DETERMINANTS OF CONSUMER ATTITUDES AND PURCHASE INTENTIONS WITH REGARD TO GM FOODS

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Abstract: Consumer acceptance of genetically modified (GM) products has become a yardstick for assessing how prosperous the markets for GM products will be in the future. However, previous research suggests that consumers are still hesitant to buy GM foods largely because of the uncertain effects on human health. This has created increased interest in understanding how consumers form attitudes towards GM foods and how such attitudes interact with other factors to influence purchase decisions. Thus, this paper presents results based on a contingent valuation questionnaire designed to assess consumer knowledge, awareness and willingness to purchase GM-tomatoes in Huntsville metropolitan area, Alabama. The results suggest that attitudes and purchase decisions concerning GM foods are generally negative, highly complex and are based on several factors. Also, the analysis shows that the utility disadvantage of GM-tomatoes corresponds to an average price equivalent of 40%; implying that Huntsville consumers would require, on average, this much of a discount to induce them to buy GM-tomatoes.

JEL: O140, Q160, Q180, 110

***Keywords*:** biotechnology, genetically modified food, contingent valuation

1. Introduction

The role of biotechnology in the future of agriculture and food is becoming increasingly significant as billions of dollars are being spent to develop new and improved foods, fuel, feeds, fibers, pharmaceuticals, and nutraceuticals (Hallman, 2002). However, as more products developed through biotechnology reach store shelves, consumer reception for these products has been decidedly mixed. This has especially been the case in Europe (Boccaletti and Moro, 2000; Burton, Ridby, Young and James, 2001) where adoption has been met with caution, and in some cases rejected altogether. In the U.S. existing research show that American consumers are relatively uninformed about agricultural biotechnology and have relatively non-crystallized views of genetically modified foods (Hallman, 2002; Hoban, 1999; Hallman and Metcalfe, 2001; Moon and Balasubramanian, 2001; Mendenhall and Evenson, 2002).

Efforts to communicate with the public and “educate” them through a scientific message have largely been unsuccessful because they do not answer the public’s questions and concerns regarding genetically modified (GM) foods and biotechnology. Much of this has 'second guessed' what consumers think and feel about the use of GM technology in food production, and a lot of it may have influenced consumer views and attitudes. It is undeniable that consumer perception of and acceptance towards GM technology and GM foods are crucial for the global market of GM products, agricultural trade, and the future development of agricultural biotechnology (Chen and Chern, 2002). Thus, understanding how consumers form attitudes (positive or negative) towards GM food products; and how such attitudes interact with other factors in determining consumers' purchase decisions is paramount.

1.1. Background Information

The current analysis is based on a sample of grocery shoppers in Huntsville metropolitan area, Alabama. Huntsville metropolitan area, located in the northern part of the state, has two incorporated counties (Madison and Limestone) and three major "town centers" (Huntsville, Madison, and Decatur). The area is one of the fastest growing metropolitan areas in Alabama. Its population is estimated to be 158,216; of which 63.42% are white, 54.3% are below 40 years old, 66.18% are educated, and average household income is estimated to be $55,857 (U.S. Census, 2000). The interest in conducting a consumer survey in this area resulted from a newspaper article in "The Decatur Daily" which reported that two women had been arrested while collecting petition signatures against GM products outside a Decatur supermarket (Parrot, 2002).

The article was about Gerry Coffey, 62, and Jean Tune, 79, who were charged with misdemeanor third-degree trespassing in a Decatur court for refusing to leave a Kroger parking lot where they were collecting signatures and handing out leaflets to shoppers about the potential risks associated with GM foods; and advocating for supermarket chains to remove GM ingredients from store brand products and ultimately from the entire chain[1]. The arrests garnered national attention and started a public dialogue about GM foods in Huntsville metropolitan area; and for a couple of days the story was a hot topic on several local radio stations. The sentiments voiced, on the radio stations, by several callers about the use of GM technology in food production, signified the need to investigate the general knowledge and perceptions towards GM foods in the area.

