An Evaluation of Consumer Acceptance of Genetically Modified Food: Willingness-to-Pay (WTP) Vs. Willingness-to-Accept (WTA).

Arbindra Rimal, Ast. Professor, Dept of Agriculture-Agribusiness, Southwest Missouri State University, 206 Karls Hall, 901 South National Avenue, Springfield, MO 65810, (417) 836 5094, E-Mail: **arr412f@smsu.edu**

Wanki Moon, Ast. Professor, Dept. of Agribusiness Economics, Southern Illinois University, Carbondale IL 62901, (Fax) 618) 453-1708, (Tel) 618) 453-6741, (Email) wmoon@siu.edu

Siva Balasubramanian, Dept. of Marketing, Southern Illinois University, Carbondale IL 62901

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Abstract

A majority of literature on genetically modified (GM) food products does not address those consumers who are indifferent to the risk of consuming GM foods. Using Heckman's sample selection model, consumer willingness-to-pay (accept) premium (discount) for non-GM (GM) cereals was analyzed. The data were collected though household surveys administered in two countries by mail in the US and online in the UK using household panels maintained by National Panel Diary (NPD) group. Willingness-to-Pay (WTP) a premium for nonGM foods is contrasted with willingness to accept (WTA) a discount for GM foods. Results showed that consumers who were indifferent to the risk of consuming GM foods behaved differently compared to those who were willing-to-pay (accept) premium (discount) for non-GM (GM) cereals.

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Background

Application of genetic engineering to crop production continues to be an issue of major concern to consumers, farmers, biotech industry and regulators. Several studies addressed this issue by measuring consumer willingness-to-pay for nonGM food products using contingent valuation or nonhypothetical lab experiments (Lusk et al, 2001, Huffman et al., 2001; Moon and Balasubramanian, 2001). They show that some segment of the US population are willing to pay a certain size of premium to avoid GM food products. A majority of literature on genetically modified (GM) food products, however, does not address those consumers who are indifferent to the risk of consuming GM foods. The objective of the study is to account for those individuals who are indifferent to the genetically modified food and are neither willing-to-pay premium for non-GM foods nor willing-to-accept discounts for GM food. The study seeks to measure and compare willingness-to-pay (WTP) a premium for nonGM food and willingness-to-accept (WTA) a discount for GM food products. We will analyze the behavior of those consumers using a sample selection model. Since identity preservation, market segregation, verification and labeling are not without additional costs to the production and marketing system, supply chain participants would want to ensure that market demand for nonbiotech foods is sizable enough to guarantee market prices cover these costs. Knowledge about whether and how much consumers would be willing to pay more for nonbiotech foods is critical for farmers to make planting decisions and for processors to make investment decisions for identity preservation, segregation, and certification.

Consumers' Indifference and Survey Responses

Several methods have been used in eliciting consumers' willingness-to-pay (WTP) responses in the health and environmental studies. The most widely used approaches to elicit WTP include open-ended and closed ended (dichotomous choice) question formats. The third approach, the payment card method, however, is gaining popularity. The open-ended approach is criticized for the potential of generating an unacceptably large number of non-responses, which is equivalent to "protest zero" responses or general indifference of consumers towards the topic. The dichotomous choice (DC) formats avoid these problems by presenting respondents with only two choices (i.e. "Yes" or "No" to a posted price) to respondents. However, this method would be forcing the truly indifferent respondents to take a position, hence may not represent the actual intention of the consumers. The National Oceanic Atmospheric Administration (NOAA) panel recommended including a middle response in dichotomous choice CV questions (Groothuis and Whitehead, 2002). A middle response might take the form of 'don't know', "undecided' or 'uncertain' options in addition to the standard 'Yes' and 'No' categories.

The payment card method, which allows respondents to select one of the series of payment amounts, has evolved as an alternative to the bidding game. Under the payment card method, the group of indifferent respondents can be identified in two ways. First, respondents may be asked whether they were willing to pay (accept) premium (discounts), then among those who responded that they were willing-to-pay, actual amount can be elicited by using a payment card with only positive amounts listed. Second approach uses a payment card that includes a zero amount that may represent

those respondents who are indifferent to the issue, hence could have chosen 'undecided' or 'don't know' option under the dichotomous choice approach. Those who chose zero WTP or WTA may be asked a follow-up question to clarify why they chose zero.

