J. Fac. Agric., Tottori Univ. 32, 49~58 (1996)

Retail Prices of Japonica Rice in the United States of America

Kozo KASAHARA*, Shoichi ITO and Yasushi SEMBOKUYA*

(Received June 24, 1996)

We investigated free market prices of japonica rice in 5 major cities in the U.S.A. between August 20th and September 15th, 1995. In this paper, we attempted to analyze the free market prices, free distribution and trade route system. In the second place, we attempted to confirm the statistical significance level of price difference among japonica rices within 15 stores in 5 main cities in the U.S.A.

The result of this research suggests the following points: 1) Almost all japonica rices are produced in the State of California; 2) The adjusted prices of rices sold at a large size store is higher than those at a small size store, because the large size stores are managed by Japanese who sell better quality rices; 3) Using the new modified t-distribution table on small samples for the statistical test, a significant difference in price was observed because of transportation cost fluctuating due to city location.

Introduction

On November 1st, 1995 a new Food Control Act (the law about stabilization of the supply & demand and the price of the staple food) was implemented in Japan replacing the old Food Control Act. Under this new food law, the distribution and trade of rice became free in Japan. Farmers now can produce and sell their rice freely in the market. Also, farmers are free to participate in the diversion program of rice production.

Several uncertain problems are related to distribution of rice and differences in prices at free markets. In the United States, rice trade is free. The American rice producers have sold their rice in a free trade market since many years ago. Thus, we need to know more about the free rice trade system and the present state of price stability. In this paper, we attempted to investigate japonica rice prices and the marketing method used in 5 U.S. cities.

Department of Agricultural Information Science, Faculty of Agriculture, Tottori University

Secondly, using the statistical t-test on the on new modified t-distribution table, we also corrected the difference in rice prices due to different transportation costs among the 5 cities.

Outline of research market in U.S.A.

1. Research cities and date

We researched stores within the following cities in the United States between August 20th and September 15th, 1995 :

1. San Francisco, 2. Houston, 3. Washington, D.C.,
4. Chicago 5. Los Angeles

2. Stores and characteristics

1) San Francisco

*CHOHOKO (Chinese store): Small size; no parking areas.

*SHOSHOKOSHI (Chinese store): Small size; no parking areas.

*CALA FOODS (American store): Large size; large parking areas, many kinds of food.

*BIG APPLE (American store): Large size discount store; parking areas, many kinds of food.

2) Houston

*DAIDO (Japanese store): Small size; public parking areas.

*KAZY'S GOURMET (Japanese store): Large size; large public parking areas.

*DAIHO MARKET (Chinese store): Large size; large parking areas, many kinds of fruits, vegetables, and fish, etc..

3) Washington D.C.

*DARUMA (Japanese store): Small size; public parking areas, many kinds of Japanese foods.

*SAKURA (Japanese store): Small size; public parking areas, many kinds of Japanese foods, books, etc..

4) Chicago

*DAIKA SHOKUHIN KOSHI (Chinese store): Small size; no parking areas.

*ZENKOKU KOSHI (Chinese store): Small size; small parking areas, many kinds of fruits and vegetables.

*YAOHAN (Japanese store): Large size; large clean parking areas, many kinds of foods such as fruits, vegetables, fish, and general goods.

5) Los Angeles

*MODERN FOOD MARKET (Japanese store): Small size; no parking areas, many Japanese foods are for sale.

*YAOHAN (Japanese store): Large size; large solid parking, many kinds of foods such as fruits, vegetables, fish, and general goods.

3. Classification of the researched stores

We classified the researched stores into three sizes by considering many elements. The elements that were considered are as follows: with or without parking areas, ways of presenting goods, number of cash registers, and distance from the main street.

4. Adjustment within the different unit prices

We used adjusted coefficients within the different unit prices. The coefficients are on the following table:

Table 1 Adjustment coefficient for the biased price within sale units

Selling unit	2LB	5LB	10LB	20LB	25LB	50LB
Adjustment coefficient	1.326	1.070	1.000	0.855	0.801	0.745

5. Adjustment of the transportation costs from California to the cities

We adjusted the transportation cost using the transport route from the start point, San Francisco.

