AN EXAMINATION OF CONSUMER WILLINGNESS TO PAY FOR A PRESERVED FARMLAND LABEL

by

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ABSTRACT

With many farms facing development pressure, state governments have responded with farmland preservation programs that deliver permanent protection via conservation easements. These programs in effect provide support for farms that provide food locally in areas with development pressure. That consumers also appear interested in keeping local farms can be seen in the growth of farmers' markets and other local food outlets. The purpose of this research was to determine if consumers would pay a premium for food labeled to have come from preserved farmland. Field experiments were run comparing willingness to pay (WTP) for watermelons with no label, a local association label, an original "Delaware Preserved Farm" label, and both labels together. Data were collected at parks and famers' markets in three adjacent counties in Delaware, Maryland, and Pennsylvania and one additional county in Delaware. There were 327 participants each of whom provided their WTP using the incentive compatible Becker, DeGroot, Marschak (BDM) mechanism.

The point estimates showed consumers were willing to pay $2.38 more for a preserved farm watermelon, on average, with a $3.00 premium when both labels were used. In all three states, WTP was similar when the experiment was conducted in a park; however, when the experiment was conducted in farmers' markets, Delaware consumers were willing to pay more and Pennsylvania consumers less. The results are also presented using latent class analysis to determine groups of consumers based upon their reasons for supporting preserved farmland and their purchasing habits. Four distinct groups of shoppers were found: conscious shoppers, community supporters, cost focused, and

dispassionate shoppers. The group names were chosen based upon how the participants responded to opinion questions. The cost focused group had the largest premium for a preserved farmland label, at $2.68, even though the point estimates suggested that the prices they were willing to pay were lower across all types of watermelons. Conscious shoppers and dispassionate shoppers would pay the most in total, but their premiums for a preserved farm watermelon were lower at $2.43 and $2.40 respectively. In sum, this research identifies a marketing opportunity for a new preserved farm label.

Chapter 1

INTRODUCTION

1.1 Research Context

The growth of local food markets in the last 30 years has led to increased research on the word "local" and its definition in the context of foods. Examining local food and the impacts it has on consumers and producers can be a key factor in benefiting segments of the agricultural industry. The premiums that consumers are willing to pay for local food can indicate ways that agricultural producers can maintain or grow their business, especially when considering development pressure that many small-scale farms are facing today. One way to address development pressure is through the use of preservation programs in which states pay farmers to forego development on their agricultural land permanently. These conservation easements are used in many states; however, this research will focus primarily on the preservation program in Delaware.

Local food research has shown strong evidence that premiums are possible when the consumer knows that produce or other food products have come from areas that the consumer considers to be local (Loureiro and Umberger 2003; Patterson and Martinez 2004; Darby et al. 2008; James et al. 2009; Yue and Tong 2009; Gracia et al 2013). It seems reasonable that many attributes that consumers ascribe to local food would also be present in food from preserved farms. However, an issue arises in that many consumers are not aware whether a product comes from a preserved farm. If consumers care about local food and preferences for local products overlap with preferences for preserved farm

produce, then consumers may also pay a premium for food that originates from preserved farms.

This study examined the impact that a *Delaware Preserved Farm* label had on consumer's willingness to pay. Using a field experiment to sell real watermelons to consumers in Delaware, Maryland, and Pennsylvania this paper examined the premiums for local and preserved farms across state boundaries. The new preserved farm label will be used in combination with a local label from the Maryland and Delaware (Mar-Del) Watermelon Association as an indicator of local association with the specific group of farmers. This research will also examine what premiums consumers will pay to obtain produce from preserved farmland as opposed to produce that they only know was grown in Delaware. Furthermore, the difference between consumers in parks and farmers' markets will be examined to determine if premiums have differences. If a premium is recognized, this research could potentially benefit farmers that produce and sell food locally, encourage enrollment into farm preservation programs, and promote growth in government funding for these programs.

Chapter 2

LITERATURE REVIEW

2.1 Literature Review

The hypothesis behind the potential premium for a preserved farm label is largely influenced by the literature supporting consumer preferences for local food. An important first step in local food research is defining what the consumers consider to be "local." Darby, Batte, Ernst, and Roe (2008), in research from Ohio, were able to show that there were no significant differences in premiums for produce originating from "nearby" or from "within Ohio". The definition of local in terms of state boundaries was further examined by Carpio and Insengildina-Massa (2009), who found in North Carolina that consumers would pay an average of 27% more for produce grown within state. Further studies have examined distance, or food miles, instead of perceived boundaries as a description for local. Grebitus, Lusk, and Nayga (2013) studied the impact that distance of transportation had on the willingness to pay for food. They determined that freshness is a key driver of demand and that consumers' perception of nearby food attributes are superior to their beliefs about the attributes of food that traveled long distances; this perception of superiority among nearby foods impacted their willingness to pay positively (Grebitus, Lusk, and Nayga 2013). These papers all indicate that consumers are willing to pay premiums for food that is produced nearby, but they used different definitions for what "nearby" is classified as (Darby, Batte, Ernst, and Roe 2008; Carpio and Isengildina-Massa 2009; Grebitus, Lusk, and Nayga 2013).

Building upon this research, additional papers explored the impacts that other labeling attributes have on willingness to pay. The comparison of local and organic produce has been explored in a variety of settings. Loureiro and Hine (2002) found that consumers' preference for locally labeled potatoes resulted in a higher willingness to pay than their preference for organic potatoes. These results have been echoed in other studies, which were conducted on different types of produce (Costanigro, McFadden, Kroll, and Nurse 2011, Onozaka, Nurse, and Thilmany-McFadden, 2010). Carroll, Bernard, and Pesek (2013) found that local premiums were similar or even higher than organic premiums and that there were larger premiums for local when products were sold at farmers' markets. This information provides justification that there are different groups of consumers that shop at traditional food stores versus farmers' markets, and it will be important to take this in to account in this analysis. Finally, literature has shown that premiums for local food can range from $0.07 - $1.53 per sale (Loureiro and Umberger 2003; Patterson and Martinez 2004; Darby et al. 2008; James et al. 2009; Yue and Tong 2009; Gracia et al 2013). Overall, the literature indicates that significant premiums are present for foods with local attributes.

Identifying the existence of a premium is important, but it is also important to understand why these premiums exist. Onken and Bernard (2010) explain how all states have developed some sort of program promoting local farming, this is a good indication that policy makers identify that there are benefits to farming locally. Consumers, on the other hand, may have different reasons for purchasing local than the states have for promoting it. These motivations have been addressed by two studies that explore reasons for consumers supporting the purchase of local. Megicks, Memery, and Angell (2012) found that purchasing local is often tied with consumers' desire to help solve

environmental and sustainability issues. Hu, Batte, Woods, and Ernst (2012) determined that consumers would be willing to pay more for local foods that came from small farms, which implies that consumers care about supporting these types of farmers. This preference seems as if it would also carry over for preserved farms because of the similarities in support for farmland preservation programs that are explored in preserved farm literature.

There is also support in literature for consumer preferences for supporting farmland preservation.. Kline and Wichelns (1996, 1998), Rosenberger (1998), and Duke and Aull-Hyde (2002) studied public preferences for land preservation, finding that environmental and agricultural attributes of land preservation are the most important to the public. Kline and Wichelns (1996) and Rosenberger (1998) also found that environmental attributes such as "protecting water quality", "protecting wildlife habitat", and "preserving natural places" were the most important factors for the public to support farmland preservation. Duke and Aull-Hyde (2002) found that agricultural attributes, such as "providing locally grown food" were more important, with environmental factors slightly less so. Reasons for supporting farmland preservation seem to overlap with reasons for supporting local food and this is a key point to be looked at in this study.

Previous literature has explored the reasons that the public support local foods and farmland preservation by determining the specific attributes that the public values. There is a positive impact that the perception of being local has on consumer willingness to pay. If consumer valuations for local foods and preserved farmland overlap, it is likely that a premium will also be present for produce from preserved farmland. Table 1 addresses the literature and indicates what the authors found about consumer motivations for supporting either preserved farmland or local food. The table shows that freshness is an

important factor for support as determined by many authors. Furthermore, it shows that leading motivations for preserved farmland are agricultural and environmental issues, while motivations for local food largely has to do with food quality (Table 1). The environmental and agricultural attributes of farmland preservation provide different things to consumers and therefore may influence purchasing habits in other ways.

Studies on the preferences for farmland preservation provide insight into the attributes of preservation programs that consumers value; however, there has yet to be a study that examines whether or not consumers would actually pay more for produce from preserved farmland. Identifying the premiums that consumers would pay for produce from preserved farmland could provide benefits to consumers and farmers.

This study used field experiments to estimate these premiums to examine the preference differences across the general public in multiple different locations. Field experiments differ from behavioral laboratory studies because of: (1) the subject pool, (2) the information that the subjects bring to the task, and (3) the environment that the experiment takes place (Harrison and List, 2004). Additionally, field experiments are performed with participants who usually have homegrown values for the items being studied in contrast to induced-value experiments.

Table 1: Consumer motivations for supporting local foods and farmland preservation

Author	Year	Focus[1]	Consumer Motivations For Support
Kline et al.	1996	P	Environmental attributes most important with agricultural attributes second most important, open space and growth control attributes follow
Rosenberger	1998	P	Environmental attributes most important, agricultural second, and open space attributes least important
Duke et al.	2002	P	Agricultural attributes most important: "providing locally grown food", "keeping farming as a way of life" and environmental attributes: "protecting water quality", "protecting wildlife habitat"
Loureiro et al.	2002	L	Freshness and nutrition
Darby et al.	2008	L	Food safety and ease of tracing origin
Carpio et al.	2009	L	Higher perceived product quality within state
Yue et al.	2009	L	Freshness and food safety are the most important attributes
Adams et al.	2010	L	Consuming fresh produce and concerns for industrialized organic agriculture
Onozaka et al.	2011	L	Freshness and better quality and taste
Grebitus et al.	2013	L	Freshness
Constanigro et al.	2014	L	Labels may act as simplifying "rules of thumb" to minimize on cognitive effort during shopping trips

[1]P, preserved farmland; L, local food

Chapter 3

METHODOLOGY

This section covers the experimental methods used and the support for those methods within the economic experiment literature. Furthermore, it covers the specific experimental design choices that were made and it will begin to address the formal models that will be used following the data collection. The two areas covered are (1) procedures and (2) variables.

