Assessing Korean Consumers' Valuation for Domestic and Imported Rice: Importance of Country of Origin and Food Miles Information

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Abstract

The aim of this paper is to determine Korean consumers' valuation for domestic rice and imported rice from China and the US. Using revealed preference data from random *n*th price auction mechanism, our results generally suggest that consumers' willingness to pay (WTP) for domestic rice is higher than the WTP for imported rice. Results also suggest that while country of origin and food miles information positively influences consumers' WTP for domestic rice, country of origin information provides higher valuation for domestic rice than food miles information. Country of origin and food miles information has no statistically significant effect on WTP for the imported Chinese rice product but food miles information has a negative effect on WTP for the imported US rice product. Implications of the findings for rice industries for Korea, the US and China are discussed.

Keywords: Rice, Country of origin information, Food mile information, Experimental auction

1. Introduction

Rice is the main staple food and a major source of farm income in South Korea. Approximately 47 percent of the Korean caloric intake and over 70 percent of farm income come from rice. While the overall self-sufficiency ratio for grain is less than 27 percent in Korea, it is approximately 98 percent for rice. Thus, the self-sufficiency ratio for grain would be drastically decreased to 5 percent if rice was excluded. This means that a stable supply of domestic rice is crucial for South Korea's food security.

As a result of the inauguration of the World Trade Organization (WTO) in 1995, Korea opened its agricultural market to the world, but with tariffs. However, rice tariffication was postponed for 10 years from 1995 to 2004. In lieu of tariffication, Korea imported rice through a Minimum Market Access (MMA), accounting for 1 to 4 percent of total domestic consumption. Rice tariffication was re-negotiated in 2004, resulting to an extension of the importation of rice by MMA for another 10 years from 2005 to 2014. In the WTO rice negotiation, Korea agreed to gradually increase its rice imports to 8 percent of total domestic consumption by 2014. This would accelerate the importation of rice from major exporters such as the US and China. However, the impact of imported rice for table use on the domestic market is limited because the amount of imported rice for table use consumption accounts for only about 2 percent of domestic rice production.

Nevertheless, the availability and marketing of imported rice will increase in the near future since Korea will be opening its rice market under tariffication after 2015. Therefore, it is necessary for Korea and other exporting countries to identify the feasibility of marketing both domestic and imported rice, and also to investigate which rice from specific countries Korean consumers prefer. In addition, it will be informative for policymakers and marketing

agents to understand consumers' preferences for imported rice and also to identify consumers' valuation for a rice product's country of origin information.

Many consumers are also now concerned about the environmental and social sustainability of the food they consume. Consequently, demand for alternative foods, such as local food, is increasing as well as the use of "food miles" information (i.e., number of miles the food has travelled from production to retail). Moreover, since Korean consumers are concerned about the taste and quality of rice they buy and eat (Lee *et al*., 2003) and since the taste and quality of rice are affected by time after milling, it would also then be important to identify consumers' valuation for food miles information in rice products.

In order to assess consumers' willingness to pay (WTP) for domestic and imported rice, we utilize a non-hypothetical experimental auction approach (i.e., random *n*th price auction) using actual consumers. We examine consumers' valuation for US and Chinese rice along with domestic rice because the US and China are the major rice exporters to Korea. We randomly assigned subjects to three treatments: 1) no labeling information (only taste testing), 2) country of origin labeling (COOL) information (taste and COOL), and 3) food mileage labeling information (taste and food mileage)) in order to analyze the effects of differing labeling information on consumers' WTP.

2. Comparison of domestic and imported rice

A few studies have attempted to identify consumers' valuation and quality difference between domestic and imported rice in Korea. Lee *et al*. (2003) identified the patterns of rice

consumption and analyzed rice consumption behavior at home and away from home using a consumer survey. Their results indicate that 44.5% of the consumers surveyed said that they would never buy imported rice and 43.5% of the consumers who were willing to buy imported rice said that they would buy it only if the imported rice was cheaper and of high quality. This result implies that consumers have a significant preference for domestic rice.