Willingness-to-pay (WTP) vs. Willingness-to-accept (WTA)

A number of field contingent valuation research and lab experiments have consistently shown that there is a significant discrepancy between willingness-to-pay (WTP) and willingness-to-accept (WTA) measures of value for public goods (e.g., Knetsch and Sinden, 1984; Brookshire and Coursey, 1987; Kahneman, Knetsch and Thaler, 1990). Willingness-to-pay measures the value that consumers place when they purchase goods, whereas willingness-to-accept measures the value placed when they sell goods. With small income effects, the standard economic theory predicts that the two measures would converge (Willig, 1976; Randall and Stoll, 1980; Walters, 1979). In view of the contradiction between theory and empirical findings, two theories have been advanced to explain the divergence.

First, Kaheman and Tversky (1979) suggested that WTA values be higher than WTP due to endowment effect. The endowment effect proposes that people value goods more highly once they own them, a plausible result of loss aversion indicated by prospect theory (i.e., losses are weighted substantially more than objectively commensurate gains in the evaluation of prospects and trades). In fact, Kahneman, Knetsch and Thaler (1990) demonstrate in their lab experiments using coffee mugs that such endowment effect persists even after controlling for transaction costs and the opportunities to learn.

Second, Haneman (1990) illustrates that, for consumer theory involving quantity changes, WTP and WTA do not need to converge and the difference between the two measures depends not only on an income effect but also on a substitution effect. Further, he shows that substitution effects could exert a far greater effect on the relation between WTP and WTA than do income effects. That is, he indicates that the convergence of WTP and WTA is expected only when the good in question has a very close substitute. When the good has an imperfect substitute, a value divergence will arise. In support of Haneman's argument, Shorgren et al. (1994) present evidence of the significant role of substitutability in the divergence between WTP and WTA using experiments involving private and public goods. They found that the divergence of WTP and WTA value measures disappears for private goods with a close substitute whereas a private nonmarket good with no close substitute, the divergence was robust and consistent.

In this research we elicit both willingness to pay (WTP) a premium to purchase a box of nonGM breakfast cereals and willingness to accept (WTA) a discount to forgo such an opportunity and purchase a box of GM breakfast cereals. Hence, the good to be valued in our research is the nonGM property of a box of breakfast cereals: i.e., consumers are required to pay a premium to obtain it and offered a discount to give it up. Our research statistically tests for the equivalence of WTP and WTA as related to the nonGM property of breakfast cereals.

Conceptual and Empirical Models

The relationship between consumer attitude toward GM foods and the willingness to pay (accept) premium (discount) for non-GM food (GM food) can be analyzed in two

stages. In the first stage, the decision-making relates to those consumers who do not have any opinion about the GM foods, therefore are not willing to pay (accept) premium (discount) for non-GM (GM) foods. The second stage relates to those consumers who are actually willing to pay (accept) premium (discounts) and their decision making is influenced by various factors including their prior knowledge about GM technology, their attitude toward application of GM technology on food production, and socio-demographic characteristics of the respondents. The two-step willingness-to-pay (accept) model for non-GM (GM) food is as follows:

(1) $$\Pr(w_i>0) = g(X_1, \gamma_1)$$

(2) $$(P_i|w_i>0) = .(X_2, \gamma_2)$$

where w_i is willing to pay (accept) premium (discount) for non-Gm (GM) foods, P_i represents amount of premium (discounts) for non-GM (GM) foods reported by the respondents, Y is the income, X_1 and X_2 are the socioeconomic variables related to the respondent, N represents respondent's prior knowledge of GM technology, and γ_1 and γ_2 are the disturbance terms. Equation (1) represents a probability of consumers' willing to pay (accept) for non-GM (GM) food, while equation (2) represents amount of premium (discount) provided that the respondents are willing-to-pay (accept).

We used Heckman's two-stage regression methodology (Heckman, 1979). First, we estimated a probit model of the choice between willing to pay (accept) premium (discount) for non-GM (GM) cereal and non-willing to pay the premium (discount) and calculated the inverse Mills ratio. Next, we added the inverse Mills ratio to the regression as an additional explanatory variable. If its coefficient is not significantly different from zero, we can conclude that there is no evidence of selection bias.