The remainder of the paper is organized into five additional sections. First, we begin with a brief background on the choice modeling framework used in our investigation; such a framework has been used extensively to investigate hypothetical changes in environmental and agricultural polices (Munasinghe, 1998; Lopez, 1994), and there have been efforts to investigate attitudes towards GM foods (Chen and Chern, 2002; Moon and Balasubramanian, 2001; Burton et al., 2001). Next, we present a description of the survey data, followed by the economic approach used to analyze the factors believed to induce consumers to choose GM or non GM foods. The analysis is conducted using an ordered probit model in which the decision on buying GM or non GM food product is specified as a function of attitude, perception, knowledge, and demographic variables as well as the price discount between GM and non GM food products. The last sections present a discussion of the empirical results and conclusions.

2. Contingent Valuation Method

Contingent Valuation method (CVM) has been taken up within the environmental valuation literature, where its ability to deal with extended attribute sets (including those related to product and process) give it considerable flexibility (Burton and Pearse, 2003). The technique is based on eliciting individual willingness to pay (WTP) or willingness to accept (WTA) for a given change in the provision of a good or service “contingent” on a given hypothetical scenario. Depending on the wording of the elicitation method, one of the four Hicksian welfare measures is approximated (Hicks, 1941; Mitchell and Carson, 1989).

Typically, a valuation function for the average individual is estimated from a representative sample. For policy purposes, the welfare estimates are generally used: (1)

to estimate individual or group gains/losses within a given population or (2) to aggregate the gains/losses over all members of the population (Hanemann, 1984, 1989). Generally, parametric non-linear statistical methods are applied to the yes/no data to model the probability of a yes (or a no) response for a given offer amount and a set of socioeconomic variables (Hanemann, 1989). The estimated probability function is then used to obtain median and mean economic surplus estimates.

In the past few years, the technique has been increasingly used to measure consumers' WTP/WTA for GM foodstuffs. Chen and Chern (2002) analyzed an Ohio survey on the consumer acceptance of GM foods and conducted a contingent valuation of WTP for vegetable oil, salmon, and corn flake breakfast cereal. Using Norwegian data, Grimsrud, McCluskey, Loureiro, and Wahl (2002) analyzed factors that induce consumers to choose GM-food and estimated the willingness to purchase GM-bread and GM-salmon with discounts. Moon and Balasubramanian (2001) estimated the WTA for breakfast cereals made of non-GM ingredients in the U.S. and the UK. Boccaletti and Moro (2000) also attempted to quantify the WTA for generic GM products with different hypothetical attributes in Italy, and Burton, Rigby, Young, and James (2001) calculated the WTA for such products in the UK. Recently, Burton and Pearse (2003) have used WTA to identify consumer preferences for various hypothetical forms of genetic modification in beer, using a sample from Western Australia. The case study presented here contributes to this foundation by eliciting consumers' willingness to purchase GM-tomatoes in Huntsville metropolitan area, Alabama.

3. Data and Method

The data used are drawn from a sample of grocery shoppers in Huntsville metropolitan area, Alabama. In February and March 2003 a total of 292 questionnaires designed to collect information on shopper's demographics, attitude, perception, knowledge and willingness to purchase GM food were randomly applied to people approaching or departing from points of food purchase in Huntsville, Alabama. These included four supermarkets in four different neighborhoods selected according to general indicators of economic status.

Prior to administering the questionnaire, respondents were provided a description of GM foods. Then, presented with a hypothetical situation in which they were to consider shopping for tomatoes. They were asked if they would be willing to purchase GM-tomatoes if the GM-tomatoes were sold at the same price (*FirstBid*) as the non GM. Based on the respondent's response, a follow-up question was asked. Those who answered Yes to the willingness to purchase question (*FirstBid*) were asked a similar second question, but this time with *HighBid* > *FirstBid*. Similarly, respondents who answered No to the first willingness to purchase question were asked a similar second question with *LowBid* < *FirstBid*. The four possible response sequences were: Yes-Yes[2], Yes-No, No-Yes and No-No (Siikamaki and Layton, 2002).

