A STUDY OF THE RELATIONSHIP BETWEEN CONSUMERS' CHARACTERISTICS AND PURCHASES OF BRANDED MAIZE FLOUR: THE CASE OF KAMPALA, UGANDA

Jun M[1]* and K Ross[2]

Minyoung Jun

*Corresponding author email: mjun@ksu.edu

[1]Graduate Research Assistant, Department of Agricultural Economics, Kansas State University, Manhattan, KS 66506, USA

[2]Research Assistant Professor, Department of Agricultural Economics, Kansas State University, Manhattan, KS 66506, USA

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ABSTRACT

Maize is one of the essential food crops in Uganda. This paper aims to examine the consumer preference for branded maize flour in urban Uganda and inform branded maize flour suppliers of the findings. The study empirically examines how the purchase of branded maize flour is influenced by consumer characteristics using survey data and a binary logit model. The survey was conducted in Kampala in October 2014. The dependent variable is the purchase of branded maize flour. Independent variables are monthly individual income, family size, gender, age, education, and quantity of purchase. The study reveals that almost half of respondents purchased branded maize flour. The results suggest that education and purchased quantity are positively and significantly related to the probability of purchasing branded maize flour. Also, the study found that gender affected the probability of purchasing branded maize flour. The probability of respondents with a college education or higher purchasing branded maize flour is 16% higher than respondents with less than a college education, holding other independent variables constant. The probability of purchasing branded maize flour is 28% greater for consumers who purchase 6 kg to 21 kg of flour compared to consumers who purchase less than 6 kg. The probability of purchasing branded maize flour is 12% greater for female consumers than for male consumers, keeping other variables constant. A clear influence of individual monthly income on the probability of purchasing branded maize flour could not be deduced in this study. Based on these results, it is recommended that suppliers of branded maize flour products in Kampala City, Uganda target female consumers, highly educated, and purchase 6-21kg of maize flour at one time. It would be recommended that further research investigates how price and aggregate household income influence purchase for branded maize flour. The study provides insight into the effect of consumer socioeconomic characteristics on branded maize preferences in the East African region.

Key words: Logit Model, Maize, Branded Maize Flour, Uganda, Maganjo, Consumer Preference

INTRODUCTION

Maize is an important income-generating cash crop produced by 57% of Ugandan farmers [1, 2]. In a typical Ugandan diet in 2011, maize provided the majority of daily calories with 344 kcal per capita [3]. Despite maize being a key crop in Uganda, the producers of maize, smallholder farmers, do not receive significant monetary benefits for producing this crop [4]. Based on a maize value chain study conducted, the distribution of profit along the value chain in Uganda was unevenly divided among the chain stakeholders with traders receiving 50% of generated value chain profit and producers only receiving 14% [4]. This may be due to numerous capacity constraints facing smallholder producers such as ineffective access to major markets and lack of bargaining power due to their small size.

Recently, rapid urbanization has occurred in Uganda, growing the urban population by 4.3% between the year 2000 and 2010 [5]. By 2010, 13% of Uganda's 32.4 million people lived in urban areas [5]. Along with this urban migration, purchasing of staple food has increased. Kampala, Uganda's capital city, alone accounted for about 50% of the formal maize trade in Uganda [6]. Given maize's position as the country's main grain staple, it is expected that its demand will continue to increase with increased urbanization.

Although maize is considered one of the major crops in Uganda, studies on maize products, brands, and preferences of consumers for maize are limited. There have been several studies investigating the relationship between consumers' characteristics and preference for maize products in Kenya to provide directions for subsidies on refined maize meal [7]. The study examines how consuming posho meal was influenced by household characteristics from a sample of 350 households in Nairobi, Kenya [7]. Posho meal is unrefined maize meal processed by small-scale mills and is sold at a lower price than sifted meal, which is highly refined maize meal processed by large-scale mills. The results revealed that the decision to consume posho meal was affected by household income, quantity of maize meal consumed per adult equivalent, and whether the primary woman in the household held a full-time job. The result showed negative coefficient (-0.24) for consumer income, which indicated that when households' income increased, consumed quantity of posho meal decreased. However, as the consumed quantity of maize meal per adult equivalent increased, the quantity of posho meal consumed also increased. The study also revealed that when the primary woman in the household has a full-time job, the probability of consuming posho meal decreased. Posho meal was offered by small-scale mills. Given the time commitment to purchase the posho meal directly from the mill or the time required to wait for the posho meal to be processed, it is unlikely that a woman with a full-time job will purchase and consume posho meal.