Data and Methods

Survey instrument was designed to measure two sets of conceptual variables of interest in this study: (1) attitudes and perceptions as related to agrobiotechnology, and (2) behavioral intentions with a focus on willingness-to-pay a premium for breakfast cereals made of nonGM ingredients and willingness-to-accept a discount for breakfast cereals made of GM ingredients. The surveys were administered in two countries by mail in the US and online in the UK using household panels maintained by National Panel Diary (NPD) group (a marketing consulting firm specializing in research on consumer behavior and food marketing). Questionnaires were distributed to 5,200 households, a subsample of the NPD panel, selected across the United States by random sampling. The US sample was stratified by geographic regions, household head age, education and income to balance with the US census for adults. The same instrument was administered to consumers in the United Kingdom using online method. Questionnaires were sent to about 9,000 participants of the online panel via electronic mails and 2,568 consumers completed the online survey within the next seven days.

CV questions are included in the survey instrument in the form of WTP and WTA in an attempt to improve our understanding of consumer preferences about nonGM/GM breakfast cereals. The CV method has emerged in recent years as an important tool to address health and nutrition-related issues in food markets (van Ravenswaay, 1995). In our survey design, respondents were asked to consider the following situation:

[*Suppose that you walk into a grocery store and want to buy breakfast cereals. The grocery store carries breakfast cereals (e.g., corn flakes, frosted flakes, or corn pops) of two types: (1) made from GM crops, and (2) made from conventional nonGM crops.]*

In an effort to reduce bias arising from the hypothetical nature of the CV questions, respondents were reminded that if they choose to spend more on conventional nonGM foods, they would be left with a smaller budget to spend on other grocery items. Further, to accommodate those respondents who were not aware of GM issues at all, we incorporate Don't Know category in the responses to contingent valuation questions.

The most widely used methods of eliciting WTP were the open-ended and closed-ended (dichotomous choice) questioning techniques. The open-ended format tends to produce an unacceptably large number of nonresponses or protest zero responses because of the cognitive difficulties associated with choosing a dollar amount of the value for a public good. Besides, it was often associated with strategic bias. The closed-ended format avoids these problems by giving only two choices to respondents, although this format yields less information as compared to other formats.

Payment card questioning technique has been increasingly used in recent years to compromise the advantages and disadvantages associated with the open-ended and closed ended formats. The payment card method was developed as an alternative to bidding game, the oldest and the most widely used elicitation method until recently (Mitchell and Carson, 1981, 1984). In this research, WTP question is posed in the forms of payment card format:

[*Consumers might have to pay a higher price for nonGM foods due to the costs of segregation in the production and marketing system plus the additional costs of testing, certification and labeling GM foods. Suppose the price of breakfast cereals made from GM crops is $4.00 per box. The price of conventional nonGM breakfast cereals will be higher than $4.00, but is not determined yet. What is the most above the current price of*

$4.00 you would be willing to pay to purchase a box of conventional nonGM breakfast cereals?]

Similarly, WTA question is posed as the following.

[*Suppose the prices of breakfast cereals of both types are identical at $4.00. The grocery store offers a discount to promote the sales of GM breakfast cereals. What is the minimum amount of discount below the current price of $4.00 that would make you want to purchase a box of GM breakfast cereals?]*

Contingent valuation questions in the form of payment card contains an ordered set of threshold values (Cameron and Huppert, 1989). The payment card for this study includes various sizes of premium ranging from $0.00 to $3.00 for a box of breakfast cereals (with a base price of $4.00) made of nonbiotech crops and identical range of discount for WTA measure. The payment card approach avoids the high rate of item non-response on open-ended valuation questions. In this approach, consumers are asked simply to go over the range of values and to circle the highest amount they would be willing to pay.

Figures 1 and 2 show the distribution of responses to WTP and WTA valuation questions in the US and UK, respectively. The horizontal axis represents the range of premium/discount that respondents would be willing to pay for nonGM food or require to give it up, while the vertical axis shows the percentage of respondents who chose a particular value as a premium or discount. Consumers seeking $0 as a premium/discount are likely to represent those who do not care between GM and nonGM food products. More than 23 percent of US consumers do not care between GM and non-GM foods and are not willing to pay a positive amount of discount for non-GM cereals. While asked about willingness to accept premium for GM cereals, about 17 percent reported a zero

discount, hence demonstrated their indifference. The degree of indifference among UK consumers is relatively low with zero values for both WTP and WTA around 17 percent. Overall, the two figures demonstrate that respondents are willing to pay a greater amount of premium as compared with the discount that respondents would require until the size of premium/discount reaches $0.5 in the US and $1.5 in the UK. In contrast, consumers require discount higher than premium when the size of premium/discount becomes greater than $0.5 in the US and $1.5 in the UK. In particular, the percentage of respondents selecting $3.00 or higher is markedly greater in the WTA (discount) than WTP (premium) in both countries. These differences in the distribution of consumer responses across WTP and WTA warrant the development of models to statistically test the size of the two measures.

