total:	117,055	121,719	107,287	215,303	385,153

Source: Grain Market News, Weekly Summary and Statistics, Livestock, Poultry, Grain and Seed Division, U.S.D.A., Various issues.

terminals, White Wheat has to compete with transit grain for terminal elevator space. However, terminal elevators in the Pacific Northwest are not now used as intensively as elevators on the Gulf coast. In 1976, the ratio of inspections for export to elevator capacity on Columbia River ports was 9.0, and the same ratio for Puget Sound ports was 6.4 [34]. In comparison, the ratio of exports to elevator capacity along the South Atlantic coast was 22.5. Along the East Gulf coast, the ratio was 48.8, and the ratio for the Gulf elevators on the Mississippi was 34.5. In 1979, the ratio of exports to elevator capacity for Columbia River terminals had risen to 13.8, which is still much less than the Gulf and Atlantic coast ratios. Even allowing for differences in trade conditions, there would seem to be room for additional grain exports from Columbia River ports without squeezing out White Wheat exports.

Quality Standards

Farmers, grain traders, flour millers and bakers are each concerned about different characteristics in the seed, wheat or flour they are working with. Persons in the U.S. are generally concerned with the quality characteristics described in the federal grain standards for wheat. The federal standards define the meanings of heat-damaged kernels, damaged kernels, foreign material, shrunken and broken kernels, defects, wheat of contrasting classes, wheat of other classes, test weight per bushel and dockage. The standards are used to determine whether a particular sample is to be graded number one,

Table 19. Ratio of Inspections for Export to Terminal Elevator Capacity in the U.S. During Calendar Year 1976.

Location of Terminals	Number of Terminals	Capacity	Inspection for export	Ratio of inspection to capacity
		—Million Bushels—		
Chicago	7	50.6	77.8	1.5
Duluth-Superior	10	59.5	95.7	1.6
Toledo	2	18.5	129.6	7.0
North Atlantic	1	14.0	110.6	7.9
South Atlantic	4	18.8	423.9	22.5
Mississippi	7	43.9	1,514.7	34.5
East Gulf	1	3.0	146.5	48.8
North Texas Gulf	6	30.4	528.6	17.4
South Texas Gulf	3	15.7	139.0	8.8
Columbia River	8	28.4	256.6	9.0
Puget Sound	3	12.8	82.3	6.4
California	4	13.0	49.0	3.8

Source of 1976 data: Sarahelen Thompson, "An analysis of the Market Performance of the U.S. Grain Export Industry" M.S. Thesis University of Minnesota, 1978.

Table 20. Ratio of Inspections for Export to Terminal Elevator Capacity in the Pacific Northwest During Calendar Year 1979.

Location of terminals	Number of terminals	Capacity	Inspection for Export	Ratio of Inspections to Capacity
		——Million Bushels——		
Columbia River	8	25.5	351.5	13.8
Puget Sound	3	11.9	208.4	17.5

two, three, four, five, or sample. Number one grade designates the highest quality. Samples of each load of wheat are taken at the time of delivery to a country elevator and are sent to state inspection stations for analysis. For Soft White Wheat, the most important single quality characteristic at the farm level is test weight per bushel. Test weight is the weight per 2,150.24 cubic inches of a dockage free test portion of the original sample. A discount of one cent per bushel on the price paid to the farmer for each pound of test weight under 60 pounds is assessed by the country elevator. The test weight of an average bushel of Soft White Wheat has gradually decreased during the 1970s. In 1969 the average test weight of all Soft White Wheat in the Pacific Northwest was 62.2 pounds per bushel [27]. However, the average fell to 61 pounds per bushel in 1972, 59 pounds per bushel in 1976, and climbed to 60 pounds per bushel in 1979. There is an inverse relationship between test weight and yield. Since farmers are not paid a premium for test weights over 60 pounds per bushel, there is no incentive to produce heavy wheat. White Club Wheat is graded number one if the test weight is 58 pounds per bushel or above.

Dockage is another factor determining a farmer's income from the sale of wheat at a country elevator. Defined as the material easily separated from the wheat, including seeds, chaff, straw, and oats, dockage is rounded down to the nearest one-half of one percentage point of the weight of the wheat. For instance, if nine-tenth of one percent of the weight of a sample was found to be attributable to dockage, then the dockage figure would be officially reported as one-half of one percent. Then one-half of one percent would be subtracted from the weight of the wheat delivered to the elevator for the purpose of determining the amount paid to the farmer. Dockage figures are rounded down because testing equipment was not accurate enough to give a precise measurement in the past. However, modern equipment can measure dockage accurately to one-tenth of one percentage point.

There are other factors which can cause wheat to be discounted. A two cent per bushel discount is charged on wheat grading number two, and a four cent per bushel discount is charged on wheat grading number three, due to the presence of damaged or heat damaged kernels, foreign material, or shrunken and broken kernels in the sample. Discounts can also be applied for the presence of other classes, wheat of contrasting classes, treated wheat, weevily wheat, ergoty and garlicky wheat, smutty wheat, and high moisture wheat. These maladies are rarely a problem with White Wheat in the Pacific Northwest.

Wheat moisture and protein content are quality characteristics which do not ostensibly affect White Wheat farm prices. Moisture can become a factor if levels are as high as 13.5 percent, in which case grain traders can refuse to accept delivery or can assess large discounts against the farmer. High moisture wheat increases the likelihood of spoilage during storage and causes larger freight bills per volume of wheat since freight is determined by weight. However, since White Wheat from the Pacific Northwest rarely exceeds eleven percent moisture, discounts for moisture rarely occur.

White Wheat is low in protein relative to the hard wheats. Consequently, White Wheat is used to produce products which do not require high protein flours, and premiums for high protein are not paid to White Wheat farmers as they are to hard wheat farmers. In fact, White Wheat with protein levels of seven to eight percent is judged by bakers to be superior to nine or ten percent protein White Wheat.

Grain traders do not have to think about agronomic factors such as yield, propensity to lodge, and resistance to pests and diseases like farmers do. However, federal grain inspectors apply the same federal standards for wheat to samples of export shipment as they do to domestic deliveries. Exporting firms are paid by the Japanese trading companies on the basis of the grades established at the time of loading. Export shipments are graded again when the wheat arrives for import into Japan. Japanese wheat standards are identical to U.S. standards, but wheat quality can deteriorate due to rough handling or spoilage. The Food Agency pays the Japanese trading company on the basis of the destination weight and grade, so the trading company faces the risks of deterioration. American country elevators face the same risks of grade change when shipping wheat from country locations to the export terminals.

Millers do not just ship wheat, they process it into flour, so milling qualities are entirely different from the factors used (by farmers and grain traders) to judge wheat quality A miller is concerned with how much flour he can get from the wheat and how well his customers can use the flour. Flour yield is the percentage of flour a miller can get from 100 pounds of tempered and cleaned wheat. Ash content, or the color of the flour is related to bran content, and is the main criteria used by the Japanese to grade flours [24]. Ash refers to the minerals left in the flour after the wheat has been completely combusted and is a measure of bran content. The whiter the flour, the lower the ash content. Ash is positively correlated with extraction rates, and millers want wheats with high extraction rates and low ash content. Mill time is another milling quality characteristic and refers to the number of minutes required to process each hundred weight of wheat.

Protein content is a critical factor to bakers who demand specific flours for each end use. Therefore millers have to blend wheats to get the protein levels demanded by bakers.

The quantity of water that can be added to the wheat during the tempering process is also important to millers. Tempering refers to the process of softening the bran by soaking the wheat in water until an appropriate moisture content is reached. The bran is then easier to separate from the rest of the kernel, and the resultant flour is actually heavier than the wheat with which the miller started. Millers temper Western White to 14 percent moisture before milling [31]. During the milling process, some moisture is lost and Western White flour is about 12.5 percent moisture. Some wheats absorb more water than others because they have a low moisture content to begin with or because they can stand more tempering without damage. Millers like heavy flours because water is cheaper than wheat, but bakers like to receive dry flours for the same reason.

Bakers and noodle makers also have a distinct set of quality characteristics for which they are looking in their wheat flour [31]. High water absorption capabilities is a very desirable feature. Manufacturers want the proportion of water to flour to be as high as possible in each of the products they produce. Again, water is cheaper than flour. Bakers also want the flour to be easily mixed into dough, and the dough must maintain its strength and composition during the mixing process. Protein content has been discussed before. Bakers and noodle makers are the ones who actually have to use the flour, and they are the people for whom low protein is valuable in soft wheats. Cookie spread is a very important quality characteristic for Western White Wheat. Cookie spread is a measure of the increase in the diameter of a cookie as it is baked. Cookie makers try to make cookies of a certain, consistent size so they will be attractive and will fit into boxes properly. So, consistent and predictable cookie spread is something a baker appreciates. Cake volume is a related characteristic which refers to the amount of cake a baker can get from a given quantity of flour.

The different grades of flours produced in the milling process are number one, sub number one, number two, and number three [16]. Bakers use number one and sub number one grade soft flours for making sponge cakes. Number two grade soft flours are used for making biscuits. For the most part, Western White Wheat alone is used for making these flours. Noodles are made from number one, sub number one, and number two grade ordinary flours which include Western White, Australian Standard White and Japanese domestic flours. The blending ratios change from mill to mill and from month to month as millers produce flours according to the desires of different bakers. The proportion of Western White in ordinary noodle flour can vary from 15 to 55 percent. In flours destined to be made into udon noodles, rather than other types of noodles, the proportion of Western White will be closer to 55 percent.

Pacific Northwest White Wheat maintains its strong position in the Japanese market because it fulfills the milling and baking quality characteristics desired by Japanese. The Pacific Northwest Wheat Quality Lab in Pullman, Washington continually tests new wheat varieties being developed at research stations around the region to determine how well quality standards are met. However, one of the weaknesses of the U.S. marketing system is that farmers and exporters are paid for wheat based on U.S. federal grain quality characteristics when users are really concerned with completely different quality criteria. For instance, White Wheat growers have no economic incentive to produce wheat with low protein content. Protein content is positively correlated with the use of nitrogen fertilizer, and is also affected by the variety a farmer chooses to plant. Pacific Northwest farmers choose their varieties and follow farming techniques designed to optimize yields without regard to protein content.

Portland Grain Exchange

A final note about the Portland Grain Exchange is needed to complete the description of the White Wheat marketing channel.

The Portland Grain Exchange is a cash market supported purely by dues collected from more than 40 member grain traders [5]. Traders meet in the exchange daily for usually less than a half an hour at 11:35 a.m., which is 15 minutes after the close of the futures market in Chicago. In the Exchange, bids and offers are made on all types of grain. Each wheat contract is for 20,000 bushels to be delivered at the coast within a specified time period for the price agreed on in the trading. However, the actual volume of grain traded publicly in the Grain Exchange is a small fraction of the total quantity of grain being marketed in the region. Only about 1.5 percent of Pacific Northwest grain exports are reflected in trades completed through the Portland Grain Exchange. The other 98½ percent of the grain being exported is traded privately. However, the prices prevailing in the trading sessions at the Exchange accurately reflect market conditions. Traders use the formal procedures of the Grain Exchange in bidding and offering on grain contracts to learn what other traders are seeking in the market.

CHAPTER IV

CALCULATION OF THE MARKETING MARGINS

To compute price spreads between the Pacific Northwest farmer and the Japanese consumer, the value of one bushel of White Wheat has to be calculated at each major level of the marketing chain. Average monthly price data were collected for the time period January 1968 to December 1978 in order to make these calculations.

Margins Earned by Country Elevators

The track price minus the farm price yields the margin earned by country elevators. U.S.D.A. publishes weighted averages of winter wheat prices received by farmers at major country elevators in each state [37]. For this thesis, 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 [27]. The result was 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 figure was considered to be an adequate approximation of White Wheat farm prices. The major shortcoming of these data is that they are not specific to number one grade White Wheat. As a result, the spread between the track price, which is quoted for number one White Wheat, and the farm price, overstates the true margin between country elevators and the export terminals. The error can be as large as two cents per bushel in years when average wheat quality declines significantly.

Average Pacific Northwest track prices for soft and club white wheat are published in "Grain Market News" [40] and are used here to approximate prices paid to country elevators for White Wheat delivered to the coast. Prior to 1977, White Club prices usually equaled Soft White prices. However, in 1977 shortages of Club developed and Club prices have risen since then as much as thirty cents above the track prices for Soft White. Western White has to be at least 10% Club wheat to meet U.S. federal grain standards [42]. However, the inspection process is subject to error so the exporters must blend more than ten percent Club into each load to insure that the grain inspectors will find enough Club kernels to grade the wheat correctly. The problem is made more difficult by the introduction in recent years of new Club Wheat varieties whose kernels are visually similar to Soft White kernels. Previous to about 1977, Club could be easily distinguished from Soft White. Today, the common practice in the exporting industry is to blend Western White to fifteen percent Club. Consequently, it is necessary to weight Soft White prices by .85 and Club prices by .15 and then sum the results to calculate a weighted average track price for White Wheat.

Margins Earned by Export Elevators

The margin earned by exporting firms on each bushel of white wheat sold is composed of two parts: the "fobbing charge" and the increase in margins due to efficiencies in blending wheats of various quality characteristics. The fobbing charge is the difference between the export price of number two or better Western White fob the coast, and the weighted average track price of number one Club and Soft White wheat. "Grain Market News" [40] publishes estimates of monthly average Western White export prices, as well as average track prices for each sub-class, making calculation of the fobbing charge possible.

Calculation of the increase in elevator margins made possible through blending wheat of different quality characteristics is more involved. Efficiencies through blending are made possible primarily by two intricacies in the White Wheat marketing system. First, while discounts are assessed against farmers for delivering wheat of low test weight, premiums are not paid for high test weight. Secondly, reported dockage is officially rounded down to the nearest one half of one percentage point on each sample tested, even though greater accuracy in measuring is now possible.

For instance, an elevator could buy one bushel of number one grade wheat with a test weight of 61 pounds per bushel, and one bushel of number two grade wheat with a test weight of 59 pounds per bushel. Blending would produce two bushels of number one grade wheat with test weights of 60 pounds, but the elevator would have made one penny on the discount due to low test weight charged to the farmer delivering the number two grade wheat. Since almost all export contracts specify grade number two or better, export elevators are able to dilute all the number one grade wheat, on which no premium is paid, with number two, three, four and five grade wheat and still meet contract specifications.

Farmers do not clean their wheat coming off the farm on the way to the elevator. Consequently, the true measure of dockage occurring in a large number of samples will be random. The export elevators, which gather wheat from many regions, are capable of blending wheat samples of high and low dockage to within .1 percentage point of desired dockage in order to improve their margins. As an example, an elevator can buy one bushel of wheat with actual dockage of .2 of one percent (officially rounded down to zero), and one bushel with actual dockage of .6 of one percent (officially rounded down to five-tenths). By blending the wheat, two bushels of four-tenths dockage wheat are produced (officially rounded down to zero). The elevator operator has increased his margin by the amount of dockage charged against the farmer delivering the dirtier wheat. Five-tenths of one percent of $3.45, which was the average farm price in Oregon for winter wheat in 1979, is 1.725 cents.

Country elevators can often take some advantage of the discount due to test weight. However, because of the vastly larger geographic region from which each terminal elevator draws, and the corresponding larger volume of grain handled, the bulk of the advantages gained through averaging quality characteristics of several different loads of wheat go to the export elevator operators.

Due to insufficient data, it is impossible to precisely measure the increased margins earned by particular elevator operators. It is also impossible to determine which elevators are earning the margins and which are not. However, estimates of the potential increases in margins by all elevator operators as a whole are possible using average quality statistics for each crop year.

Available wheat quality data give the proportion of each year's production in each grade category. However, the data do not reveal why wheat was graded less than number one. Wheat can be graded number two or lower for one or a combination of many reasons including low test weight, the presence of foreign material, or the presence of wheat of contrasting classes. Obviously, not all number two wheat fails to make number one grade in every test category.

Another important assumption used to calculate these figures was that the entire production of White Wheat is sold for export each year. Obviously, that is not true. But given the low rates of participation in government storage programs and the fact that most white wheat is exported, these figures can be relied on as rough estimates of the increased margins earned by an "average" export elevator.

The wheat quality statistics used in making the calculations, and the estimates of the increase in elevator margins due to blending for test weight and dockage are shown in Tables 21, 22, 23. The estimates of margin increases due to blending for test weight are made in the following manner:

Step 1. For each crop year and state, the proportion of Soft White Wheat production of each grade is recorded. The source for these data is the Pacific Northwest Wheat Quality Survey [27].

Table 21. Estimated Increases in Elevator Margins due to Efficiencies in Blending for Test Weight by State.