Kim (2003) investigated consumers' WTP for domestic versus imported rice from the US and China through taste quality tests. After taste testing the cooked rice, consumers were then asked their preferences and buying decisions about the rice with (non-blind test) and without (blind test) information about where the rice came from. Consumers' preferences were significantly different between the blind and non-blind tests. In addition, the WTP for domestic rice increased after consumers ascertained the rice's country of origin. Under the non-blind conditions, domestic rice was the most preferred, followed by the US rice and then the Chinese rice. The premium for domestic rice vis-à-vis the US and Chinese rice products were 4,000 KRW (Korean won) and 8,000 KRW per 20kg, respectively. Lee *et al*. (2004) also presented more concrete results on the premium for domestic rice. Their results suggested that consumers differentiate between domestic rice and imported rice, and that they place a significant premium on domestic rice. Specifically, they found that the WTP for domestic rice was 32% and 43% higher than that of US and Chinese rice, respectively.

Park *et al*. (2006) investigated the market value of imported rice using actual market price and then analyzed the price difference and substitutability between domestic and imported rice. Their study showed that the premiums for the low quality domestic rice against US and Chinese rice were over 12,000 KRW and 8,000 KRW per 20kg, respectively. This study

expected that the Chinese short grain rice would have a significant influence on the domestic rice industry and that low quality domestic rice would be adversely affected if imported rice was distributed in the domestic market. Kim *et al*. (2008) assessed the effect of imported rice on the price of domestic rice by analyzing the marketing situation and public auctions for imported rice. Their results suggest that the public auction for imported rice would not affect domestic rice prices. However, the demand for imported rice would increase 50.4% if the price of imported rice falls by more than 13.5%. This study suggested that consumers' perception of imported rice has gradually improved as its quality has improved. Peterson and Yoshida (2004) examined consumers' WTP for domestic and imported rice using a choice experiment in Japan. Their results indicated that the market retail price of imported rice is higher than the average consumers' valuation. Consumers were particularly concerned about the safety and flavor of imported rice, and these factors drastically reduced consumers' WTPs.

In summary, most studies concluded that consumers have a strong preference for domestic rice. Moreover, if the market shares of imported rice increases, the price of domestic rice would significantly decrease and consumers' negative preconception of imported rice would also decrease. However, these previous studies have estimated consumers' WTP for domestic and imported rice using hypothetical preference elicitation methods, which are more prone to hypothetical bias. Our study differs from previous studies in that we utilize a non-hypothetical experimental auction approach to elicit consumers' valuation for the rice products.

3. Experimental auction

An experimental auction is a mechanism for eliciting consumers' WTP for new goods and services using non-hypothetical and incentive compatible mechanisms (Lusk and Shogren, 2007). Actual products and cash are used in the experiment to elicit subjects' valuation for the auctioned products. Therefore, participants can focus on a valuation task. Moreover, the incentive compatibility properties can minimize the hypothetical bias since they provide participants an incentive to reveal their true valuation for the auctioned goods (Shogren *et al*., 2001; Lusk *et al*., 2004b, 2004c; Noussair *et al*., 2004).

We used the random *n*th price auction in this study (see Shogren *et al*., 2001). This method can be thought of as a combination of the Vickrey Second Price Sealed Bid Auction (Vickrey, 1961) and the Becker-DeGroot-Marschak (BDM) mechanism (Becker *et al*., 1964). This experimental auction mechanism is incentive compatible and has been widely used (List, 2003; Lusk *et al*., 2004b; Parkhurst *et al*., 2004; Lee *et al*., 2011). The random determination of market price engages not only the on-margin bidders but also the off-margin bidders in the experiment. Moreover, the endogenously determined market-clearing price is related to participants' private values. Therefore, participants' revelation of their true values is the weakly dominant strategy in the experiment. This method also minimizes competitive biases that could exist in the second price sealed bid auction (Shogren *et al*., 2001). A number of studies have compared the random *n*th price auction with other methods and proved that this method provides unbiased and accurate values (List, 2003; Lusk *et al*., 2004b; Parkhurst *et al*., 2004).

4. Experimental Design

The experiments were conducted in Seoul and the Gyeonggi province[1], Korea, in August 2010. A total of 75 participants joined our experimental auction. Our experimental auction included three treatments with different labeling information provided to participants: no labeling information (only tasting of the rice products from three countries), country of origin labeling (COOL) information (taste and COOL), and food miles labeling information (taste and food miles). Each treatment was divided into two sessions with each session comprising of 12 to 13 participants. The auctions were also conducted using five rounds, with one of the rounds randomly chosen at the end to be the binding round. A monitor instructed participants that all rounds had an equal chance to be the binding round in the experiment. Moreover, a participation fee was provided to each subject. We also provided a reference price of 7,000 KRW for average price of 4 kg of domestic rice.