Model Specification

In equation (1) and (2), willingness-to-pay a premium or willingness-to-accept a discount (W), and amount of premium and discount (P) were hypothesized to be determined by the vector (X). The empirical model specification in this study is based on the premises that WTP or WTA (behavioral intentions) is determined by consumers' food buying behavior, attitude (acceptance) toward agro-biotechnology, and socioeconomic variables.

Along with perceived attributes specific to agrobiotechnology, WTP and WTA are hypothesized to be influenced by risk attitude toward food safety, economic factor (price importance in food shopping) and stated consumption behavior of organic foods. In brief, the vector X is composed of three subgroups $X = [X_1, X_2, \text{and } X_3]$ with X_1 representing general shopping habits, X_2 representing perceptions about attributes

specific to agrobiotechnology, and X_3 socioeconomic variables. Table 1 presents a general description of the variables included in the empirical models.

The first subgroup (X_1) includes risk attitude toward food safety (FOOD_SAFE) and price importance (FOOD_PRICE) in food purchasing decisions and consumption frequency of organic food products (FOOD_ORG). We expect that the risk attitude toward food safety (FOOD_SAFE) is positively associated with willingness-to-pay a premium and willingness-to-accept a discount. That is, if consumers are risk averse in relation to food consumption, they are hypothesized to pay a higher premium to avoid GM breakfast cereals or require a higher discount to accept GM breakfast cereals. The importance of price (FOOD_PRICE) in food shopping is anticipated to impact WTP negatively but it is not conceptually straightforward about the relationship between FOOD_PRICE and WTA. The consumption frequency of organic food products (FOOD_ORGANIC) is expected to be positively linked to WTP and WTA.

The second subgroup (X_2) involves consumers' general awareness about GMOs (HEAR_GM), attitude toward agri-biotechnology (AGBIO_ATTITUDE), labeling of GM foods to differentiate from non-GM foods (LABEL_GM and LABLE_REQUIRED), potential increase in yields due to agri-biotechnology (WORLD_FOOD).

The third group of variables includes gender of the respondents (GENDER), age of the respondents (AGE), household income (INCOME), and respondent's education level.

Major Results and Implications

The results from the analysis included GM cereals vs. non-GM cereals in the US and the UK. Intentions of the respondents with indifferent attitude towards GM food were

included in the analysis through Heckman's sample selection model. The results for WTP and WTA models for USA and UK data are reported in Tables 3 to 6. In each table, the first two columns report the coefficients and t-statistics for the first stage of decision-making: whether respondents "don't know" or "undecided" or indifferent to the issue of GM vs non-GM foods. The last two columns report for the sub-sample of the respondents who are willing-to-pay (accept) a positive amount of premium(discount) for non-GM (GM) foods. The coefficient for lambda for three of the four regression models were statistically significant at less than 10 percent, which suggested that those who did not have any opinion about biotechnology behaved differently compared to those who were willing-to-pay (accept) for non-GM (GM) cereals. Hence, if all the respondents were treated similarly, there would have been a selection bias. The hypothesis that all coefficients in the WTP and WTA models for US consumers are simultaneously equal to zero was tested using $\mathbf{P}^2$ - statistics. The calculated $\mathbf{P}^2$ - statistics are reported in Tables 3 to 6. Given the critical value (23.58) at a 0.005 probability level with 9 degrees of freedom, the hypotheses were decisively rejected in both models, suggesting that the specified models have the capabilities to explain the variations in the WTP a premium for nonGM breakfast cereals and WTA a discount for GM breakfast cereals. Similar $\mathbf{P}^2$ tests were performed for the WTP and WTA models for the UK consumers and validated the statistical fits of the UK models.

Results indicated that those consumers who considered food prices in food purchasing decisions were less likely to be willing-to-pay premium for non-GM foods among both US and UK consumers and willing-to-pay less amount of premium among UK consumers. Respondents' knowledge about genetically modified food and their

attitude toward the use of biotechnology in crop production significantly influenced their willingness to pay premium for non-GM foods and their willingness-to-accept discounts for GM foods. Those who were aware of the GM technology and had relatively less favorable opinion of the application of biotechnology in agriculture were less likely to be willing-to-pay premium or accept discount. Respondents with higher household income were more likely to pay premium for non-GM food and the WTP amount was directly associated with their income level. While female respondents were more likely to be willing-to- pay premium for non-GM foods in the US, they are more likely be willing-to-accept discounts for GM food in UK.