3.1 Procedures

The data used in this research are drawn from responses to an economic experiment, which was administered in parks and farmers' markets in four different counties: New Castle and Sussex Counties in Delaware as well as Chester County in Pennsylvania and Cecil County in Maryland. These counties were chosen to represent adjacent counties in different states, with one additional county chosen in Sussex Delaware to represent vacationing populations. The participants were recruited at each location to be representative of the general population in attendance. They were recruited verbally, by intercepting them at experiment locations, and through signage indicating an association with the University of Delaware and signage that stated they could earn cash for participating in watermelon research. Potential participants were given a brief explanation of what the experiment entailed as well as the information on compensation. After taking a seat and listening to the label information provided, the subjects were given an explanation of how the bidding mechanism worked. In the experiment the

subjects were asked to state the most they would be willing to pay for each of the four watermelons with the different label treatments being examined. After writing down their WTP they had the opportunity to pick one of 100 different envelopes that contained a random price and a random label treatment. The prices ranged from $0 to $12 in increments of $0.50 for each treatment. If the subject wrote down a value higher than the price they pulled in the envelope for that specific treatment, they would get the watermelon at the price in the envelope.

This bidding mechanism incorporated incentive compatible design into the experiment. Auctions are incentive compatible if each bidder submits a bid that reflects their true value of the product (Lusk and Shogren, Ch.2 P.19). The bidding mechanism used is the BDM mechanism, because the participant is drawing a random value from an envelope. In an auction with the BDM mechanism implemented, participants submit a bid for a good and a random value is drawn from a known distribution. The bidder "wins" if the price drawn is lower than the bid they submitted (Lusk and Shogren, Ch.2 P.24). This type of auction is incentive compatible because subjects must submit their true value, otherwise they miss out on maximizing their utility. In this experiment, the participants are drawing a random value and a labeling treatment, instead of only drawing a random value for one product. In home grown experiments the BDM Mechanism generated similar mean bids to second price, random nth price, and English auctions in the initial rounds, which provides evidence of its incentive compatibility (Lusk and Shogren, Ch.5, p. 71). With an incentive compatibility mechanism the data should reflect values very close to the participants' true willingness to pay.

Following completion of the bidding process it was determined how much money the participant would receive and if they would also get a watermelon or not. The

maximum amount of cash the participant could receive was $12. If it was determined that the participant received a watermelon they would be given the opportunity to select their own watermelon from coolers that were at the experiment site. Survey data were collected after the bidding process and the last step was for the participants to fill out a receipt for the researchers. The total process took about ten minutes. The survey, script, and definition card used during the experiment can be found in Appendix A.1.

3.2 Variables

The goal of this study is to determine the willingness to pay for a preserved farmland label, observe the price differences between preserved farm label and no label, and to observe differences in consumer values across state lines and between parks and farmers' markets. The choice of a field experiment also means that there are more nuisance variables than in the lab. In the field, participants are subject to outside distractions depending upon the location the experiments are held at. Good experimental design provides data that are useful while avoiding unwanted interactions. In other words, it allows for easy examination of focus variables while correctly dealing with nuisance variables (Friedman and Cassar, Ch.4, P.32). The focus variables in the experiment are the treatments of the four different watermelon labels. In order to minimize the effects of nuisance variables the experiment ran in the same manner for all participants. This means that all participants heard the same script before taking part in the auction; furthermore, the participants were provided with identical descriptions of the auction mechanism so that they all had an understanding prior to providing their responses. Additional steps, such as randomization of label orders and requesting that participants did not communicate, ensured that as much was controlled as possible in order to have the data closely reflect the changes due to treatment effects.

The treatments of this study are the differences in labeling among the watermelon displayed. Watermelon were chosen for this experiment because they have the largest yearly receipts from all of Delaware's fresh market produce at $10,856,000 (Delaware Department of Agriculture 2015). The label treatments that were shown on the bidding sheet were chosen by the research team to represent a watermelon with no label, a watermelon with a Mar-Del Watermelon Association label, a preserved farmland label, and a watermelon with both the Mar-Del label and the preserved farmland label. The preserved farmland label has "Delaware" written across the top and the slogan "Preserving our farms, Preserving our future" written along the bottom, it can be seen in Figure 1. The researchers created initial slogans based off of their knowledge of preserved farmland. These initial slogans were narrowed down to five which were placed into a Qualtrics survey which was released through social media sites to friends and family of the researchers. Following the survey, a single slogan was chosen in a competition for graphic design students at the University of Delaware. The students were work contracted to create labels. The final label candidates, along with the slogan chosen through the survey, were displayed at the University of Delaware's Agricultural Day. Participants were recruited to vote on their favorites, and the winning combination was used as the treatment in the experiment. The Mar-Del label is a logo of the Mar-Del Watermelon Association and signifies that the watermelon was grown on a farm in the association, it can be seen in Figure 1. The no label treatment simply said "No Label" in all black lettering; however, all participants were told that all the watermelons did come from Delaware. Bidding sheets were show to the participants after they agreed to participate and an explanation of each of the labels was given (Figure 1). The bidding sheets were randomized across all participants. Other information given to the

participants at the table were a label definition card to refer to throughout the course of the experiment and a watermelon that was used as a reference point to the general size of melons that the participants had a chance of receiving. The experiment was designed to only show the participants one watermelon so as to eliminate any visual bias that may come with their watermelon valuation (Figure 1).

Location: _____ Watermelon Study Participant #: _____

Please indicate the most you would be willing to pay for a watermelon with the following labels. Your amount must fall between $0 and $12.

Note that your best strategy is to enter the most you are actually willing to pay. Please do not just enter how much you think the watermelons actually cost.

Mar-Del Watermelon Association Watermelon	Preserved Farm and Mar-Del Watermelon Association Watermelon	Unlabeled Watermelon	Preserved Farm Watermelon
		NO LABEL	
The most you'd be willing to pay for this watermelon:	The most you'd be willing to pay for this watermelon:	The most you'd be willing to pay for this watermelon:	The most you'd be willing to pay for this watermelon:

Figure 1: Bidding sheet provided to experiment participants

The results of this experiment provided the researchers with data from 328 participants. The independent variables used in further analysis are found in table 2 and table 3. The first table has the variable names for data received from the bid sheet, and

the next table has variable names for data received from the survey following the bid placement.

Table 2: WTP and location treatments

Variable Name	Description
wtp_nl	WTP for watermelon with no label
wtp_pf	WTP for watermelon with preserved farm label
wtp_md	WTP for watermelon with Mar-Del label
wtp_pfmd	WTP for watermelon with Mar-Del and preserved farm label
cecil	Cecil County
chester	Chester County
new_castle	New Castle County
sussex	Sussex County
park	Park
farmers_market	Farmer's Market
household_pur	Household watermelon consumption in one summer month
soonest	The soonest the participant planned on purchasing a watermelon: • Today, 1-3 days, one week, 2-3 weeks, one month, more than one month
inc_midpoint	The midpoint of the range in which participants' income falls in hundreds of thousands

Table 3: Consumer attributes

Variable Name	Description
	How important is it to you that farmland preservation:
inc_tax	Does not increase taxes
community	Has widespread support in the community
size	Focuses on smaller/medium sized farms
perm	Is guaranteed to be permanent
	How often do you:
attend_fm	Go to farmers' markets
local_food	Try to buy local food
food_lab	Read food labels
organic	Try to buy organic food

Note: All responses on Likert scale from 1 to 5

Chapter 4

DATA ANALYSIS

This chapter will explore the formal models that are used with the collected data to derive results. First, the hypotheses will be examined in the context of the complete data set to determine which hypothesis are statistically significant. Then, the Tobit regression model and the latent class model will be examined to understand the independent variables, dependent variables, and usage within the context of this research. It will also explore what the research results mean, and address any concerns that may be present regarding the data collection and analysis. Conclusions will be drawn from the model results and the qualitative responses will be observed. The second part of this chapter will address any points of contention that may arise from this data analysis. Additionally, it will examine the ways in which further research on this subject may look to be conducted.

4.1 Hypotheses and Models

The goals of this research were to answer three main questions. (1) Are consumers willing to pay more for produce that comes from preserved farmland? (2) Will consumers outside of Delaware have different WTP values for produce from Delaware preserved farmland? (3) Will there be a difference in WTP values for produce from preserved farmland with consumers in farmers' markets and consumers in parks? These hypotheses can be seen in the first column of table 4. Additionally, the results of the

hypothesis tests are in the third column. The results of the initial data analysis are in line with the hypotheses that were originally proposed.

Table 4: Hypotheses and results of hypotheses tests

Question	**Hypothesis**	**Results**
1. Are consumers willing to pay more for produce that comes from preserved farmland?	Participants will have higher WTP values for watermelons that were grown on farms enrolled in the Delaware farmland preservation program.	H_o: *wtp_pf* ≤ *wtp* H_a: *wtp_pf* > *wtp* P-value = 1.442e-07 Reject the null hypothesis that *wtp_pf* is less than or equal to *wtp*
2. Will consumers outside of Delaware have different WTP values for produce from Delaware preserved farms?	Participants from outside of Delaware will have lower WTP values relative to those in Delaware for all treatments.	H_o: *wtp_pf* Cecil and Chester ≥ *wtp_pf* New Castle and Sussex H_a: *wtp_pf* Cecil and Chester < *wtp_pf* New Castle and Sussex P-value = 0.1158 Unable to reject the null hypothesis that *wtp_pf* in Cecil and Chester is greater than or equal to *wtp_pf* in New Castle and Sussex
3. Will there be a difference in WTP values for produce from preserved farmland with consumers in farmers' markets and consumers in parks?	Participants in farmers' markets will have higher WTP values for all treatments.	H_o: *wtp_pf * farmers_market = wtp_pf * park* H_a: *wtp_pf * farmers_market* ≠ wtp*_pf * park* P-value = 0.01502 Reject the null hypothesis that *wtp_pf * farmers_market* is equal to *wtp_pf * park*

Note: WTP = willingness to pay

The data collected are panel data for 328 participants who placed four bids each, leading to 1,312 willingness to pay data points. Each participant answered survey questions pertaining to shopping habits and demographic information in addition to

stating their four willingness to pay values. All responses must fall between \$0.00 and \$12.00 because of the limits set in the experimental design. These types of data are best analyzed using a Tobit regression model. Tobit regressions are used when there is a limit at zero (left censored) *and* there is a limit on the maximum value that the observed variable can be (right censored). The Tobit regression model has a likelihood function of this form as described in Lusk and Shogren's writing on experimental auctions (Ch.6 P.96-98):

$$LF = \prod_{i=1}^{N} \left(\frac{1}{\sigma} \phi \left(\frac{y_i - X_i \beta}{\sigma} \right) \right) \phi \left(\frac{t_L - X_i \beta}{\sigma} \right) \phi \left(\frac{t_R - X_i \beta}{\sigma} \right)$$

Where the t's are the lower and upper limits, ϕ is the cumulative standard normal distribution, β is the coefficient estimates, X_i is the independent variables, y_i is the dependent variable, and σ is the standard deviation (Lusk and Shogren, Ch.6 P.96-98). When ϕ is maximized it yields coefficient estimates β for variables X_i (Lusk and Shogren, Ch.6 P.96-98). The variable X_i contains the variables in table 2. Using this model, it is possible to take into consideration participants' values that may fall outside of the ranges (eg. negative values). The resulting coefficients from Tobit analysis will have a slightly different interpretation because of the censors. In Tobit regressions the observed dependent variable is not directly related to the true value of the dependent variable because of the censors (Lusk and Shogren, Ch.6 P.96-98). Censoring the bid data means that it is possible for a participant's values to fall outside of the censor ranges, and therefore the effects can only be interpreted on the observed values of the dependent variable, i.e. the values that a participant may have been forced to place within the censored area (Lusk and Shogren, Ch.6 P.96-98). This means that Tobit regression coefficients do not represent the marginal effects on the dependent variable. Instead, the

coefficients represent (1) the effects on the probability of falling within the censors and (2) effects conditional on being within the censors (McDonald and Moffitt 1980).