The rice products used in the auction are: domestic rice (Kyeong-gi rice; milled, No.1 Grade, short grain), US rice (CALROSE; milled, No.1 Grade, medium grain) and Chinese rice (Golden Terra; milled, No.1 Grade, short grain). Each rice product weighed about 4 kg. We used the full bidding approach where subjects were asked to bid simultaneously for each of the three rice products. This method can eliminate loss-aversion effects and can collect more data than the endowment approach at a small additional cost. Alfnes (2009) indicated that the full bidding approach is the best option to use when valuing product attributes. In contrast, an endowment approach where the experimenter endows subjects with a product (e.g., regular product) and asks them their WTP to exchange the product they are endowed

[1] Approximately, 50 percent of national population in Korea lives in Seoul and Gyeonggi province.

with for another product(s) could produce loss aversion effects (Lusk *et al*., 2004a). According to Corrigan and Rousu (2006), they concluded that to avoid the loss aversion, the full bidding approach is better than the endowment approach.

In order to conduct the taste tests, we prepared the rice products using identical electric rice cookers and cooking conditions (i.e., same amount of water and time to cook).

The random *n*th price auction was conducted in the following manner:

Step 1: An ID number, written guidebook, and a spoon were distributed to each participant. A seat was also assigned to each subject in such a way that would avoid any communication between participants.

Step 2: Participants were verbally instructed about the procedure of the auction and how they should bid to buy the rice from three countries.

Step 3: In order to further educate participants regarding the auction mechanism, we conducted a practice auction. Three chocolate bars produced with different ingredients were shown to the participants. They were then asked their WTP to buy each chocolate bar. The practice auction was designed to provide an experience and understanding of how the actual auction would function and to show subjects that their best bidding strategy is to bid their true valuation for the auctioned goods.

Step 4: After the practice auction, we conducted the random *n*th price auction for domestic and imported rice products. Before bidding for the rice products, three bowls of cooked rice were distributed to participants, and they were asked to taste and rank the products based on their preference.

Step 5: After tasting the rice, participants submitted sealed bids representing their WTPs to buy the three different types of rice.

Step 6: A monitor collected the bids and then randomly drew the *n*th bid for each of the rice products. After posting the *n*th bids, all the bids above the *n*th bid were identified. The winners of the round were the participants whose bids exceeded the *n*th bid. The ID numbers of the winners and their bids were announced after each round.

Step 7: After five rounds, a binding round was randomly selected. The binding rice product was then randomly selected. The winners of the binding product in the binding round had to pay the market price (Nth bid) determined in that round to purchase the binding rice product.

5. Experimental Results

Summary statistics of the variables used in the analysis are exhibited in Table 1. The majority of participants were married females by design since they are the primary purchasers of rice in Korea (Lee *et al*. 2003). The average age of the participants was 47.7 years; 32 percent of participants had graduated from high school, and 40 percent had graduated from university. On average, the number of family members in the household of the participants was 3.5 persons. Based on the income level categories, 26.7 percent of the participants have an average monthly household income of between 3 million KRW and 3.99 million KRW while 20 percent has average monthly household income between 2 million KRW and 2.99 million KRW. The participants indicated that they are mostly concerned about taste when buying rice, followed by rice quality. About 36 percent of participants indicated that they normally purchase rice at the price level of 41,000 to 51,000 KRW/20kg while 20 percent indicated that they normally purchase rice at price of between 51,000 to 61,000 KRW/20kg.

"Table 1 near here"

The mean of the bids from all treatments by type of rice or country of origin are exhibited

in Table 2. Consumers' WTP for imported US and Chinese rice range from 6919 KRW in round 1 to 7027 KRW in round 5 and from 6924 KRW in round 1 to 7571 KRW in round 5, respectively. On the other hand, consumers' WTP for domestic rice range from 7132 KRW in round 1 to 8071 KRW in round 5. Hence, subjects overall are willing to pay a 10.7 percent premium for domestic rice over US rice, and a 5.7 percent premium for domestic rice against Chinese rice. These figures imply that Korean consumers have either a strong preference for or loyalty towards domestic rice. The most likely reasons for Korean consumers' strong preference for domestic rice are food safety concerns, a strong desire to support domestic producers, and beliefs that domestic rice is of higher quality (Lee *et al*., 2003; Kim, 2003).

