PREFERENCE FOR ORGANIC PRODUCTS AND BUYERS' SOCIOECONOMIC CHARACTERISTICS IN EMERGING MARKETS: THE CASE OF PACKED RICE IN CHINA

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Abstract

Organic products have become popular in the developed world, and scholars have long explored the acceptance, preference, and perceived benefits of organic products in these affluent countries. However, how and to what extent consumers in developing countries acquire a taste for organic products is not well understood. Moreover, it remains unclear which segment of the population in these countries is more susceptible to acquiring a taste for organic products. The study aims to develop understanding of consumers in emerging markets, particularly regarding whether or not they exhibit any preference for organic food products. The study focuses on the most prominent emerging economy—China—to investigate whether and to what extent its consumers develop a taste for organic over non-organic rice. The choice of rice is founded on the fact that rice is the staple food for many low- and middle-income countries, and typically employs conventional farming methods, which involve the heavy use of inorganic pesticides and synthetic fertilizers. It is, thus, advantageous to explore the Chinese rice market and assess its rice consumers' acceptance or preference for organic products. The buyer survey conducted, subjected the participants to a choice model experiment. The participants rank-ordered four hypothetical packed-rice products exhibiting four key product characteristics: organic label, price, package size, and product origin. The gathered data were analyzed through several rank-ordered logit regressions. It was found that Chinese packed-rice buyers were yet to develop a taste for organic products. Instead, there existed distaste in general. Such distaste was similar in size between high- and low-income groups but more pronounced for the old, or those with no tertiary education, as well as males. Consumers generally were sensitive to price changes, except older individuals. Such individuals, those only with a grade school education level, or males, preferred small packages. Imported rice from Thailand was not well received, but the high-income, young, and female population appeared less resistant. Surprisingly, the acceptance or preference level of organic rice in China did not differ between the high-income and low-income groups. Such a finding suggested that the preference for organic products might not develop along with a growing economy and increases in the per capita income. These results indicate that organic products and agriculture suppliers should develop strategies to raise awareness and cultivate a taste for such products effectively.

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INTRODUCTION

With increases in the health consciousness and life expectancy of individuals in developed countries in Europe and North America, organic products have become popular and have gradually penetrated stores frequented by the general public (Tleis et al., 2019). Thus, several studies have explored the acceptance, preference, and perceived benefits, of organic products by examining consumers in developed markets (Fernqvist & Ekelund, 2013; Loureiro et al., 2001; Meas et al., 2015; Pearson et al., 2011; Urban et al., 2012). The positive attitudes and actual purchases for such products are growing in these areas.

Introducing organic products to consumers in some developing countries has also begun, such as parts of Asia, Latin America, and Africa (Willer & Lernoud, 2019). The focal countries in these studies have undergone substantial economic development and have raised their per capita income significantly. Most importantly, the consumers in these emerging markets have exhibited their ever-growing interests in organic products (Willer & Lernoud, 2019). Thus, there have been several studies exploring the preference of these countries' consumers for organic products, for example, Pedersen et al. (2019a; 2019b), Nguyen et a. (2019), Tleis et al. (2019), and Thøgersen (2019). However, understanding how and to what extent consumers in emerging markets accept or develop a preference for organic products is still worth exploring. In addition, it also remains unclear which segment of the population in these countries is more susceptible to aquiring a taste for organic products. Therefore, this study aims to expand the understanding of consumers in emerging markets, particularly regarding whether or not they exhibit any preference for organic food products. The study focuses on the largest developing country—China—to investigate whether and to what extent its consumers have developed a taste for organic over non-organic rice.

To seek answers to the research questions and bridge the gap in the prior literature, this study explores the preferences of Chinese consumers for packed rice products by conducting a buyer survey that subjected the participants to a choice model experiment. The survey participants were asked to rank order four hypothetical packed-rice products according to four key product characteristics, namely organic labelling, price, package size, and product origin. The gathered data were then anaylzed through several rank-ordered logit regressions.

The estimation revealed that Chinese packed-rice buyers were yet to develop a taste for organic products. Instead, there existed distaste in general. Such distaste was similar in size between high- and low-income groups but more pronounced for the old, or those with no tertiary education, as well as males. Consumers generally were sensitive to price changes, except older individuals. Such individuals, those only with a grade school education level, or males, preferred small packages. Imported rice from Thailand was not well received, but the high-income, young, and female population appeared less resistant. Surprisingly, the acceptance or preference level of organic rice in China did not differ between the high-income and low-income groups. Such a finding suggested that the preference for organic products might not develop along with a growing economy and increases in the per capita income. Consequently, instead of relying on possible changes in consumer preference due to economic development and growing personal income, suppliers of organic products and agriculture should develop strategies to raise awareness in order to cultivate a taste for such products effectively.