Crop Year	Proportion of Production in each Grade #1	#2	#3	#4	#5	Sample	Total	Increased Margins due to Blending for test wt.
			WASHINGTON					¢/bu.
69	81.2	11.3	4.0	2.5	1.0	---	100.0	.527
70	---	---	---	---	---	---	---	
71	76.8	15.5	5.2	1.8	.4	.3	100.0	.575
72	71.0	23.2	4.0	.8	.4	.6	100.0	.624
73	70.4	19.6	6.4	1.8	.8	.9	99.9	.771
74	72.6	17.6	5.1	1.9	.7	2.1	100.0	.813
75	43.6	31.4	18.3	4.2	1.2	1.3	100.0	1.568
76	39.2	34.5	21.4	3.4	.8	.8	100.1	1.597
77	52.6	28.1	12.3	3.7	1.8	1.5	100.0	1.349
78	68.0	22.0	6.8	1.5	.6	1.0	99.9	.798
79	65.3	24.0	6.9	2.3	.6	.9	100.0	.866
			IDAHO					
69	77.4	11.3	7.0	3.8	.5	---	100.0	.663
70	---	---	---	---	---	---	---	
71	75.8	17.8	4.0	1.0	.6	.8	100.0	.590
72	74.4	21.4	3.1	.7	.2	.2	100.0	.504
73	60.3	26.9	9.8	2.0	.3	.7	100.0	.950
74	64.9	26.6	6.3	1.3	.9	.5	100.5	.813
75	31.2	42.4	17.7	5.5	2.3	1.0	100.1	1.842
76	21.7	43.8	28.6	4.7	.9	.3	100.0	2.018
77	17.8	32.0	28.6	13.6	7.0	1.0	100.0	2.889
78	63.3	30.0	4.5	1.2	.2	.7	99.9	.759
79	48.6	35.7	10.6	2.7	1.0	1.4	100.0	1.275
			OREGON					
69	76.1	13.9	5.8	2.7	1.5	---	100.0	.680
70	---	---	---	---	---	---	---	
71	79.8	12.7	4.9	1.8	.8	.7	100.7	.595
72	70.4	18.7	6.5	2.1	1.4	.9	100.0	.825
73	64.9	22.5	7.1	4.0	.7	.8	100.0	.942
74	56.1	30.9	8.9	2.2	1.2	.6	99.9	1.052
75	44.7	36.8	12.3	3.8	1.3	1.1	100.0	1.405
76	36.2	21.6	26.3	10.6	3.1	2.3	100.1	2.305
77	23.5	40.3	23.6	8.0	2.9	1.7	100.0	2.272
78	51.8	24.0	10.5	7.7	4.9	1.1	100.0	1.653
79	44.0	32.0	15.2	4.7	2.5	1.6	100.0	1.630

Discount Schedule for Test Weight

Grade	#1	#2	#3	#4	#5	Sample
Average Discount	0.0¢	1.5¢	3.5¢	5.5¢	8.0¢	10.0¢

Source of Wheat Quality Data: "Quality Wheat" Pacific Northwest Grain Standards and Quality Committee, Various issues.

Table 22. Estimated Increases in Elevator Margins due to Efficiencies in Blending for Dockage by State.

Crop Year	Average Actual Dockage	Dockage Earned by Farmers	Gross Dockage Earned by Elevators (assumed)	Net Dockage Earned by Elevators	Average fob Western White Export Price following harvest		Increased Margins due to Blending for Dockage cents/bushel
	WASHINGTON						
69	.8%	.3	.4	.1	8/69-7/70	$1.52	.152
70	--	--	--	--			
71	.9%	.4	.4	.0	8/71-7/72	1.63	0
72	.8%	.3	.4	.1	8/72-7/73	2.69	.269
73	1.3%	.3	.4	.1	8/73-7/74	5.14	.514
74	1.1%	.1	.4	.3	8/74-7/75	4.39	1.317
75	1.0%	.0	.4	.4	8/75-7/76	3.94	1.576
76	1.0%	.0	.4	.4	8/76-7/77	3.02	1.208
77	1.0%	.0	.4	.4	8/77-7/78	3.30	1.320
78	.9%	.4	.4	.0	8/78-7/79	3.96	0
79	1.3%	.3	.4	.1	8/79-2/80	4.37	.437
	IDAHO						
69	1.3%	.3	.4	.1			.152
70				.			
71	1.2%	.2	.4	.2			.326
72	1.1%	.1	.4	.3			.807
73	1.3%	.3	.4	.1			.514
74	1.3%	.3	.4	.1			.439
75	1.4%	.4	.4	.0			0
76	1.3%	.3	.4	.1			.320
77	1.2%	.2	.4	.2			.660
78	1.1%	.1	.4	.3			1.188
79	1.7%	.2	.4	.2			.874
	OREGON						
69	.9%	.4	.4	.0			0
70							
71	1.2%	.2	.4	.2			.326
72	1.2%	.2	.4	.2			.538
73	1.2%	.2	.4	.2			1.028
74	1.4%	.4	.4	.0			0
75	2.0%	0	.4	.4			1.576
76	1.1%	.1	.4	.3			.906
77	1.9%	.4	.4	.0			0
78	3.2%	.2	.4	.2			.792
79	.8%	.3	.4	.1			.437

Table 23. Weighted Average Increase in Elevator Margins due to Efficiencies in Blending for the Pacific Northwest Region.

Crop Year	State Totals of Efficiencies Due to Dockage and Testweight	Proportion of Soft White Wheat Production by State
	cents/bushel	
	WASHINGTON	
69	.68	58%
70	---	---
71	.58	61%
72	.89	63%
73	1.28	53%
74	2.13	55%
75	3.14	60%
76	2.81	58%
77	2.67	55%
78	.80	57%
79	1.30	54%
	IDAHO	
69	.81	24%
70	---	---
71	.92	21%
72	1.31	18%
73	1.46	23%
74	1.25	20%
75	1.84	16%
76	2.32	17%
77	3.55	19%
78	1.95	21%
79	2.15	20%
	OREGON	
69	.68	18%
70	---	---
71	.92	18%
72	1.36	19%
73	1.97	24%
74	1.05	24%
75	2.98	24%
76	3.21	25%
77	2.27	26%
78	2.44	22%
79	2.07	26%

Weighted Average Total for the Region by Crop Year

Crop Year	cents/bu.
69	.71
70	
71	.71
72	1.05
73	1.49
74	1.67
75	2.89
76	2.83
77	2.73
78	1.40
79	1.67

Step 2. The discount applicable to each grade is determined. Farmers delivering number one grade wheat suffer no discount. Farmers delivering number two grade wheat are charged either one cent or two cents discount depending on the actual test weight of their wheat. Thus the average discount for number two wheat is 1.5 cents. Similarly, the average discount for number three wheat is 3.5 cents. The average for number four wheat is 5.5 cents, and the average for number five wheat is 8 cents. The average discount for sample grade wheat with less than 51 pounds test weight was estimated to be 10 cents.

Step 3. The discount due to test weight for each state and crop year is calculated by multiplying the proportion of production of each grade by the average discount charged on that grade and then summing each grade. For example, the estimate of discounts earned due to test weight on Soft White Wheat grown in Washington in the 1971 crop year equals:

$$(.768 \times 0.0) + (.155 \times 1.5) + (.052 \times 3.5) +$$
$$(.018 \times 5.5) + (.004 \times 8.0) + (.003 \times 10.0) =$$
$$.575 \text{ cents per bushel.}$$

Dockage rivals test weight in importance to farmers and elevator operators, and estimates of increased margins earned due to dockage are made in the following manner:

Step 1. The average actual dockage in Soft White wheat samples from each state and crop year is recorded. This information is found in the Pacific Northwest Wheat Quality Survey [27].

Step 2. The actual dockage is rounded down to the nearest five-tenths of one percent to get the average official dockage. The amount rounded down represents the potential average increase in farm earnings due to dockage. For example, if the average actual dockage coming off farms is .7 percent, farmers will have made an extra .2 percent.

Step 3. Since the export elevators have the capacity to clean and blend wheats to precise dockage levels, it is assumed that they always earn the full .4 percent dockage allowed to them under present grading standards.

Step 4. The difference between what elevators earn and what they have to pay farmers is the net dockage earned by elevators. For example, if the average actual dockage in Soft White Wheat is .7 percent, farmers would earn .2 percent on average, and the elevators would earn an average of .2 percent (.4 - .2 = .2).

Step 5. The average export price charged by the exporting firms is calculated for the twelve-months period following each harvest, and then multiplied by the net dockage earned by the elevators. The result is an estimate of increased margins earned by exporting firms due to dockage, assuming all the wheat produced is exported within twelve months after harvest. As an example, an estimate of the increased margins due to dockage on Soft White Wheat grown in Washington in the 1972 crop year would be: \$2.69 (per bushel fob the coast) x .001 (dockage) = .269 cents per bushel.

The potential increases in margins due to test weight and dockage are summed for each crop year using the wheat quality data from each state. The weighted average potential increase in elevator margins for the Pacific Northwest region for each crop year is obtained by weighting each state total by the proportion of White Wheat production in that state each crop year. For the 1971 crop, the estimated increase in elevator margins is .71 cents as calculated here and shown in Table 23:

$$(.58^{¢} * .61) + (.92^{¢} * .21) + (.92^{¢} * .18) = .71^{¢}$$

Assuming all of the efficiencies due to blending accrue to export elevators, the total marketing margin earned at the export level is the sum of the fobbing charge and the efficiencies from blending. The increased margins earned by blending wheat in elevators is a measure of the efficiency of the U.S. grain industry. If the elevators were unable to earn money by blending, farm prices would be forced lower.

Margins Earned by Trading Firms and the Food Agency

Since the Japanese trading firms and the Food Agency in no way transform the wheat they market, their margins are easily figured. The Japanese Food Agency maintains records on both the cif prices charged by trading companies and the resale price charged by the Food Agency for Western White wheat [45]. The cif Japan price represents the price the Japanese Food Agency actually pays to the trading company for the landed wheat. The resale price is the price the Food Agency charges to millers. Both prices are reported in yen per metric ton and so must be transformed into dollars per bushel using average currency exchange rates each month. When the yen/dollar exchange rate is changing rapidly, the calculated dollar value of wheat prices in Japan can change even though the price in yen is constant. However, the use of exchange rates is necessary when calculating the retail-farm price spread.

The trading firm's margin is the difference between the average cif price and the average fob price from the exporting firms. The Food Agencies' margin equals the resale price minus the cif price.

Margins Earned by Japanese Millers

Millers buy wheat from the Food Agency and sell milled flour and mill feeds to their customers. The margin earned by a miller is equal to the price received for one bushel's worth of flour and mill-feeds minus the resale price. Therefore, the conversion ratio between one bushel of Western White Wheat and milled products must be determined.

Dockage material and damaged kernels account for about 98.6 percent of each 60 lb. bushel of wheat from the Pacific Northwest, and when cleaned out, an average of 59.2 pounds of wheat are actually available to the miller for processing [24]. The dockage and damaged material is blended with the bran, left over after the wheat is milled, and fed to cattle. American wheat is considered "dirty" on international markets because the dockage is not cleaned out of it, and ocean freight has to be paid on that material. Australia and Canada do clean their export wheat before loading.

Also contained in each bushel of White Wheat is water. The moisture content of Western White Wheat varies between 9 and 11 percent [27]. This characteristic is considered very "dry," thus good, and more than makes up for the dockage in the wheat. The average moisture content of Western White is 9.5 percent of the cleaned wheat. Millers "temper" this wheat by soaking it in water for several hours until the moisture content is raised. Millers actually temper Western White to about 14 percent, but water is lost in the milling process as most of it remains in the bran [31]. Western White flour contains only 12.5% moisture, but the bran is about 13% moisture. In calculating the weight of tempered wheat available to the miller, the weight of the cleaned wheat is adjusted to account for an increase in moisture to 14%. On the average, one bushel of tempered Western White weighs 62.3 pounds, and extraction rates are applied to this figure.

Western White Wheat is used primarily in making two kinds of flours, noodle flour and confectionary flour. Noodle flour is made by blending Western White with wheats from Japan and Australia. However, the only other ingredients in Japanese noodles besides flour are water and salt. Confectionary flour is almost exclusively Western White wheat, but the final products, like biscuits and especially sponge cakes, contain other expensive ingredients like eggs and butter [24]. Therefore, for the purposes of this thesis, it was assumed that the bushel of White Wheat being studied was milled into noodle flour.

Since millers refuse to divulge their recipes, there is no way of knowing the proportion of Western White in the noodle flour. If it were possible to know the prices and the proportions of all ingredients in each consumer product made with wheat, it would not matter which product was chosen to study. It is assumed that businessmen will adjust their recipes and production until the value of the marginal product of Western White Wheat in noodles is equal to the value of the marginal product of Western White Wheat in other products.

The problem is that all the prices and recipes are not known, and no product is made solely from Pacific Northwest White Wheat. However, by choosing dry udon noodles as the consumer product to use in calculating wheat price transformations, good estimates of the true value added in the marketing process can be made.

Assuming an average extraction rate of 72 percent, 44.8 pounds of noodle flour can be made from 62.2 pounds of tempered white wheat, leaving 17.4 pounds of lowgrade flour and mill feeds. These figures have to be adjusted for decreases in moisture content, and consequently, 44.0 pounds of 12.5% moisture flour and 17.2 pounds of other material at 13% moisture are the actual result of the milling process. The .8 pounds of dockage and damaged material, when added to the 17.2 pounds of other material, results 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. 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 out as mill feeds for the purposes of determining the value of one bushel of Western White Wheat in the marketing chain.

The value of one bushel of White Wheat in the form of milled flour and mill feeds is then calculated as:

[(yen/kg. of flour) x (kg./pounds) x (cents/yen) x (pounds of flour/bushel of wheat)] + [(yen/kg. of mill feed) x (kg./pounds) x (cents/yen) x (pounds of mill feed/bushel of wheat)] = cents/bushel.

These calculations are made using monthly prices of flour and mill feeds at the miller's level in Japan [45].

Margins Earned by Wholesalers, Noodle Factories and Retailers

From mills, noodle flour and mill feeds 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 [45].

Again, dried udon noodles were chosen as the final consumer product to study for the purposes of determining the retail-farm price spread since only water and salt are added to the flour in the noodle factory. The only other "ingredients" that consumers buy with the dried udon noodles are packaging materials. Noodles are usually packaged in plastic bags or cellophane and these materials do not significantly inflate the retail prices paid by consumers.

The value of one bushel of wheat at retail in the form of udon noodles and mill feeds is calculated in the following manner:

$$\frac{\text{Yen}}{\text{kg. noodles}} * \frac{\text{kg. noodles}}{\text{kg. flour}} * \frac{\text{kg.}}{\text{lb.}} * \frac{\text{lbs. flour}}{\text{bu. wheat}} *$$

$$\frac{\text{cents}}{\text{Yen}} + \frac{\text{Yen}}{\text{kg. mill-feeds}} * \frac{\text{kg.}}{\text{lb.}} *$$

$$\frac{\text{lbs. mill feeds}}{\text{bu. wheat}} * \frac{\text{cents}}{\text{Yen}} = \frac{\text{cents}}{\text{bu. wheat}}$$

This is the estimated final value of one bushel of Western White Wheat when sold at retail in Japan. 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. Therefore, about 20.6 kilograms of dried udon noodles can be made from one bushel of Western White Wheat.

Total Farm-Retail Price Spread

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 that the estimated value added could be computed on the same average bushel of wheat at each step. 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 will arrive 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 left the farm. The farm-retail price spread is the difference between the farm price and the retail value, seven months later, of one bushel of wheat.

Analysis of the Marketing Margins

The calculated prices, marketing margins, and the proportions of each consumer dollar earned by each marketing level are presented in tables that follow. The total White Wheat marketing margin has grown steadily from about \$4.50 in 1968 to about \$23.50 in 1978. During the same time period, the proportion of each consumer dollar received by farmers rose from about 22 percent in 1968 to 40 or even 50 percent for a few months in 1973 and 1974, and then fell steadily to about 14 percent in 1978. In December of 1978, average farm prices were \$3.37 and average retail prices were \$28.39 for one bushel's worth of Western White Wheat.

The margins earned at each level of the marketing chain vary widely, depending on the relative quantities of labor and transportation services which must be provided. 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. Prior to 1973, the difference between track prices and farm prices averaged between three and four percent of each consumer dollar spent. After 1973,

Table 24. Average Annual Prices in the White Wheat Market Between the Pacific Northwest and Japan in Dollars per Bushel.

Calendar 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	1.43	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	1.70	1.67	1.70	1.90	2.70	3.30	7.32
1972	1.93	1.93	1.97	2.28	3.06	3.73	8.65
1973	3.72	3.75	3.90	4.98	3.48	4.30	11.07
1974	4.59	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 25. Annual Average Marketing Margins in the White Wheat Market Between the Pacific Northwest and Japan in Dollars per Bushel.

Calendar Year	Farm To Track	Track To Export		Export To Import	Import To Resale	Resale To Miller	Miller To Retail
		Fobbing Charge	Effi-ciencies in blending				
1968	.21	.01	--	.44	.59	.41	2.69
1969	.18	.02	.0080	.47	.69	.46	2.84
1970	.21	.02	--	.43	.58	.48	3.07
1971	.21	.03	.0071	.23	.69	.57	3.70
1972	.21	.04	.0105	.13	.85	.63	4.43
1973	.28	.14	.0149	.23	-.91	.80	5.67
1974	.29	.18	.0167	1.09	-2.23	1.12	9.33
1975	.27	.07	.0289	1.17	-1.08	1.41	11.79
1976	.25	.05	.0283	1.01	0.00	1.31	10.97
1977	.31	.05	.0273	.77	2.12	2.16	10.62
1978	.39	.05	.0143	.73	2.60	3.04	13.15

Table 26. Annual Average Proportion of Each Consumer Dollar Received at Each Level in the White Wheat Market Between the Pacific Northwest and Japan.