In another study surveying 604 residents in Nairobi, Kenya, the relationship between the purchase decision of various maize products (maize grain to be milled, maize grain not for milling, posho meal, industrial maize meal, and industrial fortified meal) and consumers' demographic characteristics were investigated [8]. Industrial maize meal is degermed, sifted and packaged by large-scale milling firms. The milling firms producing industrial meal target consumers in the middle and high-income level. Posho meal is less expensive than industrial maize meal where 2 kg of posho meal is sold for KSh 32 to 35

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(or \$0.42 to \$0.46 USD) compared to industrial maize meal at KSh 44 to 56 (or\$0.57 to \$0.73 USD). Consumers may process maize grain into posho meal at nearby mills or they can purchase already processed posho meal at the mills, kiosks, and supermarkets. Milling firms add minerals and vitamins to fortify industrial meal for nutrition supplement. Based on the findings from the survey in the year of 2003, there were more than 34 milling firms in the industrial maize meal market, and nine brands of the industrial maize meal were offered in supermarkets and five brands in the temporary stores, kiosks, set up in the streets. Almost half of the respondents in the survey (47%) indicated they consumed industrial maize meal. The findings from the study revealed that preference for maize meal differs with education level. Almost half of them consumed industrial maize meal, and 2.6% of the respondents consumed posho meal. The percentage of respondents who consumed industrial maize meal increased as education increased. Similarly, the result revealed that as income increased, the percentage of respondents who consumed industrial maize meal increased.

Consumer preferences for maize grain and refined maize meal were investigated in study of 400 low income households in Mozambique [9]. Results from the study indicated that consumers preferred more expensive white maize to lesser expensive yellow maize and preferred highly refined meal to less refined meal. Under the situation where the prices are the same for yellow and white maize, over 95% of consumers would purchase white grain, and only 1.8% of consumer would purchase yellow grain. Consumers in lower income groups are more willing to consume yellow maize grain over white maize grain when the price of yellow maize grain is discounted to less than 43% of white maize grain price.

In a USAID study in 1993, consumer preferences for maize meal in Zimbabwe were examined to provide government officials with a better understanding for maize demand [10]. Results from the study revealed a negative relationship between income per capita of a household and consumption of unrefined maize meal. Factors that positively influenced the consumption of unrefined maize meal were low income, close distance to mill for processing grain, and large household size. Since consumers can purchase unrefined maize meal directly from mills, consumers within close proximity to mills are more likely to purchase of unrefined maize meal. The result shows that consumers preferred refined maize meal to unrefined maize meal. White maize meal is preferred over yellow maize meal, provided that the price is the same between the two maize varieties.

The quantity of maize meal available is also another factor influencing purchasing decisions. According to a 1993 USAID study in Zambia, larger packages of maize meal, 25 kg or larger, were not preferred by low income consumers because of the high price associated with these large packages [11]. Instead, consumers preferred the medium size packages of maize meal (2kg, 5kg, 12.5kg packages) produced by small milling firms.

The present analysis is concerned with consumer preference for branded maize flour in Kampala, the capital city of Uganda. The survey was conducted in 2014, and 210 urban residents were surveyed. Uganda respondents of the present study reported consuming

degermed and refined flour which is industrial maize meal. In the current study, branded maize flour refers to degermed, refined, and branded maize flour processed by industrial mills. The study examined how the purchase of branded maize flour is influenced by consumers' characteristics using a binary logit model. To the best of our knowledge, the present study might be the first attempt to measure how consumer characteristics influence preference for branded maize flour in an urban setting in Uganda. Findings from the study will provide some insight into the effect of consumer socioeconomic characteristics on branded maize preferences in the East African region.

STUDY AREA AND DATA

The survey was conducted by five trained enumerators from the Agricultural Department of Makerere University in Kampala, interviewing consumers in Nakawa and Kisenyimarkets, bus terminals and main streets of Kampala on October 9 and 10 in 2014. The purpose of the survey was to investigate the consumer preference on maize flour in urban Uganda. The enumerators were fluent in English and Luganda, the local language. Each enumerator conducted an one-on-one interview to ensure the accurate meaning of the survey questions was conveyed to the participants. The survey included questions about consumer demographics and consumers' purchases of different maize products, the reasons for purchasing these maize products, and the characteristics of these purchases such as the point of purchase, the frequency of purchase and the amount purchased at one time. The survey also included questions about consumer preference for different grades of maize flour (e.g., grade no.1, grade no.1+1/2, grade no. 2). The survey did not capture information on prices or quantity purchased on a monthly or annual basis.