Rice is the most important crop in Asia and the staple food for many low- and middle-income countries (Fairhurst & Dobermann, 2002). It is grown chiefly in water-filled

paddies and tropical and temperate climates (Nguyen, n.d.). To control pests and improve yields, farmers typically rely on conventional farming techniques, which rely heavily on the use of inorganic pesticides and synthetic fertilizers (Zhu & Habisch, 2020). Organic rice is, thus, expected to appeal to health-conscious consumers and eco-friendly farming supporters.

The Chinese market was chosen for this investigation of whether and to what extent consumers of an emerging economy prefer organic rice to non-organic rice. With its 1.4 billion population, most of whom rely on rice as the primary source of calorie intake, China is the number one rice-consuming country and the largest rice producer in the world. It is, thus, advantageous to explore the Chinese rice market and assess its rice consumers' acceptance or preference for organic rice. Furthermore, this study sheds light on how product attributes, mainly whether organic or not, and socioeconomic factors, influence the buying choices of Chinese consumers. This study enhances current understanding of the effects of a product's "organic" attributes on purchase intentions and uncovers the role of socioeconomic characteristics in developing a preference for organic products.

Questionnaire Structure

The Chinese rice consumers' acceptance or preference for organic rice was assessed based on a framework of discrete choice models. The modeling assumed that the consumer preferences were homogeneous (Martínez, 2015) hence allowing focus on the observable and measurable characteristics of the product itself rather than the vast variations of unobservable characteristics of the consumers. The survey participants were subjected to a situation that was both controlled and realistic as if they are in the store facing multiple rice products to choose from. Therefore, the vital element of the study was the one and only question with the answer sought through several hypothetical rice products' being ranked by preference order.

The hypothetical rice products were designed to resemble the products commonly found in the market while incorporating the study's main objective testing the preference for organic products. Therefore, the key attributes of the hypothetical rice products were the presence or absence of an organic label, price, product size (weight), and product origin. The "organic label" attribute is a category variable indicating whether or not the product is organic. The attribute "price" included more variation, with ten different prices of 14, 15, 30, 35, 45, 60, 80, 100, 130, and 160 Chinese yuan. The "product size" attribute had two possibilities: two and five kilograms. Lastly, the final attribute of "product origin" was another category variable indicating where the rice in the product had been grown; here there were three variations of Guanxi province, Dongbei region of China, or the country of Thailand. Thus, there were a total of 120 hypothetical products.

It is impractical to ask one to rank 120 alternatives from the most preferred to the least. Thus, ten hypothetical products were compiled based on these attributes; Table 1 details the attributes of each hypothetical product. Four out of the ten products were included in each questionnaire. Therefore, each survey participant ranked only the four products illustrated in their questionnaire. However, setting four out of a total of ten alternatives leads to 210 possibilities. Therefore, the orthogonal design concepts were largely followed to hypothesize the ten products and select four products to form ten versions of the questionnaire (Fisher, 1935; Frederic & Moore, 1995; Moore, 1994). Each version included four packed rice products (as shown in Table 2).

Table 1 Ten Hypothetical Products and their Attributes

Product attributes	Product									
	A	B	C	D	E	F	G	H	I	J
Organic label	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes
Price (CNY)	15	35	14	30	80	45	100	60	130	160
Origin	GX	GX	DB	DB	TH	GX	GX	DB	DB	TH
Packaging size (kg)	2	5	2	5	5	2	5	2	5	5

Note: GX denotes Guanxing province, DB Dongbei region, and TH the country of Thailand.

Table 2 Ten Versions of the Questionnaire

Questionnaire version	Product									
	A	B	C	D	E	F	G	H	I	J
1	x	x				x	x			
2	x		x			x		x		
3	x		x				x			x
4	x			x	x				x	
5		x	x	x	x					
6		x	x					x		x
7		x		x		x		x		
8			x	x				x	x	
9					x		x		x	x
10						x	x		x	x

Note: Please see Table 1 for the ten different products and their characteristics.