Calendar 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	.13	.02	.00	.04	.11	.11	.57
1978	.14	.02	.00	.03	.11	.13	.57

the proportion going to country elevators averaged between one and two percent of retail prices.

The fobbing charge by exporters averaged two or three cents per bushel prior to 1973. In 1973, the fobbing charge rose to an average of 14 cents. In 1974, it rose to an average of 18 cents. However, the fobbing charge averaged a steady five cents per bushel from 1976 to 1978.

The potential increases in margins made possible by efficiencies in blending have grown from less than one cent per bushel in the early 1970's to more than 2.5 cents per bushel in 1975, 1976, and 1977. Average test weight per bushel on newer white wheat varieties has fallen since 1970 making larger margin increases possible. As a proportion of each consumer dollar spent, the fobbing charge usually represents less than one percent. In 1973 and 1974, when the fobbing charge rose as high as 30 cents per bushel, the proportion of each consumer dollar going to exporters was about three percent. As the fobbing charge has fallen to about five cents per bushel on average, the exporter's margin has become a very small portion of the total marketing bill.

The margins earned by Japanese trading firms and ocean transportation companies in delivering wheat to Japan cif are extremely erratic according to these data. The estimated margins earned vary between -$1.00 to $3.12 during some months, and no explanation can be given for the results. However, some causes of the variation could be due to changes in ocean freight rates, changing exchange rates, hidden subsidies from the Japanese Government, or perhaps trading companies are taking losses on some shipments in order 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 was gradually decreased by the Food Agency. However, from April 1973 until June 1976, the Food Agency actually subsidised 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.

The marketing margins earned by millers, wholesalers, noodle factories and retailers 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, 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 up significantly over the average in 1968 of about 53 percent. Prior to June of 1977, millers received a fairly consistent eight or nine percent of each consumer dollar. However in that month, the miller's share rose to 14 percent and held at an average of 13 or 14 percent through December of 1978. The proportion of each consumer dollar received by wholesaling, baking and retailing firms rose to a high of 69 percent in February of 1976. After that month, the retail proportion fell gradually to an average of about 57 percent.

There are several reasons why the proportion of consumer spending received by farmers has fallen so sharply since 1975. First, the Food Agency raised its resale price in 1976. Secondly, the yen strengthened against the dollar between 1975 and 1978. In December of 1975, the exchange rate was .32715 cents per yen. In December of 1978, the exchange rate was .51038 cents per yen. This meant that even if consumer prices remained steady in yen, the prices in dollars were rising. Between January of 1977 and December of 1978, the retail price in dollars for a bushel of wheat transformed into 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 three 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.

However, 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 of 1976 and February of 1980, yet retail prices of udon noodles in Japan, in yen, still rose about eight percent. So other factors related to the general inflation in Japan must be contributing to the rise in consumer prices.

George and King, 1971, have explained that there are two basic types of price spreads in agricultural marketing chains [9]. Margins can be specified as either constant percentages of farm or retail prices, or margins can be absolute spreads between farm and retail prices. The total marketing margin equals the difference between retail and farm prices:

$$Pr = Pf + M$$

where Pr is the retail price,

Pf is the farm price, and

M is the marketing margin.

A margin as a constant percentage of the retail price can be expressed as:

$$M = kPr$$

where k is a proportion. In this case,

$$Pr = Pf + kPr$$

$$Pf = (1-k)Pr.$$

If a marketing margin consists of an absolute number of cents per quantity marketed, the margin can be expressed as:

$$M = a + bQ$$

$$Pr = Pf + a + bQ$$

$$Pf = Pr - a - bQ.$$

It is likely that any given margin is a combination of both percentage markups and absolute spreads. George and King used the following notation to express this type of margin:

$$M = A + BPr$$

$$Pr = Pf + M$$

$$Pr = Pf + A + BPr$$

$$Pf = -A + (1-B)Pr$$

$$Pf = a + bPr$$

where $a = -A$, and

$b = (1-B)$.

A derived demand model can be used to illustrate the assumed relationship between the retail level demand for udon noodles in Japan and farm level demand for wheat in the Pacific Northwest. The demand for wheat is defined here as the highest price that will be paid for each possible quantity of the commodity offered within a given time period, all variables other than quantity held constant.

In figure 4 the retail demand in country A for finished goods containing soft white wheat is given, along with a curve representing the cost of supplying marketing services at the retail level. As used here, all costs, including opportunity costs, associated with producing the finished products are represented in the supply of marketing services curve. Only the cost of purchasing White Wheat as an input is excluded from the cost curve. Assuming businessmen at each level purchase quantities of wheat as inputs such that the value of the marginal product of wheat equals the cost of wheat, the vertical distance between the supply curve and the retail demand curve represents the most that wholesalers could afford to pay for each

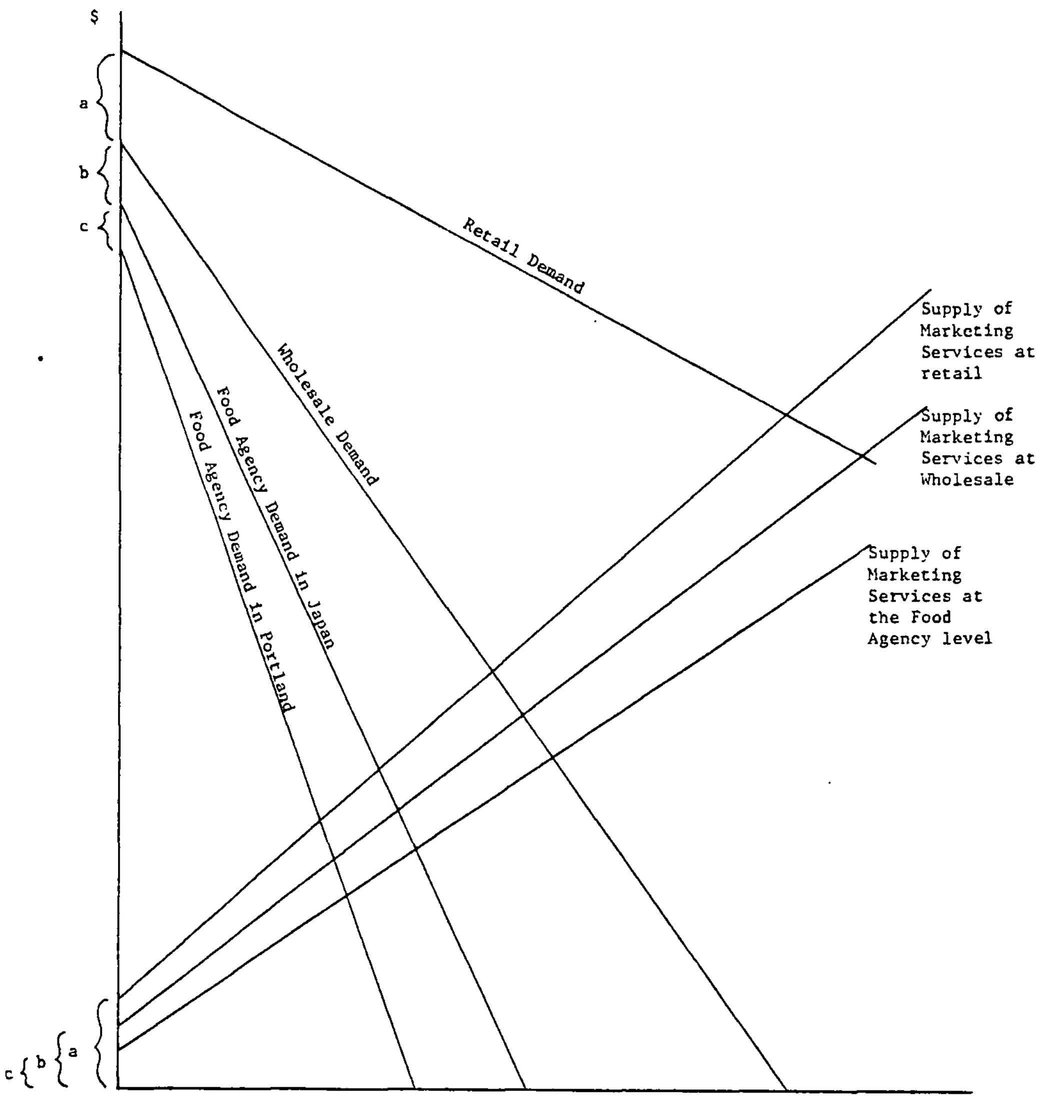


Figure 4. The Derivation of Japanese Demand for Soft White Wheat in Portland.

quantity of wheat. By repeatedly subtracting the costs of marketing services at each marketing level, the potential demand from country A for Soft White Wheat at the farm level, or at any other level, can be derived.

For this thesis, margins at each step in the White Wheat marketing channel were thought to be a combination of an absolute number of cents per bushel handled, plus a percentage of the market price at the next highest step in the marketing channel. Thus, the following six regression equations were specified:

1) Pf = a + bPt

2) Pt = a + bPe

3) Pe = a + bPi

4) Pi = a + bPr

5) Pr = a + bPm

6) Pm = a + bPx

where Pf = average monthly farm price of winter wheat in the Pacific Northwest,

Pt = average monthly track price on White Wheat,

Pe = monthly average export price on Western White Wheat fob,

Pi = monthly average import price on Western White cif Japan, lagged two months, in dollars,

Pr = monthly average resale price on Western White, in dollars, lagged five months,

Pm = monthly average miller's price for one bushel's worth of White Wheat products, in dollars, lagged five months,

Px = monthly average retail price for one bushel's worth of White Wheat products, in dollars, lagged six months.

Using ordinary least squares with data covering the years 1968 to 1978, the following results were obtained:

<u>The Margin Between Track and Farm Prices</u>

1) $Pf = -.174 + .970Pt$

$t \quad (-11.271) \quad (193.164)$

$R^2 = .997$

Durbin Watson = 1.099

Autocorrelation was indicated so a correction was made using an iterative procedure.

1a) $Pf = -.183 + .974Pt$

$t \quad (-7.038) \quad (115.972)$

$R^2 = .998$

Durbin Watson = 2.258

Autocorrelation was no longer indicated and both coefficients were significant at the 95 percent confidence level. Therefore the structure of the marketing margin between farm and track prices was calculated as:

$-A = -.183 \qquad (1-B) = .974$

$A = .183 \qquad B = .026$

$$Mt = A + BPt$$

$$Mt = .183 + .026Pt$$

For the eleven-year period covered by the data, the margin between farm and track prices averaged about 18 cents plus 2.6 percent of the track price.

The Margin Between Export and Track Prices

2) $Pt = .048 + .962Pe$

$t = (5.346) \quad (334.886)$

$R^2 = .999$

Durbin Watson = .451

After correcting for autocorrelation:

2a) $Pt = .063 + .957Pe$

$t = (3.38) \quad (165.36)$

$R^2 = .999$

Durbin Watson = 2.278

$-A = .063 \qquad (1-B) = .957$

$A = -.063 \qquad B = .043$

$$Me = -.063 + .043Pe$$

The results of model 2a indicate that over the period from 1968 to 1978, the margin between export prices and track prices averaged about 4.3 percent of the export price less six cents.

<u>The Margin Between Japanese Import Prices and U.S. Export Prices</u>

3) Pe = .180 + .771Pi

t (1.86) (30.508)

R^2 = .891

Durbin Watson = 1.044

A correction for autocorrelation was needed:

3a) Pe = .387 + .706Pi

t (3.162) (21.907)

R^2 = .969

Durbin Watson = 1.570

Positive autocorrelation was still indicated by the Durbin Watson score so a second iteration was tried in an attempt to correct it:

3b) Pe = 2.510 + .867Pi

t (13.595) (8.045)

R^2 = .907

Durbin Watson = .863

The results of the second correction for autocorrelation were disappointing. The change in the Durbin Watson test value and the change in the coefficient on the constant term between models 3a and 3b indicated that misspecification and not autocorrelation was the problem. Further, due to missing data, the lagging of variables in each iteration to correct for autocorrelation caused additional cases to be deleted from the file of residuals. As a result, the calculated value of $\hat{p}$ would not converge with further attempts to correct the problem. While recognizing that additional work is needed on the nature of the margin earned by Japanese trading firms, model 3a was deemed the best of the three models which had been completed. Using model 3a:

$-A = .387$ $\qquad$ $(1-B) = .706$

$A = -.387$ $\qquad$ $B = .294$

$Mi = -.387 + .294Pi$

The margin between import prices cif Japan and export prices fob the U.S. is approximately 29 percent of the import price less 39 cents.

<u>The Margin Between Resale Prices and Import Prices</u>

4) $Pi = 1.251 + .572Pr$

$t = (3.565) \quad (6.832)$

$R^2 = .290$

Durbin Watson = .089

After one iteration to correct for autocorrelation:

4a) $Pi = 1.995 + .378Pr$

$t \quad (3.836) \quad (3.282)$

$R^2 = .733$

Durbin Watson = 1.090

After a second iteration to correct for autocorrelation:

4b) $Pi = -.765 + .153Pr$

$t \quad (-2.080) \quad (2.958)$

$R^2 = .62$

Durbin Watson = 1.256

Following the same reasoning used in analyzing the results of models 3, 3a, and 3b, model 4a was chosen as best. Additional research is needed to properly specify a model explaining the margin between resale prices and import prices in Japan. The Food Control Account budget and a cost of living index for Japan are two variables which might be included in such a model. Using model 4a:

$-A = 1.99 \qquad (1-B) = .378$

$A = -1.99 \qquad B = .622$

$Mr = -1.99 + .622Pr$

The margin between resale prices and import prices was an average of 62 percent of the resale price less $1.99 over the range of the data.

The Margin Between Mill Prices and Resale Prices

5) $Pr = .652 + .639Pm$

$t \quad (23.135) \quad (127.053)$

$R^2 = .993$

Durbin Watson = .540

After one iteration to correct for autocorrelation:

5a) $Pr = .759 + .621Pm$

t (6.758) (32.277)

$R^2 = .985$

Durbin Watson = 2.729

After a second iteration to correct for autocorrelation:

5b) $Pr = .410 + .632Pm$

t (9.018) (47.051)

$R^2 = .993$

Durbin Watson = 2.114

$-A = .410$ $(1-B) = .632$

$A = -.410$ $B = .368$

$Mm = .410 + .368Pm$

The improvement in the Durbin Watson score on the second correction combined with the relatively small changes in the coefficients following each iteration, support the use of model 5b to explain the margin between miller's prices and resale prices. This margin is about 37 percent of miller's prices less 41 cents.

The Margin Between Retail Prices and Miller's Prices

6) $Pm = .690 + .355Px$

t (4.419) (31.561)

$R^2 = .897$

Durbin Watson = .105

After one iteration to correct for autocorrelation:

6a) $Pm = 2.465 + .240Px$

t (4.188) (7.532)

$R^2 = .754$

Durbin Watson = 1.695

$-A = 2.465$ $(1-B) = .240$

$A = -2.465$ $B = .760$

$Mx = -2.465 + .760Px$

The margin between miller's prices and retail prices averaged 76 percent of the retail price less $2.46 over the period of study.

To conclude briefly, the margins earned at the track and export levels in the U.S. and at the mill and retail levels in Japan appear to conform to the general specification suggested by George and King. That is, marketing firms at those levels seem to seek a combination of a percentage markup and an absolute margin. However, the form of the margins at the import and resale levels in Japan are not as easily explained and further research in those areas is needed.

CHAPTER V

ESTIMATION OF THE ELASTICITIES OF PRICE TRANSMISSION

As explained in Chapter I, the elasticity of price transmission is a tool which can be used to better understand the relationships between margins earned in a marketing channel. George and King [9] define the elasticity of price transmission as the ratio of the relative change in retail prices to the relative change in farm level prices. The relationship can be written as:

$$E = \frac{dPr}{dPf} * \frac{Pf}{Pr}$$

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 for consumer products through retailers and wholesalers to producers by purchasing products which best satisfy their wants subject to budget constraints.

Competitive markets and rational business practices force businessmen in each marketing firm to purchase wheat as an input such that the value of the marginal product of wheat equals the cost of wheat. Thus prices offered to farmers should represent the most that marketing firms can afford to pay for wheat products. As consumer's willingness to pay changes, farm prices should change to stimulate greater or less production. If consumer demand is not communicated in this way, then computed values for the elasticity of price transmission will be no more than statistical relationships.

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:

$$Eij = \frac{M_t^i - M_{t-j}^i}{M_{t-j}^i} \div \frac{F_t - F_{t-j}}{F_{t-j}}$$

where E_{ij} = 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.

If firms in the marketing chain are striving to earn a set percentage mark-up 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 would be increasing their percentage mark-ups. If the elasticity of price transmission is zero, retail and farm prices must be unrelated.