Consumers are becoming increasingly concerned with food safety. For example, Genetically Modified Organisms (GMOs) and the Bovine Spongiform Encephalopathy (BSE) have been very sensitive issues in Korea. Moreover, the public auction for imported rice for table use started in 2006, beginning with US rice. However, the negative social atmosphere towards imported rice has led to the failure of the public auction given Korean farmers' strong desire to protect the domestic rice market and the general public's hostility to the marketing of imported rice. This social atmosphere has provided a disincentive for large rice distributors to attend the public auction when imported rice first came into the Korean rice market.

"Table 2 near here"

As previously mentioned, we conducted experiments with three information treatments. Therefore, each participant was randomly assigned to three treatments: (1) no labeling information (taste test only), (2) country of origin labeling information (taste and COOL) and (3) food mile labeling information (taste and food miles).

Average taste scores in each treatment are presented in Table 3. Interestingly, the results suggest that subjects give the lowest score to domestic rice in the no information treatment, but give the highest scores to domestic rice in treatments with information on COOL and Food miles. Obviously, in the no information treatment, subjects could not easily distinguish the domestic rice from the imported rice products. This finding implies that taste is not the reason for subjects' preference for domestic rice when given information about country of origin or food miles. This result is perhaps not surprising given Korean consumers' positive perception of domestic farm products and food safety concerns about imported farm products (Kim *et al*., 2004; Lee *et al*., 2004)

Table 4 presents the mean bids across the three information treatments. Results suggest that subjects do not value the domestic rice higher than either the US or Chinese rice when no information about the rice products is given to them. This is consistent with the results of the taste scores where subjects actually rated the taste of domestic rice lower than the two imported rice products. However, when given information about country of origin or food miles, subjects' bids are higher for domestic rice than for the two imported rice products. WTP values are actually highest for domestic rice in the COOL treatment, suggesting the value that subjects attached to country of origin information.

We performed a simple mean equality t-test on the WTPs from different information treatments. The results of the t-test are tabulated in Table 5. T-test results imply that the estimated mean WTPs are statistically different between domestic and US rice in all information treatments. However, WTPs are not statistically different between domestic and Chinese rice in the No Information and food miles information treatments. Our results suggest that consumers respond more sensitively to COOL information than No information

and Food miles information.

Overall, the results imply that Korean consumers value rice that is grown in their own country. While the US rice seems to be the preference just on taste alone, they value this product the least when given information about where it came from or how many miles it travelled before reaching the Korean market. Interestingly, however, results also suggest that consumers have a hard time distinguishing the domestic rice from the imported Chinese rice when given only food miles information, perhaps because of the relatively close distance of China to Korea.

"Table 3 near here"

"Table 4 near here"

"Table 5 near here"

A regression model was also developed in order to analyze the effect of different factors on consumers' valuation for the rice products. Independent variables include participants' socioeconomic characteristics, information treatments and round effects. To consider the panel nature of our data, we used the random effect panel model. Table 6 exhibits the parameter estimates of the random effects models using the pooled data where we combined data from all three products and using individual product data. According to the pooled model results, WTP for US rice is significantly lower (i.e., 742 KRW lower) than the WTP for domestic rice. WTP for Chinese rice is also lower (i.e., 417 KRW lower) but not statistically different from the WTP for domestic rice.

Based on the regression models for each rice product, results suggest that while COOL and food miles information positively influences consumers' WTP for the domestic rice product, COOL information increases valuations more than food miles information. Specifically,

results indicate that consumers are willing to pay approximately 1,487 KRW and 1,271 KRW more for domestic rice when given COOL and food miles information, respectively. COOL and food miles information has no statistically significant effect on WTP for the imported Chinese rice product while food miles information has a negative effect on WTP for the imported US rice product.

"Table 6 near here"

6. Conclusions

The demand for imported US and Chinese rice in Korea has been slowly but continuously increasing due to the opening of the Korean rice market through the MMA framework. This trend is causing some concerns in Korea about the safety of imported rice and the future of the domestic rice industry due to increased competition. Little is known, however, about Korean consumers' valuation for these imported rice vis-à-vis domestic rice. Surprisingly, no other known study has evaluated this issue using a revealed preference mechanism given its relevance for public policy and marketing of domestic rice. To assess consumers' WTP for domestic and imported rice, we conducted non-hypothetical experimental auctions (i.e., the random *n*th price auction) using real rice products and cash in transactions. We also analyzed consumers' response to different types of labeling information related to country of origin and food miles.