Main interstate highway routes are as follows:

Los Angeles from San Francisco: interstate route 5.

Houston from San Francisco: interstate 5-40-35-45 routes.

Chicago from San Francisco: interstate route 8.

Washington D.C. from San Francisco: interstate 50-70 routes.

The standard transport costs are as follows (a container unit is 20 pallets=48,000LB):

1) Standard transport cost from San Francisco to New York is ¢4.17/1LB by train.

2) Standard transport cost from San Francisco to Texas (Houston) is ¢2.09/1LB by train.

6. Method of the statistical test

The statistical test of the significance in the difference of retail prices among the main cities was conducted using a modified t-test which used the unbiased variance on small samples.

7. Separate ranks of japonica rices

We separated the japonica rice[1] into two classes, rank A and rank B.

Rank A rice includes KOKUHO ROSE KODA, KOSHIHIKARI, TAMAKI, AKITA

-KOMACHI and OTOME.

Rank B rice includes KOKUHO ROSE (pink or yellow), NISHIKI, BOTTA (calrose rice), KIKU, SHIRAKIKU (calrose rice).

Average market prices of japonica rice and the Coca-Cola prices in U.S.A.

Table 2 shows the adjusted average market prices of japonica rice, rank A and ran B, at the stores of San Francisco, Los Angeles, Houston, Washington D. C. an Chicago. Also, the Coca-Cola prices in each of the cities are also listed.

From this table, we can confirm the difference of prices between rank A and B rice Namely, rank A rices are more expensive than rank B rices. Further, it is obvious tha larger store size is reflected by higher prices except for Houston. Coca-Cola in the U S. is sold at supermarkets, gas stations, sightseeing areas, etc.. Coca-Cola price varied widely depending upon specific locations rather than main cities.

Table 2 Adjusted average prices of Japonica Rice and price of Coca-Cola in U.S.A.

unit: $/10LB, ¢/can

	Adjusted average price		Coca-Cola price	
	Rank A	Rank B	Each sale	Dozen sale
SAN FRANCISCO				
Middle & small size store	···	5.42	50 ¢	···
Large size store	···	6.23	···	43 ¢
○sightseeing area			100-125 ¢	
LOS ANGELES				
Middle & small size store	6.84	5.98	49 ¢	···
Large size store	7.55	6.36	···	···
HOUSTON				
Middle & small size store	7.66	5.53	99-50 ¢	33 ¢
Large size store	···	5.18	44 ¢	25 ¢
WASHINGTON D.C.				
Middle & small size store	9.00	6.12	uron tea 125 ¢	···
○super market			35 ¢	33 ¢
○Seven Eleven			75 ¢	35 ¢
CHICAGO				
Middle & small size store	···	5.36	60-50 ¢	28 ¢
Large size store	8.91	6.65	lemon lime 69 ¢	37 ¢

Adjusted average prices in the three types of stores

Table 3 reflects the different prices between A, B rices among small, middle, and large size stores. The results confirm that prices of a large size store are higher than the small size for both A and B rices. Prices of rank B rice sold in Japanese stores are higher than the prices at Chinese or American stores. This may be because the Japonica rices are usually bought by Japanese oriented peoples. Almost all Japonica rices are sold at large Japanese stores such as, YAOHAN in Chicago and Los Angeles.

Almost all the japonica rices are produced in the state of California (near Sacramento) and then transported to other states. Therefore, japonica rices prices are higher on the East coast than the West. So, we tried to adjust the transportation cost. The adjusted transportation cost prices are denoted at the same table 3. From those adjusted prices, we can confirm that prices at the large size store are higher than the small or middle size store. Prices at the Japanese store are higher than the prices at Chinese or American owned stores, based on unadjusted transportation cost. Also, the price difference among cities is recognized in the analysis based on the prices which are adjusted to transportation costs. Therefore, we attempted to clear the price differences among the cities in the next section.