Due to 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 between 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 tables 27 and 28 and in the Appendix:

EFT = the elasticity between track and farm prices,

EFE = the elasticity between export and track 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 miller's prices in yen and farm prices,

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

The results of the estimated elasticities of price transmission, given a one month lag, are listed in Appendix VI, along with the mean and standard deviation at each marketing level. There are 132 months between January of 1968 and December of 1978. For each month of lag allowed in the calculations, one observation is lost, in addition to the observations lost due to missing data and the occurance of zeros in some of the denominators. Mean values of EFT and EFE are close to 1.0, although the variance of each mean is large. The means of EFI and EFID are both negative, indicating that the lag between export and import prices is at least two months. 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.

In table 27, the means and standard deviations of the calculated elasticities at each marketing level for lag times extending to 12 months are given. 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 approach zero.

Table 28 shows statistics computed after outlying observations in the lists of calculated elasticities of price transmission at each marketing level are removed. Any calculated elasticity less than -4.0 and greater than 5.0 was deleted from each file and the means and standard deviations of the reduced files were calculated to get a better idea of where the values were clustering.

Using the statistics computed on the reduced files, the elasticities of price transmission at the track and export levels, excluding five and three observations out of 129 valid observations in each file, approach .9, with three months adjustment allowed. The standard deviations calculated on the full files are small enough to reject the

Table 27. 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 O EFIO	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=2.59			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	.689	.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	-

Table 28. Elasticities of Price Transmission Between Farms in the Pacific Northwest and Various Levels in the Marketing Chain Using Only Observations Greater than -4.0 and Less than 5.0.

Length of lag (months)		Track EFT	Export EFE	Import ¥ EFI	Import D EFID	Resale EFR	Millers EFM	Retail EFX
1	Mean	.765	.857	.475	.481	.068	-.019	.029
	Standard deviation	.940	1.144	1.022	1.198	.441	.799	.660
	Missing cases	5	5	28	27	2	1	8
	Number of outliers	4	4	12	11	1	0	4
2	Mean	.864	.966	.464	.632	.014	.005	.054
	Standard deviation	.802	1.328	1.183	1.050	.313	.712	.894
	Missing cases	8	15	29	29	6	8	12
	Number of outliers	5	11	10	10	3	5	5
3	Mean	.915	.900	.362	.282	.056	.042	.048
	Standard deviation	.670	.765	1.288	1.327	.519	.751	.830
	Missing cases	8	6	31	27	6	8	12
	Number of outliers	5	3	12	8	3	5	5
		t=15.2	t=13.2					
4	Mean	.836	.837	.380	.517	-.042	.051	.159
	Standard deviation	.891	.842	1.280	1.130	.642	.931	1.025
	Missing cases	7	7	31	30	7	8	14
	Number of outliers	3	3	14	13	3	4	6
5	Mean	.921	.889	.385	.534	-.093	-.108	.052
	Standard deviation	.591	.654	1.389	1.034	.763	.939	.893
	Missing cases	9	9	23	27	8	10	15
	Number of outliers	4	4	4	8	3	5	6
6	Mean	.828	.829	.487	.553	-.157	-.179	.089
	Standard deviation	.633	.645	1.179	1.015	.637	.964	1.130
	Missing cases	8	8	32	29	9	9	13
	Number of outliers	2	2	10	7	3	3	3
7	Mean	.913	.902	.352	.553	-.100	-.113	.009
	Standard deviation	.444	.440	1.201	.992	.750	.982	.898
	Missing cases	8	8	29	26	8	10	17
	Number of outliers	1	1	6	3	1	3	6
8	Mean	.906	.919	.438	.577	-.144	-.169	.092
	Standard deviation	.415	.390	1.097	.965	.533	.878	.987
	Missing cases	9	10	30	27	11	10	17
	Number of outliers	1	2	6	3	3	2	5
9	Mean	.944	.966	.573	.692	-.141	-.155	.069
	Standard deviation	.568	.435	1.088	.951	.636	.861	.877
	Missing cases	10	10	29	27	11	12	19
	Number of outliers	1	1	6	4	2	3	6
10	Mean	.945	.968	.581	.731	-.114	-.109	.096
	Standard deviation	.426	.319	1.065	.899	.800	.873	.836
	Missing cases	12	12	30	27	12	14	24
	Number of outliers	2	2	5	2	2	4	10
11	Mean	.919	.947	.485	.635	-.068	-.029	.232
	Standard deviation	.625	.438	1.093	1.006	.936	.923	.825
	Missing cases	12	12	34	30	12	15	23
	Number of outliers	1	1	7	3	1	4	8
12	Mean	.925	.908	.696	.714	-.067	-.060	.204
	Standard deviation	.377	.529	1.080	.945	.840	.955	.748
	Missing cases	13	12	30	28	16	17	23
	Number of outliers	1	0	3	1	4	5	—

hypotheses at the 95 percent confidence level that the mean calculated elasticities at the track and export levels, with only one month 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.

At the import level, a large number of observations lie outside the range -4.0 to 5.0, therefore the results are less clear. Using the statistics computed on the full files, the mean of EFID with six months lag is about .6, with a standard deviation of 3.467. Due to 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.

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 hypotheses that the means of EFR, EFM or EFX equals 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 supports the findings from Chapter IV that the marketing margins are 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 suggests again 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 miller's 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.

CHAPTER VI

CONCLUSIONS AND SUMMARY

In Chapter I of this thesis, five questions were asked relating to the marketing of White Wheat between the Pacific Northwest and Japan. The five questions have been answered in Chapters IV and V. The average marketing margins between 1968 and 1978 are listed again.

The margin between track prices and farm prices:

$Mt = .183 + .026Pt$

The margin between export prices and track prices:

$Me = -.063 + .043Pe$

The margin between import prices and export prices:

$Mi = -.387 + .294Pi$

The margin between resale prices and import prices:

$Mr = -1.99 + .622Pr$

The margin between miller's prices and resale prices:

$Mm = -.410 + .368Pm$

The margin between retail prices and miller's prices:

$Mx = -2.465 + .760Px$

Since the coefficients of the constant terms and on the slope terms are significant, it can be concluded that each margin is a combination of percentage markups and an absolute markup. However, the negative intercept terms and problems in correcting for autocorrelation indicate that additional work is needed in specifying each margin. The most likely explanatory variable which could be included is quantity marketed at each level, but obtaining monthly average data on quantities of wheat, by class, marketed off farms and from country elevators, will be very difficult. Another explanation of the negative intercept terms is that at very low prices in the marketing chain, marketing margins are squeezed to zero as firms are unable to pass costs either up or down the chain. More work also needs to be done to determine whether or not the margins at each level have changed over time.

The average elasticities of price transmission between export prices and farm prices and between track prices and farm prices are both approximately .9, although the variance of the mean at the export level is greater than 1.0 with a lag of less than three months. The average elasticity of price transmission at the import price level is approximately .6 with a six month lag. 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 improvements 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 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 calculated elasticity between resale prices, mill prices and retail prices in Japan and farm prices in the U.S. is zero, even with an adjustment period extending to 12 months. Consequently, consumer demand theory can not be used to explain short run changes in Japanese Food Agency demand for White Wheat from the Pacific Northwest. Certainly Japanese Food Agency demand must be influenced by long run trends in consumer demand, and future research could be aimed at determining how long an adjustment period is necessary before U.S. farm prices are affected by changes in Japanese demand at retail.

Farm level demand is derived from export level demand directly, and Japanese import level demand can also affect Pacific Northwest farm level demand, although to a lesser degree. Consequently, changes in the costs of marketing wheat to the track, export and import levels will affect farm prices. In 1968, the average margin between White Wheat import prices in Japan and Pacific Northwest farm prices was about 66 cents. In 1978, the average margin was 117 cents, or 51 cents higher than in 1968. It is generally assumed that short run supply of an annual crop is less elastic than short run demand. However, given the Japanese system of annual import plans, that may not be true in the Pacific Northwest White Wheat market. More importantly, long run White Wheat supply may be more elastic than long run demand, and future research could be aimed at determining whether the Japanese

Food Agency and other importers or White Wheat farmers have absorbed the bulk of increased marketing costs.

A final observation is that the values for the elasticities of price transmission at the track and export levels, being close to 1.0, indicate that the pricing behavior of marketing firms in the U.S. conforms to patterns that would be expected in effectively competitive markets. Rumors of collusion and the exercise of monopoly power by the major exporting firms are not supported by the findings of this thesis.

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APPENDICES

APPENDIX I

Arithmetic Statements Used in Making Computations

```
RUN NAME        APPENDIX
VARIABLE LIST   X1,X2,X3,X4,X5,X6,X7,X8,X9,X10,X11,X12,X13,X14,X15,X16,X17,X18,
                X19,X20,X21
INPUT MEDIUM    CARD
N OF CASES      132
INPUT FORMAT    FIXED(F2.0,F2.0,6F3.2,2F5.0,2F4.0,F3.0,F4.0,F5.5,3F2.2,3F3.3)

ACCORDING TO YOUR INPUT FORMAT, VARIABLES ARE TO BE READ AS FOLLOWS
```

VARIABLE	FORMAT	RECORD	COLUMNS
X1	F 2. 0	1	1- 2
X2	F 2. 0	1	3- 4
X3	F 3. 2	1	5- 7
X4	F 3. 2	1	8- 10
X5	F 3. 2	1	11- 13
X6	F 3. 2	1	14- 16
X7	F 3. 2	1	17- 19
X8	F 3. 2	1	20- 22
X9	F 5. 0	1	23- 27
X10	F 5. 0	1	28- 32
X11	F 4. 0	1	33- 36
X12	F 4. 0	1	37- 40
X13	F 3. 0	1	41- 43
X14	F 4. 0	1	44- 47
X15	F 5. 5	1	48- 52
X16	F 2. 2	1	53- 54
X17	F 2. 2	1	55- 56
X18	F 2. 2	1	57- 58
X19	F 3. 3	1	59- 61
X20	F 3. 3	1	62- 64
X21	F 3. 3	1	65- 67

```
THE INPUT FORMAT PROVIDES FOR  21 VARIABLES.   21 WILL BE READ.
IT PROVIDES FOR  1 RECORDS (*CARDS*) PER CASE.
A MAXIMUM OF    67 *COLUMNS* ARE USED ON A RECORD.

MISSING VALUE   X9(00000)/X14(0000)
PRINT FORMATS   X1,X2(0)/X3 TO X8(2)/X9 TO X14(0)/X15(5)/X16 TO X18(2)/
                X19 TO X21(3)
COMPUTE         PF=(X3*X19)+(X4*X16)+(X5*X17)
COMPUTE         PT=(X6*.85)+(X7*.15)
COMPUTE         PIY=X9/36.7437
COMPUTE         PIO=(PIY * X15)*.01
COMPUTE         PRY=X10/36.7437
COMPUTE         PRO=(PRY * X15)*.01
COMPUTE         AM=(X16*X19)+(X17*X20)+(X18*X21)
COMPUTE         TW=(59.16 -(59.16*AM))/.86
COMPUTE         NF14=TW*.72
COMPUTE         NF12=(NF14-(NF14*.14))/.875
COMPUTE         MF14=(TW-NF14)
COMPUTE         MF13=((MF14-(MF14*.14))/.87)*.84
COMPUTE         PMY =((X11/55.11555)*NF12)+ ((X12/66.13866)*MF13)
COMPUTE         PMO =  (PMY*X15)*.01
COMPUTE         PXY =  (X13*.463*NF12)+((X14/30)*(MF13/2.204622))
COMPUTE         PXO =(PXY*X15)*.01
ASSIGN MISSING  PF TO PXO(999)
PRINT FORMATS   PF,PT(2)/PIY(0)/PIO(2)/PRY(0)/PRO(2)/AM TO MF13(3)/PMY(0)/PMO(2)/
                PXY(0)/PXO(2)
COMPUTE         PFL =  LAG(PF)
COMPUTE         PTL =  LAG(PT)
COMPUTE         X3L =  LAG(X3)
COMPUTE         PIYL=  LAG(PIY)
COMPUTE         PIOL =  LAG(PIO)
COMPUTE         PIO2L =  LAG(PIOL)
COMPUTE         PRYL    = LAG(PRY)
COMPUTE         PROL=LAG(PRO)
```

```
COMPUTE          PRO2L=LAG(PROL)
COMPUTE          PRO3L=LAG(PRO2L)
COMPUTE          PRO4L=LAG(PRO3L)
COMPUTE          PRO5L=LAG(PRO4L)
COMPUTE          PMYL  = LAG(PMY)
COMPUTE          PMOL=LAG(PMO)
COMPUTE          PMO2L=LAG(PMOL)
COMPUTE          PMO3L=LAG(PMO2L)
COMPUTE          PMO4L=LAG(PMO3L)
COMPUTE          PMO5L=LAG(PMO4L)
COMPUTE          PXYL  = LAG(PXY)
COMPUTE          PXOL=LAG(PXO)
COMPUTE          PXO2L=LAG(PXOL)
COMPUTE          PXO3L=LAG(PXO2L)
COMPUTE          PXO4L=LAG(PXO3L)
COMPUTE          PXO5L=LAG(PXO4L)
COMPUTE          PXO6L=LAG(PXO5L)
COMPUTE          MT=PT-PF
COMPUTE          ME=X8-PT
COMPUTE          MI=PIO2L-X8
COMPUTE          MR=PRO5L-PIO2L
COMPUTE          MM=PMO5L-PRO5L
COMPUTE          MX=PXO6L-PMO5L
COMPUTE          TOTALM=PXO6L-PF
COMPUTE          FPRCF=PF/PXO6L
COMPUTE          TPRCF=MT/PXO6L
COMPUTE          EPRCF=ME/PXO6L
COMPUTE          IPRCF=MI/PXO6L
COMPUTE          RPRCF=MR/PXO6L
COMPUTE          MPRCF=MM/PXO6L
COMPUTE          XPRCF=MX/PXO6L
COMPUTE          EFT=((PT-PTL)/PTL)/((PF-PFL)/PFL)
COMPUTE          EFE=((X8-X8L)/X8L)/((PF-PFL)/PFL)
COMPUTE          EFI=((PIY-PIYL)/PIYL)/((PF-PFL)/PFL)
COMPUTE          EFIO = ((PIO-PIOL)/PIOL)/((PF-PFL)/PFL)
COMPUTE          EFR=((PRY-PRYL)/PRYL)/((PF-PFL)/PFL)
COMPUTE          EFM=((PMY-PMYL)/PMYL)/((PF-PFL)/PFL)
COMPUTE          EFX=((PXY-PXYL)/PXYL)/((PF-PFL)/PFL)
ASSIGN MISSING   PFL TO EFX(999)
PRINT FORMAT     PFL TO EFX(2)
LIST CASES       CASES = 132/
                 VARIABLES = X1 TO X5
CONDESCRIPTIVE X5
STATISTICS       1
READ INPUT DATA

00034400 CM NEEDED FOR CONDESCRIPTIVE

OPTION - 1
IGNORE MISSING VALUE INDICATORS
(NO MISSING VALUES DEFINED...OPTION 1 WAS FORCED)
```

APPENDIX II

Data used in the Computation of
Market Prices, Marketing Margins and
the Elasticities of Price Transmission

LEGEND

x1	Month
x2	Year
x3	Oregon Winter Wheat Farm Prices $/bu.
x4	Washington Winter Wheat Farm Prices $/bu.
x5	Idaho Winter Wheat Farm Prices $/bu.
x6	Soft White Wheat Track Prices $/bu.
x7	Club White Wheat Track Prices $/bu.
x8	Western White Wheat import price cif Japan Yen/Mt.
x9	Western White Wheat Resale price Yen/Mt.
x10	Noodle flour mill price Yen/25 Kg.
x11	Mill feeds mill price Yen/30 Kg.
x12	Dried udon noodles retail price Yen/Kg.
x13	Mill feed retail price Yen/30 Kg.
x14	Exchange rate cents/Yen
x15	Washington proportion of White Wheat production
x16	Idaho proportion of White Wheat production
x17	Oregon proportion of White Wheat production
x18	Average moisture in Washington wheat
x19	Average moisture in Idaho wheat
x20	Average moisture in Oregon wheat