The results suggest that Korean consumers are willing to pay a premium for domestic rice vis-à-vis the imported rice products, especially over US rice. Compared to the WTP for imported rice, our subjects on average are willing to pay a 10.7 percent premium for domestic

rice over the US rice, and a 5.7 percent premium over the Chinese rice[2]. Interestingly, when subjects are not provided information about country of origin or food miles and are only allowed to taste the products, subjects value the US rice the highest and the domestic rice the lowest. However, results change when subjects are provided either country of origin or food miles information. Specifically, subjects value the domestic rice the highest when given either type of information, although the WTP for domestic rice is not significantly different from the WTP for Chinese rice when subjects are given only food miles information.

Results from our random effects panel models also generally suggest that consumers' WTP for domestic rice is significantly higher than the WTP for US rice but not for Chinese rice. Results show that while country of origin and food miles information positively influences consumers' WTP for domestic rice, country of origin information provides higher valuation for domestic rice than food miles information. Country of origin and food miles information has no statistically significant effect on WTP for the imported Chinese rice product but food miles information has a negative effect on WTP for the imported US rice product.

Our results generally imply that Korean consumers have a positive perception of and preference for domestic rice, particularly when country of origin information is provided. Interestingly, our results also suggest that food miles information alone may not help consumers to distinguish between domestic and Chinese rice. Hence, if the policy objective is to help the Korean rice industry and local farmers, then our overall findings seem to suggest

[2] Premiums for domestic rice over imported rice in our study are lower than those from previous studies since we used a non-hypothetical experimental auction. Lee *et al*. (2004) showed premiums for domestic rice over the US and Chinese rice that were in the magnitudes of 32 % and 43 %, respectively. According to Park *et al*. (2006), consumers' WTP for domestic rice was 28.5 % and 22.8 % higher than those for the US and Chinese rice.

that a country of origin labeling policy would be more appropriate than a food miles labeling policy. It would be interesting to re-assess, however, Korean consumers' valuation for food miles information in the future given likely increasing environmental and sustainability concerns among consumers. There seems to be room as well for improvement in the taste or sensory attributes of the domestic rice given the results in the no information treatment.

If COOL and food miles labeling policies are implemented in Korea, the US rice industry could potentially diminish the negative effect of this information by emphasizing the taste/sensory attributes of their rice since we found that our subjects picked the US rice the best based on just the taste test (no information treatment). Furthermore, there might be some potential for China to export more rice to Korea since it has the advantages of being geographically close to the Korean market and it cultivates short grain rice that is similar to Korean rice. This potential could be further enhanced if China can develop and implement marketing strategies that can improve the image of their rice in terms of quality and food safety.

A limitation of this study is that we did not test the effect of simultaneous provision of both country of origin and food miles information on WTP for the rice products since this was beyond the scope of our study. It would be interesting for future studies, for example, to examine if provision of both types of information increases the WTP for domestic rice relative to provision of only either type of information. Future studies could also test the robustness of our findings using a different auction mechanism (e.g., BDM).

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Table 1. Participants' socioeconomic characteristics

Variables	Categories	Value	
		Mean	Std.Dev
Age		47.7	9.9
Household size		3.5	1.2
Number of purchase[1]		6.4	3.3
Education	Middle school	1.3%	
	High school	32.0%	
	College	22.7%	
	University	40.0%	
	Post-graduate	4.0%	
Income[2]	Less than 1 million	1.3%	
(Unit: KRW)	1 to 1.99 million	9.3%	
	2 to 2.99 million	20.0%	
	3 to 3.99 million	26.7%	
	4 to 4.99 million	14.7%	
	5 to 5.99 million	10.7%	
	6 to 6.99 million	8.0%	
	7 to 7.99 million	1.3%	
	Higher than 8 million	8.0%	
Concern	Quality	25.3%	
	Taste	34.7%	
	Milling date	8.0%	
	Food safety	18.7%	
	Convenience to buy	4.0%	

	Nutriment	2.7%
	Others	6.7%
Purchasing Price[2]	Below 32,000	6.7%
(Unit: KRW)	32,000 to 35,000	1.3%
	35,000 to 38,000	17.3%
	38,000 to 41,000	14.7%
	41,000 to 51,000	36.0%
	51,000 to 61,000	20.0%
	Over 61,000	4.0%

[1] Frequency of buying rice a year.