Further analysis for this research will be completed through a technique called latent class analysis (LCA). The latent class model allows for the researchers to define discrete groups of consumers based upon their responses to survey questions. The community and preference variables are the variables present in table 3. All responses were written down on Likert scales from 1-5. When performing LCA these variables are used as indicators of the latent classes present in the subject pool based upon their response characteristics. The model is shown here Vermunt and Magidson in the technical guide for Latent Gold (2016):

$$P(y_t = m_t) = \sum_{x=1}^{K} P(x) \prod_{t=1}^{T} P(y_t = m_t \,|x)$$

Subjects are placed into a class *x* based upon T response variables y_t which are the indicator variables from the survey (Vermunt and Magidson, 2016). The responses, *m*, where $1 \leq m \leq M_t$ is the number of categories within each indicator variable, are then placed into classes based upon a linear term which yields an adjacent-category ordinal logistic regression model with ordinal response variables (Vermunt and Magidson, 2016). The formulas as described by Vermunt and Magidson are seen here:

$$\eta_{m|x}^{t} = \beta_{m0}^{t} + \beta_{mxO}^{t}$$

With the restriction of (Vermunt and Magidson, 2016):

$$\beta_{mxO}^{t} = \beta_{x0}^{t} \cdot y_{m_t}^{t*}$$

Where $y_{m_t}^{t*}$ is the score assigned to category m_t of the tth indicator (Vermunt and Magidson, 2016). This yields an adjacent-category ordinal logit model for response variable y_{it} (Vermunt and Magidson, 2016).

These parameters are then estimated through a Maximum Likelihood function. Where ϑ is the vector containing the unknown β parameters and I denote the total number of cases. This formula, as defined by Vermunt and Magidson, is seen here:

$$log\mathcal{L} = \sum_{i=1}^{I} w_i log\, f(y_i|\vartheta)$$

Where $f(y_i|\vartheta)$ is the probability density associated with case i given parameter values ϑ and w_i is the case weight corresponding to that case. When this formula is maximized it means that the case was placed in the cluster, which maximizes its log likelihood (Vermunt and Magidson, 2016). After the subjects are broken into these latent classes, the original Tobit regression is re-run on the groups to examine willingness to pay differences.

4.2 Results

The sample that was collected is described in Table 5. This is the demographic information about the 328 survey respondents. Overall, the largest portion of the sample falls between 50 and 64 years old, this may explain an average of less than one children in the house under the age of 18. Compared to the United States Census there is an oversampling of 25-34 year-olds in Cecil County and an under sampling of 50-64 year-olds. In New Castle County, 25-34 year-olds were a larger portion compared to the census and the 65+ grouping was much smaller. In Sussex County, there was an over representation of 50-64 year-olds. All other age categories were similar to US Census results. Furthermore, 96% of our sample graduated from high school and 53% have a bachelor's degree or higher. When broken down into county level data, the Sussex county sample had a much larger portion of college and graduate school graduates, they were also older than the participants from other counties. This could be because it is

representative of the population that attends the Lewes Delaware area for vacation purposes. Additionally, Cecil, Chester, and New Castle counties all had a higher average for children under 18 in the household.

Table 5: Sample properties

	Pooled Survey Respondents	Cecil County		Chester County		New Castle County		Sussex County	
		Sample	Census	Sample	Census	Sample	Census	Sample	Census
Female	62%	49%	50%	66%	51%	64%	52%	68%	52%
Age (Above 18)									
18-24	11%	12%	12%	12%	12%	15%	14%	3%	9%
25-34	19%	25%	15%	12%	15%	28%	18%	9%	13%
35-49	22%	29%	27%	24%	27%	22%	26%	14%	21%
50-64	29%	12%	29%	32%	28%	24%	26%	47%	28%
65+	16%	19%	17%	18%	18%	6%	17%	24%	29%
Children under 18 in Household	0.66	0.81		.72		0.76		0.39	
High School Graduate	96%	93%	88%	100%	93%	94%	92%	98%	86%
Bachelor's Degree	53%	38%	22%	54%	49%	49%	35%	70%	23%
Graduate Degree	26%	22%		25%		16%		43%	

Source: United States Census Bureau, 2010

The Tobit regression is used in two different capacities: (1) to examine willingness to pay as a dependent variable in relation to independent variables across the entire sample, and (2) to examine the willingness to pay as a dependent variable in relation to independent variables *within* the classes determined through latent class analysis. With these two approaches, the premium for a preserved farmland label is examined across the whole sample, and within the discrete consumer classes, offering insight into which consumer groups may be the best suited to target with a farmland preservation education campaign.

Table 6: Regression analysis with treatments and time-to-purchase considerations

Regression with Time Until Next Purchase and Income Adjustments

	Dependent variable:				
			wtp		
	OLS Regression	Only Treatments and Interactions	Time-to-purchase Consideration	Income Adjustment	Combined
	(1)	(2)	(3)	(4)	(5)
wtp_pf	2.29***	2.38***	2.37***	2.39***	2.38***
	(0.16)	(0.17)	(0.16)	(0.17)	(0.17)
wtp_md	1.82***	1.90***	1.90***	1.92***	1.91***
	(0.15)	(0.16)	(0.16)	(0.17)	(0.16)
wtp_pfmd	2.89***	2.99***	2.99***	3.01***	3.00***
	(0.16)	(0.17)	(0.17)	(0.18)	(0.17)
cecil	-0.25	-0.26	-0.41**	-0.25	-0.43**
	(0.18)	(0.19)	(0.18)	(0.19)	(0.19)
chester	0.09	0.12	-0.07	0.15	-0.05
	(0.23)	(0.24)	(0.24)	(0.24)	(0.24)
farmers_market	0.52***	0.54***	0.44***	0.54***	0.43**
	(0.16)	(0.16)	(0.17)	(0.17)	(0.17)
cecil:farmers_market	0.15	0.15	0.42	0.19	0.43
	(0.27)	(0.28)	(0.29)	(0.28)	(0.29)
chester:farmers_market	-0.85***	-0.93***	-0.72**	-0.84**	-0.58*
	(0.31)	(0.33)	(0.32)	(0.33)	(0.32)
household_pur			-0.02		-0.02

			(0.03)		(0.03)
soonest: 1-3 days			-0.20		-0.16
			(0.20)		(0.21)
soonest: 1 week			0.26		0.26
			(0.23)		(0.22)
soonest: 2-3 weeks			-0.09		0.16
			(0.27)		(0.26)
soonest: 1 month			-0.84***		-0.79***
			(0.29)		(0.30)
soonest: > 1 month			-1.03***		-1.10***
			(0.29)		(0.29)
inc_midpoint				0.13**	0.07
				(0.07)	(0.06)
constant	3.97***	3.89***	4.20***	3.76***	4.09***
	(0.15)	(0.17)	(0.26)	(0.18)	(0.28)
Observations	1312	1312	1308	1,264	1,260
Log Likelihood		-2823.82	-2795.54	-2,709.61	-2,680.42
Akaike Inf. Crit.		5667.63	5623.07	5,441.21	5,394.85
Bayesian Inf. Crit.		5719.43	5705.89	5,497.78	5,482.21

Note: *p<0.1; **p<0.05; ***p<0.01

4.2.1 Tobit Regression

The results for the Tobit regression can be seen in Table 6. Five different regressions were run. The coefficients for the label treatments are robust across all models. The first model shown is an OLS regression with label treatments, location treatments, and label-location interactions. Because Tobit coefficients are not representative of marginal effects on the dependent variable, this model was included to compare the results between an OLS model and the Tobit model. Model (2) in Table 6 is a Tobit regression with the same independent variables as Model (1). The coefficient values between the two different models are similar, but the OLS point estimates are slightly lower for all coefficients. Although the Tobit coefficients are not marginal effects, the remaining analysis in this paper will assume that the point estimates are very close to the marginal effects, and will be referred to as such. In the Tobit regression, the constant value is the price of a non-labeled watermelon in a Delaware park. The coefficient values represent the changes to this value depending upon the variable being examined. In these results, consumers are WTP a premium of $2.38 for a watermelon with the farmland preservation label with significance at the 1% level. Additionally, the results show that the combination of the farmland preservation label and the Mar-Del Watermelon Association label resulted in a premium of $2.99 which is also significant at the 1% level. It can be concluded that the addition of a farmland preservation label added value to an unlabeled Delaware watermelon. Locational attributes also appear to play a role in the consumers' willingness to pay for a watermelon grown in Delaware. We can see that the coefficient for farmers' markets indicates that consumers in those markets paid $0.54 more and it is also significant at the 1% level.

Interesting to note is that consumers in the Chester Farmers' Market would pay $0.93 less and that is also significant at the 1% level. Overall, model (2) indicates that premiums are present for our treatments and that locational effects are also present.