Statistical test of the price difference between cities

In this section, we attempted to test the statistical significance in rice prices adjusted to transportation costs. It was confirmed that prices in the western region were higher than the eastern region. Table 4 showed the results of the t-test of statistical significance of the difference in prices adjusted to transportation costs among the cities. Judgement X is the results from the ordinary t-test method, and judgement Y is the results from the modified t-test method, using an adjusted t-distribution table. The adjusted t-distribution table was made from the Monte Carlo experiment conducted several years ago[2,3].

The results showed that while the price differences among retail stores in San Francisco, Houston, Washington D.C. and Chicago are significant at better than a 10% significance level by the ordinary method, some of them become significant at 5% using the judgement Y method. Also, we can confirm significant differences in the prices at retail stores in Houston, Chicago, and Washington D.C..

Table 3 Adjusted average prices of Japonica Rice each manager of store

unit: $/10LB

	Adjusted average price		Adjusted to transportation costs	
	Rank A rice	Rank B rice	Rank A rice	Rank B rice
Small size Japanese store				
(Los Angeles)	6.84	5.98	6.75	5.89
(Houston)	7.51	5.94	7.07	5.50
(Washington D.C.)	9.11	6.29	8.55	5.73
Average price	7.82	6.07	7.46	5.71
Middle size Japanese store				
(Houston)	7.82	5.26	7.38	4.82
(Washington D.C.)	8.85	5.92	8.29	5.36
Average price	8.33	5.59	7.84	5.09
Large size Japanese store				
(Los Angeles)	7.55	6.36	7.46	6.27
(Chicago)	9.34	6.37	8.82	5.85
Average price	8.44	6.37	8.14	6.06
Small size Chinese store				
(San Francisco)	···	5.42	···	5.42
(Chicago)	···	5.36	···	4.84
Average price	···	5.39	···	5.13
Large size Chinese store				
(Houston−A store)	···	4.89	···	4.45
(Houston−B store)	···	5.36	···	4.92
Average price	···	5.13	···	4.69
Large size American store				
(San Francisco)	···	6.23	···	6.23

Table 5 shows the results of the t-test for the significance level of price difference between Japanese-managed and Chinese-managed stores. From this table, the conclusion is that the average retail price at a Japanese-managed store is higher than the Chinese-managed stores.

Similarly, we attempted to test the difference in prices between size of store. Table 6 shows the results. Because the sample size is small, we could not confirm the significance of the price differences.

Table 4 T-test of significance difference of retail prices within city stores

	LOS ANGELES		HOUSTON		WASHINGTON D.C.		CHICAGO	
	n-1	t-value	n-1	t-value	n-1	t-value	n-1	t-value
SAN FRANCISCO	1	1.739	1	6.973	1	14.130	1	8.956
judgement X		—		* *		***		* *
judgement Y		—		*		* *		* *
LOS ANGELES			3	0.994	5	0.283	5	0.486
judgement X				—		—		—
judgement Y				—		—		—
HOUSTON					4	2.726	4	2.097
judgement X						* *		*
judgement Y						* *		*
WASHINGTON D.C.							6	1.988
judgement X								* *
judgement Y								*

1) judgement X is ordinary t-test method.
judgement Y is modified t-test method by use of adjusted t-distribution table.
2) *, * *, *** denote 25%, 10%, 5% significance level, each one.
3) n-1 denote degree of freedom.

Table 5 T-test of significance difference of retail prices with in a Japanese managed store and Chiness managed store

	Indiscrimination rank	Rank B rice
Japanese store average price	7.76	5.63
Chinese store average price	5.36	4.90
T-value	7.559	2.613
Degree of freedom (n_1+n_2-2)	16	9
judgement X	****	***
judgement Y	****	***

1) judgement X is ordinary t-test method.
judgement Y is modified t-test method by use of adjusted t-distribution table.
2) ***, **** denote 5%, 1% significance level, each one.