CASE-NO	X1	X2	X3	X4	X5
1	1.	68.	1.46	1.46	1.36
2	2.	68.	1.50	1.52	1.33
3	3.	68.	1.45	1.49	1.36
4	4.	68.	1.42	1.44	1.34
5	5.	68.	1.40	1.43	1.31
6	6.	68.	1.40	1.43	1.29
7	7.	68.	1.33	1.33	1.19
8	8.	68.	1.27	1.27	1.12
9	9.	68.	1.22	1.30	1.04
10	10.	68.	1.24	1.30	1.09
11	11.	68.	1.30	1.32	1.14
12	12.	68.	1.28	1.31	1.16
13	1.	69.	1.30	1.31	1.22
14	2.	69.	1.32	1.32	1.24
15	3.	69.	1.29	1.33	1.24
16	4.	69.	1.26	1.29	1.24
17	5.	69.	1.29	1.30	1.24
18	6.	69.	1.29	1.31	1.25
19	7.	69.	1.27	1.25	1.21
20	8.	69.	1.23	1.22	1.14
21	9.	69.	1.24	1.23	1.23
22	10.	69.	1.27	1.27	1.24
23	11.	69.	1.31	1.30	1.27
24	12.	69.	1.34	1.34	1.30
25	1.	70.	1.36	1.35	1.31
26	2.	70.	1.35	1.33	1.27
27	3.	70.	1.36	1.35	1.28
28	4.	70.	1.40	1.39	1.29
29	5.	70.	1.39	1.35	1.30
30	6.	70.	1.37	1.35	1.28
31	7.	70.	1.34	1.31	1.25
32	8.	70.	1.34	1.34	1.22
33	9.	70.	1.43	1.42	1.29
34	10.	70.	1.45	1.47	1.37
35	11.	70.	1.53	1.54	1.43
36	12.	70.	1.57	1.56	1.47
37	1.	71.	1.57	1.57	1.47
38	2.	71.	1.57	1.58	1.44
39	3.	71.	1.56	1.59	1.45
40	4.	71.	1.56	1.56	1.42
41	5.	71.	1.63	1.65	1.43
42	6.	71.	1.61	1.57	1.45
43	7.	71.	1.46	1.48	1.37
44	8.	71.	1.38	1.34	1.26
45	9.	71.	1.35	1.33	1.27
46	10.	71.	1.38	1.39	1.30
47	11.	71.	1.41	1.36	1.35
48	12.	71.	1.39	1.39	1.35
49	1.	72.	1.40	1.38	1.35
50	2.	72.	1.39	1.39	1.34
51	3.	72.	1.42	1.41	1.36
52	4.	72.	1.49	1.45	1.40
53	5.	72.	1.55	1.54	1.41
54	6.	72.	1.50	1.46	1.37
55	7.	72.	1.47	1.44	1.34
56	8.	72.	1.56	1.60	1.45
57	9.	72.	1.87	1.91	1.65
58	10.	72.	2.15	2.24	1.64
59	11.	72.	2.35	2.41	2.05
60	12.	72.	2.60	2.72	2.41
61	1.	73.	2.60	2.67	2.43
62	2.	73.	2.30	2.28	2.14
63	3.	73.	2.40	2.40	2.18
64	4.	73.	2.43	2.45	2.16
65	5.	73.	2.43	2.45	2.20
66	6.	73.	2.95	2.91	2.51
67	7.	73.	3.10	3.06	2.59
68	8.	73.	4.70	4.33	4.49
69	9.	73.	4.95	5.10	4.54
70	10.	73.	4.60	4.39	4.24
71	11.	73.	4.53	4.57	4.18

CASE-NO	X1	X2	X3	X4	X5
72	12.	73.	4.90	5.10	4.55
73	1.	74.	5.54	5.56	5.26
74	2.	74.	5.78	5.89	5.45
75	3.	74.	5.26	5.20	4.92
76	4.	74.	4.12	4.11	3.77
77	5.	74.	3.63	3.54	3.11
78	6.	74.	4.00	3.97	3.44
79	7.	74.	4.42	4.35	3.98
80	8.	74.	4.38	4.30	3.96
81	9.	74.	4.35	4.25	4.02
82	10.	74.	4.94	4.91	4.50
83	11.	74.	4.92	4.88	4.53
84	12.	74.	4.76	4.70	4.43
85	1.	75.	4.34	4.35	4.03
86	2.	75.	4.09	4.12	3.70
87	3.	75.	3.67	3.67	3.26
88	4.	75.	3.62	3.67	3.23
89	5.	75.	3.23	3.29	3.00
90	6.	75.	3.02	3.11	2.61
91	7.	75.	3.62	3.65	3.17
92	8.	75.	3.99	4.01	3.65
93	9.	75.	4.05	4.12	3.76
94	10.	75.	4.03	4.01	3.70
95	11.	75.	3.58	3.60	3.29
96	12.	75.	3.51	3.50	3.20
97	1.	76.	3.61	3.61	3.20
98	2.	76.	3.90	3.79	3.35
99	3.	76.	3.71	3.72	3.31
100	4.	76.	3.52	3.55	3.20
101	5.	76.	3.33	3.41	3.16
102	6.	76.	3.47	3.34	3.17
103	7.	76.	3.39	3.41	3.16
104	8.	76.	3.12	3.13	2.80
105	9.	76.	3.07	3.03	2.76
106	10.	76.	2.84	2.81	2.42
107	11.	76.	2.75	2.75	2.34
108	12.	76.	2.55	2.56	2.25
109	1.	77.	2.56	2.55	2.40
110	2.	77.	2.63	2.67	2.54
111	3.	77.	2.73	2.66	2.50
112	4.	77.	2.61	2.69	2.55
113	5.	77.	2.70	2.60	2.39
114	6.	77.	2.49	2.55	2.44
115	7.	77.	2.63	2.50	2.40
116	8.	77.	2.65	2.50	2.44
117	9.	77.	2.55	2.55	2.26
118	10.	77.	2.50	2.45	2.30
119	11.	77.	2.69	2.64	2.47
120	12.	77.	2.67	2.70	2.57
121	1.	78.	2.65	2.83	2.65
122	2.	78.	3.03	2.95	2.80
123	3.	78.	3.13	3.21	2.66
124	4.	78.	3.26	3.22	3.03
125	5.	78.	3.26	3.37	3.03
126	6.	78.	3.35	3.41	2.93
127	7.	78.	3.42	3.45	3.01
128	8.	78.	3.42	3.46	3.21
129	9.	78.	3.51	3.43	3.14
130	10.	78.	3.45	3.40	3.05
131	11.	78.	3.48	3.42	3.00
132	12.	78.	3.46	3.42	3.11

CASE-NO	X6	X7	X9	X10	X11
1	1.66	1.66	26435.	34640.	1097.
2	1.70	1.70	26435.	34640.	1100.
3	1.56	1.66	26435.	34640.	1101.
4	1.63	1.63	26435.	34640.	1097.
5	1.60	1.60	26435.	34640.	1097.
6	1.60	1.60	26435.	34640.	1098.
7	1.45	1.45	26435.	34640.	1097.
8	1.45	1.45	26435.	34650.	1097.
9	1.45	1.45	26435.	34650.	1105.
10	1.46	1.40	26435.	34650.	1114.
11	1.40	1.40	26435.	34650.	1120.
12	1.45	1.49	26435.	34650.	1121.
13	1.45	1.49	25365.	34650.	1121.
14	1.46	1.43	25365.	34650.	1121.
15	1.46	1.46	25365.	34650.	1121.
16	1.40	1.46	25365.	34650.	1120.
17	1.46	1.48	25365.	34460.	1116.
18	1.46	1.49	25365.	34460.	1114.
19	1.42	1.42	25365.	34460.	1113.
20	1.35	1.39	25365.	34460.	1110.
21	1.40	1.40	25365.	34460.	1109.
22	1.44	1.44	25365.	34460.	1111.
23	1.47	1.47	25365.	34460.	1114.
24	1.51	1.51	25365.	34460.	1118.
25	1.53	1.53	27113.	34460.	1115.
26	1.52	1.52	27113.	34460.	1115.
27	1.53	1.53	27113.	34460.	1118.
28	1.55	1.55	27113.	34460.	1119.
29	1.57	1.57	27113.	34460.	1120.
30	1.57	1.57	27113.	34460.	1117.
31	1.53	1.53	27113.	34460.	1121.
32	1.53	1.53	27113.	34460.	1133.
33	1.59	1.59	27113.	34460.	1150.
34	1.63	1.63	27113.	34460.	1154.
35	1.72	1.72	27113.	34460.	1154.
36	1.77	1.77	27113.	34460.	1154.
37	1.76	1.75	22544.	34460.	1151.
38	1.77	1.77	22544.	34460.	1151.
39	1.77	1.77	22544.	34460.	1152.
40	1.77	1.77	27071.	34460.	1153.
41	1.83	1.83	26660.	34460.	1152.
42	1.75	1.75	20472.	34460.	1147.
43	1.60	1.60	20465.	34530.	1148.
44	1.55	1.55	-0	34530.	1149.
45	1.54	1.55	24167.	34530.	1152.
46	1.56	1.55	23624.	34530.	1150.
47	1.55	1.55	22108.	34530.	1151.
48	1.56	1.56	-0	34530.	1151.
49	1.57	1.57	22220.	34530.	1154.
50	1.57	1.57	22394.	34530.	1161.
51	1.60	1.60	22333.	34530.	1172.
52	1.70	1.70	22770.	34530.	1133.
53	1.74	1.74	22602.	34530.	1164.
54	1.67	1.67	22816.	34530.	1134.
55	1.61	1.61	22503.	33690.	1186.
56	1.62	1.62	22702.	33690.	1188.
57	2.12	2.12	28073.	33690.	1136.
58	2.41	2.41	31814.	33690.	1137.
59	2.54	2.54	32445.	33690.	1186.
60	2.78	2.78	31962.	33690.	1137.
61	2.60	2.60	-0	33690.	1139.
62	2.56	2.56	31162.	33690.	1136.
63	2.59	2.59	323[illegible]	33690.	1136.
64	2.61	2.61	33365.	33690.	1165.
65	2.77	2.75	-0	33690.	1137.
66	3.13	3.13	40013.	33690.	1138.
67	3.43	3.43	42101.	33690.	1139.
68	4.86	4.33	57607.	33670.	1130.
69	5.20	5.20	70475.	33670.	1134.
70	4.96	4.95	-0	33670.	1134.
71	4.81	4.81	66716.	33670.	1136.

CASE-NO	X6	X7	X9	X10	X11
72	5.27	5.27	70266.	45760.	1200.
73	5.72	5.72	75717.	45760.	1724.
74	6.01	6.01	-0	45760.	1727.
75	5.26	5.26	-0	45760.	1725.
76	4.19	4.19	77349.	45760.	1718.
77	3.69	3.69	52000.	45760.	1718.
78	4.30	4.30	60419.	45760.	1717.
79	4.66	4.66	65346.	45760.	1717.
80	4.57	4.57	63793.	45250.	1720.
81	4.57	4.58	64926.	45250.	1721.
82	5.17	5.19	72980.	45250.	1721.
83	5.16	5.19	74144.	45250.	1722.
84	5.01	5.04	71047.	45250.	1721.
85	4.45	4.49	60538.	45250.	1717.
86	4.15	4.19	54648.	45250.	1715.
87	3.94	3.95	-0	45250.	1715.
88	3.68	3.68	47970.	45250.	1711.
89	3.48	3.48	45571.	45250.	1715.
90	3.33	3.33	44177.	45250.	1711.
91	3.79	3.79	53122.	45250.	1713.
92	4.27	4.27	58529.	45200.	1706.
93	4.39	4.39	59643.	45200.	1705.
94	4.23	4.23	60622.	45200.	1706.
95	3.85	3.85	55563.	45200.	1706.
96	3.73	3.73	52380.	45200.	1706.
97	3.80	3.80	52326.	45200.	1706.
98	4.03	4.03	53958.	53220.	1962.
99	3.90	3.90	53063.	53220.	2045.
100	3.71	3.71	49160.	53220.	2046.
101	3.55	3.55	47722.	53220.	2044.
102	3.60	3.60	49031.	53220.	2040.
103	3.58	3.57	48453.	60660.	2041.
104	3.35	3.35	45766.	60660.	2277.
105	3.25	3.25	44275.	60660.	2298.
106	3.02	3.02	42105.	60660.	2298.
107	2.94	2.93	41044.	60660.	2299.
108	2.78	2.78	39209.	60660.	2298.
109	2.88	2.88	33722.	60660.	2596.
110	2.96	2.99	39715.	60660.	2587.
111	2.95	2.96	35416.	60660.	2586.
112	2.96	2.98	38272.	60650.	2584.
113	2.93	2.95	35076.	60660.	2587.
114	2.79	2.80	35647.	60650.	2586.
115	2.88	2.90	35832.	60600.	2588.
116	2.86	2.92	36451.	60660.	2587.
117	2.80	2.81	36034.	60650.	2586.
118	2.75	2.75	33618.	60600.	2586.
119	2.91	2.94	34228.	60660.	2589.
120	2.97	3.12	34111.	60660.	2589.
121	3.17	3.40	35911.	60600.	2589.
122	3.33	3.54	37313.	60660.	2589.
123	3.41	3.51	36655.	60660.	2590.
124	3.62	3.73	37604.	60650.	2590.
125	3.60	3.65	37794.	60660.	2589.
126	3.60	3.69	34648.	60660.	2590.
127	3.74	3.83	34726.	60660.	2590.
128	3.72	3.80	32514.	60260.	2589.
129	3.77	3.86	33391.	60260.	2590.
130	3.76	3.90	32428.	60260.	2590.
131	3.76	4.01	33251.	60260.	2590.
132	3.71	3.95	33013.	60260.	2590.

CASE-NO	X12	X13	X14	X15	X16
1	796.	90.	901.	.26120	.61
2	798.	90.	901.	.27616	.61
3	800.	90.	901.	.27620	.61
4	800.	91.	901.	.27603	.61
5	801.	91.	901.	.27604	.61
6	800.	91.	901.	.27635	.61
7	799.	91.	901.	.27740	.61
8	797.	91.	901.	.27803	.61
9	795.	91.	901.	.27839	.59
10	797.	92.	901.	.27890	.59
11	796.	92.	901.	.27925	.59
12	799.	92.	901.	.27940	.59
13	797.	92.	905.	.27934	.59
14	778.	93.	905.	.27945	.59
15	799.	93.	905.	.27935	.59
16	799.	93.	905.	.27917	.59
17	797.	93.	905.	.27899	.59
18	795.	94.	905.	.27830	.59
19	793.	96.	905.	.27809	.59
20	786.	95.	905.	.27810	.59
21	789.	96.	905.	.27905	.59
22	790.	95.	905.	.27911	.58
23	794.	96.	905.	.27951	.58
24	796.	96.	905.	.27953	.58
25	797.	96.	927.	.27946	.58
26	801.	96.	927.	.27950	.58
27	803.	95.	927.	.27963	.58
28	812.	96.	927.	.27926	.58
29	811.	96.	927.	.27852	.58
30	806.	99.	927.	.27864	.58
31	806.	95.	927.	.27826	.58
32	809.	98.	927.	.27915	.58
33	812.	107.	927.	.27935	.60
34	816.	109.	927.	.27945	.60
35	817.	110.	927.	.27956	.60
36	819.	111.	927.	.27959	.60
37	825.	110.	939.	.27932	.60
38	828.	110.	939.	.27959	.60
39	827.	112.	939.	.27971	.60
40	825.	112.	939.	.27972	.60
41	824.	112.	939.	.27979	.60
42	819.	112.	939.	.27979	.60
43	805.	112.	939.	.27930	.60
44	814.	112.	939.	.28113	.60
45	813.	112.	939.	.29533	.61
46	812.	112.	942.	.30202	.61
47	812.	112.	940.	.30416	.61
48	809.	114.	943.	.31249	.61
49	751.	114.	941.	.31578	.61
50	758.	114.	936.	.32759	.61
51	715.	114.	923.	.33054	.61
52	666.	114.	899.	.32943	.61
53	616.	114.	876.	.32854	.61
54	610.	114.	852.	.33070	.61
55	606.	116.	843.	.33219	.61
56	608.	119.	854.	.33204	.61
57	622.	119.	831.	.33209	.63
58	652.	119.	837.	.33221	.63
59	671.	119.	846.	.33224	.63
60	696.	119.	855.	.33196	.63
61	727.	120.	870.	.33135	.63
62	747.	125.	893.	.36041	.63
63	761.	126.	925.	.36190	.63
64	758.	129.	932.	.37666	.63
65	733.	134.	930.	.37785	.63
66	722.	139.	919.	.37808	.63
67	724.	139.	922.	.37801	.63
68	753.	137.	930.	.37704	.63
69	734.	135.	967.	.37568	.63
70	819.	136.	980.	.37547	.63
71	827.	142.	988.	.35941	.53