The enumerators randomly selected 280 consumers in Nakawa and Kisenyi markets, bus terminals and main streets of Kampala. About 14% of the 280 respondents indicated that they did not purchase maize flour and grain for their home consumption. Another 4% of respondents answered that they purchased maize grain instead of maize flour. After the removal of incomplete and erroneous survey responses (approximately 6% of the 280 responses) and responses from non-maize flour consumers, the final survey sample consisted of 210 consumers who purchase maize flour, which represents a 75% response rate.

THEORETICAL MODEL

An individual's (i) decision to purchase branded maize flour (MF) is assumed to be a function of demographic (D) and socio-economic (SE) and product attributes (A). The demographic factors include gender, age, and family size. The socio-economic factors include education and individual monthly income. The final factor included in the model is associated with the quantity purchased.

$$MF_i = f(D, SE, A) \qquad \text{Equation(1)}$$

MF_i is the latent variable or the unobservable dependent variable. The observed Y_i is associated with MF_i based on the following expression:

$$Y_i = \begin{cases} 1 \ if \ MF_i^* > 0 \\ 0 \ otherwise \end{cases} \qquad \text{Equation (2)}$$

where Y_i represents purchasing decision of the consumer.

If Y_i equals 1, then the individual purchased branded maize flour and 0 if she did not purchase the branded flour. Given the nature of the dependent variable, a binary logit regression model was used in this study. Independent variables such as monthly income, family size, gender, age, education, quantity of purchase are gathered in vector x. Its expression is Equation (2).

$$\text{Prob}[y = 1 \| x] = F(x, \beta)$$
$$\text{Prob}[y = 0 \| x] = 1 - F(x, \beta)$$

$$\text{Equation (2)}$$

The general form of a binary logit model is represented in Equation (3):
$$log \frac{\text{Prob}[y = 1]}{\text{Prob}[y = 0]} = \beta_i x_i + c$$

$$\text{Equation (3)}$$

where β_i is coefficient of independent variables and x_i is independent variables which are monthly income, family size, gender, age, education, and quantity of purchase.

The set of parameters β, which are coefficients of the independent variables, represents how the probability is affected by changes in the independent variables, which are gathered in the vector x. The probability of observing a purchasing outcome can be expressed using a linear regression model [12] in Equation (3).

$$y = x'\beta + \varepsilon$$
$$\text{Equation (4)}$$

In the case of the binary logit regression model, the error term, ε, is assumed to have a standard logistic distribution [12]. Since Prob (y=1) = [0,1] and $x'\beta = [-\infty, \infty]$, it is difficult to predict probability with the coefficients obtained from this calculation. Thus, marginal effects at means were used in the study. Stata® 14 is used to estimate the logit regression model.

Table 1 provides summary statistics for the model. The demographic factors include gender, age, and family size. Gender is a dummy variable which equals 0 if the respondent was female and 1 if male. The age of the respondent in years is recorded within six different age groups: 10-19 years, 20-29 years, 30-39 years, 40-49 years, 50-59 years and 60-69 years. Family size is a continuous variable representing the number

of family members. The composition of family between adults and children was not included in the research.

The socio-economic factors include education and monthly income. Education is a dummy variable where 0 represent a respondent with less than a college education and 1 if she has earned a college education or higher. Monthly income has values ranging from less than 50,000 Ugandan shillings (USh) to more than 1,500,000 USh, and it is divided into eight categories. The final factor included in the model is associated with the quantity purchased. Quantity of purchase represents the quantity of maize flour the respondent purchased at the market at one time. It is categorized into the three groups: quantity purchased less than 6kg, between 6 kg and 20.9 kg, and 21 kg or more.