WTP mean values and WTA mean values were calculated using estimated parameters from the WTP and WTA equations for each country, fitted values (W^) were calculated conditional on (X**$**^). The estimated mean WTP and WTA were \$0.7525 (\$0.9363) and \$0.9555 (\$1.8452), respectively, for the US (UK) consumers. The mean size of WTP premium, \$0.7525 (\$0.9363)for the US (UK) consumers is translated into about 18.8 (23.4) percent of the base price (\$4.00) of breakfast cereals, while \$0.9555 (\$1.8452) for the WTA discount is about 23.8 (46.13) percent of the base price.

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Figure 1: WTP and WTA for US consumers

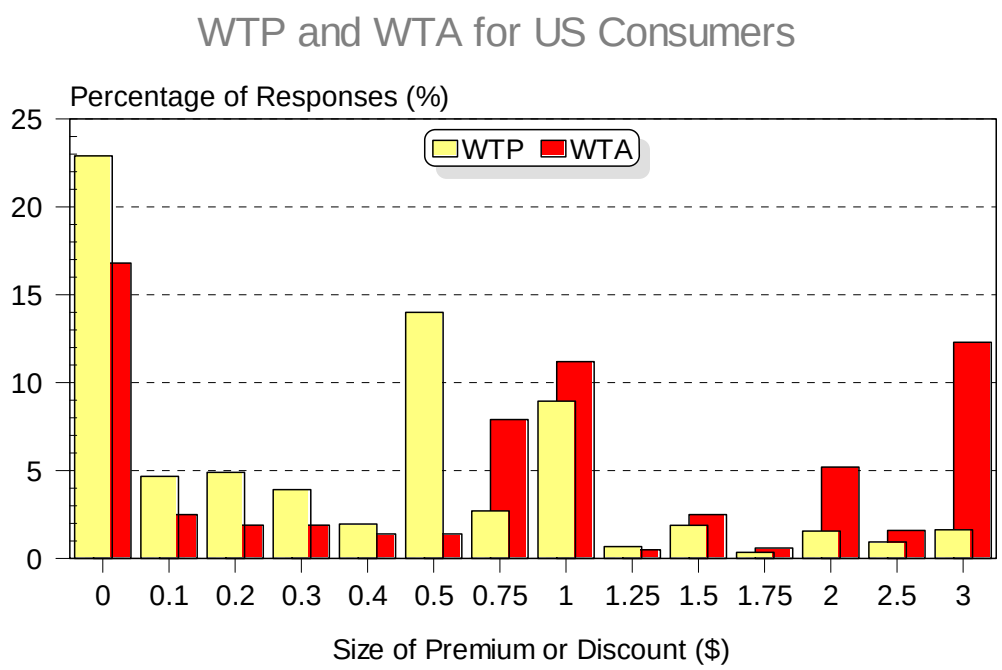

Figure 2: WTP and WTA for UK Consumers

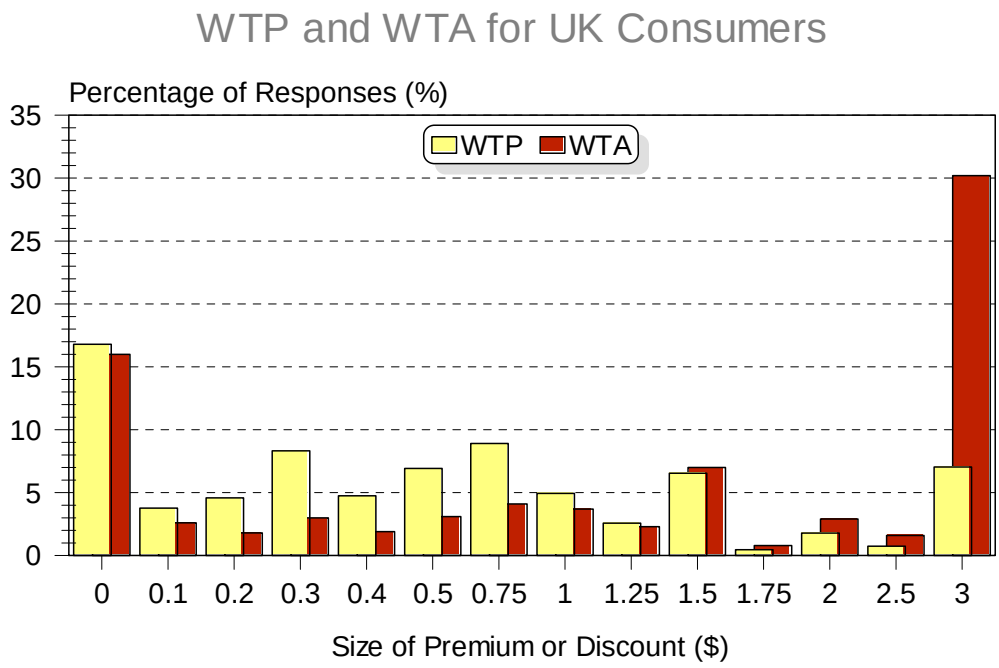

Table 1: Description of the variables used in the regression models

Variable	Explanation
SELECT1	Willing to pay $Amount =1; else =0
AMOUNT1	Amount in $( )
SELECT2	Willing to accept $Amount =1; else =0
AMOUNT2	Amount in $( )
FOOD_SAFE	Foods available at the grocery stores are safe 1=disagree completely; 6=agree completely
FOOD_PRICE	Price is an important consideration in food purchasing 1=disagree completely; 6=agree completely
FOOD_ORGANIC	Purchase frequency of organic food 1=Never; 6=All the time
HEAR_GM	How much heard about genetically modified organism (GMOs) 1=Nothing; 6=A great deal
AGBIO_ATTITUDE	Attitude about the use of biotechnology in crop production 1=strongly oppose; 6=strongly support
LABEL_GM	How do you feel that conventional foods are currently not labeled differently than GM foods1=Not bothered; 6=Extremely bothered