[2] The household income level was reported in nine 1 million KRW intervals.

[3] The purchasing price level was reported in seven.

Table 2 Mean of bids from all treatments by country of origin (Round)

Unit: KRW/4kg

	Round				
	1	2	3	4	5
WTP(Korea)					
Mean	7132	7493	7824	8037	8071
Median	7000	7600	8100	8500	8500
Std. dev.	1394	1571	1872	1971	1854
WTP(US)					
Mean	6919	6837	7094	6966	7027
Median	7000	6550	7500	7000	7500
Std. dev.	1324	1036	1181	1337	1381
WTP(China)					
Mean	6924	7096	7369	7509	7571
Median	7000	7000	7600	8000	8000
Std. dev.	2805	2777	2867	2836	3057

Table 3. Average taste scores across the treatments

	Treatment		
	No information	COOL	Food Mileage
Korea	70	79	78
US	74	75	71
China	74	74	74

Table 4. Mean bids by treatment

Unit: KRW/4kg

Country	Round	Treatment		
		No information	COOL	Food mileage
Korea				
Mean	*1*	6748	7476	7172
	2	6620	8100	7760
	3	6568	8444	8460
	4	6956	8528	8628
	5	7244	8628	8340
	Mean	6827	8235	8072
US				
Mean	*1*	7152	6784	6820
	2	7212	7032	6268
	3	7242	7433	6606
	4	7142	7577	6180
	5	6912	7653	6516
	Mean	7132	7296	6478
China				
Mean	*1*	6760	6504	7508
	2	6624	7017	7650
	3	6592	7429	8086
	4	6894	8057	7518
	5	6984	8184	7546
	Mean	6783	7438	7662

Table 5. T-test for equality of WTP means across the treatments

Treatment	t-Test for equality of means		
	Mean differences	**Std. Error**	**t-value**
No information			
$H_0: \overline{WTP}_{KR} = \overline{WTP}_{US}$	-304.8	165.38	-1.84*
$H_0: \overline{WTP}_{KR} = \overline{WTP}_{CH}$	-44.4	231.36	0.19
COOL			
$H_0: \overline{WTP}_{KR} = \overline{WTP}_{US}$	939.44	108.94	8.62***
$H_0: \overline{WTP}_{KR} = \overline{WTP}_{CH}$	797.04	129.39	6.16***
Food Miles			
$H_0: \overline{WTP}_{KR} = \overline{WTP}_{US}$	1594.16	248.96	6.40***
$H_0: \overline{WTP}_{KR} = \overline{WTP}_{CH}$	410.4	436.83	0.93

* and *** denote significance at 10% and 1% levels, respectively.

Table 6. Random effect panel model estimation results

Variable	WTP_{Pooled}		WTP_{KR}		WTP_{US}		WTP_{CN}	
	Coef.	z-value	Coef.	z-value	Coef.	z-value	Coef.	z-value
Intercept	5952.99***	5.27	4732.68***	3.41	6057.49***	6.01	5908.58**	2.06
COOL	784.12**	2.36	1486.94***	3.61	157.56	0.53	707.86	0.83
Foodmiles	450.02	1.46	1271.25***	3.33	-710.99***	-2.57	789.81	1.00
Age	9.30	0.68	-3.03	-0.18	4.51	0.36	26.44	0.75
Education	-209.95	-1.52	42.28	0.25	-71.70	-0.58	-600.43*	-1.69
FamilySize	218.89*	1.87	267.13*	1.84	264.43**	2.51	125.13	0.42
Income	-75.04	-1.06	-139.11	-1.59	-87.05	-1.37	1.04	0.01
PurchasingPrice	224.02**	2.28	255.19**	2.09	129.40	1.46	287.48	1.13
Round2	151.02*	1.73	361.46**	2.17	-81.33	-0.64	172.93	1.12
Round3	437.37***	5.00	692.13***	4.16	174.93	1.38	445.06***	2.88
Round4	512.75***	5.87	905.20***	5.44	47.46	0.37	585.60***	3.79
Round5	564.84***	6.46	938.66***	5.64	108.40	0.85	647.46***	4.19
US	-742.93**	-2.47						
CN	-417.28	-1.39						
Observations	1125		375		375		375	
Sigma u	1795.69***		1238.25***		893.09***		2706.68***	
Sigma e	926.99***		1018.57***		777.22***		946.48***	

*, ** and *** denote significance at 10%, 5% and 1% levels, respectively.