Ideally, we assumed that the sequence of the questions isolate the range in which the respondents' true WTA lie (Grimsrud et al., 2002). Thus, the discount for the GM-tomatoes relative to the non GM-tomatoes can be zero, B_0, or it can be located in one of the intervals $(B_0, B_D]$, $(B_D, +\infty)$; where B_D is the discount bid offered[3]. The second bid, B_D, in conjunction with the response to the initial preference decision, allows bounds to be placed on the respondent's unobservable true WTA for GM-tomatoes (Grimsrud et al., 2002). The lower bound on the WTA discounts for GM-tomatoes is determined *a priori* as no discount on GM-tomatoes in comparison to non-GM-tomatoes; because it is assumed that the genetic modification did not add any value to the product for the customer.

The variables collected through the survey questionnaire and their definitions and sample means are presented in Table 1. Focusing on the sample breakdown, the majority of the respondents (58.9%) were female and of white race (51.4%). As for age, 45.4% of the respondents were below 40 years while 34.8% were over 50 years. In reference to education, 28.3% had a high school degree or less, 33.2% had at least some college education while 38.5 had a college degree or higher. Looking at income, 37.6% of the respondents reported income levels over \$50,000 while 27.8% reported income levels below \$30,000. Overall, the data represent consumers who are mostly female, younger and educated.

------------- Table 1 about here -------------

4. Economic Approach

The model chosen for this study loosely follows previous work by Ben-Akiva and Lerman (1985), Chen and Rickertsen (2002) and Haab and McConnell (2002). While these studies used a logit model to estimate probabilities of choosing alternative *i* for respondent *n*, and then combine the estimated parameters to identify monetary values associated with changes in each attribute and characteristic level, we will use an ordered probit model to estimate probability of choosing GM or non GM-tomatoes. Models with discrete dependent variables are frequently specified as *index* function models

(McFadden, 1973). Suppose the decision of buying something. Economic theory emphasizes that the individual will evaluate this decision based upon the obtained utilities; that is he/she will evaluate marginal costs and benefits of making that decision of buying. As marginal benefits are not observed, usually one models the difference between benefit and cost through a variable (V*):

$$V_i^* = \beta X_i + \varepsilon_i, \quad \varepsilon_i \sim \mathrm{N}(0, \sigma^2), \tag{1}$$

where V_i^* is a continuous, latent variable representing, for instance, the cardinal utility function of the individual. We assume linear dependence between the latent variable V_i^* and the variables X_i, β, and ε_i, respectively. Thus, the variable V_i^* defines a variable v_i, related to the aforementioned categories in the following way:

$$v_i = \begin{cases} 0 \text{ if } V_i^* \leq \theta_0 & \text{(No - No, responses)} \\ 1 \text{ if } \theta_0 < V_i^* \leq \theta_1 & \text{(Yes - No, responses)} \\ 2 \text{ if } \theta_1 < V_i^* & \text{(No - Yes, responses)} \end{cases} \tag{2}$$

where θ_i = 0, 1, are unobservable thresholds. In other words, it is not possible to observe the net benefit of buying, only whether the purchase was made or not. Denoting the cumulative density function of the standard normal distribution as $\Phi(\cdot)$, it follows that the probabilities of an individual for each category are given by:

$$\mathrm{Prob}\left[V_i = 0\right] = \Phi\left[\mu_0 - \alpha X\right] \tag{3}$$

$$\mathrm{Prob}\left[V_i = 1\right] = \Phi\left[\mu_1 - \alpha X\right] - \Phi\left[\mu_0 - \alpha X\right] \tag{4}$$

$$\mathrm{Prob}\left[V_i = 2\right] = 1 - \Phi\left[\mu_1 - \alpha X\right] \tag{5}$$

with α = β/σ and $\theta_j / \sigma = 0{,}1$. Note that only the ratios β/σ and θ_j / σ are estimable (Dustman, 1996).