Table 6 T-test of difference in retail prices at various sizes of stores

Rank B rice	Average price	t-value	n_1+n_2-2	judgement X	judgement Y
Small size store	5.47				
Middle size store	5.09	1.160	5	—	—
Small size store	5.47				
Large size store	5.54	0.167	8	—	—
Middle size store	5.09				
Large size store	5.54	0.722	5	—	—
Rank A rice	**Average price**	**t-value**	n_1+n_2-2	**judgement X**	**judgement Y**
Small size store	7.46				
Middle size store	7.84	0.477	3	—	—
Small size store	7.46				
Large size store	8.14	0.779	3	—	—
Middle size store	7.84				
Large size store	8.14	0.373	2	—	—

1) judgement X is ordinary t-test method.
judgement Y is modified t-test method by use of adjusted t-distribution table.
2) — denote not passed more than 25% significance level.

Characteristic of rice distribution

The main descriptions of the japonica rice are follows:

1) NISHIKI and BOTTAN: A Japanese Food Company controls distribution. They have other branches at Los Angeles, Houston, Chicago, Atlanta, New York, etc,.
2) KOKUHO ROSE: The Nomura Company which is in California has full power of this. They produce rice themselves and sell to several traders who have a license.
3) KOSHIHIKARI: Daiei which has a head office in New York controls this Japonica rice. This Company distributes rice around the eastern area of the U.S.A.
4) TAMAKI RICE : The Hosoda Trade Company and the Yamada Trade Company are in control of this Japonica rice. The former has territory in the western area; California, Arizona, Nevada, and Washington. The latter has territory in the central area, around Illinois.
5) Farmers' Rice Cooperative (FRC)[4]: This is the largest japonica rice producer in the U.S. The head office is located in Sacramento and distributes rice by way of the

Sacramento River.

summary

In Japan, a new food law has been enforced, and rice has been sold freely since June 1st, 1996. Stores can now handle rice without having to obtain governmental permission. There are some concerns about the movement of prices in the free market. In the United States, rice trade is free. The American rice farmers have produced according to changes in market prices and have freely sold their products at markets since many years ago. Thus, the U.S. system may have important implications for Japan.

In this paper, we attempted to analyze the free market prices and free distribution trade system. Second, we also attempted to test the significant level of differences in japonica rice prices within 15 stores in 5 major U.S. cities.

The results of this research suggest the following points:

1) almost all japonica rices sold in those stores are produced in the State of California.

2) adjusted prices of large size stores are higher than the small size store. The reason being the large size store is managed mainly by Japanese who sell good quality rices, such as KOKUHO ROSE KODA, KOSHIHIKARI, TAMAKI RICE, etc..

3) We can confirm the significant difference in prices which are adjusted transportation costs among the cities. Namely, in eastern cities such as Washington D.C. and Chicago the adjusted prices, which are deducted the transportation cost from the free market price are lower than the west coast, such as San Francisco, Sacramento. In Houston prices are lower than the western areas despite the fact that the western area is a production region and, also have a large sightseeing and demand in background.

4) We used the new modified t-distribution table on small samples for the statistical test. We can confirm that the modified t-test method is useful for significance reference.

references

1) Ito S.: The Japonica in the World. Food Promotion in Japan, Tokyo (1994) pp.133-165 (in Japanese)

2) Kasahara K., Sembokuya Y. and Imai R.: Estimation of the Modified Exponential

Curve under Given Maximum Value. *Bull. Fac. Agri., Tottori Univ.*, **48** 197-210 (1995) (in Japanese)

3) Kasahara K. and Imai R.: On Small Sample Properties of the Unbiased Variance. *Bull. Fac. Agri., Tottori Univ.*, **45** 135-143 (1992) (in Japanese)

4) Yagi H.: Rice Industry of California. print Tokyo University, Tokyo (1992) pp.55-96 (in Japanese)