HEALTH_GM	Likelihood of health hazard from eating GM foods1=Extremely low; 6=Extremely high
WORLD_FOOD	The application of biotechnology to crop production will potentially reduce world food shortages by increasing yields 1=disagree completely; 6=agree completely
LABEL_REQUIRED	A labeling system is necessary to differentiate foods from genetically modified (GM) foods on the supermarket shelf 1=disagree completely; 6=agree completely
GENDER	Female =1; Male=0
AGE	Age of the respondents
INCOME	Household income (in ‘000)
EDUCATION	

Table 2 Data summary for key variables, USA

Variable	All sample		Willing-to-pay (accept) only	
	Mean	Standard Deviation	Mean	Standard Deviation
USA sample				
WTP amount	$0.58	$0.71	$0.86	$0.710
WTA amount	$1.22	$1.18	$1.60	$1.09
UK sample				
WTP amount	0.87	0.95	1.11	0.94
WTA amount	1.70	1.34	2.11	1.17

Table 3: Heckman's sample selection model results for willingness-to-pay (WTP) premium for non-GM breakfast cereal using US sample

Variables	Not willing-to-pay		Willing-to-pay	
	Coefficient	T-statistics	Coefficient	T-statistics
Constant	0.4894*	1.8410	0.7075	1.4730
FOOD_SAFE	0.0546*	2.2760	0.0107	0.4340
FOOD_PRICE	-0.1456*	-5.5350	-0.0629	-1.3070
FOOD_ORGANIC	0.0611*	2.8870	0.0629*	2.5120
HEAR_GM	-0.0741*	-3.3750	-0.0195	-0.6340
AGBIO_ATTITUDE	-0.0261*	-1.8420	-0.0339*	-2.5960
LABEL_GM	0.0542*	3.0460	0.0453*	1.9420
HEALTH_GM	0.0792*	5.0620	0.0382	1.3050
WORLD_FOOD	-0.0302*	-1.7400	-0.0058	-0.3590
LABEL_REQUIRED	0.0810*	3.3310	0.0606*	1.7070
GENDER	0.1160*	2.1460	0.0430	0.7920
AGE	-0.0057*	-2.6730	-0.0084*	-3.4760
INCOME	0.0134*	3.5110	-0.0009	-0.1700
EDUCATION	-0.0132	-0.2350	0.0403	1.0360
Lambda			0.3105	0.3940
Chi-squared	213.0526*		137.1338	
Adjusted R-squared			.0723	