The second regression in Table 6 attempts to consider any impact that may occur during the experiment process because of considerations directly related to consumers' beliefs and habits pertaining to watermelons. Two questions that were asked in the survey attempted to recognize tastes or distastes for watermelons as a produce. The Variable *household_pur* asked participants how many watermelons their household consumes in one summer month and the variable soon asked about how soon the participants were planning on buying a watermelon; the levels within soon are, (1) today, (2) one-to-three days, (3) one week, (4) two-to-three weeks, (5) one month, and (6) more than one month. These variables were included to determine if consumer purchase volume and time-to-purchase attributes play a role in their WTP. Model (2), in Table 6, includes these variables to account for participants who may have specific tastes in regards to purchasing watermelons. Using the comparison between models (1) and (2) it can be examined if the sample was affected by consumers' like or dislike of the produce. The coefficient values for *household_pur* are unable to reject the null hypothesis, which implies that the amount of watermelons a household consumes in a month does not have significance in determining *wtp* values. However, how soon a participant was going to buy a watermelon does seem to influence their valuations to a certain extent. The *soonest* variable at the last two levels of within "one month" and "more than one month" both point estimates suggest a decrease in the willingness to pay, by $0.84 and $1.03 respectively, and are significant at the 1% level. The soonest they would purchase a watermelon values of "one month" and "more than one month" indicate that the

household either (1) does not like watermelons, (2) just purchased a watermelon, or (3) has some other reason for not wanting a watermelon at the present time or in the near future. It therefore makes sense that the participant could value watermelons less which is confirmed by the coefficient values. Another interesting thing to note is that there is now significance at the 5% level for the *cecil* coefficient.

Model (3) in Table 6 shows the results of a Tobit regression with variables included to indicate the impact that an individual's income will have on their willingness to pay. The participants were asked to place their income within a certain range on the survey following the experiment. Because of this, the midpoint of this range is used to indicate participants' approximate income and is used as an independent variable in the model; the variable *inc_midpoint* is representative of the participants in hundreds thousands of dollars. Model (3) indicates that the null hypothesis of the variable having no effect can be rejected at the 5% level with a coefficient of 0.134, so income can influence the price that consumers will pay for watermelons. The coefficients for the premiums in model (3) are similar to models (1) and (2); however, when the time-to-purchase and income adjustments are combined into one model, as can be seen in model (4), it is not possible to reject the null hypothesis for the income coefficient because the changes in *wtp* are attributed more towards how soon participants were planning on purchasing a watermelon.

Between these two models, the variable soonest is important to *wtp* valuation, however it is also important to recognize that the coefficients for *wtp_pf*, *wtp_md*, and *wtp_pfmd* do not see any changes. In other words, the *soonest* coefficient in this regression represents changes to the constant only and not any changes in the label

treatments. However, because the *soonest* variable can give insight into consumer characteristics, model 4 will be the main model examined across the latent class groups.

In this model, the constant of 4.09 is significant at the 1% level which is representative of the willingness to pay for an unlabeled watermelon sold at a park in Delaware. As stated earlier, the parameter values for *wtp_pf*, *wtp_md*, and *wtp_pfmd* are robust. The coefficients are point estimates for how the consumers price will be impacted by that independent variable. The parameter for the farmland preservation label suggests that consumers were willing to pay $2.38 more for a watermelon with that label. While the Mar-Del Watermelon Association parameter indicates that consumers were willing to pay $1.91 more for the label. The results also signify that consumers were willing to pay $3.00 more for the combination of both the Delaware farmland preservation label and the Mar-Del Watermelon Association label. The coefficients are representative of the premiums that consumers are willing to pay for a label treatment indicating the type of farm that the watermelon came from. These results further support the first hypothesis that consumers would be willing to pay more for produce that comes from preserved farmland in Delaware.

The second hypothesis, regarding consumers outside of Delaware having different WTP values for produce with the farmland preservation label can also be addressed with the results from model 4 in Table 6. The point estimate for *cecil* suggests that consumers in Cecil county would pay $0.43 less for produce compared to consumers in Delaware, regardless of the label. However, there is no statistical evidence that the *chester* independent variable influences *wtp*. In relation to the second hypothesis in Table 4, this means that the data support the hypothesis for participants in Cecil county, but not for participants in Chester county. The third hypothesis, that participants in farmers' markets

would pay more than participants in parks, was supported by the data. The coefficient for *farmers_market* suggests that participants in farmers' markets would pay $0.43 more on average in all counties. Further results from this model suggest that the interaction of *chester* and *farmers_market* reduces consumers' willingness to pay by $0.58 and is significant at the 10% level.

In addition to this, the parameter estimates for the *soonest* variable, indicate that participants who planned on buying a watermelon after a month would spend $0.79 less than participants who planned on purchasing a watermelon today. Participants who planned on purchasing a watermelon further than a month away would spend $1.10 less. It is possible that consumers who answer this way did not like watermelons, and therefore did not plan on purchasing them anytime soon. This dislike of watermelons would also result in a lower *wtp*. The second thing that this variable response could indicate, is that the consumers purchased a watermelon recently, and therefore did not plan on getting a watermelon for a longer period. This would also explain a lower *wtp* because the consumer has a lower demand for a product that they already have.

4.2.2 Latent Class Analysis

Shown are the process and results for using latent class analysis to identify discreet groups of consumers from the dataset of willingness to pay values. Latent Class Analysis (LCA) uses a model to allow the consumer characteristic and purchasing habit data to determine a group or "class" into which a specific subject will be placed. For this study, LCA was used to determine classes based upon responses to certain questions in the survey; the determined classes will then be analyzed with a Tobit regression to determine if there are differences in premiums across the classes determined by LCA.

The first step in LCA is deciding which variables from the dataset are going to be used to determine the resulting groups from the model. Choosing variables is a combination of comparison between models, and deciding what types of characteristics the model should use as its deciding factor in class placement. The method of variable selection used in this model is based upon the selection method outlined by Dean and Raftery in 2010. This process uses a comparison of two class models with differing indicator variables used for class selection. One variable is chosen as the initial clustering variable that must be included in the analysis. From this point variables are added one at a time and comparisons between models' Bayesian Information Criterion (BIC) are made. If the BIC increases, then the variable should be included in the analysis. This is called the "Inclusion Step" (Dean & Raftery, 2010). After this process, when the model has multiple variables in it, the process is reversed. One variable is removed and the resulting BIC is compared with the BIC of the model with all variables (Dean and Raftery, 2010). If the BIC decreases, the variable remains in the model and the next variable is checked (Dean and Raftery, 2010). This is called the "Exclusion Step" (Dean and Raftery, 2010). The final resulting model should include all variables that have a significance in the class selection process; however, there are reasons that the resulting model may not make sense for this analysis. For example, in this research there are variables which address the participants' belief about how safe a watermelon with each labeling treatment is to eat on a Likert scale from one-to-five. There is a variable for each different treatment that the participants saw, so four variables on food safety perceptions. When performing Dean and Raftery's (2010) method for variable inclusion, it occurred on multiple occasions that groups of related variables were partially included in class selection. Because of this, the LCA variable selection method was only performed on

variables for questions which pertained to consumers' preferences and shopping habits and did not involve consumers' opinions about individual treatments. The resulting variable selection for LCA is shown in Table 3.

The second step in LCA is to determine the number of classes that are to be examined. There are several methods for determining the best number of classes to be used for a specific model, and they focus on the comparison of information criteria across models with different numbers of classes but the same indicator variables (Ruto et al., 2007; Scarpa and Thiene, 2005). In addition to comparing information criteria, it is also important to consider the conclusions that can be drawn from the data. With many classes, it will be difficult to draw meaningful conclusions about *wtp* because there will be little significance in the resulting regressions due to a much smaller number of observations per class. The information criterion we will be using for this comparison are the Bayesian information criterion (BIC) and the Akaike information criterion (AIC). Information criteria measure the quality of a model in relation to other models using the same data. The formulas are (Scarpa and Thiene, 2005):

$$AIC = -2lnL + 2D$$

$$BIC = -2lnL + Dln(N)$$

Where lnL is the log likelihood of the model at convergence, D is the number of estimated parameters and N is the sample size. The differences between the two calculations is how they choose to penalize the number of estimated parameters. The AIC chooses a constant penalty factor of two while the BIC uses a penalty factor that takes into consideration the size of the sample. Lower information criterion values indicate that the model is a better fit for the data. Using these calculations, it is possible to compare

LCA models with the same indicator variables, but a different number of classes. The results of this are shown in Figure 2.

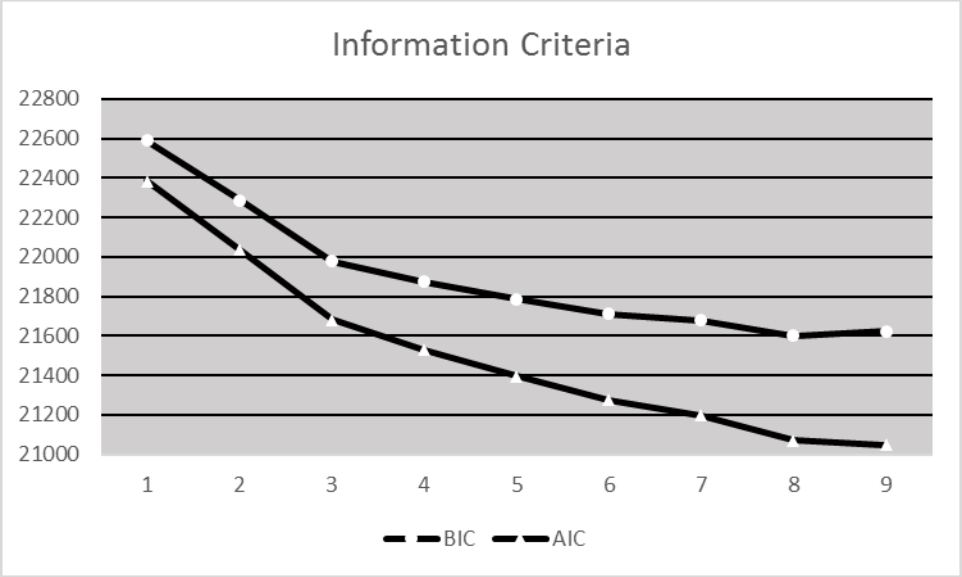

Figure 2: LCA information criteria for different number of classes determined from experimental data

Figure 2 shows the change in the information criteria calculations as the number of classes input into LCA is changed. Both methods show a decrease as the number of classes is increased, indicating a better model fit. For BIC, the calculation reaches its lowest level at eight total classes, while AIC continues to decrease for the number of classes shown. Information from past research indicates that the AIC tends to over-estimate the number of classes, while the BIC does not; additionally, in smaller sample sizes the BIC could choose too few classes (Mclachlan & Peel, 2000). In addition to using information criterion to determine the number of classes used in LCA, it is also important to consider what parameter estimates will explain when increasing model sizes.