As in the majority of cases it is not possible to preview how each individual will behave, it is more reliable to estimate a probability that an individual with some attributes will choose a given alternative. In relation to the current analysis, we are testing the hypothesis: how price, attitude, perception, knowledge, and demographic variables – mostly income and education – affect the willingness to, or not to purchase GM-tomatoes. In our formulation, we follow Ben-Akiva and Lerman (1985), Chen and Rickertsen (2002) and Haab and McConnell (2002) and specify a random utility model that is linear in parameters:

$$V_{in} = \alpha_{i0} - \rho_1 B_{in} + \lambda_{i2} x_{n2} + \ldots + \lambda_{ik} x_{nk} + \varepsilon_{in} \quad (6)$$

where V_{in} is respondent *n*'s utility of choosing alternative *i*, B_{in} is the discount bid offered to respondent *n* for alternative *i*, $x_{n2} \ldots x_{nk}$ are the individual specific characteristics (for example gender or education) of respondent *n*, α, ρ and λ are parameters to be estimated, and the error terms ε_{in} are assumed to be independently, and identically distributed. The estimated parameters, except that of the bid function (ρ_1), are allowed to vary across the alternatives allowing the personal characteristics to have non-constant effects for the alternatives and thereby an impact on the choices made. For identification, the parameters of the first equation (except ρ_1) are normalized to zero.

Since the utility of the non-GM alternative (No-No response) is $V_{0n} = -\rho_1 B_{0n} + \varepsilon_{0n}$, the WTA_{in} for the GM alternatives (Yes-No and No-Yes responses) are calculated from the expression:

$$-\rho_1 B_{0n} + \varepsilon_{0n} = \alpha_{i0} - \rho_1 (B_{in} + WTA_{in}) + \lambda_{i2} x_{n2} + \ldots + \lambda_{ik} x_{nk} + \varepsilon_{in} \quad (7)$$

Assuming that E (ε_{0n}) =E (ε_{1n}) = E (ε_{2n}) = 0, the average consumer's willingness to purchase GM-tomatoes is:

$$\overline{WTA_i} = \frac{1}{\rho_1}(\alpha_{i0} + \lambda_{i2}\bar{x}_2 + ... + \lambda_{ik}\bar{x}_k) \tag{8}$$

where $\bar{x}_k$ denotes the mean value of the individual specific characteristic k. The marginal change in WTA for alternative i associated with a change in characteristic k is

$$\frac{\partial WTA_i}{\partial x_i} = \frac{\lambda_{ik}}{\rho_1} \tag{9}$$

We allow for possible heteroscedasticity in the data by assuming the variance of the error term to take the form: $Var[\varepsilon_{in}] = [\exp(\gamma' z_i)]^2$ and estimate a multiplicative heteroscedasticity ordered probit model. The variables included in Z_i are income and shopper type. Finally, we use the estimated parameters from the probit model to derive the mean WTA discount by setting $\lambda_{i2}, \ldots, \lambda_{ik} = 0$ (Grimsrud et al., 2002; Hanemann et al., 1991).

5. Results

As a measure of goodness of fit, psuedo R-square is used to describe how well our data fitted the model. The estimated pseudo R^2 value is 0.342 indicating that the model explains a substantive amount of the variation in the dependent variable[4]. Also, the *log likelihood* statistics is used to test the significance of the model. We observe a *log likelihood* value of -207.9412 and a significance level of (.0000) guaranteeing that the model is significant. In reference to the variance function, we find evidence of heteroscedasticity. The coefficients on income are negative and significant at 5 percent level indicating a reduced error variance for those with incomes above \$30,000. Furthermore, the assumption of independence of irrelevant alternatives is tested by dropping the "conventional" alternative from the model, and re-estimating the model over the restricted, two-option data set (Hausman and McFadden, 1984). The null hypothesis, of no systematic difference in the parameter values, could not be rejected at conventional levels of significance.