The second section of the questionnaire gathered information on the survey participants' four key socioeconomic characteristics: education level, income, age, and gender, because the acceptance or preference for organic rice may vary across individuals sharing different characteristics. Education was categorized into five levels: grade 6 or unknown, grade 7 to 12, vocational or undergraduate level, master's, and PhD or above. Income values were based on a monthly cycle, and categorized into five levels: 1,500 Chinese yuan or below, 1,501 to 2,500, 2,501 to 3,500, and 3,501 to 4,500, and 4,501 and above. Six different age groups were categorized: younger than 20 years old, 21 to 30, 31 to 40, 41 to 50, 51 to 60, and 61 and over. Lastly, gender was assigned into the usual binary components.

Data

The survey was conducted from March to May 2018 in 76 cities in China, including Beijing and Shanghai. Rice shoppers were solicited to participate in the study by distributing the questionnaire at the aisle of the packed rice products inside "ma and pa" grocery stores or supermarkets. More than a thousand individuals were surveyed. Any observations that contained incomplete or contradictory information were then removed, resulting in 838 valid responses. The descriptive statistics of the participants are displayed in Table 3.

Table 3 Descriptive Statistics of the Survey Participants

characteristic	Frequency						Total
Income level	<= 1500	1,501 to 2,500	2,501 to 3,500	3,501 to 4,500	> 4,500		
	237	279	170	110	42		838
Age	< 20	20-30	31-40	41-50	51-60	61+	
	104	243	229	195	60	7	838
Education level	Grade 6 or less (including unknown)	Grade 7-12	College or undergraduate	Master's degree	Doctoral degree		
	264	227	283	44	20		838
Gender	Male			Female			
	470			368			838

METHODOLOGY

The choice experiment was first introduced and implemented by Louviere and Hensher in 1983 when they examined consumer preferences over different transportation alternatives; while Louviere and Woodworth (1983) later extended the model by integrating concepts and methods of conjoint analysis and discrete choice theory (McFadden, 1984), allowing multinomial attributes to be studied under controlled conditions.

The model set-up follows the common framework as a dichotomous choice contingent valuation under the Random Utility Model (McFadden, 1984 and Hanemann, 1994):

The utility of the i-th respondent, from consuming the j-th product, U_{ij} ,is a summation of two distinct parts: a linear summation of the utility brought by each and every different deterministic and observable attribute of the good s, and a stochastic and unobservable element (ϵ_{ij}). Thus, the utility can be expressed in functional form as follows:

$$U_{ij} = \sum_{m=1}^{n} V_{ij}^{m} + \epsilon_{ij} \quad (1)$$

where V_{ij}^{m} is the utility derived from the good's m-th attribute.

The probability that any particular respondent (i) picks an option (a) from the set of choices over other available options (b) can be represented as the probability of utility from option (a) exceeds the utility from option (b):

$$Prob[U_{ia} > U_{ib} \; \forall \; a \neq b] = Prob[V_{ia} - V_{ib} > \epsilon_{ia} - \epsilon_{ib}] \quad (2)$$

By assuming that the stochastic elements are independently and identically distributed with an extreme value (Weibull Distribution), the explicit form of the probability density function can therefore be established as:

$$Prob[\epsilon_{ij} \leq t] = F(t) = \exp(-\exp(-t)) \quad (3)$$

And hence the probability for the consumer (i) to pick option (a) can be represented by the logistic distribution function (McFadden, 1984):

$$Prob[U_{ia} > U_{ib} \; \forall \; a \neq b] = \frac{\exp(\theta V_{ia})}{\sum_j \exp(\theta Vij)} \quad (4)$$

where θ is a parameter inversely proportional to the standard deviation of the error distribution and often cannot not be estimated and commonly assumed to be one (Hanley et al., 2001).

If the choice set also obeys the properties of Luce's Choice Axiom (Luce, 1959), also known as Independence from Irrelevant Alternatives (IIA) [5] ,the model can be estimated by the conventional maximum likelihood process:

$$\log L = \sum_{i=1}^{N} \sum_{j=1}^{J} \gamma_{ij} \log \left[\frac{\exp(V_{ij})}{\sum_{j=1}^{J} \exp(V_{ij})}\right] \quad (5)$$

γ_{ij} is a scalar number taking the value of one if consumer (i) chooses option (j) and zero if otherwise.

Once the parameters have been obtained from equation (5), the willingness to pay can be represented as:

$$WTP = \beta_y^{-1} \ln \left(\frac{\sum_i \exp(V_i^a)}{\sum_i \exp(V_i^0)}\right) \quad (6)$$

where V_i^a is the utility of consumer (i) with option (a) and V_i^0 is the utility without, as β_y is the coefficient of the cost attribute and represents the marginal utility of income.