RESULTS

Summary Statistics
Slightly more than half of the survey respondents (109 out of the 210) purchase branded maize flour. There are nine brands of maize flour available in three supermarkets – Uchumi, Nakumatt, and Quality - in Kampala. These nine brands are Maganjo, Amazing Grace, Jogoo, Kamposho, Kawempe, Excel, Gombe, KPL, and Numa. Respondents of the survey indicated they purchase Maganjo, Amazing Grace, Kasawo, Nile, and Musolo brands of maize flour in mills, local markets, small shops, and supermarkets. Since 60 respondents purchase Maganjo among 111 of the consumers who purchase branded maize flour, it revealed that Maganjo is one of the most popular brands in Kampala.

The survey has an equal representation of male and female respondents. The average respondent is between 20-39 years old, has four to five family members, has a monthly individual income between 200,000 to 499,999 USh, and has at least a college education. More detailed distributions of each demographic and socio-economic variables are presented in Table 2. The majority of respondents purchase maize flour in quantities less than 6 kg (62%), and the least popular quantity size is 21 kg or more (18%) (Figure 1). Those who purchase above 6kg and less than 21kg accounted for 20.8% of respondents. Figure 1 provides a comparison of the quantities purchased between two groups of consumers: those who do not purchase branded maize flour and those who purchase branded maize flour. The percentage of respondents who does not purchase branded maize flour above 6kg and less than 21kg is 12% and who purchase branded maize flour above 6kg and less than 21kg is 29%. The percentage of consumers who does not purchase branded maize flour in quantities greater than 6 kg but less than 21 kg is smaller than the percentage of consumers purchasing branded maize flour in those quantities.

A multicollinearity test was conducted between independent variables in the model. The mean of variance inflation factor (VIF) was 1.05, which is less than the threshold value for multicollinearity (VIF =10). This low VIF value suggests that multicollinearity does not exist within the model's independent variables. Link test was conducted to determine if the model was specified. The test failed to reject the null hypothesis at 10 % critical level (p = 0.76). It means that the model specification is good. Ramsey RESET test was implemented to check whether omitted variables exist in the model. The results

of the test indicated that omitted variables are not an issue in this model since the null hypothesis is not rejected (p=0.72).
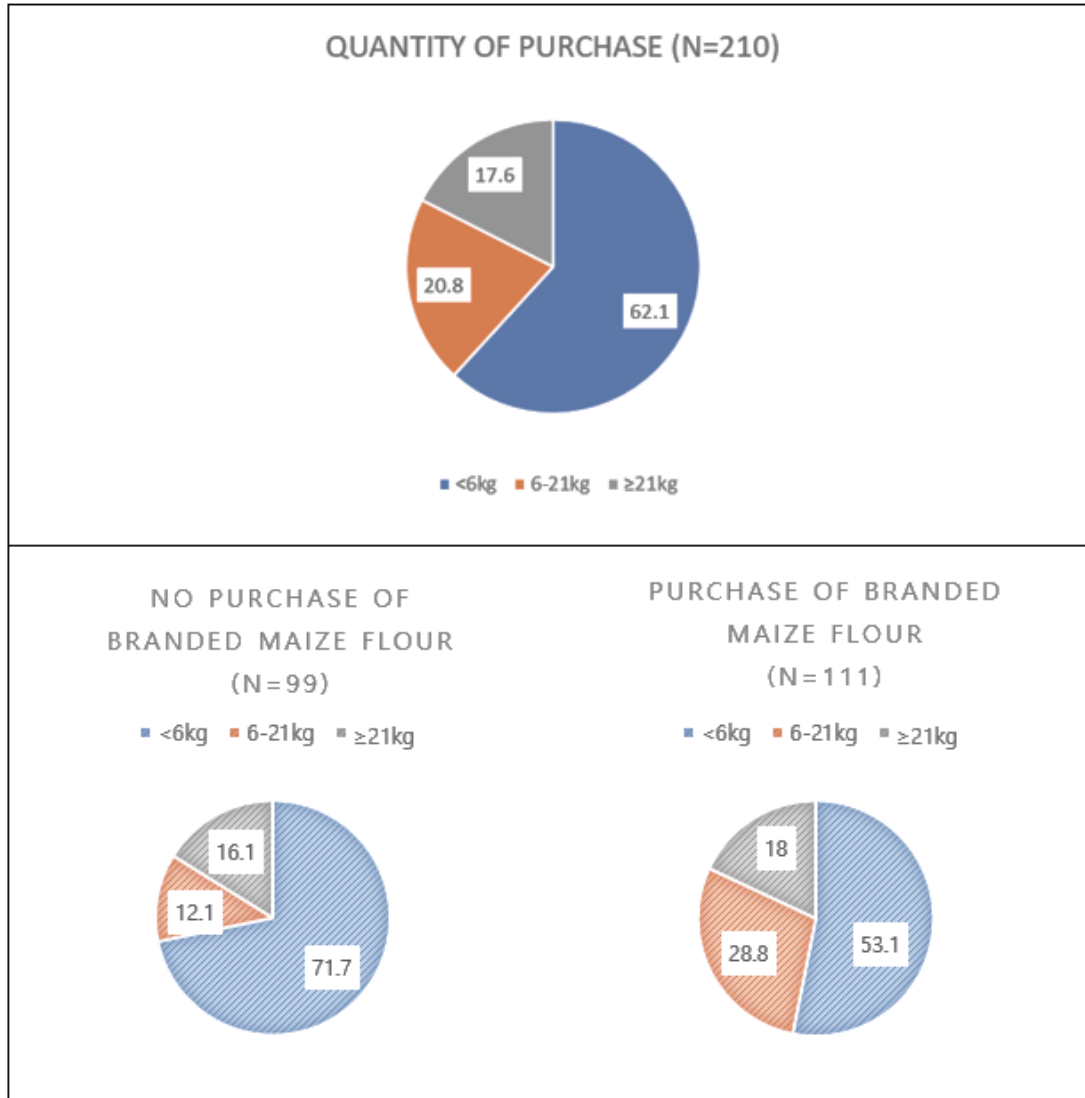