Models with a larger number of classes will be unable to reject the null hypothesis for parameter estimates, and will make it difficult to draw conclusions. The analyses performed was completed using four latent classes because it offered the largest information criteria decreases, as seen in Figure 2. Figure 2 shows that the largest improvement in information criterion values can be had by adding up to four classes, while adding past four classes results in marginal improvements of less than 100 in BIC, which Dean and Raftery (2010) identified as insignificant.

Table 7: LCA cluster response characteristics

	Four Clusters			
	Conscious Shoppers	**Community Supporters**	**Tax Haters**	**Dispassionate Shoppers**
Cluster Size	32%	27%	22%	19%
N	396	340	280	232
	Respondent Origin Within Cluster			
Delaware	64%	53%	44%	64%
Pennsylvania	16%	19%	33%	17%
Maryland	20%	28%	23%	19%
Farmers Market	58%	45%	56%	47%
	Mean Responses (Scales of 1-5)			
inc_tax	3.22	4.40	4.93	3.23
community	4.15	4.80	4.98	3.49
size	4.46	4.61	4.99	3.49
perm	4.49	4.89	5.00	3.45
attend_fm	4.22	3.70	4.65	3.38
local_food	4.44	3.89	4.84	3.38
food_lab	4.68	3.84	4.60	3.64
organic	4.01	2.56	4.11	2.69

Note: Blue shading signifies a lower response average, while red signifies higher

Table 7 shows the results of LCA being run on the eight response variables shown in Table 3. The values shown are the averages on a Likert scale of 1-5 within each cluster that LCA determined. These results show the characteristics that each latent class has, and was used to draw conclusions from the Tobit regressions run on each class. As researchers, it is important to attempt to identify what the consumer differences are between each latent class, and as such the classes are given names based upon what the characteristics are representing. The first group is recognized as "Conscious Shoppers" because they value more highly the positive characteristics of farmland preservation while also being willing to pay for them; and, they actively participate in purchasing or sourcing identity-preserved produce. The second group of consumers is recognized as "Community Supporters" because they have the highest values for the variables associated with benefits for their community and smaller-sized farms. However, Community Supporters do not seem to participate in actions, such as purchasing local food, as heavily as their other preferences would suggest. The third group determined through LCA is the "Tax Haters". This group is the most averse to increases in taxes, but they are the largest supporters of the benefits within the community. Furthermore, they seem to be the most concerned with opportunities for identity-preserved produce. The final group are "Dispassionate Shoppers", this group feels the least strong about ensuring support within the community and for farmers and they are the least concerned with the source of the foods they purchase. They are also the second highest supporters of farmland preservation increasing taxes. These group names are chosen by the author to represent the perceived characteristics of each group, as is common with LCA models (Ruto et al., 2007; Scarpa and Thiene, 2005).

Table 8: Tobit regression performed across LCA clusters

Four Cluster Regressions					
	Dependent variable:				
	wtp				
	No Grouping	Conscious Shoppers	Community Supporters	Tax Haters	Dispassionate Shoppers
	(1)	(2)	(3)	(4)	(5)
wtp_pf	2.38***	2.46***	2.23***	2.61***	2.38***
	(0.17)	(0.28)	(0.31)	(0.41)	(0.38)
wtp_md	1.90***	1.79***	1.89***	1.95***	2.15***
	(0.16)	(0.26)	(0.31)	(0.41)	(0.39)
wtp_pfmd	3.00***	2.93***	3.07***	2.88***	3.28***
	(0.17)	(0.29)	(0.34)	(0.41)	(0.42)
cecil	-0.26	-0.86***	-0.72*	1.02***	0.31
	(0.19)	(0.31)	(0.39)	(0.38)	(0.40)
chester	0.12	0.61	-0.09	1.51***	-0.05
	(0.24)	(0.96)	(0.39)	(0.51)	(0.48)
farmers_market	0.54***	0.15	0.15	1.89***	0.03
	(0.16)	(0.28)	(0.36)	(0.41)	(0.34)
cecil:farmers_market	0.15	0.67	1.16**	-1.39**	-0.53
	(0.28)	(0.52)	(0.51)	(0.57)	(0.81)
chester:farmers_market	-0.93***	-1.48	-0.74	-2.73***	-0.05
	(0.33)	(1.01)	(0.55)	(0.76)	(0.65)
constant	3.89***	4.51***	4.18***	2.78***	3.77***
	(0.17)	(0.27)	(0.36)	(0.38)	(0.36)
Observations	1,312	396	340	280	232
Log Likelihood	-2,823.82	-836.88	-714.91	-625.06	-489.50

Akaike Inf. Crit.	5,667.63	1,693.76	1,449.81	1,270.12	1000.00
Bayesian Inf. Crit.	5,719.43	1,733.57	1,488.10	1,306.47	1,033.47

Note: *p<0.1; **p<0.05; ***p<0.01

The regression coefficients represent the effects on the observed dependent variable in dollar values. Because the regression is censored, it is possible that unobserved dependent variables could occur outside of the censored ranges, which would represent a participant's true value (Lusk and Shogren Ch.6 P.96)

The clusters resulting from the LCA model were used in combination with a Tobit regression model to draw coefficient values from within each class. The results for a model with no time-to-purchase or income considerations can be seen in Table 8. In this model, and all other LCA regression models in this research, it is important to note the sample sizes and the makeup of the respondent origin in Table 7 when considering the significance values for coefficients. Significance levels may change depending upon the sample sizes within each cluster, this is the nature of breaking the entire sample down into smaller groups. In this analysis, wtp premiums are significant at the 1% level for a preserved farm label, a Mar-Del watermelon association label, and the combination of labels, across all latent classes. The Conscious Shoppers grouping gains significance for *cecil* at the 1% level but is unable to reject the null hypothesis for *farmers_market* and the interaction of *chester:farmers_market* compared to the model with no grouping. The Community Supporters group can reject the null hypothesis at the 10% level for *cecil*, and the 5% level for the interaction of *cecil:farmers_market* while also no longer having significant estimates for *farmers_market* and the interaction of *chester:farmers_market* compared to the model with no grouping. The Tax Haters grouping has the most different results from no grouping. All of the coefficients are significant at the 1% level with the exception of the interaction *chester:farmers_market* which is significant at the 5% level. In addition to the differences in significance, the coefficient values for the constant and the location and interaction treatments are all larger than other models. Interestingly, this model also suggests that participants who fall within the Tax Haters group and who participated in Delaware parks, would pay lower prices than those from Pennsylvania or Maryland parks who are also in the Tax Haters group. The final model with the group of

Dispassionate Shoppers is unable to reject the null hypothesis for coefficients other than WTP treatments and the constant.

Table 9: Tobit regression performed across LCA clusters with time-to-purchase and income considerations

Four Cluster Regression with Time-to-Purchase and Income Adjustment

	Dependent variable:				
	wtp				
	No Grouping (1)	Conscious Shoppers (2)	Community Supporters (3)	Tax Haters (4)	Dispassionate Shoppers (5)
wtp_pf	2.38***	2.43***	2.20***	2.68***	2.40***
	(0.17)	(0.27)	(0.31)	(0.40)	(0.36)
wtp_md	1.91***	1.77***	1.90***	2.03***	2.17***
	(0.16)	(0.26)	(0.31)	(0.40)	(0.38)
wtp_pfmd	3.00***	2.89***	3.11***	2.94***	3.31***
	(0.17)	(0.28)	(0.34)	(0.39)	(0.40)
cecil	-0.43**	-1.27***	-0.53	0.77*	-0.43
	(0.19)	(0.32)	(0.42)	(0.42)	(0.43)
chester	-0.05	1.14	0.01	1.13**	-0.22
	(0.24)	(0.89)	(0.48)	(0.54)	(0.44)
farmers_market	0.43**	0.00	-0.30	1.98***	-0.02
	(0.17)	(0.28)	(0.43)	(0.43)	(0.33)
inc_midpoint	0.07	0.07	0.87***	-0.02	0.10
	(0.06)	(0.11)	(0.24)	(0.11)	(0.12)
household_pur	-0.02	-0.04	0.01	-0.08*	-0.10*
	(0.03)	(0.04)	(0.04)	(0.05)	(0.05)
soonest: 1-3 days	-0.16	0.47	-0.76*	-0.54	0.25
	(0.21)	(0.32)	(0.42)	(0.45)	(0.85)
soonest: 1 week	0.26	1.56***	-1.07**	-0.20	0.35
	(0.22)	(0.34)	(0.47)	(0.51)	(0.91)

soonest: 2-3 weeks	0.16	1.03***	-0.29	-1.46***	0.49
	(0.26)	(0.37)	(0.55)	(0.53)	(0.93)
soonest: 1 month	-0.79***	-0.59	-0.27	-1.98***	-0.72
	(0.30)	(0.50)	(0.62)	(0.75)	(0.98)
soonest: > 1 month	-1.10***	1.63***	-2.08***	-2.25***	-1.46
	(0.29)	(0.61)	(0.53)	(0.77)	(0.95)
cecil:farmers_market	0.43	1.60***	1.28**	-1.06*	-0.10
	(0.29)	(0.61)	(0.60)	(0.61)	(0.86)
chester:farmers_market	-0.58*	-1.95**	-0.85	-1.92**	-0.06
	(0.32)	(0.92)	(0.62)	(0.75)	(0.64)
Constant	4.09***	3.88***	4.42***	3.68***	4.14***
	(0.28)	(0.48)	(0.59)	(0.60)	(1.03)
Observations	1,260	388	320	264	228
Log Likelihood	-2,680.42	-792.73	-660.95	-572.83	-468.07
Akaike Inf. Crit.	5,394.85	1,619.46	1,355.90	1,179.66	970.15
Bayesian Inf. Crit.	5,482.20	1,686.80	1,419.96	1,240.45	1,028.45

Note: *p<0.1; **p<0.05; ***p<0.01

Table 9 shows the Tobit regression run with considerations for time-to-purchase and income characteristics between latent classes. In these models, once again, all premiums for labeling and the constant are robust. Additionally, the LCA groups are able to reject the null hypothesis for parameter estimates that were unable to reject the null in the model with no grouping. Some notable results are that conscious shoppers show significant positive parameter estimates for the *soonest* variable at 1 week, 2-3 weeks, and > 1 month. All other groups with significance for those variables have negative parameter estimates, which means that only the conscious shoppers will have increased valuation for watermelons if they plan to buy one further in the future. These reason for this result is not easily inferred, and implies that there is more to be known about what the *soonest* variable may actually mean for consumers. Furthermore, the coefficient for income in this model can be rejected at the 1% level only within the community supporters group. Finally, the null hypothesis for *household_pur* can be rejected for cost focused and dispassionate shoppers at the 10% level.