ESTIMATION AND RESULTS

Each questionnaire contained a preference, from the most to the least, over the four rice products. The stated ranking was fitted to a logistic specification and maximum likelihood estimation was performed accordingly (Beggs et al., 1981; Hair et al., 2010; Marden, 1995; Punj & Staelin, 1978). The estimation produced the results seen in Table 4. The negative and statistically significant coefficient on the "organic" dummy implied that rice consumers in China generally did not favor organic products. The negative and significant estimate on the scalar variable "price" signals a distaste for price increases. Rice buyers did not seem to favor a larger package size as the estimation yielded a negative coefficient (-0.030) in column 1. However, such preference was not statistically visible. Rice grown in the Guanxi province and Dongbei region were preferred over imported rice from Thailand, as indicated by the coefficient of the dummy variable "Thailand", which was negative and large (-0.577).

However, it is natural to expect that preference over the product attributes, particularly the organic label, likely varies across individuals of different socioeconomic characteristics. Therefore, the survey participants were separated according to their socioeconomic characteristics into various subsamples to examine such a conjecture.

First, whether and to what extent the level of acceptance (or preference) toward organic rice products differed across individuals with different levels of monthly income was explored. Low-income individuals were identified as those with monthly income equal to or below 2,500 Chinese yuan and high-income individuals to be those with monthly income greater than 2,500. Both groups yielded a negative coefficient on the organic dummy, indicating that organic rice products were, in general, not preferred by any group. There seemed a marginal difference between the two groups in their preference toward organic products. The estimated coefficient of the organic dummy for the high-income group was

[5] Luce's Choice Axiom stated that the relative probabilities of two options being selected are unaffected by the introduction or removal of other alternatives (Luce, 1959): in common sense, that would suggest that the consumers' preference between option a and option b should not be affected regardless of how many other options are available.

slightly smaller in size than that for the low-income counterpart, suggesting that low-income individuals on average had a distaste for organic rice marginally stronger than that of high-income individuals.

The two groups had similar price sensitivities (-0.008 for the high-income group in column 1 and -0.009 for the low income in column 2). The dislike of price increases was evident regardless of income. In stark contrast, the two groups differed substantially in their preference toward product size. High-income people seemed to dislike the larger package more than their low-income counterparts, given that the coefficient of the packaging variable for the high-income (-0.063 in column 1) was about 11 times greater than that of the low-income. Both estimates were, nevertheless, not statistically significant from zero.

Both income groups also showed (table 5) a dislike of imported Thai rice as the estimate of the Thailand dummy was negative in both columns. However, the distaste was more prominent for the low-income group as the size of the coefficient for the group was about two times larger than that for the high-income group. Perhaps low-income individuals were less susceptible than high-income people to foreign products, resulting in a more pronounced distasteful preference over Thai rice.

Age also caused preference over product attributes to differ among individuals. As shown in Table 6, individuals aged 41 and over disliked organic rice more than their younger counterparts since the coefficient of the organic dummy in column 1 was larger in size than that in column 2. The estimated coefficient in column 2 did not statistically differ from zero. Perhaps the young generation was more curious and risk-taking, so it had no strong distaste.

Table 4 Rank-Ordered Logit Estimation on the Entire Sample

	(1)
Sample	Pooled
Organic	-0.358***
	(0.067)
Price	-0.008***
	(0.002)
Packaging size	-0.030
	(0.030)
Thailand	-0.577***
	(0.112)
Observations	3,352
Number of individuals	838

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5 Preference Comparison of High- and Low-Income Individuals

	(1)	(2)
Sample	High income[6]	Low income
Organic	-0.327***	-0.367***
	(0.109)	(0.085)
Price	-0.008***	-0.009***
	(0.003)	(0.002)
Packaging size	-0.063	-0.005
	(0.048)	(0.040)
Thailand	-0.320*	-0.744***
	(0.179)	(0.145)
Observations	1,288	2,064
Number of individuals	322	516

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6 Preference Comparison of the Old (Age 41 and over) and Young (40 and less)

	(1)	(2)
Sample	Age 41 and over	Age 40 and below
Organic	-1.005***	-0.116
	(0.138)	(0.078)
Price	0.002	-0.012***
	(0.004)	(0.002)
Packaging size	-0.353***	0.091**
	(0.063)	(0.036)
Thailand	-0.833***	-0.527***
	(0.241)	(0.128)
Observations	1,048	2,304
Number of individuals	262	576

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

On the other hand, the old were less sensitive to price than the young as column 1 reported a coefficient on the price variable of 0.002 while -0.012 was listed in column 2. The old liked smaller packaging sizes while the young preferred larger sizes, as indicated by the coefficient on the packaging variable in column 1 being negative and significant while the corresponding estimate in column 2, was positive and significant. Both age groups

[6] The High/Low income groups were divided based on the rounded average income of China, as reported by the World Bank in 2018.

disliked imported Thai rice as shown in both columns reporting a negative estimate on the Thailand dummy. The distasteful preference was more visible in the old population as indicated by the size of the estimate being larger in column 1 than that in column 2.