Table 2 presents frequencies of actual and predicted outcomes from the survey we conducted and the predictions from the estimated model. The results show that the model performs relatively well, correctly predicting 66.4% (194) of the total 292 observations. Specifically, the model predicts, based on the consumer's characteristics, that 64 (observed: 76) of the total sample are likely to purchase GM-tomatoes at the same price as non GM-tomatoes, but not at a higher price; 96 (Observed: 95) of the total sample are less likely to purchase GM-tomatoes at the same price as non GM-tomatoes, but would at a discounted price; and 132 (observed: 121) of the 292 respondents in the sample are less likely to purchase GM-tomatoes neither at the same price as non GM-tomatoes nor at a discounted price. Overall, 78 percent of the survey sample is opposed to GM-tomatoes on some level. Also notable are the percentages of respondents (33%) who expect a discounted price in order to accept GM-tomatoes.

------------- Table 2 about here ------------

The estimated effects of each independent variable are discussed and summarized in Table 3. First, demographic characteristics turn out to be insignificant with respect to race, age, and gender. The estimated coefficients on all demographic variables, with the exception of gender (indicating female) and Age2 (indicating shoppers who are between 41 and 60 years old), are positive. For instance, the positive effect on Age1 implies that young consumers are more likely than old consumers (60 years or older) to purchase

GM-tomatoes, *ceteris paribus*. However, this result does not correspond to the general tendency that younger people are more critical than older people. Furthermore, women reject GM food more than men: a result which meets with our expectations.

Looking at the awareness variables, the coefficients for self-reported knowledge and education about biotechnology are significant indicating that self-reported knowledge is likely to increase WTA while higher education levels are more likely to decrease WTA. Grimsrud et al. (2002) have interpreted similar findings to indicate that the self-reported knowledge has been obtained from sources that are negative to biotechnology and/or genetic modification. They posit that the discrepancy in willingness to purchase genetically modified food between people with high self-reported knowledge and people with higher education may indicate that consumer education may increase consumers' willingness to purchase GM foods.

---------- Table 3 about here --------

Furthermore, the results show that variables related to income, shopper type, perception, labeling, risk and attitude have significant influence on WTA. First, concerns about safety do affect willingness to buy GM-tomatoes. We observe significant negative relationships between perceived risk and perception of GM food as unsafe, on one hand, and WTA, on the other hand: the stronger the risk and safety concern, the lower the willingness to purchase GM-tomatoes. Also, attitude towards GM foods places an important impact on consumption, as strong negative attitudes generate lower WTA. The opinion on labeling is also a significant factor showing that the more important labeling of GM foods is to the respondents the lower the willingness to purchase GM-tomatoes.

Primary shoppers are also suggested to have a positive significant influence on purchase decisions.

The results for the bid discount and income variables suggest that economic factors may be important to consumers when making purchase decisions. It is observed that many consumers who perceive some safety risks in GM food would still be willing to buy it at a discounted price. This is mostly true among resource constrained consumers; for these consumers ill defined or uncertain risks would not necessarily be highly dissuasive of GM food consumption, especially if it were cheap. In other wards, consumers with low incomes or consumers who perceive low price as the most important factor in the food purchase decisions are likely to increase WTA. Thus, if GM food risks are indeed low or non-existent, then poor consumers would be most likely to reap the benefits of GM foods that reduce the price of food.

The estimated mean WTA is reported at the bottom of Table 2. It reflects the percentage discount a consumer is willing to accept to purchase GM-tomatoes in Huntsville metropolitan area, Alabama. The results suggest that on average consumers require a 40% price discount to induce them to purchase GM-tomatoes. The high discount is reasonable given how relatively few people (22% of the sample) indicated willingness to buy GM-tomatoes at same price as non GM (see Table 3).

Next, we consider the marginal effect of each independent variable on consumer's willingness to purchase GM-tomatoes (Table 4). Focusing mainly on the set of respondents who were not prepared to consider GM-tomatoes, but only at a discounted price (WTA=2), the demographic characteristics collected are found not to be significant modifiers of WTA. The only variables showing significant marginal effects are bid discount, primary shopper, labeling and perceptions. First, looking at the bid discount variable, the marginal effect for consumers who expressed no desire to purchase GM-tomatoes, but only at a discounted price, is 2.4549. This implies that increasing the bid discount by one unit is likely to increase WTA among this group of consumers by 2.4549 in probability.