The differences between parameter estimates across classes can provide insight into which consumer groups are good targets for a farmland preservation label. The most important thing to examine is whether there are differences in the *wtp* values and the premiums that consumers would pay between groups. The constants for Conscious Shoppers, Community Supporters, Cost Focused, and Dispassionate Shoppers represent WTP for an unlabeled Delaware watermelon for participants in a park at $3.88, $4.42, $3.68, and $4.14 respectively. These point estimates indicate that the Community Supporters have the highest valuation while the Cost focused group have the lowest valuation. Both groups place a high value on the community supporting attributes, such as the size of farm supported and ensuring preservation permanence. However, these values do not seem to be represented in the Cost Focused groups willingness to pay. This

may be explained by the fact that the Community Supporters group has a larger percentage of participants from Delaware, while the Cost focused group has the lowest percentage as seen in Table 7. This discrepancy in cluster membership is important to note when further examining the results from the Tobit regression.

Examining the premiums for specific labeling across LCA clusters may be the most important results from this data analysis. In the results, the highest premiums for a farmland preservation label come from the Cost Focused group of consumers at $2.68, while the Community Supporters are willing to pay the lowest premiums at $2.20. However, the combined *wtp_pfmd* tells a different story, Dispassionate Shoppers have the highest valuation for a combined farmland preservation and Mar-Del Watermelon Association label at $3.31, while Conscious Shoppers have the lowest at $2.89. Comparing this data with the respondent origin data yields some unexpected results. The cluster that had the highest WTP for a Delaware farmland preservation label, is the cluster that had the smallest percentage of its participants from the state of Delaware. Furthermore, the Conscious Shoppers, who have the largest percentage of Delaware consumers, had the lowest willingness to pay for the combination of a Delaware farmland preservation and Mar-Del Watermelon Association label. This suggests that the locational characteristics within a group may not be a strong influence in determining *wtp* for certain labeling treatments. Furthermore, it suggests that the group to focus on reaching with a farmland preservation label is the Cost Focused group, whose value for the *attend_fm* Likert Scale survey response was the highest across clusters. This suggests that using a farmland preservation label at farmers' markets may result in targeting consumers who are willing to pay more for farmland preservation produce.

In addition to point estimate differences, there are significance differences across the LCA clusters. Conscious Shoppers parameter estimates for *cecil* suggests that

consumers in this group from Maryland pay $1.27 less for watermelons, significant at the 1% level. The Cost Focused group is willing to pay $0.77 more if the participants were from Chester, significant at the 10% level. In addition to this, the Cost Focused grouping is the only model which is also significant for the *chester* variable. Participants from Chester County were willing to pay $1.13 more for a watermelon, significant at the 5% level. The Cost Focused group is also the only LCA cluster with significance for the *farmers_market* variable, indicating that participants who fall in this group would pay $1.98 more for a watermelon at a farmer's market. The LCA model also suggests that *inc_midpoint* coefficient can reject the null hypothesis within the Community Supporters group at the 1% level. This suggests that the group will pay $0.87 more for every $100,000 of income. Interestingly, *household_pur* is significant at the 10% level for both the Cost Focused group and the Dispassionate Shoppers. The point estimate suggest that for every watermelon the households consume in a month, their *wtp* decreases by $0.08 and $.10 respectively. This means that households who consume more watermelons seem to value the product slightly less which may signify diminishing returns on watermelon consumption.

Some of the largest differences between classes are seen through the *soonest* variable, which is included in the models to examine whether consumers time-to-purchase characteristics influenced their *wtp*. Analysis with the *soonest* variable may give insight into which consumers were in the market for a watermelon on the day the experiment was conducted. Consumers who were not in the market would likely be purchasing a watermelon further in the future. All but the Dispassionate Shoppers group have significant results for one or more levels of the *soonest* variable. The first group, Conscious Shoppers, had significance at the 1% level for *soonest:1 week*, *soonest:2-3 weeks*, and *soonest>1 month*. The point estimates suggest that consumers would pay

$1.53 more, $1.02 more, and $1.63 more respectively. Positive coefficients for these variables are interesting because they counter the results from the model without groupings which were only negative coefficients. Additionally, the group of Community Supporters has significance at the 10% level for *soonest:1-3 days,* significance at the 5% level for *soonest:1 week,* and significance at the 1% level for *soonest:>1month*. The point estimates signify the consumer would pay $0.76 less, $1.07 less, and $2.08 less respectively. Here, a trend can once again be seen for the further out a consumer plans to purchase a watermelon, the lower they value a watermelon at the present time. Finally, looking at the Cost Focused group, coefficients for *soonest:2-3 weeks, soonest:1 month,* and *soonest:>1month* are significant at the 1% level. The point estimates signify the consumers would pay $1.46 less, $1.98 less, and $2.25 less respectively. This group also shows the trend seen in the model with Community Supporters: the further out the consumer plans on purchasing a watermelon, the lower they value a watermelon presently. Intuitively, it seems possible that those who plan on purchasing a watermelon further away from the present time have some bias towards purchasing a watermelon now, and therefore would result in lower *wtp* values. Higher *wtp* values for the *soonest* variable, as seen with Conscious Shoppers, are not easily interpreted presently, however there may be some insight when potential consumer bias is explored later in this chapter.

The last differences examined between the LCA clusters is the interaction coefficients of *cecil:farmers_market* and *chester:farmers_market*. In the model with no grouping, only the interaction of *chester:farmers_market* had a coefficient which could reject the null hypothesis at the 10% level. With the LCA clusters, there is differing levels of significance for all groups except for Dispassionate Shoppers. The Conscious Shoppers group coefficients suggest that they would pay $1.60 more at a Cecil farmers' market at the 1% level, and $1.95 less at the 5% level in a Chester farmers' market. The

Community Supporters model only held 5% significance for the Cecil farmer's market interaction, signifying that consumers would pay $1.28 more. The Cost Focused grouping signified that consumers would pay $1.06 less in a Cecil farmers' market and $1.92 less in a Chester farmers' market; significant at the 10% level and 5% level respectively. These values are interesting because they can potentially help to target consumers in different areas. This may suggest that selling in a Cecil farmers market could be a better option if a famer can only choose to sell in one of the two locations. However, the negative coefficients for Community Supporters and Dispassionate Shoppers signify that farmers' markets in Delaware are still the best places to target consumers when selling Delaware watermelons.

When examining premiums for treatments, it is also important to try to understand why those premiums exist. The focus of this research is the premiums that consumers will pay for labeling which signifies that a watermelon came from preserved farmland. The premiums that consumers pay for this label could be derived from several different reasons. The most obvious of these reasons is that they know they are supporting farmland preservation, and the farmers who are enrolled in these programs. Economists call this a non-use value, because the consumers find value in something that they are not directly using themselves. However, it is also possible that consumers are valuing the label because they themselves would benefit from preserving farmland; either through proximity to their property or because they would benefit from a reduction in developable land. This type of value would be called quasi-use value, because the consumers will not directly consume preserved farmlands, but they do benefit from supporting them. The final valuation that could contribute to the farmland preservation label premium is a use value. This value could come from consumers who like the idea of consuming produce that comes from preserved farmland because its "local" or "fresh". It could also come

from farmers who are enrolled, or plan to be enrolled, in the program. The premium would represent a use value for them because they value their ability to enroll in the program in the future. It is likely that the combination of these values forms the premium that consumers are willing to pay. If it were possible to examine the magnitude of these values within the WTP premiums, it would provide insight into successfully reaching certain consumer groups.

Overall, the LCA clusters in combination with a Tobit regression, further support that consumers are willing to pay premiums for a farmland preservation label. They also reveal that it may be possible to target higher paying consumer groups by providing the label specifically in farmers' markets, and that farmers' markets in Delaware offer larger benefits than farmers' markets in Chester or Cecil county.

4.2.3 Qualitative Results

In addition to the results from quantitative analysis techniques, it is also relevant to examine what the actual stakeholders, the farmers, have to say about the results that were drawn from Tobit regressions and LCA in combination. There were three organizations that were contacted to gather opinions on what stakeholders in the market thought about the results of the initial data analysis. The three groups were (1) Delaware Department of Agriculture, (2) the Mar-Del Watermelon Association, and (3) the Fruit and Vegetable Growers Association of Delaware. The groups were contacted in March of 2017. Discussions were held with at least one member from all three groups through email or in person to learn about their thoughts on the analysis results. Responses have been organized in Table 10. All interactions were cleared by an institutional review board in order to ensure that they did not fall under experimental procedures.

Table 10: Stakeholders reactions to data analysis

Organization Affiliation	Summarization of Response to Research
Delaware Department of Agriculture	• Unless consumer is educated, most will not notice or understand the meaning of the preserved farm label • There should be a consideration of distribution and labor costs for applying stickers to produce • Billboards, flyers, brochures, and advertising could do well to build brand initiative
Mar-Del Watermelon Association	• Foresee difficulty with getting products into retail spaces because of space availability in retail • Easier to acknowledge and sell farmland preservation labeling in farmer's markets • Did not believe that profits would be passed on to the farmers by the brokers • Money would need to be spent to educate consumers on what the label means
The Fruit and Vegetable Growers Association of Delaware	• Believed the main value in farmland preservation label was for direct to market sales (i.e. farmers' markets) • Believed that wholesale markets would not care about the farmland preservation label • There was concern about the amount of education that consumers would need to understand the label; but, in a farmers' market this information could be more easily conveyed

The qualitative results provide a contrast to the quantitative results derived from consumers purchasing characteristics. The qualitative data attempt to represent the farmers who would be most impacted by a farmland preservation label. All three groups are stakeholders in the implementation of a Delaware farmland preservation label, and their view of the current consumer landscape is important to understand where the quantitative data may be lacking.