Table 7 displays results of the exploration of whether and how different levels of education affected the preference. Both columns displayed a statistically significant and negative coefficient for the organic dummy. The coefficient was larger in size for individuals with grade school education than for those with at least college-level education. The distaste for organic rice was more pronounced for the less educated than those with post-secondary education, even though organic rice was in general not preferred. Both groups had a negative coefficient for the price variable, implying that they both disliked higher prices. Comparing the coefficient size between the teo groups, -0.006 and -0.011; this indicates that those educated at the grade school level were less sensitive to price changes. They had a strong distaste for larger packages of rice (-0.081 in column 1). The two groups' estimated coefficients for the Thailand dummy were both negative and similar in size, suggesting that imported Thai rice was not preferred regardless of education level.

Gender also played a role in the level of preference for organic rice, as seen in Table 8. The negative and statistically sizable estimate of the organic dummy in column 1 revealed that male buyers had a strong distaste for organic products. On the other hand, the same dummy yielded a coefficient, although negative, statistically indistinguishable from zero (-0.128 in column 2) when regression explored female rice buyers. Both genders disliked price increases. Male buyers preferred small packages to larger ones (-0.105 in column 1). Female buyers did not exhibit high sensitivity to the packed size as the coefficient was not statistically distinguishable from zero. Both male and female rice buyers did not prefer imported Thai rice. The distaste was more visible among the males as the estimated coefficient of the Thailand dummy was larger in size for male than for female consumers.

Table 7 Preference Comparison of Individuals with and without College Education

	(1)	(2)
Sample	Grade school	College and above
Organic	-0.462***	-0.188*
	(0.090)	(0.104)
Price	-0.006**	-0.011***
	(0.003)	(0.003)
Packaging size	-0.081**	0.049
	(0.041)	(0.047)
Thailand	-0.547***	-0.589***
	(0.153)	(0.165)
Observations	1,964	1,388
Number of individuals	491	347

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8 Preference Comparison of Males and Females

	(1)	(2)
Sample	Males	Females
Organic	-0.617***	-0.128
	(0.092)	(0.100)
Price	-0.007***	-0.009***
	(0.003)	(0.003)
Packaging size	-0.105**	0.042
	(0.042)	(0.044)
Thailand	-0.876***	-0.333**
	(0.156)	(0.162)
Observations	1,880	1,472
Number of individuals	470	368

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

CONCLUSION

This study identified whether and to what extent there existed a preference for organic rice in China as a whole and across groups with different socioeconomic characteristics. Based on the concept of choice models, a consumer survey was conducted in China where the participants, according to their preference, rank ordered four "orthogonally arranged" hypothetical products. The collected data were subjected to ranked-order logistic regressions. The results suggested that Chinese rice buyers had little, if not negative, preference for organic rice. The level of such distaste was similar between high- and low-income groups but more pronounced on individuals aged 41 and over, those who did not receive any tertiary education, and males.

Rice consumers in China, in general, were sensitive to price changes, except individuals aged 41 and over. It was also found that individuals 41 years old and older, those who were only educated at the grade school level, and males, preferred rice products with small packages. Imported Thai rice was not well received among Chinese rice shoppers, although the high-income, young, and female populations, seemed less resistant than their respective counterparts.

The findings imply that the acceptance level of organic products remains low in China. Furthermore, the acceptance or preference level of organic rice in China, did not seem to differ between the high-income group and its low-income counterpart. The Chinese may not develop a preference for organic products even with a rapidly growing economy, thereby increasing per capita GDP income. This might be a potential challenge for organic rice producers to consider before investing and shifting their production to be organic. However, to raise awareness and cultivate a preference for such products, suppliers of organic products can target some subsets of the population first: young, college-educated, or female, as they do not display a resistance from our regression analysis.

This study only explored the Chinese consumers' preferences over the observable characteristics of packed rice products. While the finding that Chinese consumers at the

moment do not exhibit a strong willingness to pay for packed organic rice, can be useful to rice producers in determining their production procedure as well as the package design, the findings do not generally indicate that all Chinese consumers are not interested in other organic products.

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