For consumers who expressed no desire to purchase GM-tomatoes even at a discounted price, marginal effect is -2.7892; implying that increasing the bid discount by one unit is likely to reduce WTA among this group of consumers by 2.7892 in probability. In other wards, for skeptic respondents the discount reflects some disutility associated with the product. However, it may also be that respondents were expressing a view that any cost savings associated with the use of GM technology in food production should be passed on to consumers. Hence, even if they were indifferent to the product, they were expressing a preference for market consequences of its use based on some notion of equity. The current survey was not designed to tease out these possibilities, but it does show the potential complexity of consumer responses to the introduction of GM technologies in food production.

------------- Table 4 about here ------------

Looking at shopper types, the estimated marginal effects suggest that primary shoppers are more likely to influence WTA, given a price discount, by 0.7946 in probability. Likewise, consumers with positive attitudes toward GM foods are likely to influence WTA, given a price discount, by 0.2373 in probability. In reference to labeling, the estimated marginal effect suggest that consumers who think that labeling GM foods is important are more likely to influence WTA, given a price discount, by -0.2023 in probability. Also, the marginal effect for the perception variable suggest that consumers who view GM foods as unsafe are more likely to influence WTA, given a price discount, by -0.1571 in probability. In general, price discounts, primary shopper, labeling and perceptions are suggested to have the greatest influence, based on marginal effects, on WTA among Huntsville consumers.

6. Conclusions

The paper used contingent valuation survey to examine the determinants of consumer attitudes, perceptions towards, and willingness to accept (WTA) GM-tomatoes in Huntsville metropolitan area, Alabama. An ordered probit model was described and applied to the data. The results revealed a diversified set of preferences towards genetic modification in foods. There was a set of respondents (45%) who were not prepared to purchase GM-tomatoes for any of the price discounts offered in the hypothetical scenario. There was a set of respondents (33%) who required some price discount to be induced to purchase GM-tomatoes; and a small set who were prepared to purchase GM-tomatoes at same price as non GM-tomatoes. In general, the results suggested that consumer perceptions and purchase decisions concerning GM foods are generally negative, highly complex and are based on several factors.

For instance we have estimated on the basis of the results of the probit analysis that the utility disadvantage of GM-tomatoes corresponds to an average price equivalent of 40%. This means that prices for GM-tomatoes must be 40% lower than the prices for non GM-tomatoes, to compensate their utility disadvantage for a significant proportion of the consumers. The distribution of these price equivalents suggests that some consumers will accept GM food at a lower price difference; however other consumers will not accept GM food even as a present.

Notes

1. The two women were participating in a national supermarket campaign led by GE-Free Markets Coalition and Greenpeace (Parrot, 2002).

2. However, we did not get enough responses for the Yes-Yes response category. Perhaps shoppers were not willing to pay a higher price for the GM-tomatoes since there was no indication that genetic modification added value to the product. Thus, similar to several previous studies (Grimsrud et al., 2002; Hanemann et al., 1991; Cameron et al., 1989; Welsh and Poe, 1998) our model is based on three response categories.

3. The bid discounts offered were 10 and 20 percent.

4. It is imperative to note, however, that the pseudo R^2 as a measure of goodness of fit deserves only limited attention because it was chosen to maximize the joint density of the observed dependent variable rather than maximizing a criterion based on prediction of *y*, as with R^2 in ordinary least squares regression analysis.