CASE-NO	X12	X13	X14	X15	X16
72	837.	143.	1001.	.35632	.53
73	917.	199.	1062.	.33559	.53
74	931.	228.	1164.	.34367	.53
75	914.	231.	1139.	.35454	.53
76	917.	232.	1141.	.36001	.53
77	911.	233.	1152.	.35347	.53
78	909.	234.	1150.	.35340	.53
79	913.	236.	1149.	.34372	.53
80	922.	235.	1154.	.33062	.53
81	951.	234.	1181.	.33439	.55
82	987.	234.	1206.	.33404	.55
83	1013.	235.	1237.	.33325	.55
84	1034.	234.	1257.	.33288	.55
85	1061.	235.	1292.	.33370	.55
86	1064.	234.	1306.	.34294	.55
87	1056.	234.	1309.	.34731	.55
88	1024.	234.	1304.	.34224	.55
89	1000.	234.	1291.	.34314	.55
90	969.	234.	1277.	.34077	.55
91	989.	232.	1262.	.33741	.55
92	987.	232.	1255.	.33560	.55
93	994.	231.	1259.	.33345	.60
94	1020.	230.	1272.	.33076	.60
95	1051.	230.	1291.	.33053	.60
96	1071.	230.	1307.	.32715	.60
97	1056.	231.	-0	.32326	.60
98	1091.	231.	-0	.33157	.60
99	1085.	233.	1319.	.33275	.60
100	1079.	236.	1324.	.33433	.60
101	1091.	238.	1319.	.33444	.60
102	1124.	238.	1357.	.33424	.60
103	1169.	238.	1392.	.33940	.60
104	1207.	237.	1450.	.34410	.60
105	1231.	241.	1455.	.34600	.58
106	1256.	245.	1466.	.34344	.58
107	1276.	246.	1482.	.33579	.58
108	1281.	246.	1502.	.33933	.58
109	1277.	250.	1533.	.34359	.58
110	1273.	251.	1546.	.35037	.58
111	1277.	251.	1553.	.35637	.58
112	1273.	251.	1565.	.36339	.58
113	1264.	252.	1563.	.350[illegible]	.58
114	1261.	253.	1571.	.36052	.58
115	1248.	253.	1571.	.37755	.58
116	1224.	253.	1560.	.37499	.58
117	1225.	255.	1543.	.37436	.55
118	1206.	256.	1540.	.39253	.55
119	1190.	256.	1534.	.40672	.55
120	1155.	256.	1524.	.41491	.55
121	1107.	255.	1469.	.41431	.55
122	1076.	256.	1430.	.41603	.55
123	1035.	259.	1403.	.43143	.55
124	1013.	256.	1367.	.45034	.55
125	1012.	256.	1356.	.44215	.55
126	1009.	256.	1347.	.46744	.55
127	1014.	256.	1347.	.50101	.55
128	994.	256.	1308.	.53002	.55
129	975.	256.	1280.	.52696	.57
130	963.	256.	1263.	.54478	.57
131	958.	258.	1257.	.52066	.57
132	952.	257.	1254.	.51038	.57

CASE-NO	X17	X18	X19	X20	X21
1	.23	.16	.095	.100	.100
2	.23	.16	.095	.100	.100
3	.23	.16	.095	.100	.100
4	.23	.16	.095	.100	.100
5	.23	.16	.095	.100	.100
6	.23	.16	.095	.100	.100
7	.23	.16	.095	.100	.100
8	.23	.16	.095	.100	.100
9	.25	.16	.095	.100	.100
10	.25	.16	.095	.100	.100
11	.25	.16	.095	.100	.100
12	.25	.16	.095	.100	.100
13	.25	.16	.095	.100	.100
14	.25	.16	.095	.100	.100
15	.25	.15	.095	.100	.100
16	.25	.16	.095	.100	.100
17	.25	.16	.095	.100	.100
18	.25	.16	.095	.100	.100
19	.25	.16	.095	.100	.100
20	.25	.16	.095	.100	.100
21	.24	.18	.092	.099	.096
22	.24	.18	.092	.099	.096
23	.24	.18	.092	.099	.096
24	.24	.18	.092	.099	.096
25	.24	.18	.092	.099	.096
26	.24	.18	.092	.099	.096
27	.24	.18	.092	.099	.096
28	.24	.18	.092	.099	.096
29	.24	.18	.092	.099	.096
30	.24	.18	.092	.099	.096
31	.24	.18	.092	.099	.096
32	.24	.18	.092	.099	.096
33	.23	.17	.095	.093	.095
34	.23	.17	.095	.093	.095
35	.23	.17	.095	.093	.095
36	.23	.17	.095	.093	.095
37	.23	.17	.095	.093	.095
38	.23	.17	.095	.093	.095
39	.23	.17	.095	.093	.095
40	.23	.17	.095	.093	.095
41	.23	.17	.095	.093	.095
42	.23	.17	.095	.093	.095
43	.23	.17	.095	.093	.095
44	.23	.17	.095	.093	.095
45	.21	.18	.087	.094	.092
46	.21	.18	.087	.094	.092
47	.21	.18	.087	.094	.092
48	.21	.18	.087	.094	.092
49	.21	.18	.087	.094	.092
50	.21	.18	.087	.094	.092
51	.21	.18	.087	.094	.092
52	.21	.18	.087	.094	.092
53	.21	.18	.087	.094	.092
54	.21	.18	.087	.094	.092
55	.21	.18	.087	.094	.092
56	.21	.18	.087	.094	.092
57	.18	.19	.094	.097	.094
58	.18	.19	.094	.097	.094
59	.18	.19	.094	.097	.094
60	.18	.19	.094	.097	.094
61	.18	.19	.094	.097	.094
62	.18	.19	.094	.097	.094
63	.18	.19	.094	.097	.094
64	.18	.19	.094	.097	.094
65	.18	.19	.094	.097	.094
66	.18	.19	.094	.097	.094
67	.18	.19	.094	.097	.094
68	.18	.19	.094	.097	.094
69	.23	.24	.085	.084	.090
70	.23	.24	.083	.084	.090
71	.23	.24	.083	.084	.090

CASE-NO	X17	X18	X19	X20	X21
72	.23	.24	.085	.084	.090
73	.23	.24	.085	.084	.090
74	.23	.24	.085	.084	.090
75	.23	.24	.085	.084	.090
76	.23	.24	.085	.084	.090
77	.23	.24	.085	.084	.090
78	.23	.24	.085	.084	.090
79	.23	.24	.085	.084	.090
80	.23	.24	.085	.084	.090
81	.20	.25	.093	.091	.101
82	.20	.25	.093	.091	.101
83	.20	.25	.093	.091	.101
84	.20	.25	.093	.091	.101
85	.20	.25	.093	.091	.101
86	.20	.25	.093	.091	.101
87	.20	.25	.093	.091	.101
88	.20	.25	.093	.091	.101
89	.20	.25	.093	.091	.101
90	.20	.25	.093	.091	.101
91	.20	.25	.093	.091	.101
92	.20	.25	.093	.091	.101
93	.16	.24	.110	.117	.121
94	.16	.24	.110	.117	.121
95	.16	.24	.110	.117	.121
96	.16	.24	.110	.117	.121
97	.16	.24	.110	.117	.121
98	.16	.24	.110	.117	.121
99	.16	.24	.110	.117	.121
100	.16	.24	.110	.117	.121
101	.16	.24	.110	.117	.121
102	.16	.24	.110	.117	.121
103	.16	.24	.110	.117	.121
104	.16	.24	.110	.117	.121
105	.17	.25	.111	.119	.125
106	.17	.25	.111	.119	.125
107	.17	.25	.111	.119	.125
108	.17	.25	.111	.119	.125
109	.17	.25	.111	.119	.125
110	.17	.25	.111	.119	.125
111	.17	.25	.111	.119	.125
112	.17	.25	.111	.119	.125
113	.17	.25	.111	.119	.125
114	.17	.25	.111	.119	.125
115	.17	.25	.111	.119	.125
116	.17	.25	.111	.119	.125
117	.19	.26	.093	.098	.094
118	.19	.26	.093	.098	.094
119	.19	.26	.093	.098	.094
120	.19	.26	.093	.098	.094
121	.19	.26	.093	.098	.094
122	.19	.26	.093	.098	.094
123	.19	.26	.093	.098	.094
124	.19	.26	.093	.098	.094
125	.19	.26	.093	.098	.094
126	.19	.26	.093	.098	.094
127	.19	.26	.093	.098	.094
128	.19	.26	.093	.098	.094
129	.21	.22	.096	.102	.102
130	.21	.22	.096	.102	.102
131	.21	.22	.096	.102	.102
132	.21	.22	.096	.102	.102

APPENDIX III

Market Prices at the Farm, Track, Export, Import, Resale, Mill and Retail Levels

LEGEND

X8	fob Pacific Northwest Western White export prices $/bu.
PF	Weighed average P.N.W. farm prices $/bu.
PT	Weighed average P.N.W. White Wheat track prices $/bu.
PIY	cif Japan Western White import prices Yen/bu.
PID	cif Japan Western White import prices $/bu.
PRY	Resale prices Western White Yen/bu.
PRD	Resale prices Western White $/bu.
PMY	Miller's prices Western White flour and mill feeds Yen/bu.
PMD	Miller's prices Western White flour and mill feeds $/bu.
PXY	Retail prices dried udon noodles Yen/bu.
PXD	Retail prices dried udon noodles $/bu.

APPENDIX

CASE-NO	X8	PF	PT	PIY	PIC	PRY
1	1.68	1.44	1.66	719.	1.86	943.
2	1.72	1.43	1.70	719.	1.99	943.
3	1.65	1.45	1.60	719.	1.99	943.
4	1.63	1.41	1.63	719.	1.99	943.
5	1.62	1.40	1.60	719.	1.99	943.
6	1.60	1.39	1.50	719.	1.99	943.
7	1.50	1.30	1.45	719.	2.00	943.
8	1.47	1.24	1.4[illegible]	719.	2.00	943.
9	1.46	1.22	1.45	719.	2.00	943.
10	1.47	1.24	1.46	719.	2.01	943.
11	1.50	1.27	1.45	719.	2.01	943.
12	1.49	1.27	1.49	719.	2.01	943.
13	1.49	1.29	1.45	690.	1.93	943.
14	1.50	1.33	1.46	690.	1.93	943.
15	1.47	1.24	1.46	690.	1.93	943.
16	1.46	1.25	1.46	690.	1.93	943.
17	1.46	1.23	1.45	690.	1.93	943.
18	1.50	1.29	1.49	690.	1.92	943.
19	1.45	1.25	1.42	690.	1.92	938.
20	1.41	1.20	1.38	690.	1.92	938.
21	1.42	1.23	1.40	690.	1.93	938.
22	1.46	1.26	1.44	690.	1.93	938.
23	1.49	1.29	1.47	690.	1.93	938.
24	1.53	1.33	1.51	690.	1.93	938.
25	1.55	1.34	1.53	738.	2.06	938.
26	1.54	1.32	1.52	738.	2.06	938.
27	1.55	1.34	1.53	738.	2.06	938.
28	1.61	1.37	1.56	738.	2.06	938.
29	1.60	1.35	1.57	738.	2.06	938.
30	1.59	1.34	1.57	738.	2.06	938.
31	1.54	1.30	1.53	738.	2.05	938.
32	1.55	1.31	1.53	738.	2.05	938.
33	1.63	1.39	1.59	738.	2.06	938.
34	1.66	1.44	1.63	738.	2.06	938.
35	1.74	1.51	1.72	738.	2.05	938.
36	1.79	1.54	1.77	738.	2.06	938.
37	1.80	1.55	1.79	614.	1.71	938.
38	1.80	1.55	1.77	614.	1.72	938.
39	1.79	1.55	1.77	614.	1.72	938.
40	1.79	1.54	1.77	737.	2.06	938.
41	1.86	1.52	1.83	726.	2.03	938.
42	1.76	1.55	1.75	720.	2.02	938.
43	1.64	1.40	1.60	720.	2.02	940.
44	1.59	1.33	1.55	999.	999.00	940.
45	1.56	1.32	1.5[illegible]	658.	1.95	940.
46	1.60	1.37	1.56	643.	1.94	940.
47	1.58	1.35	1.55	604.	1.64	940.
48	1.56	1.33	1.56	999.	999.00	940.
49	1.61	1.39	1.57	605.	1.93	940.
50	1.60	1.39	1.57	603.	2.00	940.
51	1.62	1.40	1.60	609.	2.01	940.
52	1.73	1.46	1.70	620.	2.04	940.
53	1.75	1.51	1.74	615.	2.02	940.
54	1.71	1.45	1.67	621.	2.05	940.
55	1.64	1.42	1.61	613.	2.03	917.
56	1.85	1.56	1.82	613.	2.05	917.
57	2.17	1.86	2.12	764.	2.54	917.
58	2.45	2.15	2.41	866.	2.83	917.
59	2.60	2.33	2.54	983.	2.93	917.
60	2.83	2.64	2.78	870.	2.89	917.
61	2.89	2.61	2.80	999.	999.00	917.
62	2.66	2.26	2.56	848.	3.06	917.
63	2.65	2.36	2.59	895.	3.42	917.
64	2.66	2.40	2.61	903.	3.42	917.
65	2.86	2.41	2.77	999.	999.00	917.
66	3.25	2.85	3.13	1089.	4.12	917.
67	3.33	2.98	3.43	1143.	4.34	917.
68	5.12	4.74	4.88	1559.	5.92	916.
69	5.46	4.94	5.20	1318.	7.22	916.
70	5.26	4.74	4.96	999.	999.00	916.
71	5.04	4.47	4.81	1616.	6.53	916.

CASE-NO	X8	PF	FT	PIY	FID	PRY
72	5.46	4.93	5.27	1912.	6.83	1245.
73	5.96	5.54	5.72	2061.	6.92	1245.
74	6.23	5.75	6.01	999.	999.00	1245.
75	5.58	5.15	5.26	999.	999.00	1245.
76	4.43	4.03	4.19	2105.	7.56	1245.
77	3.90	3.46	3.69	1415.	5.07	1245.
78	4.46	3.96	4.30	1644.	5.81	1245.
79	4.82	4.28	4.66	1778.	6.11	1245.
80	4.73	4.24	4.57	1735.	5.74	1232.
81	4.74	4.23	4.57	1767.	5.91	1232.
82	5.33	4.94	5.17	1986.	6.63	1232.
83	5.25	4.82	5.10	2018.	6.72	1232.
84	5.11	4.66	5.01	1934.	6.44	1232.
85	4.58	4.30	4.40	1648.	5.50	1232.
86	4.24	4.03	4.16	1457.	5.10	1232.
87	3.98	3.59	3.94	999.	999.00	1232.
88	3.94	3.55	3.88	1305.	4.47	1232.
89	3.54	3.22	3.48	1240.	4.26	1232.
90	3.40	3.03	3.33	1202.	4.10	1232.
91	3.84	3.55	3.79	1446.	4.88	1232.
92	4.36	3.93	4.27	1593.	5.35	1230.
93	4.44	4.05	4.39	1623.	5.41	1230.
94	4.29	3.97	4.23	1650.	5.46	1230.
95	3.92	3.55	3.85	1512.	5.00	1230.
96	3.82	3.45	3.73	1426.	4.65	1230.
97	3.86	3.54	3.80	1424.	4.67	1230.
98	4.06	3.75	4.03	1469.	4.87	1448.
99	3.96	3.65	3.90	1460.	4.86	1448.
100	3.75	3.49	3.71	1339.	4.47	1448.
101	3.59	3.35	3.55	1299.	4.34	1448.
102	3.64	3.34	3.60	1334.	4.46	1448.
103	3.64	3.37	3.58	1319.	4.46	1651.
104	3.43	3.10	3.35	1246.	4.29	1651.
105	3.30	3.02	3.25	1205.	4.19	1651.
106	3.06	2.75	3.02	1145.	3.94	1651.
107	2.99	2.69	2.94	1117.	3.73	1651.
108	2.84	2.50	2.78	1067.	3.62	1651.
109	2.93	2.59	2.88	1081.	3.71	1651.
110	3.02	2.65	2.95	1061.	3.79	1651.
111	2.99	2.66	2.95	1073.	3.83	1651.
112	3.00	2.65	2.96	1042.	3.79	1651.
113	2.96	2.59	2.93	1036.	3.74	1651.
114	2.85	2.52	2.79	970.	3.56	1651.
115	2.92	2.57	2.83	975.	3.65	1651.
116	2.94	2.59	2.89	992.	3.72	1651.
117	2.85	2.49	2.80	931.	3.68	1651.
118	2.82	2.45	2.75	915.	3.59	1651.
119	2.96	2.61	2.91	932.	3.81	1651.
120	3.04	2.67	2.99	928.	3.85	1651.
121	3.21	2.75	3.20	977.	4.05	1651.
122	3.39	2.96	3.36	1015.	4.22	1651.
123	3.48	3.12	3.42	993.	4.30	1651.
124	3.69	3.19	3.64	1023.	4.61	1651.
125	3.66	3.29	3.61	1029.	4.55	1651.
126	3.70	3.30	3.61	943.	4.41	1651.
127	3.82	3.35	3.75	945.	4.73	1651.
128	3.78	3.40	3.73	885.	4.69	1640.
129	3.84	3.39	3.78	909.	4.79	1640.
130	3.82	3.34	3.76	883.	4.61	1640.
131	3.84	3.34	3.80	905.	4.71	1640.
132	3.79	3.37	3.75	953.	4.65	1640.