The responses reveal several concerns regarding the benefits of a farmland preservation label. The first is that the premiums that consumers are willing to pay would

not be seen by the farmers in wholesale markets. Within this response, there were three main reasons stated: (1) retail stores did not have enough space to place another separate product on the floor, (2) the retailers would not purchase watermelons being sold at an increased price because of the label, or they would purchase them and sell them at a premium but not pass on the resulting benefit to the original farmers, and (3) wholesale markets would not care about the farmland preservation label. An understanding of the supply chain of watermelons to consumers is important. In a retail setting the watermelons usually travel from the farmers to an initial broker who advises on pricing. From this point, the broker sends the watermelons to a distributor who then sends it to the retailer. The chain of people who work with the watermelons is longer than one might initially think, and it is reasonable to believe that at each step some of the premium for a farmland preservation label would be reallocated away from the farmer. With this in mind, the first two concerns are valid and they are not touched upon in the data analysis. From an economics standpoint, it would not make sense for wholesalers to limit their products if they provide the opportunity to make more money than those currently being sold, however, it is possible that these benefits will not be passed on to the farmers because the retailers will have incentive to purchase the produce at a price that maximizes their own benefit. The third concern, about wholesale markets "caring", would boil down to if the economic incentives would encourage the sale of produce with farmland preservation labeling, and the quantitative analysis performed earlier provides evidence that markets should "care" because of the premiums that can be seen for the label.

The second common response from the three different groups, is that consumers need to be educated to understand the meaning of a farmland preservation label. In the experiment, participants were provided with a standardized definition of farmland preservation and completed their responses following receiving this information.

Stakeholders believe that consumer education is important to producing the premiums for a farmland preservation label, and two main research questions stem from this stakeholder response: (1) how do consumers interact with labels in retail settings? And (2) how could education occur in retail settings?

The way consumers interact with labels is essential to determining how effective a new label may be. Logically, it is possible to imagine a tree of outcomes from the moment a person sees the farmland preservation label. The first outcome is that they ignore it and continue shopping as they normally would. However, if the consumer decides to read the label further and recognize that it signifies the produce comes from preserved farmland, two more outcomes are possible: they either know what farmland preservation is or they do not. Consumers who understand farmland preservation are likely to exhibit similar response data as was determined in this research. Consumers who do not know farmland preservation are then likely two exhibit one of two other behaviors: ignore the label that they do not know and continue shopping as usual, or take an opportunity to educate themselves on farmland preservation. This is a very simplified idea of what consumer decision making looks like, however it provides insight into what different scenarios may occur when a consumer is deciding to purchase a product. This research focuses on consumers who have a basic understanding of farmland preservation, which means that without outside education, only the group of consumers who already have knowledge of the policy or those who take time during their shopping ritual to examine and keep themselves informed on all labels, will exhibit purchasing response patterns like those seen in this experiment. This then leads to the second question pertaining to how education could occur in a retail setting.

Using the simple consumer decision tree example, education in a retail setting could occur at one of two locations, prior to the consumer examining the product or after

they have seen a label that they do not understand. The latter relies upon the consumer educating themselves, but the former provides opportunities for stakeholders to teach consumers what farmland preservation is prior to making their purchase decisions. Education opportunities such as this can be taken advantage of in a farmers' market, where the seller is more likely to interact with their consumers; however, in a commercial retail setting this is a more difficult task. Ideally, consumers would be educated through outreach programs expressing the benefits of farmland preservation, but this would pose more questions, such as who pays for the outreach or would the outreach offset the benefits that the farmland preservation label provides to stakeholders. These concerns were expressed by representatives from the Delaware Department of Agriculture and the Mar-Del Watermelon Association.

There were also qualitative responses which were in line with the results from the quantitative research. The members from the Fruit and Vegetable Growers Association of Delaware and the Mar-Del Watermelon Association believe that the main value of a farmland preservation label would be for direct to market sales. The data supports the statement, and suggests that there are premiums for produce sold in farmers' markets. In addition to this, roadside stands would likely offer the best opportunity for farmers to reach many consumers and to interact with them at the point of sale. Roadside stands provide the opportunity to make sales outside of a specific time frame, which is how most farmers' markets are set up. In a roadside stand, it is likely that the farmland preservation label premium would be recognized easily because of the opportunity to educate customers at the point of sale. If this benefit is taken advantage of, the concerns with whether or not the premiums are recognized by the farmers could be mitigated because there are less intermediaries between grower and consumer.

The quantitative data raise some questions that are not readily evident when looking at the Tobit regression results, and these concerns are important to a holistic understanding of the data. The two main problems for a farmland preservation label seem to be ensuring the benefits are passed onto the farmers to account for their costs of producing and distributing produce with a farmland preservation label, and educating consumers so that the premiums seen in this research will be present in an actual retail scenario. If these issues can be addressed though policy or outreach, then a farmland preservation label would have a greater chance to benefit farmers in the current economic landscape.

4.3 Limitations to Study

This section will touch upon two main topics. The first is concerns that may arise from the experiment procedure and data collection. Specifically, the issue of sample bias because of the participant selection method. The second addresses the areas in which this study can be improved upon, or how these results can be tested further. Identifying the limitations of research is paramount to a complete understanding of the topic.

The results of this research suggest that consumers will pay a premium for produce that is labeled to have been produced on preserved farmland. However, there may be concerns with potential sample bias. The nature of the participant selection strategy means that the sample is not truly random. Participants were given the opportunity to walk up to the experiment tent in order to participate, while others chose to walk by the experiment tent and not participate. This potentially poses self-selection bias. In addition to this, it is possible that the selection strategy oversamples participants who are not in the market for watermelon, specifically for those who participated in a park. It is reasonable to assume that not everyone who completed the experiment and survey was

planning on purchasing a watermelon on that day, and therefore this bias may have been influencing their responses. Self-selection bias would tend to result in participants who are more interested in watermelons, and may have resulted in higher WTP values for the produce. Conversely, if it is true that those who participated were not in the market for watermelons on that day, it is likely that their WTP values would tend to be lower.

To combat the effects that these types of bias may have caused, the *soonest* variable was included in the final Tobit regression model. This variable was intended to signify whether consumers held bias towards watermelon through this hypothesis: if a consumer did not plan on purchasing a watermelon for a longer time, it could signify that they did not want a watermelon today, and therefore would pay less. This hypothesis seemed to hold true in the model before LCA clusters were introduced. With the incorporation of LCA clusters, it was apparent that the hypothesis might not hold true. The participants in the Community Supporters group and the Cost Focused group had negative coefficient values for their response to the *soonest* variable. Additionally, the longer they planned to wait to purchase a watermelon, the less they were willing to pay for a watermelon. This supports the hypothesis that some consumers may not have been in the market for a watermelon. However, the participants who were placed in the Conscious Shoppers group had positive coefficients for the *soonest* variable. A possible explanation for this discrepancy may arise if participants carried bias into their survey responses. The survey was completed after participants knew if they were getting a watermelon from the experiment or not. It is possible that those who valued a watermelon more highly and therefore wrote down higher *wtp* values, were more likely to have received a watermelon in the initial bidding procedure. If the participants received a watermelon during the experiment, it is possible they allowed the new watermelon to influence their response to the *soonest* variable question which asked:

"Before starting this experiment, when was the soonest you were planning on purchasing a watermelon?". Even though the question asks them to state their behavior prior to the experiment, it is possible the participants were allowing their recent acquisition of a watermelon to influence their response on how soon they were planning to purchase one. If this assumption is considered, it could mean that conscious shoppers are the best group to target for watermelon sales because they were placing higher WTP values down, and therefore have a greater preference for watermelon consumption. However, targeting is difficult when considering latent classes. By their nature, latent classes are unobservable, and therefore impossible to specifically target. In this research, they are determined by examining consumer beliefs and shopping habits, which are not observable characteristics. The best place to recognize increased valuation of watermelons would be through sales at farmer's markets and possibly roadside stands, because of the ability to interact better with the consumers at these locations. Consideration of bias concerns is important in the studies context, but they are a result of performing an experiment in the field in this manner. Obtaining a more random sample from the consumers at each location could have improved the results of this research.

Although the results contribute to the current farmland preservation literature, it also raises some new questions which could be further explored. As stated earlier, the success of a farmland preservation label relies upon consumer education and understanding how consumers progress through the purchasing process. Expanding this study to an actual retail setting could be beneficial to answering both questions. For example, a study which incorporates the label onto actual produce in a super market or at a farmers' market, may be able to explore different consumer education mechanisms. Furthermore, this progression could open the door to research on how consumers interact with a label that some do not know. Research in this area would expand upon the

concerns that the stakeholders had, and potentially draw stronger support from farmers to use a farmland preservation label.

Chapter 5

CONCLUSIONS

Farmland preservation programs provide a tool for the government to support farmers in areas where agriculture lands could be more profitable in other uses. Past research has shown that consumers are willing to pay premiums for local foods that are based in values similar to those that farmland preservation provides. The overlapping values suggest that products from preserved farmland could entice consumers to pay more. This research expanded upon the farmland preservation literature by attempting to identify the actual values that consumers hold for produce from preserved farms. The ability to capitalize on these premiums through a label could: incentivize more farmers to enroll in farmland preservation, supplement the budget of conservation easement programs, and provide benefits to consumers who value preservation. This research set out to determine if consumers would be willing to pay more for the knowledge that the product they are buying comes from preserved farmland through a *Delaware Preserved Farm* label.

The initial Tobit regression model provided findings in line with the hypotheses proposed at the beginning of the research. The results suggest that consumers would pay $2.38 more for a watermelon with a farmland preservation label and $3.00 more for a combination of a farmland preservation label and a Mar-Del watermelon association label, which supports the first hypothesis. Additionally, the model also suggests that consumers in Cecil county will pay less for a watermelon, and that consumers in Chester farmer's market would pay less as well. Both findings support the second hypothesis,

even though hypothesis testing was unable to. Finally, there is also support for the hypothesis that consumers in farmers' markets will pay more for produce. This data, suggests that farmers' markets, and possibly roadside stands, are the best opportunity to reach consumers who are willing to pay more, but the introduction of a farmland preservation label could increase willingness to pay regardless of the location.

The introduction of LCA to the Tobit regression model provided discrete consumer groups to the analysis based upon purchasing habits and beliefs pertaining to farmland preservation. The results of LCA suggest that selling watermelons in Farmers' Markets, is still the best opportunity to capitalize on both farmland preservation premiums and premiums from farmers' markets. These results could be motivated by their response characteristics: they had the highest response averages for supporting their community, supporting small and medium sized farms, and ensuring preservation permanence. However, it is important to note that all four consumer grouping models resulted in premiums for farmland preservation labels, which further supports the first hypothesis of this research. These models also suggest that, within the sample used, there are differences in how people value watermelons depending on how far in the future they were planning to purchase them next. Consumers in the Conscious shoppers group valued watermelons more highly if they planned on purchasing one further in the future, while consumers in both the Community Supporters group and the Cost Focused group valued watermelons less.