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Table 1. Variable definition and sample means

Dependent variable		
CONTINGENT VALUATION Assessment of willingness to purchase GM-tomatoes:		
0 = Not willing, neither at same price as non GM nor at a discounted price (No-No, responses)		
1 = Willing at the same price as non GM, but not at a higher price (Yes-No, responses)		
2 = Not willing at the same price as non GM, but willing at a discounted price (No-Yes, responses)		
Independent variables		Mean
Gender	= 1 if female; 0 otherwise.	0.60
Race	= 1 if White; 0 otherwise.	1.60
Age1	= 1 if < 40 years old; 0 otherwise.	0.66
Age2	= 1 if 41 to 60 years old; 0 otherwise.	0.34
Focus group	= > 60 years old.	
Education1	= 1 if some college but no bachelor degree; 0 otherwise.	0.63
Education2	= 1 if 4 years college degree and above; 0 otherwise.	0.37
Focus group	= high school diploma or less.	
Income1	= 1 if income $30,000 to $50,000; 0 otherwise.	0.57
Income2	= 1 if income more than $50,000; 0 otherwise.	0.43
Focus group	= income less than $30,000.	
Risk1	= 1 if associate GM foods with high; 0 otherwise.	2.68
Risk2	= 1 if associates GM foods with no risk; 0 otherwise	1.75
Focus Group	= Do Not Know	
Knowledge	= 1 if very/somewhat knowledgeable about GM foods; 0 otherwise.	2.23
Perception	= 1 if feels very/somewhat negative about GM foods; 0 otherwise	1.97

Attitude	= 1 if would consume a dish with GM ingredient; 0 otherwise.	0.67
Shopper	= 1 if primary shopper; 0 otherwise.	0.85
Labeling	= 1 if GM foods should be labeled; 0 otherwise.	0.93

Table 2. Regression estimates for WTA model

Variable	Coefficient	t-Statistics
Constant	0.189***	4.594
Gender	-0.104	-1.130
Race	0.279E-01	0.140
Age1	0.143	0.629
Age2	-0.156	-0.786
Education1	-0.145*	-1.358
Education2	-0.098**	-1.515
Income1	-0.282	-1.128
Income2	-0.504**	-1.643
Knowledge	0.122*	1.441
Perception	-0.666***	-2.737
Risk1	-0.030*	-1.404
Risk 2	0.459	0.267
Labeling	-0.604**	-2.024
Bid Discount	5.105***	4.805
Attitude	-0.438***	-2.858
Shopper	0.247*	1.406
μ	1.119***	3.176
Heteroscedasticity Variables		
Shopper	0.325	0.977
Income1	-0.314**	-1.722
Income2	-0.323**	-1.921

Psuedo R^2	0.342
Log-L	-207.94
Model χ^2	215.25
N	292
Mean WTA	40%

Table 3. Frequencies of actual and predicted outcomes

	Predicted			
Actual	0	1	2	Total
0	91	22	8	121
1	37	27	12	76
2	4	15	76	95
Total	132	64	96	292
Model Prediction[a]				66.4%

a. The predicted percentages are calculated as (predicted/total sample)*100.

Table 4. Marginal effects for WTA

Variable	WTA=0	WTA=1	WTA=2
Constant	-1.1046	0.1324	0.9722
Gender	-0.0443	0.0053	0.0390
Race	-0.0085	0.0010	0.0075
Age1	-0.0439	0.0053	0.0386
Age2	0.0335	-0.0061	-0.0275
Education1	0.0263	-0.0031	-0.0231
Education2	0.0429	-0.0077	-0.0351
Income1	-0.0025	0.0062	0.0037
Income2	-0.0086	0.0010	0.0076
Knowledge	-0.0065	0.0008	0.0057
Perception	0.1785	-0.0214	-0.1571
Risk1	0.0254	-0.0030	-0.0224
Risk2	-0.0831	0.0264	0.0567
Labeling	0.2298	-0.0276	-0.2023
Bid Discount	-2.7892	0.3343	2.4549
Attitude	-0.2697	0.0323	0.2373
Shopper	-0.0755	0.0090	0.0664
Heteroscedasticity Variables			
Shopper	0.6350	-1.4296	0.7946
Income1	0.0038	-0.0084	0.0047
Income2	0.0077	-0.0136	0.0059