Figure 1: Distribution of Respondents' Quantity of Flour

Logit Regression Result

The results from the logit model (Table 3) show coefficients between the purchase of branded maize flour and consumers' characteristics. For the likelihood ratio test, the log-likelihood value for the analysis of a selection of branded maize flour product was -136.36 (p-value of 0.013), indicating that the model fits the data relatively well. The results show that purchase of branded maize flour was affected by respondents' education level, gender, and the quantity they purchased. Income, respondents' age, or family sizes were not significant variables.

Table 4 presents the marginal effects at the means. The marginal effect of gender is -0.12, which suggests the probability of purchasing branded maize flour is 12% less for male

consumers compared to female consumers, holding all other independent variables fixed at their means. The marginal effect of education is 0.16. The probability of purchasing branded maize flour is 16% higher for respondents with a college education or more than respondents without a college education. The marginal effect of purchasing 6-12 kg of maize flour is 0.28. It means the probability of purchasing branded maize flour is 28% greater for consumers who purchase branded maize flour in 6kg to 21kg quantities compared to consumers who purchase less than 6kg. Although the marginal effect of quantity of purchase with value 2 is 0.12; however, it is not statistically significant.

DISCUSSION

The results suggest that gender, education, and quantity purchased were key explanatory variables affecting preference for branded maize flour. Preference for the level of refinement of maize flour varies depending on culture and region. The current study about branded maize flour in urban Uganda has a similar point with the previous studies of Mozambique and Zimbabwe in terms of the preference on the branded maize flour which indicates the highly refined maize flour. Based on the results, female consumers preferred branded maize flour more than male. Women are the main food purchasers in the family [13] and are aware of the benefit associated with branded maize flour. Through several interviews with retailers and manufacturers in Kampala, a common belief was that consumers purchased branded maize flour because of its consistent quality. This result is consistent to a research of brand equity [14]. To increase sales of branded maize flour, manufacturers and retailers could embark on aggressive marketing campaigns targeted towards female consumers and focused on preferred product attributes such as consistent quality. Manufacturers and retailers could prepackage the branded maize flour inpreferred sizes such as package sizes between 6 kg to 21 kg. In general, maize flour can be purchased in bulk without standard packages. Retailers can custom package maize flour in consumers' preferred quantities. Since the maize flour packages in supermarkets and local markets in Kampala are presented in 1kg, 2kg, 5kg, 10kg, 25kg, and 50kg, suppliers of branded maize products may focus on producing medium-sized packages such as 10kg to attract the consumers who prefer packaged products.

The results also showed that as consumers' education increased, they were more likely to purchase branded flour. A possible explanation for this relationship is that consumers with more education are aware of the benefits of the product attributes offered by branded maize flour. A consumer with more education is assumed to be literate and it is expected that those consumers can distinguish specific names of the branded maize flour from other maize flour products offered in the market. Using positive health symbols can be a way to convey benefits of the branded maize flour for consumers who are illiterate.