CASE-NO	PRD	PMY	PMC	PXY	PXD
1	2.46	1092.	2.85	2078.	5.43
2	2.60	1095.	3.02	2078.	5.74
3	2.60	1096.	3.03	2078.	5.74
4	2.60	1093.	3.02	2098.	5.79
5	2.60	1093.	3.02	2098.	5.79
6	2.61	1094.	3.02	2098.	5.80
7	2.62	1093.	3.03	2098.	5.82
8	2.62	1092.	3.04	2098.	5.83
9	2.63	1093.	3.06	2098.	5.84
10	2.63	1106.	3.08	2118.	5.91
11	2.63	1110.	3.10	2118.	5.91
12	2.63	1112.	3.11	2118.	5.92
13	2.63	1111.	3.10	2119.	5.92
14	2.64	1108.	3.09	2133.	5.96
15	2.63	1112.	3.11	2133.	5.96
16	2.63	1111.	3.10	2139.	5.97
17	2.63	1107.	3.09	2139.	5.97
18	2.63	1105.	3.08	2160.	6.02
19	2.61	1104.	3.07	2200.	6.12
20	2.61	1100.	3.06	2200.	6.12
21	2.62	1103.	3.05	2207.	6.16
22	2.62	1105.	3.05	2207.	6.16
23	2.62	1108.	3.10	2207.	6.17
24	2.62	1112.	3.11	2207.	6.17
25	2.62	1110.	3.10	2213.	6.18
26	2.62	1111.	3.10	2213.	6.19
27	2.62	1114.	3.11	2213.	6.19
28	2.62	1117.	3.12	2213.	6.16
29	2.61	1118.	3.11	2213.	6.17
30	2.61	1114.	3.11	2254.	6.26
31	2.51	1117.	3.11	2254.	6.27
32	2.62	1127.	3.15	2254.	6.29
33	2.62	1142.	3.19	2437.	6.61
34	2.62	1146.	3.20	2478.	6.93
35	2.62	1146.	3.20	2493.	6.93
36	2.62	1147.	3.21	2519.	7.04
37	2.62	1146.	3.20	2502.	6.99
38	2.62	1147.	3.21	2502.	7.00
39	2.62	1147.	3.21	2542.	7.11
40	2.62	1146.	3.21	2542.	7.11
41	2.62	1147.	3.21	2542.	7.11
42	2.62	1141.	3.19	2542.	7.11
43	2.63	1138.	3.18	2542.	7.11
44	2.64	1141.	3.21	2542.	7.15
45	2.72	1150.	3.40	2557.	7.56
46	2.84	1143.	3.47	2553.	7.72
47	2.88	1149.	3.49	2557.	7.78
48	2.94	1143.	3.59	2599.	8.12
49	3.01	1143.	3.65	2598.	8.31
50	3.05	1142.	3.74	2597.	8.51
51	3.11	1139.	3.77	2595.	8.59
52	3.10	1135.	3.74	2587.	8.52
53	3.09	1122.	3.68	2531.	8.48
54	3.11	1120.	3.70	2574.	8.51
55	3.05	1122.	3.73	2613.	8.65
56	3.04	1123.	3.73	2677.	8.69
57	3.04	1120.	3.72	2656.	8.82
58	3.05	1128.	3.75	2657.	8.83
59	3.05	1134.	3.77	2660.	8.84
60	3.04	1140.	3.78	2662.	8.84
61	3.04	1150.	3.81	2657.	8.90
62	3.30	1154.	4.16	2817.	10.15
63	3.50	1157.	4.42	2824.	10.79
64	3.45	1155.	4.35	2887.	10.85
65	3.46	1150.	4.34	2999.	11.29
66	3.47	1147.	4.34	3083.	11.67
67	3.47	1149.	4.34	3083.	11.63
68	3.45	1158.	4.36	3050.	11.50
69	3.45	1160.	4.45	3048.	11.49
70	3.44	1190.	4.47	3072.	11.53
71	3.29	1194.	4.29	3198.	11.49

CASE-NO	PRD	FMY	FPC	PXY	PXD
72	4.45	1200.	4.23	3222.	11.50
73	4.18	1645.	5.52	4393.	14.74
74	4.28	1651.	5.67	5018.	17.25
75	4.42	1645.	5.63	5079.	18.01
76	4.46	1640.	5.90	5094.	18.34
77	4.46	1638.	5.87	5113.	18.35
78	4.40	1637.	5.78	5133.	18.16
79	4.26	1638.	5.63	5179.	17.60
80	4.07	1643.	5.43	5160.	17.07
81	4.12	1636.	5.47	5098.	17.05
82	4.11	1646.	5.50	5105.	17.05
83	4.10	1654.	5.51	5134.	17.11
84	4.10	1659.	5.52	5119.	17.04
85	4.11	1663.	5.55	5149.	17.16
86	4.22	1662.	5.70	5133.	17.60
87	4.26	1660.	5.77	5133.	17.63
88	4.21	1648.	5.64	5132.	17.56
89	4.23	1645.	5.64	5128.	17.60
90	4.20	1639.	5.56	5124.	17.46
91	4.16	1640.	5.52	5079.	17.14
92	4.13	1634.	5.46	5077.	17.04
93	4.10	1601.	5.34	4951.	16.51
94	4.07	1609.	5.32	4935.	16.32
95	4.07	1617.	5.34	4941.	16.33
96	4.02	1622.	5.31	4944.	16.16
97	4.04	1626.	5.34	999.	999.00
98	4.80	1828.	6.06	999.	999.00
99	4.82	1891.	6.29	5007.	16.65
100	4.84	1891.	6.32	5069.	16.95
101	4.84	1892.	6.33	5107.	17.03
102	4.84	1898.	6.34	5117.	17.10
103	5.60	1911.	6.4[illegible]	5127.	17.40
104	5.66	2106.	7.25	5122.	17.63
105	5.75	2123.	7.35	5192.	18.07
106	5.67	2130.	7.32	5274.	18.11
107	5.59	2136.	7.24	5293.	17.95
108	5.60	2135.	7.2[illegible]	5304.	18.00
109	5.67	2361.	8.11	5392.	18.52
110	5.79	2360.	8.26	5415.	19.00
111	5.89	2361.	8.42	5417.	19.33
112	6.00	2358.	8.57	5420.	19.70
113	5.95	2358.	8.50	5441.	19.61
114	6.05	2353.	8.64	5461.	20.02
115	6.23	2354.	8.69	5461.	20.62
116	6.19	2347.	8.60	5453.	20.47
117	6.19	2405.	9.02	5625.	21.10
118	6.46	2400.	9.42	5649.	22.17
119	6.75	2397.	9.30	5646.	23.03
120	6.85	2387.	9.[illegible]0	5643.	23.41
121	6.85	2374.	9.55	5629.	23.35
122	6.87	2366.	9.64	5617.	23.37
123	7.12	2355.	10.15	5671.	24.47
124	7.44	2349.	10.59	5641.	25.43
125	7.30	2348.	10.35	5597.	24.75
126	7.72	2348.	10.[illegible]	5595.	26.15
127	8.27	2349.	11.77	[illegible]	28.03
128	8.69	2343.	12.42	55[illegible]4.	29.60
129	8.64	2327.	12.2[illegible]	5550.	29.22
130	8.93	2324.	12.65	5545.	30.21
131	8.54	2323.	12.09	5584.	29.07
132	8.37	2321.	11.85	5563.	28.39

APPENDIX IV

Marketing Margins

LEGEND

MT	Margin between track and farm prices \$/bu.
ME	Margin between export and track prices \$/bu.
MI	Margin between import and export prices \$/bu.
MR	Margin between resale and import prices \$/bu.
MM	Margin between miller's and resale prices \$/bu.
MX	Margin between retail and miller's prices \$/bu.

60/07

CASE-NO	MT	ME	MI	MR	MN	MX	TOTALM
1	.22	.02	999.00	999.00	999.00	999.00	999.00
2	.22	.02	999.00	999.00	999.00	999.00	999.00
3	.21	-.01	.23	999.00	999.00	999.00	999.00
4	.22	0	.36	999.00	999.00	999.00	999.00
5	.20	.02	.37	999.00	999.00	999.00	999.00
6	.21	0	.39	.40	.39	999.00	999.00
7	.18	.02	.4[illegible]	.62	.42	2.40	4.13
8	.21	.02	.52	.62	.42	2.71	4.50
9	.23	.01	.54	.61	.42	2.72	4.52
10	.22	.01	.53	.60	.42	2.77	4.55
11	.22	.01	.50	.60	.42	2.77	4.52
12	.22	0	.52	.61	.42	2.77	4.53
13	.19	.01	.52	.61	.43	2.7[illegible]	4.53
14	.18	.02	.51	.62	.43	2.7[illegible]	4.53
15	.16	.01	.49	.70	.45	2.78	4.56
16	.12	0	.47	.70	.47	2.81	4.63
17	.20	0	.45	.71	.47	2.81	4.63
18	.20	.01	.43	.71	.47	2.81	4.62
19	.17	.03	.45	.71	.45	2.83	4.67
20	.16	.03	.51	.71	.47	2.87	4.76
21	.17	.02	.50	.71	.47	2.87	4.74
22	.16	.02	.40	.71	.46	2.88	4.71
23	.18	.02	.4[illegible]	.70	.45	2.85	4.67
24	.18	.02	.40	.68	.46	2.95	4.65
25	.19	.02	.36	.58	.49	3.00	4.76
26	.20	.02	.39	.59	.46	3.0[illegible]	4.50
27	.20	.02	.51	.56	.47	3.0[illegible]	4.82
28	.21	.03	.46	.55	.43	3.06	4.79
29	.21	.03	.46	.56	.49	3.06	4.81
30	.23	.02	.47	.56	.48	3.07	4.83
31	.23	.01	.52	.57	.45	3.06	4.88
32	.22	.02	.51	.57	.49	3.07	4.87
33	.20	.04	.42	.57	.50	3.07	4.80
34	.19	.03	.40	.55	.50	3.07	4.74
35	.21	.02	.32	.55	.49	3.06	4.65
36	.23	.02	.27	.55	.50	3.17	4.74
37	.23	.02	.26	.56	.53	3.12	4.72
38	.22	.03	.26	.56	.57	3.10	4.75
39	.22	.02	-.0[illegible]	.31	.5[illegible]	3.3[illegible]	5.2[illegible]
40	.23	.02	-.07	.31	.5[illegible]	3.72	5.3[illegible]
41	.21	.03	-.1[illegible]	.91	.5[illegible]	3.78	5.37
42	.20	.03	.2[illegible]	.56	.56	3.8[illegible]	5.49
43	.2[illegible]	.0[illegible]	.3[illegible]	.59	.5[illegible]	3.7[illegible]	5.5[illegible]
44	.22	.04	.4[illegible]	.61	.59	3.7[illegible]	5.57
45	.22	.04	.4[illegible]	.51	.59	3.90	5.7[illegible]
46	.15	.04	999.00	999.00	.5[illegible]	3.90	5.7[illegible]
47	.17	.03	.37	.5[illegible]	.57	3.92	5.73
48	.1[illegible]	0	.3[illegible]	.5[illegible]	.56	3.93	5.7[illegible]
49	.19	.04	.2[illegible]	.31	.57	3.[illegible]	5.7[illegible]
50	.19	.03	999.00	999.00	.62	3.[illegible]	5.7[illegible]
51	.20	.02	.31	.90	.63	4.10	6.16
52	.24	.03	.27	.86	.64	4.23	6.25
53	.23	.04	.22	.92	.65	4.1[illegible]	6.2[illegible]
54	.22	.04	.33	.96	.65	4.[illegible]	6.6[illegible]
55	.2[illegible]	.03	.30	1.0[illegible]	.66	4.57	6.[illegible]
56	.2[illegible]	.03	.20	1.05	.65	4.7[illegible]	6.[illegible]
57	.25	.05	-.1[illegible]	1.36	.64	4.34	6.[illegible]2
58	.26	.04	-.40	1.04	.60	4.3[illegible]	6.37
59	.21	.05	-.06	.57	.60	4.7[illegible]	6.14
60	.14	.0[illegible]	.05	.17	.63	4.7[illegible]	6.[illegible]
61	.19	.09	.04	.11	.65	4.9[illegible]	6.07
62	.30	.10	.23	.16	.67	5.17	6.[illegible]3
63	.23	.0[illegible]	999.00	999.00	.70	5.07	6.4[illegible]
64	.21	.0[illegible]	.[illegible]0	-.11	.72	5.08	6.[illegible]2
65	.3[illegible]	.09	.36	-.35	.74	5.05	6.43
66	.2[illegible]	.15	.14	-.34	.77	5.03	5.[illegible]
67	.45	-.[illegible]	999.00	999.00	.65	5.74	5.[illegible]3
68	.14	.24	-1.0[illegible]	-.62	.92	5.74	5.[illegible]1
69	.26	.2[illegible]	-1.1[illegible]	-.[illegible]	.90	6.44	5.[illegible]
70	.22	.30	.[illegible]5	-2.4[illegible]	.63	6.53	6.13
71	.34	.23	2.1[illegible]	-3.75	.67	6.90	6.[illegible]2

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CASE-NO	MT	ME	MI	MR	MM	MA	TOTALM
72	.34	.19	999.00	999.00	.68	7.33	6.75
73	.18	.24	.57	-3.07	.91	7.31	6.14
74	.25	.22	.60	-3.37	.99	7.05	5.74
75	.11	.32	1.34	-3.47	1.03	7.01	6.33
76	.18	.24	999.00	999.00	1.00	7.24	7.50
77	.23	.21	999.00	999.00	-.15	7.21	8.03
78	.44	.16	3.12	-3.40	1.34	5.33	7.64
79	.36	.16	.25	-.79	1.39	9.07	10.42
80	.33	.15	1.03	-1.40	1.42	11.41	13.01
81	.34	.17	1.37	-1.53	1.42	12.10	13.76
82	.34	.16	.41	-1.29	1.41	12.47	13.50
83	.34	.03	.65	-1.51	1.33	12.56	13.33
84	.35	.10	1.32	-2.35	1.35	12.53	13.50
85	.16	.12	2.14	-2.35	1.30	12.37	13.50
86	.13	.03	2.20	-2.32	1.35	11.60	13.04
87	.35	.04	1.52	-1.33	1.33	11.55	13.46
88	.30	.06	1.16	-1.00	1.41	11.54	13.47
89	.26	.06	999.00	999.00	1.42	11.59	13.89
90	.30	.07	1.07	-.36	1.44	11.49	14.01
91	.24	.05	.42	-.33	1.48	11.48	13.63
92	.34	.09	-.26	.18	1.49	11.34	13.67
93	.34	.05	.44	-.66	1.43	12.19	13.77
94	.26	.06	1.06	-1.12	1.42	11.92	13.50
95	.30	.07	1.49	-1.22	1.39	12.31	14.05
96	.26	.09	1.64	-1.30	1.36	11.93	14.01
97	.26	.05	1.14	-.37	1.36	11.65	13.59
98	.28	.03	.60	-.50	1.24	11.70	13.29
99	.25	.06	.71	-.61	1.25	11.19	12.86
100	.22	.04	1.12	-.30	1.23	10.98	12.84
101	.29	.04	1.27	-.34	1.25	11.02	12.33
102	.26	.34	.33	-.43	1.30	10.34	12.43
103	.21	.06	.76	.46	1.28	999.00	999.00
104	.25	.03	1.03	.36	1.47	999.00	999.00
105	.23	.05	1.13	.37	1.49	10.34	13.64
106	.27	.34	1.23	.58	1.46	10.62	14.13
107	.25	.05	1.20	.65	1.50	10.74	14.34
108	.26	.06	1.10	1.67	.85	10.62	14.30
109	.29	.05	.85	1.90	1.56	10.15	14.31
110	.33	.04	.60	2.12	1.64	10.24	14.40
111	.29	.04	.72	1.90	1.63	10.75	15.41
112	.32	.04	.73	1.30	1.64	10.86	15.47
113	.34	.05	.38	1.77	1.64	10.70	15.36
114	.29	.06	.94	1.39	2.44	9.99	15.45
115	.31	.04	.62	2.35	2.43	10.24	15.93
116	.30	.05	.62	2.34	2.53	10.57	16.41
117	.31	.05	.33	2.32	2.57	10.76	16.84
118	.30	.07	.30	2.23	2.55	11.20	17.24
119	.30	.05	.72	2.37	2.59	10.97	17.00
120	.33	.05	.55	2.64	2.65	11.13	17.35
121	.45	.01	.60	2.34	2.61	11.32	17.37
122	.40	.03	.49	2.34	2.63	11.45	17.51
123	.30	.06	.57	2.43	2.94	11.67	17.97
124	.44	.05	.53	2.32	3.05	12.36	18.35
125	.34	.05	.64	2.34	3.05	13.17	19.40
126	.31	.09	.61	2.23	3.00	13.57	20.11
127	.39	.07	.7[illegible]	2.32	2.97	13.50	19.93
128	.33	.05	.63	2.72	3.04	13.21	19.97
129	.40	.06	.38	2.71	3.15	13.33	21.06
130	.44	.04	.37	2.61	3.03	15.05	22.09
131	.45	.04	.35	2.93	3.25	13.77	21.40
132	.38	.04	1.02	3.46	3.50	14.35	22.76

APPENDIX V

Proportions of Retail Dollars Received at Major Levels of the Marketing Chain

LEGEND

FPROP	Proportion of each consumer dollar received by P.N.W. farmers
TPROP	Proportion received at the track price level
EPROP	Proportion received by P.N.W. exporters
IPROP	Proportion received by Japanese Trading Company and ocean freight companies
RPROP	Proportion received by the Food Agency
MPROP	Proportion received by millers
XPROP	Proportion received by firms at the retail level