This study does have some limitations. Potential stakeholders in a farmland preservation label have concerns about the implementation. It is possible that the premiums that consumers are willing to pay will not be passed on to the farmers because of the nature of the relationship between them and the wholesalers. Additionally, consumers might need to have a basic level of education on farmland preservation for the

label premiums to be realized. An expansion of this study could examine how consumers interact with a farmland preservation label in a retail setting with an actual sticker on the produce. Implementing different education treatments could create a further understanding of how a farmland preservation label should be implemented. In addition to this, further research could examine education campaigns, how they would be funded, and whether the resulting premiums from those campaigns would offset the costs. Observing consumer interactions in a natural retail settings would contrast the formal experimental procedures used in this study.

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Appendix A

EXPERIMENT RESOURCES

A.1 Survey

1. How much do you think one watermelon of the size displayed would cost at a grocery store?

$_____

2. How many watermelons does your household buy in one month during the summer?

_____

3. Before starting this experiment, when was the **soonest** you were planning on purchasing a watermelon?

_____ Today
_____ Within 1 – 3 days
_____Within one week
_____ Within 2 – 3 weeks
_____ Within one month
_____ More than a month from now

4. Before today, how familiar were you with:

	Not at all Familiar				Very Familiar
Preserved Farms	1	2	3	4	5
Mar-Del	1	2	3	4	5

5. Rate how well each type of watermelon meets your perception of what it means to be "**local"**:

Definitely Not Local		Definitely Local

Preserved Farmland	1	2	3	4	5
Mar-Del	1	2	3	4	5
Preserved Farmland and Mar-Del	1	2	3	4	5
No Label	1	2	3	4	5

6. Rate each type of watermelon in terms of how you'd expect them to **taste:**

	Very Bad				Very Good
Preserved Farmland	1	2	3	4	5
Mar-Del	1	2	3	4	5
Preserved Farmland and Mar-Del	1	2	3	4	5
No Label	1	2	3	4	5

7. In terms of **food safety**, rate each watermelon in terms of how **safe** you'd expect it to be:

	Very Unsafe				Very Safe
Preserved Farmland	1	2	3	4	5
Mar-Del	1	2	3	4	5
Preserved Farmland and Mar-Del	1	2	3	4	5
No Label	1	2	3	4	5

8. Please rank the importance **to you** of there being preserved farms in the following states.

	Not Important		Moderately Important		Very Important

Maryland	1	2	3	4	5
Delaware	1	2	3	4	5
Pennsylvania	1	2	3	4	5

9. How important is it to you that farmland preservation…

	Not at all Important		Moderately Important		Very Important
Does not increase taxes	1	2	3	4	5
Has widespread support in the community	1	2	3	4	5
Focuses on smaller/medium sized farms	1	2	3	4	5
Is guaranteed to be permanent	1	2	3	4	5

10. How often do you:

	Never		Sometimes		Always
Go to farmer's markets	1	2	3	4	5
Try to buy local foods	1	2	3	4	5
Read food labels	1	2	3	4	5
Try to buy organic foods	1	2	3	4	5

Consumer Characteristics

Remember this information will remain <u>confidential</u> and is important for the study.

1. What is your gender?

_____ Male _____ Female

2. In what year were you born? _____

3. What ethnicity best describes you?

_____ White _____ Hispanic/Latino _____ Black/African American

_____ Asian _____ Other

4. What is your highest level of completed education?

_____ Less than High School _____ Bachelor's degree

_____ High School _____ Graduate or professional degree

_____ Some College/Associate's (2 year degree)

5. How many children under 18 are in your household? _____

6. Please state your home address zip code _____

7. What is your annual household income?

_____ Less than $24,999 _____ $75,000 to $99,999 _____ $250,000 to $299,999

_____ $25,000 to $34,999 _____ $100,000 to $149,999 _____ $300,000 to $349,999

_____ $35,000 to $49,999 _____ $150,000 to $199,999 _____ $350,000 to $399,999

_____ $50,000 to $74,999 _____ $200,000 to $249,999 _____ $400,000 or above

A.2 Script

Hi I'm ____ and this is ____ and we are graduate students at the University of Delaware. We are conducting an economic study on consumer demand for watermelons in which you can earn up to $12 and potentially go home with a watermelon! Participation is

voluntary. Participating includes writing down four numbers and completing a brief survey. It shouldn't take more than 10 minutes of your time. You need to be over 18 to participate and your responses will be anonymous and kept confidential. Are you willing to help us with our study?

If No:

Have a nice day.

<u>If Yes:</u>

Please check the "Yes" on this sheet to indicate that you have been informed of the study procedures and are willing to participate in our study.
Indicate area on the back of the bid sheet]

<u>A card will say:</u>

Watermelons from the **<u>Mar-Del Watermelon Association</u>** are grown in Maryland or Delaware.

What is **<u>preserved farmland</u>**?

- A **voluntary** arrangement between farmers and the government
- **One-time payment** to farmers to **never develop** their land into houses and businesses
- The land still **belongs to the farmer**

<u>Preserved farmland</u> is a voluntary, legal agreement between a farmer and the government. In exchange for a one-time payment from the government, the contract restricts use of the land to agricultural production, ensuring that productive farmland remains available for farming forever. In this contract, the land still belongs to the farmer, but the easement prohibits any future non-agricultural development by landowners.

Hand them the card

This definition card will provide you with some information on preserved farmland and the MarDel Watermelon Association, two terms we would like you to know for this experiment. I will give you a moment to read the card, which you can hold onto throughout the experiment to help you understand the terms. Note that watermelons from the Mar-Del Watermelon Association are grown in Maryland and Delaware. Preserved farmland is a voluntary arrangement between a farmer and the government. The

government gives farmers a one-time payment to never develop their land into houses or businesses, but the land still belongs to the farmer. If you have questions, a more detailed explanation of preserved farmland is provided at the bottom of the definition card.

For the first part of our study, we will be asking you to state the maximum amount that you would be willing to pay, between $0 and $12, for four differently labeled watermelons. We do not want you to write down how much you think they cost, or the average amount you'd pay for them. You will be telling us this maximum amount for four watermelons, although there is only the chance of receiving one watermelon maximum. Therefore, you don't need to split the $12 among the four watermelons, you can bid up to $12 on each watermelon. Do not bid more than $12, as this is the maximum amount we will be giving you towards the watermelons. The watermelon you could potentially receive will be revealed in one of these envelopes. You will get to randomly draw one of these envelopes. In the envelopes there is a paper indicating one of the watermelon labels, and a price. If the price from the envelope is higher than your personal amount that you're willing to pay for that watermelon, I will pay you $12 and you will not receive the watermelon. If the price from the envelope is lower than your personal amount, then you will receive the watermelon and whatever money is left over ($12 – the number drawn). You will be allowed to go pick the watermelon yourself from the corresponding labeled bin behind us. Note that the amount you pay if you receive a watermelon is the price determined in the envelope, not your amount. The price is a random number between $0 and $12 with an equal probability of being drawn. Remember that in you receive a watermelon, we will subtract its random price from your $12.

Demonstrate what the card inside the envelope look like

Since you may end up buying a watermelon, it is very important that you enter the actual maximum amount that you would be willing to pay. Entering too high of a value could lead you to buy one at more than it is worth to you while entering a lower value could mean missing a chance to buy a whole watermelon at a price you would like. Note that the price you'd pay for a watermelon would be less than what you actually wrote down by the rules of the experiment.

Note: If we are asked to explain the differences in the watermelon, we will say:
Due to the design of the study, I cannot give you information on other attributes.

Demonstrate single watermelon

This watermelon is a size approximation of the watermelon you may receive. If you end up buying a watermelon, you will be allowed to choose it yourself from the bins behind us.

Collect bids

Now that we have your amounts for the watermelons, let's see whether you'll receive a watermelon!

Conduct random draw/Compare values

If random draw < offer:
Your amount is higher than the one in the envelope, which means you have bought this watermelon. We will pay you _____ ($12-the number drawn) and you will also receive a watermelon.

If random draw > offer:
Your amount is less than the one in the envelope, which means you did not purchase this watermelon and will receive $12 as payment for this study.

If random draw = offer:
Both amounts were the same. Since the auction requires a higher subject price number to determine purchase we will just be giving you $12.

For all after above explanations:

While we count out your money [and get your watermelon], please fill out this short survey. After the survey we will ask you to sign a receipt once we give you your money. Please note that your receipt can in no way be traced to your anonymous survey or amounts. Your survey and bids have matching ID numbers on them, but this ID number does not appear on your receipt, so that we can not match them later. You will personally place your receipt in the lockbox. As the survey is anonymous, please be sure to answer as honestly as possible.

Hand survey to the participant. Have money and receipt ready for when the survey is completed.

We will need you to sign a receipt for your payment so that we can account for our funds. Please place the receipt in the lockbox once you have completed it.

Hand over money once they have signed the receipt.

Thank you very much for participating in our survey and enjoy the rest of your day.

A.3 Definition Card

Watermelons from the **Mar-Del Watermelon Association** are grown in Maryland or Delaware.

What is **preserved farmland**?

- A **voluntary** arrangement between farmers and the government
- **One-time payment** to farmers to **never develop** their land into houses and businesses
- The land still **belongs to the farmer**

Preserved farmland is a voluntary, legal agreement between a farmer and the government. In exchange for a one-time payment from the government, the contract restricts use of the land to agricultural production, ensuring that productive farmland remains available for farming forever. In this contract, the land still belongs to the farmer, but the easement prohibits any future non-agricultural development by landowners.

Appendix B

IRB LETTER OF VERIFICATION

UNIVERSITY OF DELAWARE
RESEARCH OFFICE

210 Hullihen Hall
University of Delaware
Newark, Delaware 19716-1551
Ph: 302/831-2136
Fax: 302/831-2828

DATE: July 26, 2016

TO: Joshua Duke
FROM: University of Delaware IRB

STUDY TITLE: [915372-3] Experiments on Watermelon
IRB REFERENCE #:
SUBMISSION TYPE: Amendment/Modification

ACTION: DETERMINATION OF EXEMPT STATUS
DECISION DATE: July 26, 2016

REVIEW CATEGORY: Exemption category # *(2)*

Thank you for your submission of Amendment/Modification materials for this research study. The University of Delaware IRB has determined this project is EXEMPT FROM IRB REVIEW according to federal regulations.

We will put a copy of this correspondence on file in our office. Please remember to notify us if you make any substantial changes to the project.

If you have any questions, please contact Nicole Farnese-McFarlane at (302) 831-1119 or nicolefm@udel.edu. Please include your study title and reference number in all correspondence with this office.