CONCLUSION

Results from the survey indicate that education, gender, and quantity of purchase affected the purchase of branded maize flour. Based on these results, it is recommended that suppliers of branded maize flour products in Kampala focus on offering packages in 6-21kg sizes to consumers who are female and more educated. This study provides a baseline for further research regarding consumers of maize flour in Uganda. Since the study did not address the price of branded maize flour, it would be recommended that further research investigates how price influences purchase for branded maize flour. It would provide some insight into the price effect on consumers' preference for branded maize in the East African region. Another recommendation for future research is to examine the impact of household income on purchase decision of branded maize flour. The present study examined the influence of an individual's monthly income on the purchase of branded maize flour and not the household's income. Aggregate household income is needed to verify the relationship between household income and purchase of branded maize flour. Thus, it is recommended that household income is collected for future research investigating the effect of the household's income on purchases of branded maize flour.

Table 1: Summary of Variables

Variables	Description	Mean	Std. Dev.	Min	Max
Purchase of Branded Maize Flour	0 = No Purchase of Branded Maize Flour 1 = Purchase of Branded Maize Flour	0.52	0.50	0	1
Gender	0 = Female 1 = Male	0.50	0.50	0	1
Age Group	1 = 10-19 yrs 2 = 20-29 yrs 3 = 30-39 yrs 4 = 40-49 yrs 5 = 50-59 yrs 6 = 60-69 yrs	2.77	0.92	1	6
Family Size	The Number of People in the Family	4.19	1.87	1	8
Education	0 = Less than College Education 1 = College Education or More	0.52	0.50	0	1
Income Group	1 = < 49,999 2 = 50,000 – 99,999 3 = 100,000 – 199,999 4 = 200,000 – 299,999 5 = 300,000 – 499,999 6 = 500,000 – 699,999 7 = 700,000 – 1,499,999 8 = ≥ 1,500,000	4.59	1.53	1	8
Quantity	(Base = Quantity <6kg) Quantity 1 = 6 – 21kg Quantity 2 ≥ 21kg	 0.21 0.17	 0.41 0.38	 0 0	 1 1

Table 2: Demographic Characteristics of Respondents

Variables	Description	Frequency	%
Gender	Male	105	50.0
	Female	105	50.0
Age	10-19 yrs	4	1.9
	20- 29 yrs	90	42.8
	30-39 yrs	78	37.1
	40-49 yrs	29	13.8
	50-59 yrs	6	2.8
	60-69 yrs	3	1.4
Education	Less than college education	100	47.6
	College education or more	110	52.3
Income	< 49,999	3	1.4
	50,000 -99,999	13	6.1
	100,000 - 199,999	36	17.1
	200,000 – 299,999	46	21.9
	300,000 – 499,999	62	29.5
	500,000 – 699,999	26	12.3
	700,000 – 1,499,999	14	6.6
	≥ 1,500,000	10	4.7

Table 3: Logit Regression Result for Purchase of Branded Maize Flour

Variables	Coef.	Std. Err.	P >IzI	Sig.
Education	0.66	0.30	0.02	**
Gender	-0.50	0.30	0.09	*
Quantity 1	1.20	0.39	0.00	***
Quantity 2	0.49	0.40	0.21	
Age	0.07	0.16	0.65	
Family	-0.05	0.08	0.48	
Income	0.01	0.09	0.88	
Constant	-.33	0.65	0.61	

Sig = Significant level ; *** = 1%, ** = 5%, and * = 10%
Log likelihood = -136.36
Prob > chi2 = 0.01

Table 4: Marginal Effect at Means for Purchase of Branded Maize Flour

Variables	dy/dx	Delta-method Std. Err.	P >IzI	Sig.
Education	0.16	0.07	0.02	**
Gender	-0.12	0.07	0.08	*
Quantity 1	0.28	0.08	0.00	***
Quantity 2	0.12	0.09	0.20	
Age	0.01	0.04	0.65	
Family	-0.01	0.01	0.48	
Income	0.00	0.02	0.88	

Sig = Significant level ; *** = 1%, ** = 5%, and * = 10%

Note: dy/dx for factor levels is the discrete change from the base level

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