CASE-NO	FPROP	TFROP	EPROF	IFROP	FPROF	MPROF	XPROF
1	999.00	999.00	999.00	999.00	999.00	999.00	999.00
2	999.00	999.00	999.00	999.00	999.00	999.00	999.00
3	999.00	999.00	999.00	999.00	999.00	999.00	999.00
4	999.00	999.00	999.00	999.00	999.00	999.00	999.00
5	999.00	999.00	999.00	999.00	999.00	999.00	999.00
6	999.00	999.00	999.00	999.00	999.00	999.00	999.00
7	.24	.03	.00	.09	.11	.08	.44
8	.22	.04	.00	.09	.11	.07	.47
9	.21	.04	.00	.09	.11	.07	.47
10	.21	.04	.00	.09	.10	.07	.46
11	.22	.04	.00	.09	.10	.07	.45
12	.22	.04	0	.09	.11	.07	.48
13	.22	.03	.00	.09	.11	.07	.46
14	.22	.03	.00	.09	.11	.07	.46
15	.22	.03	.00	.08	.12	.08	.47
16	.22	.03	0	.08	.12	.05	.46
17	.22	.03	0	.08	.12	.05	.47
18	.22	.03	.00	.07	.12	.08	.46
19	.21	.03	.01	.08	.12	.08	.48
20	.20	.03	.01	.09	.12	.08	.48
21	.21	.03	.00	.08	.12	.08	.46
22	.21	.03	.00	.08	.12	.06	.46
23	.22	.03	.00	.07	.12	.08	.48
24	.22	.03	.00	.07	.11	.05	.49
25	.22	.03	.00	.06	.11	.07	.50
26	.22	.03	.00	.06	.11	.05	.50
27	.22	.03	.00	.08	.09	.08	.50
28	.22	.03	.00	.07	.09	.08	.50
29	.22	.03	.00	.08	.09	.08	.50
30	.22	.04	.00	.08	.09	.08	.50
31	.21	.04	.00	.03	.09	.08	.50
32	.21	.04	.00	.05	.09	.08	.50
33	.22	.03	.01	.07	.09	.05	.50
34	.23	.03	.00	.06	.09	.08	.50
35	.25	.03	.00	.05	.09	.08	.50
36	.25	.04	.00	.04	.09	.08	.51
37	.25	.04	.00	.04	.09	.08	.50
38	.25	.04	.00	.04	.09	.09	[illegible]
39	.23	.03	.00	-.01	.13	.09	.53
40	.22	.03	.00	-.01	.13	.05	[illegible]
41	.23	.03	.00	-.02	.13	.05	[illegible]
42	.22	.03	.00	.04	.08	.08	[illegible]
43	.20	.03	.01	.05	.05	.06	[illegible]
44	.19	.03	.01	.06	.09	.08	[illegible]
45	.19	.03	.01	.05	.09	.08	[illegible]
46	.19	.03	.01	999.00	999.00	.03	[illegible]
47	.19	.02	.00	.05	.10	.03	[illegible]
48	.19	.03	0	.05	.10	.08	[illegible]
49	.19	.03	.01	.03	.11	.09	[illegible]
50	.19	.03	.00	999.00	999.00	.09	.52
51	.19	.03	.00	.04	.12	.08	[illegible]
52	.19	.03	.00	.03	.11	.09	[illegible]
53	.19	.03	.01	.03	.12	.03	[illegible]
54	.18	.03	.00	.04	.12	.05	[illegible]
55	.17	.02	.00	.05	.13	.06	.55
56	.18	.03	.00	.02	.12	.03	.56
57	.22	.03	.01	-.02	.12	.07	.56
58	.25	.03	.00	-.03	.12	.07	.57
59	.25	.02	.01	-.01	.07	.07	.56
60	.31	.02	.01	.01	.02	.08	.56
61	.30	.02	.01	.01	.01	.08	.57
62	.25	.03	.01	.03	.02	.03	.56
63	.27	.03	.01	999.00	999.00	.06	.58
64	.27	.02	.01	.04	-.00	.04	[illegible]
65	.27	.04	.01	.06	-.04	.03	.57
66	.32	.03	.02	.02	-.04	.03	.57
67	.33	.05	-.00	999.00	999.00	.10	.53
68	.47	.01	.02	-.10	-.06	.09	.60
69	.46	.02	.03	-.11	-.08	.08	.60
70	.44	.02	.03	.06	-.23	.03	.60
71	.40	.03	.02	.19	-.33	.08	.62

80/07/13.

CASE-NO	FPROP	TPROP	EPROP	IPROP	PPROP	HPROP	XPROP
72	.42	.03	.02	999.00	999.00	.08	.63
73	.47	.02	.02	.05	-.26	.08	.63
74	.50	.02	.02	.05	-.29	.09	.61
75	.45	.01	.03	.12	-.30	.09	.61
76	.35	.01	.02	999.00	999.00	.09	.63
77	.30	.02	.02	999.00	999.00	-.01	.63
78	.34	.04	.01	.27	-.30	.12	.52
79	.29	.03	.01	.02	-.05	.09	.62
80	.25	.02	.01	.06	-.08	.08	.66
81	.23	.02	.01	.05	-.09	.08	.67
82	.26	.02	.01	.02	-.07	.08	.68
83	.26	.02	.00	.04	-.03	.08	.66
84	.26	.02	.01	.08	-.13	.07	.69
85	.24	.01	.01	.12	-.15	.08	.69
86	.24	.01	.00	.13	-.14	.08	.68
87	.21	.02	.00	.09	-.08	.06	.66
88	.21	.02	.00	.07	-.06	.05	.66
89	.19	.02	.00	999.00	999.00	.08	.68
90	.16	.02	.00	.06	-.02	.08	.67
91	.21	.01	.00	.02	-.00	.09	.67
92	.22	.02	.01	-.01	.01	.08	.67
93	.23	.02	.00	.02	-.04	.06	.63
94	.23	.02	.00	.05	-.05	.08	.66
95	.20	.02	.00	.08	-.07	.08	.66
96	.20	.02	.01	.09	-.07	.08	.66
97	.21	.01	.00	.07	-.05	.08	.68
98	.22	.02	.00	.04	-.03	.07	.69
99	.22	.02	.00	.04	-.04	.08	.68
100	.21	.01	.00	.07	-.05	.08	.67
101	.21	.01	.00	.05	-.05	.06	.66
102	.21	.02	.00	.05	-.03	.08	.57
103	999.00	999.00	999.00	999.00	999.00	999.00	999.00
104	999.00	999.00	999.00	999.00	999.00	999.00	999.00
105	.18	.01	.00	.07	.02	.09	.62
106	.16	.02	.00	.07	.03	.09	.63
107	.16	.01	.00	.07	.04	.09	.63
108	.15	.02	.00	.05	.10	.05	.62
109	.15	.02	.00	.05	.11	.09	.56
110	.15	.02	.00	.03	.12	.09	.56
111	.15	.02	.00	.04	.11	.09	.60
112	.15	.02	.00	.04	.10	.08	.60
113	.14	.02	.00	.05	.10	.09	.60
114	.14	.02	.00	.05	.10	.14	.55
115	.14	.02	.00	.04	.11	.13	.55
116	.14	.02	.00	.03	.12	.13	.56
117	.13	.02	.00	.04	.12	.13	.56
118	.12	.02	.00	.05	.11	.13	.57
119	.13	.02	.00	.04	.12	.13	.56
120	.13	.02	.00	.03	.13	.13	.56
121	.13	.02	.00	.03	.12	.13	.57
122	.14	.02	.00	.02	.11	.14	.56
123	.15	.01	.00	.03	.12	.14	.55
124	.14	.02	.00	.02	.11	.14	.55
125	.14	.01	.00	.03	.11	.13	.57
126	.14	.01	.00	.04	.10	.13	.55
127	.14	.02	.00	.03	.10	.13	.55
128	.15	.01	.00	.03	.12	.13	.57
129	.14	.02	.00	.04	.11	.13	.57
130	.13	.02	.00	.03	.10	.12	.55
131	.14	.02	.00	.04	.12	.13	.56
132	.13	.01	.00	.04	.13	.13	.55

APPENDIX VI

Elasticities of Price Transmission
Given a One Month Lag

LEGEND

EFT	Elasticity of Price Transmission between track and farm prices
EFE	Elasticity between export and farm prices
EFI	Elasticity between import prices in Yen and farm prices
EFID	Elasticity between import prices in dollars and farm prices
EFR	Elasticity between resale and farm prices
EFM	Elasticity between mill and farm prices
EFX	Elasticity between retail and farm prices

CASE-NO	EFT	EFE	EFI	EFID	EFR	EFM	EFX
1	999.00	999.00	999.00	999.00	999.00	999.00	999.00
2	.73	.72	0	1.73	0	.03	0
3	1.13	1.95	0	-.01	0	-.06	0
4	.66	.44	0	.02	0	.11	-.36
5	1.61	.54	0	-.00	0	-.02	0
6	0	3.75	0	-.35	0	-.15	0
7	1.10	.91	0	-.06	0	.01	0
8	.42	.42	0	-.05	-.01	.01	0
9	0	.63	0	-.12	0	-.49	.01
10	.54	.53	0	.14	0	.55	.76
11	.75	.75	0	.05	0	.15	0
12	0	2.07	0	-.17	0	-.38	0
13	-.47	0	-2.32	-2.33	0	-.02	.04
14	0	.61	0	.34	0	-.43	.46
15	1.06	1.5[illegible]	0	.03	0	-.[illegible]	0
16	0	1.15	0	.11	0	.12	0
17	2.33	2.33	0	-.11	0	-.57	0
18	.60	1.59	0	-.05	0	-.23	1.12
19	1.35	.95	0	.07	.16	.03	-.54
20	.74	.73	0	-.00	0	.10	0
21	.55	.23	0	.14	0	.12	.12
22	1.14	1.12	0	.00	0	.07	0
23	.63	.82	0	.06	0	.13	0
24	.98	.97	0	.00	0	.12	0
25	1.49	1.47	7.77	7.75	0	-.22	.31
26	.38	.39	0	-.00	0	-.06	0
27	.55	.54	0	.04	0	.22	0
28	1.33	1.55	0	-.05	0	.12	0
29	1.66	1.63	0	.60	0	-.12	0
30	0	.33	0	-.00	0	.15	-.97
31	.95	1.17	0	.05	0	-.05	0
32	0	.63	0	.41	0	1.19	0
33	.64	.94	0	.01	0	.21	1.32
34	.66	.49	0	.01	0	.10	.45
35	1.15	1.00	0	.01	0	.09	.17
36	1.57	1.55	0	.01	0	.03	.44
37	1.45	1.43	-43.29	-43.49	0	-.17	-1.75
38	9.65	0	0	-2.23	0	-1.23	0
39	0	-14.32	0	.19	0	1.13	-2.04
40	0	0	-88.74	-88.75	0	-.10	0
41	.71	.82	-.32	-.31	0	-.02	0
42	1.04	1.03	.17	.17	0	.11	0
43	.91	.86	.00	.00	-.02	.03	0
44	.59	.57	999.00	999.00	0	-.05	0
45	1.16	1.13	999.00	999.00	0	-1.35	-1.02
46	.35	.35	-.61	-.05	0	-.04	.01
47	-.90	-1.[illegible]	-5.[illegible]	-7.5[illegible]	0	.10	-.03
48	-2.[illegible]	-4.35	999.00	999.00	0	.27	-6.27
49	4.90	24.4[illegible]	999.00	999.00	0	-3.52	-.16
50	0	-3.69	4.30	20.51	0	-.34	-.33
51	1.21	.79	-.03	.52	0	-.15	-.05
52	1.37	1.49	.35	.30	0	-.09	-.07
53	.70	.86	-.22	-.30	0	-.34	-.07
54	.92	.90	-.22	-.37	0	.03	.06
55	2.1[illegible]	2.4[illegible]	.32	.55	1.47	-.11	-.31
56	1.35	1.33	.09	.08	0	.01	.2[illegible]
57	.67	.91	1.2[illegible]	1.25	0	-.01	-.04
58	.87	.92	.84	.35	0	.04	.00
59	.63	.72	.23	.23	0	.06	.01
60	.72	.67	-.11	-.12	0	.04	.01
61	-.68	-2.01	999.00	999.00	0	-.84	-.07
62	.63	.59	999.00	999.00	0	-.03	-.36
63	.25	-.03	1.23	2.63	0	.04	.06
64	.42	.20	.77	.02	0	-.03	1.21
65	43.75	53.16	999.00	999.00	0	-3.29	24.[illegible]
66	.71	.31	999.00	999.00	0	-.01	.14
67	2.0[illegible]	.73	1.17	1.17	0	.03	.01
68	.71	.[illegible]	.62	.61	-.00	.01	-.02
69	1.53	1.75	5.51	5.43	0	.49	-.22
70	1.20	1.33	999.00	999.00	0	-.21	-.20
71	.52	.73	999.00	999.00	0	-.06	-.71

CASE-NO	EFT	EFE	EF[illegible]	EFID	EFR	EFM	EFA
72	.94	.82	.52	.45	3.53	.05	.07
73	.69	.73	.62	.11	0	2.98	2.92
74	1.26	1.12	999.00	999.00	0	.09	3.53
75	1.17	.98	999.00	999.00	0	.04	-.11
76	.94	.95	999.00	999.00	0	.01	-.01
77	.84	.84	2.31	2.33	0	.01	-.03
78	1.46	1.27	1.43	1.28	0	-.01	.03
79	.76	.73	.74	.47	0	.01	.07
80	1.62	1.75	2.29	5.73	1.05	-.28	.35
81	-.19	-1.24	-10.[illegible]	-17.26	0	2.39	7.02
82	.92	.87	.36	.86	0	.04	.01
83	.51	4.68	-4.96	-4.23	0	-1.50	-1.76
84	.86	.81	1.27	1.30	0	-.09	.0[illegible]
85	1.44	1.34	1.[illegible]	1.86	0	-.03	-.0[illegible]
86	1.07	1.15	1.[illegible]4	1.15	0	.01	.0[illegible]
87	.47	.56	999.00	999.00	0	.01	-.00
88	6.59	4.24	999.00	999.00	0	3.04	.11
89	1.02	1.00	.49	.47	0	.02	.01
90	.73	.67	.52	.63	0	.06	.01
91	.80	.75	1.17	1.10	0	.01	-.05
92	1.18	1.26	.95	.99	-.01	-.03	-.0[illegible]
93	.92	.60	.62	.41	0	-.67	-.61
94	1.69	1.55	-.76	-.33	0	-.22	.19
95	.85	.82	.79	.79	0	-.05	-.01
96	1.21	.99	2.23	2.60	0	-.13	-.03
97	.72	.40	-.0[illegible]	.09	0	.10	999.00
98	1.06	.91	.55	.73	-3.12	2.13	999.00
99	1.29	.98	.22	.03	0	-1.39	999.00
100	1.06	1.17	1.26	1.76	0	.01	-.27
101	1.11	1.09	.7[illegible]	.74	0	-.02	-.20
102	-6.94	-6.86	-13.[illegible]2	-13.21	0	-1.49	-.98
103	-.94	0	-1.[illegible]	.55	22.05	1.07	.29
104	.63	.75	.72	.55	0	-1.32	.01
105	1.13	1.44	1.24	.32	0	-.32	-.52
106	.79	.81	.[illegible]	.58	0	-.03	-.1[illegible]
107	1.14	.97	1.07	1.63	0	-.12	-.19
108	.60	.74	.[illegible]	.54	0	.01	-.01
109	1.05	.93	.36	.76	0	3.10	.49
110	1.51	1.32	-.01	.99	0	-.01	.19
111	-2.64	-2.61	-1.[illegible]	2.4[illegible]	0	.03	.09
112	-.72	-.62	5.40	2.10	0	.21	-.11
113	.47	.31	.24	.51	0	.00	-.1[illegible]
114	1.71	1.5[illegible]	2.2[illegible]	1.70	0	.00	-.1[illegible]
115	1.44	1.0[illegible]	.23	1.56	0	-.06	0
116	.23	1.4[illegible]	3.77	2.25	0	-.67	-.12
117	.84	.[illegible]	.33	.34	0	-.71	-.[illegible]
118	.95	.60	3.[illegible]1	1.30	0	.12	-.20
119	.[illegible]	.75	.27	.91	0	-.02	-.[illegible]
120	1.2[illegible]	1.2[illegible]	-.1[illegible]	.56	0	-.19	-.02
121	2.27	1.[illegible]	1.[illegible]	1.[illegible]	0	-.1[illegible]	-.05
122	.65	.74	.32	.56	0	-.05	-.03
123	.34	.[illegible]	-.32	.34	0	-.08	.1[illegible]
124	2.6[illegible]	2.63	1.13	3.13	0	-.11	-.23
125	-.2[illegible]	-.31	.20	-.5[illegible]	0	-.02	-.30
126	.05	1.3[illegible]	-10.[illegible]3	-3.52	0	-.00	-.0[illegible]
127	2.31	1.33	.1[illegible]	4.43	0	.03	0
128	-.42	-.7[illegible]	-4.[illegible]	-.[illegible]	-.4[illegible]	-.1[illegible]	-.1[illegible]
129	-2.[illegible]	-3.00	-5.10	-3.[illegible]3	0	1.26	1.1[illegible]
130	.05	.35	1.[illegible]9	-.33	0	.10	.0[illegible]
131	1.94	2.33	11.2[illegible]	-3.91	0	-.26	3.13
132	-1.56	-1.[illegible]	7.67	4.56	0	-.10	-.5[illegible]