Table 4: Heckman's sample selection model results for willingness-to-accept (WTA) discount for GM breakfast cereal using US sample

Variables	Not willing-to-accept		Willing-to-accept	
	Coefficient	T-statistics	Coefficient	T-statistics
Constant	0.0280	0.0990	-1.6091	-1.0310
FOOD_SAFE	-0.0497*	-1.8610	-0.1378*	-2.0010
FOOD_PRICE	0.0062	0.2270	0.0040	0.0630
FOOD_ORGANIC	0.0185	0.7960	0.0338	0.6210
HEAR_GM	-0.0213	-0.8950	-0.0154	-0.2560
AGBIO_ATTITUDE	-0.0517*	-3.2240	-0.1846*	-3.8030
LABEL_GM	0.0895*	4.7540	0.2269*	2.6990
HEALTH_GM	0.1029*	6.1540	0.2483*	2.9420
WORLD_FOOD	-0.0235	-1.2210	-0.0415	-0.8910
LABEL_REQUIRED	0.0939*	3.7030	0.2912*	2.7480
GENDER	0.0412	0.6970	0.1337	0.9360
AGE	-0.0016	-0.6910	-0.0126*	-2.2310
INCOME	0.0112*	2.6740	0.0188	1.5160
EDUCATION	0.0188	0.3070	0.0526	0.3610
Lambda			3.8082*	2.0010
Chi-squared	241.3997*		396.0594*	
Adjusted R-squared			0.2109	

Table 5: Heckman's sample selection model results for willingness-to-pay (WTP) premium for non-GM breakfast cereal using UK sample

Variables	Not willing-to-pay		Willing-to-pay	
	Coefficient	T-statistics	Coefficient	T-statistics
Constant	1.3879*	4.2280	0.8683*	2.9320
FOOD_SAFE	-0.0016	-0.0550	-0.0319	-1.4640
FOOD_PRICE	-0.1832*	-5.8270	-0.2040*	-8.2360
FOOD_ORGANIC	0.1502*	5.1640	0.1064*	4.7900
HEAR_GM	-0.1014*	-3.6850	0.0014	0.0600
AGBIO_ATTITUDE	-0.1138*	-5.2210	-0.1257*	-7.1450
LABEL_GM	0.1285*	5.0360	0.1196*	4.2280
HEALTH_GM	0.1266*	6.1650	0.1148*	5.8970
WORLD_FOOD	-0.0524*	-2.1350	-0.0542*	-3.3050
LABEL_REQUIRED	0.1127*	3.7050	0.1019*	3.0470
GENDER	0.0101	0.1400	-0.0661	-1.3080
AGE	-0.0104*	-3.3470	-0.0076*	-3.1170
INCOME	-0.0112	-1.1350	0.0026	0.3630
EDUCATION	-0.0295	-0.3680	-0.0042	-0.0730
Lambda			1.0897*	3.6070
Chi-squared	552.6698*		472.4534*	
Adjusted R-squared			0.2462	

Table 6: Heckman's sample selection model results for willingness-to-accept (WTA) discount for GM breakfast cereal using UK sample

Variables	Not willing-to-accept		Willing-to-accept	
	Coefficient	T-statistics	Coefficient	T-statistics
Constant	0.4249	1.2820	0.1993	0.5280
FOOD_SAFE	0.0018	0.0610	-0.0653*	-3.1060
FOOD_PRICE	-0.0274	-0.9140	-0.0812*	-3.9610
FOOD_ORGANIC	0.0357	1.2450	0.0599*	3.1710
HEAR_GM	-0.1190*	-4.2760	0.0070	0.2840
AGBIO_ATTITUDE	-0.0800*	-3.5330	-0.1808*	-10.6740
LABEL_GM	0.1728*	6.6500	0.1967*	5.5270
HEALTH_GM	0.1647*	7.7320	0.1977*	8.1980
WORLD_FOOD	-0.0566*	-2.2800	-0.0474*	-2.9160
LABEL_REQUIRED	0.1052*	3.4580	0.1656*	4.6250
GENDER	-0.0005	-0.0060	0.1674*	3.4360
AGE	-0.0039	-1.2440	0.0007	0.2950
INCOME	-0.0126	-1.2790	0.0084	1.2020
EDUCATION	-0.1413*	-1.7600	0.0058	0.1000
Lambda			0.7885*	2.0020
Chi-squared	527.6019*		913.0598*	
Adjusted R-squared			0.4110	

References: