THE EFFECTS OF A LOCAL LABEL CONVEYING MINIMAL ADDITIONAL INFORMATION ON CONSUMER WILLINGNESS TO PAY: A FIELD EXPERIMENT

by

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ABSTRACT

To begin to understand consumers' preferences for labels, it must be understood what consumers believe they are obtaining from the labels, and whether their perceptions deviate from what they are truly being guaranteed by a label. To study the impact of a label conveying minimal additional information on consumer willingness to pay (WTP) and perceptions, this thesis examined the impact of adding such a label on consumer WTP for a watermelon. The label conveying minimal additional information was a Mar-Del Watermelon Association label. The main information that the label conveyed was that the watermelon had been grown in either Maryland or Delaware, meaning that this label conveyed the potential for the watermelon to be local. However, consumers were told that all watermelons available to them regardless of labeling had been grown in Delaware, theoretically negating the main additional information being conveyed by the Mar-Del label.

Field experiments were conducted in eight locations with a total of 328 participants in farmer's markets and parks in Cecil County, Maryland, Chester County, Pennsylvania, New Castle County, Delaware, and Sussex County, Delaware (where a ferry terminal was used as opposed to a park). To study the impact of the Mar-Del label, changes in WTP were observed when the label was added both to no label and when added to a preserved farm label, which told participants that the watermelon had been grown on preserved farmland in Delaware. A

Becker-DeGroot-Marschak (BDM) mechanism was used to elicit WTP. Participants then completed a survey on shopping habits, demographics, perceptions of taste, safety, and locality, and perceptions of preserved farmland.

On average participants were willing to pay $1.82 more for a watermelon with the Mar-Del label compared to no label and $0.60 more for the Mar-Del label when added to the preserved farm label. When the Mar-Del label was added either to no label or the preserved farm label, consumers' expectations of taste, food safety, and belief that the watermelon was local all increased at at least the 5% level of statistical significance. Therefore, the addition of a label conveying minimal information made participants believe that the watermelon would taste better, was safer in terms of food safety, and was more likely to meet their definition of local.

Results showed that the addition of a local label, regardless of actual additional information provided, increases consumer's trust that the food product will taste better, has a higher level of food safety, and is local. This finding could have significant impact for both farmers within the Mar-Del Watermelon Association, and have a more widespread impact on farmers across the U.S. In broader applications, simply including a label, even if it does not convey significant information, could result in consumers willing to pay more for a watermelon grown at any farm across the U.S., resulting in increased profits for the farmers, and a higher trust on behalf of the consumers that their food will taste good, will be safe, and is local. It is possible these findings could apply to any food product, although further studies would be required to establish this effect.

Chapter 1

INTRODUCTION

1.1 Background

As consumers become more interested in food production practices and nutrition, food labeling has become critical in signaling various attributes of food. This can result in premiums placed on food viewed as safer, healthier, more environmentally friendly, or having some other positive social benefit. Literature has indicated that there are premiums for food labels besides mandated nutritional labels, such as labels indicating that food is organic or eco-friendly. These premiums are generated when consumers are provided with previously unknown information on the goods they are purchasing, where labeling is crucial as the attributes may be attributes that the consumer can not personally identify (credence attributes) although they still desire the attributes. However, literature remains divided and sparse on the impacts of labels that are not conveying significantly new information. This thesis examined the effects on consumer willingness to pay (WTP) for a label that was not introducing significant additional information.

The thesis specifically examined the effects of a local label that was not conveying new information concerning the food product's origin. A local label was selected as the type of label to use, as there is already widespread variation in

perceptions of what it means for food to be local. Although this study ensured that the local label used did not introduce significantly new information, the pre-existing variation in definitions for local further allowed the tested label to not introduce new information. Recent years have seen a significant increase in demand for locally produced food, leading to premiums for food advertised as local. Although there is widespread interest in local goods, there is no agreed upon definition for what makes food local. Congress defined locally produced agricultural goods in the Food, Energy, and Conservation Act of 2008 as transported less than 400 miles from the origin or produced within the same state as the final region in which the product is marketed (United States, Congress, House 2007). Despite this legal definition, there is a wide range of definitions of local used in practice that can vary based on traveling distances, political boundaries, place of residence, type of product, season, and other factors (Feldmann and Hamm 2015). Regardless of its definition, there remain premiums for local goods. Through the use of a local label conveying little significant information, this thesis studied both the impact of labels with minimal information, in addition to further exploring what local means to different consumers by asking consumers to rate how each label type aligns with their personal definitions of what it means to be local.

1.2 Objectives

This thesis studied the impacts of a local label conveying minimal information. To observe these effects, field experiments were conducted using watermelons as the tested food product. Field experiments allow participants to spend real money for the

chance to receive an actual watermelon, meaning that the experiments were not hypothetical. Watermelons were selected as the food product to study because of their important role in Delaware agriculture. Watermelon sales were the highest among all fresh market vegetables in Delaware at $10,856,000 in 2015, with the greatest number of fresh market farms dedicated to watermelons (Delaware Department of Agriculture 2015). In addition, watermelon growers can be part of the Mar-Del Watermelon Association, which growers in Maryland and Delaware can join. This association provided a natural means to test a local label, as experimenters could use watermelons from the association in the field experiments in addition to using the label.

To conduct the study, the label from the Mar-Del Watermelon Association was used as the local label conveying minimal information. From this point on, the local label conveying minimal information will be referred to as the Mar-Del label. This label indicates that a watermelon was grown in either Maryland or Delaware. However, participants were always told that all watermelons (including the unlabeled watermelon) in the experiment were grown in Delaware, thus negating the information conveyed by the label. Although location of production is not the only information being conveyed by the label, this was still the best label to use to achieve the study's objectives, as other information conveyed by the Mar-Del label was arguably not of great importance. For instance, participants were made aware that the Mar-Del Watermelon Association label means that the watermelon growers are part of an association, in addition to the information concerning the two states of production. However, pretesting determined that the majority of participants were unfamiliar with

the association, and the only information provided to participants was that the growers were in Maryland or Delaware. This information was provided both by experimenters and by the slogan on the label that says "Grown in Maryland & Delaware". Therefore participants had very limited prior knowledge and were not provided with significant additional information concerning the association other than the states of the association.

An additional concern was that the Mar-Del label could be perceived as a brand. Brands can generate premiums, and it has been hypothesized that the agricultural market could benefit from increased profits through farm-owned brands (Hayes and Lence 2015). However, the use of brands is currently not common for fresh produce (Kaufman et al. 2000). In addition, consumers have a lower WTP for brands of fresh produce compared to brands used in other categories such as electronics, clothing, and packaged food (Jin, Zilberman and Heiman 2008). Therefore, if there were premiums generated due to consumers perceiving the Mar-Del label as a brand, the impact could still be minimal.

Another variable introduced by the Mar-Del label was that it includes the slogan "MAR-DELicious watermelons – The Original Summertime Treat". This slogan makes some allegations of superior taste through the use of the word "delicious". However, as it is clearly a marketing slogan, there was no evidence provided to substantiate their claim of taste. While the label may have had some potential additional information in the form of perceptions concerning associations and taste claims, there was still minimal information truly being conveyed other than

location of production. Therefore, while the label may have provided some additional information, it was still considered minimal. Nevertheless, the thesis still examined the impact of the local Mar-Del label on taste expectations to determine the potential impact of the slogan.

The thesis studied the impact of the Mar-Del label compared to no label, when experiment participants were already told that all watermelons were grown in Delaware, to evaluate how consumers would react to a local label that was not providing significantly new information. Not only were consumers told the identical origin of the watermelons, thus negating any additional information provided by the label on locality, but consumers may also have held varying definitions of local, further rendering the information conveyed by the label as non significant to the consumer. Because of varying definitions of local held by consumers, participants were never specifically told that any of the watermelons were "local." However, given that the label was mainly providing information on the states of production and given that some field experiments were conducted in these two states, the experimenters viewed the label as a local label, although one goal of the study was to determine whether consumers would truly believe that the label meant local. Field experiments were also conducted in Pennsylvania, to examine how being outside of the two states of production conveyed in the Mar-Del label would impact perceptions of local. It should be noted that while in this thesis the Mar-Del label is referring to a local label conveying minimal additional information, it was left up to participants to decide whether they truly believed the label meant local or not.

The study also examined the addition of the Mar-Del label to a Delaware preserved farm label, to examine whether the presence of a label conveying information would affect the impact of the addition of the local label that was not conveying significant information. 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. The label conveying that the product (watermelons) was grown on preserved farmland in Delaware was conveying significantly new information, unlike the local label. For ease of reading, the Delaware preserved farm label will be referred to simply as the preserved farm label.

In addition to the local label's impact on WTP, the thesis also examined whether the presence of the Mar-Del label impacted consumer expectations of taste, food safety, and whether the good was actually considered local by their standards or not. It was observed how the state and venue in which data was collected affected these perceptions and WTP. The watermelons used in experiments always originated from the same state (Delaware), which could potentially have altered participants' perceptions of whether the product was local or not if they were outside of the state of production.

To seek to answer these questions, the study elicited WTP values for watermelons with varying labels. The four label types considered were no label, a

Mar-Del label, a preserved farm label, and both a Mar-Del label and preserved farm label. Participants were provided with information on both the Mar-Del label and the preserved farm label, and were told that all watermelons, including the unlabeled watermelon, were grown in Delaware, thus theoretically negating the impact of the location claims on the Mar-Del label. The impact on WTP of the addition of the label that experimenters believed represented local was analyzed both relative to no label, and to the preserved farm label.

In addition, the effects of location and venue were examined. Field experiments were conducted in four counties total. Consumers in three adjacent counties in Maryland, Delaware, and Pennsylvania were studied to determine whether state or proximity played more of a role in determining whether consumers viewed a food product as local or not. Consumers in Sussex County, Delaware were also studied because the selected venues of this county had high levels of tourism. The purpose of conducting experiments at venues with lots of tourists was to determine the impact of distance traveled on WTP. However, this was not the goal of this thesis, which focuses primarily on WTP for the Mar-Del label. Although participants were told that all watermelons were grown in Delaware, the Mar-Del label said grown in Maryland and Delaware, and the preserved farm label specified Delaware. Field experiments were conducted at both a farmer's market and a more general-population location (a park in three counties, and a ferry terminal in Sussex County) to determine whether a venue that could potentially draw a sample more informed in food production practices like a farmer's market would impact WTP for the Mar-Del label. Lastly, expectations of

taste, food safety, and ratings of whether the varying labels for the watermelons were truly local were also studied.

There were several possible implications of this study. Despite the existence of the Mar-Del label indicating that the watermelon growers are part of the Mar-Del Watermelon Association, the label is never displayed on watermelons in Maryland or Delaware, although it is occasionally displayed as a poster or banner at farm stands. If it could be determined that consumers were willing to pay more for this label, this could benefit all farmers who are part of the Mar-Del Watermelon Association as increased revenue. In addition, the results could have a more widespread application to benefit all farmers. If the simple appearance of a label, despite conveying little information, can generate premiums from consumers, many farmers could increase profits through increased labeling and marketing. The labels could have the potential to increase consumers' expectations of food safety, taste, and whether they consider the product to be local or not, which would benefit the consumer.

1.3 Hypotheses

The first hypothesis was that consumers would still be willing to pay more for the Mar-Del label compared to an unlabeled watermelon, despite knowing that both watermelons were grown in Delaware. The addition of the local label would result in an increase in expectations of taste and food safety, and consumers would have higher confidence that the watermelon was truly local. This was hypothesized by the experimenters because they believed that the addition of any label, regardless of

information provided, would inherently increase consumers' trust in the product. Although the Mar-Del label was less specific in its information provided in that the state of production could have been Maryland or Delaware, it was hypothesized that the presence of a physical label would increase participant belief that the watermelon met their personal definition of local by instilling more trust in participants. This could indicate that the presence of a local label means more to consumers in defining local than actually knowing where the good was produced.

The second hypothesis was that when the Mar-Del label was added to the preserved farm label, there would also be an increase in WTP, accompanied by an increase in expectations of taste, food safety, and whether the watermelon was local. Although in this hypothesis there was already a label present, unlike when adding the Mar-Del label to no label, it was hypothesized that the presence of two labels as opposed to one would still increase participants' overall trust in the product. The third hypothesis was that despite this increase in WTP, the increase in WTP between the combination of two labels versus the preserved farm label would be a smaller increase than when adding the Mar-Del label to no label. This would be due to a diminishing marginal utility for additional labels conveying minimal information, over which literature remains divided (see Section 2.4).

The fourth hypothesis was that participants in the field experiments conducted in Delaware as opposed to Maryland or Pennsylvania would have the greatest increase in WTP values when the Mar-Del label was added to both no label and the preserved farm label. Because participants were told that all watermelons were grown in

Delaware, it was believed that they would be the most likely to state that the watermelons were definitely local, which in turn could generate WTP for the Mar-Del label if it further increased participant belief that the label met their personal definition that the watermelon was local. Therefore, a higher WTP for the Mar-Del label in Delaware could result in a greater increase between no label and the Mar-Del label or the preserved farm label and both labels compared to the increase observed in Maryland or Pennsylvania.

The fifth hypothesis was that venue of the experiment at either a park or a farmer's market would not influence the difference in WTP values with the addition of the Mar-Del label to either no label or the preserved farm label. It could be possible that participants at farmer's markets would have higher WTP values for a label given that farmer's market shoppers may be more interested in labeling and food production. On the other hand, given that they may focus more on food production and labeling than a more general population, it could be possible that farmer's market participants would better grasp the lack of information conveyed in the Mar-Del label, and therefore not place as large a premium on it. In addition, it could be possible that farmer's market shoppers are less suspicious of unlabeled produce if they are used to buying unlabeled produce directly from farmers at markets. Given the possibilities for either a greater or lower difference in WTP for the Mar-Del label, it was hypothesized that venue would not affect differences in WTP, although it was believed that farmer's market shoppers would have higher average values across all label types than participants at more general locations.

1.4 Organization of Thesis

Chapter 2 will contain a literature review that first assesses consumer WTP for local, followed by WTP for food attribute labels, and finally will review previous studies concerning preference for labels that convey minimal to no new information. The review will conclude by explaining this thesis's contributions to current literature. Next, Chapter 3 will discuss the experimental design used, involving locations and dates, experimental methods, the survey, and an explanation of the bidding mechanism used. Chapter 4 will explain the methodology, beginning with the factor analysis conducted, progressing into the econometric models used for data analysis, and finally summarizing the descriptive statistics of the demographic variables. Chapter 5 will present the results of the econometric models and other analyses, and provide a discussion of the results. Chapter 6 will conclude the thesis with a summary of the main findings of the study, potential implications, limitations of the study, and finally will provide suggestions for future studies.

Chapter 2

LITERATURE REVIEW

2.1 Organization of Literature Review

The chapter will begin by reviewing the literature on WTP for local food to substantiate the claim that consumers are willing to pay premiums for local, as some hypotheses are based on the idea that consumers will pay more for what they truly believe is local. The experimenters believe that consumers will pay a premium for local, but wished to study whether consumers would still pay this premium when a local label is not truly providing additional information. The literature review next discusses impacts of food quality and attribute labels and WTP for these labels, in an effort to understand what information consumers are willing to pay premiums for and what consumers believe they are obtaining from the labels. Understanding what consumers believe they are receiving through labeling can provide insight into what a consumer might believe they are receiving through a label conveying minimal information to help explain why there could be premium for minimal information. Lastly, the literature review considers studies that have tested labels providing minimal to no information, and summarizes the additions to the literature that this thesis will provide.

2.2 Willingness to Pay for Local

There has been a significant increase in local food marketing channels since 2006-2007. In the U.S., the number of farmer's markets increased by 180% from 2006 to 2014, the number of regional food hubs that aggregate locally sourced food increased by 288% from 2006-2007 to 2015, and the number of farm to school programs that serve locally sourced food in school meals increased by 430% between 2006 and 2015 (Low et al. 2015). In a global food system distances between food production and consumption can be high and often consumers express greater trust in local food as it is perceived as safer and easier to trace back to its origin (Buchardi, Shroder and Thiele 2005; Nganje, Hughner and Lee 2011). This greater trust in local is just one of many reasons spurring consumers to purchase local goods.

Many studies have indicated that consumers are willing to pay a premium for local foods, for a variety of reasons (Feldmann and Hamm 2015). Consumers believe local food to be of higher quality, better taste, and to be fresher (Bond, Thilmany, and Bond 2008; Darby et al. 2008; Grebitus, Lusk and Nayga 2013). In conjunction with perceived higher food safety, consumers also express greater trust in local food because there is greater ease of determining how it was transported (Feldmann and Hamm 2015).

2.3 Impacts of Food Quality and Food Attribute Labels

McCluskey and Loureiro (2003) conducted an empirical study on preferences and WTP for food quality or attribute labels. They analyzed results on ecolabels,

genetically modified (GM) food labels, U.S. State Agricultural Product labels, European Protected Geographical Indications labels, and Fair trade labels. They determined that consumers needed to perceive higher quality associated with food labels in order to place a premium on the food product. Nonetheless, an increase in consumer demand for healthier, safer, and more environmentally friendly food products has led to an increase in the importance of food labeling.

Bernard and Liu (2017) conducted a study examining the impacts of food labeling on perceived taste. Consumers tasted five different apple slices: two from the same organic apple and two from the same local apple, where one slice of each apple was labeled and the other was not, and an unlabeled conventional apple. Certain groups of consumers rated the taste of the labeled apples higher than their unlabeled counterparts, indicating that expectations of taste due to labeling as organic or local can play a stronger role in taste perceptions than actual taste.

Wansink et al. (2000) examined the impacts of soy labeling on perceptions of taste and health. They used a "Phantom Ingredient" taste test in which participants were presented with a food package claiming it contained soy but in actuality did not contain soy. When compared to results of taste tests for participants who contained a non-soy product that did not claim to contain soy, participants who erroneously believe they received soy had lower ratings of taste, demonstrating the impact of a soy label on diminishing perceptions of taste. However, it was determined that participants only believed health claims shown on the packages when the packages also claimed

there was soy present, indicating the need for the soy label to positively impact health perceptions.

Loureiro, McCluskey and Mittelhammer (2011) examined consumer preference among eco-labeled, organic-labeled, and regular apples. For certain consumers, eco-labeled apples were less desirable than organic apples due to a perception of lower quality. However, consumers who had higher perceptions of quality for eco-labels had a higher probability of selecting eco-labeled apples over organic apples. Lusk, Roosen and Fox (2003) observed the impacts of a GM label by estimating consumer WTP for beef in France, Germany, the United Kingdom and the United States that had or had not been fed GM corn. Both European and United States consumers had higher willingness to pay values for beef from cattle that had not been fed GM corn, with Europeans placing even higher values than United States consumers. Loureiro and McCluskey (2003) determined consumers, particularly younger consumers, are willing to pay a premium for apples that were labeled as being produced by farm workers who enjoy fair and safe working conditions. Many studies indicate similar conclusions that food labeling is critical to consumers' choices.

2.4 Willingness to Pay for Food Labels Conveying Minimal to No Additional Information

Most related to this thesis are studies concerning the impact of labels conveying little additional information. These studies prove more divided, which is one way in which this thesis can contribute to literature, by potentially being able to

present a side in favor of one argument or the other. Barreiro-Hurle, Gracia, and de Magistris (2008) studied the impact of multiple health and nutrition labels through choice experiments using a healthy product (plain yogurt) and a less healthy product (pork Frankfurt sausages). They found that multiple competing health and nutrition labels representing identical or similar information could significantly decrease consumer preferences for a product. Like this thesis, they examined the impacts of labels providing minimal information through the addition of labels representing identical information. However, this thesis will contribute through using non-hypothetical field experiments, and observing the impacts of a local label and how this affects food safety and taste expectations, as opposed to directly studying health and nutrition labels.

Fonner and Sylvia (2015) also examined the impacts of multiple labels on consumer choice. They conducted choice experiments for two types of seafood (salmon and crab) using four classes of seafood information: safety, quality, local, and ecolabels. Although the information classes were distinct as opposed to competing, two of the classes still did not provide as much additional information as the other two. They found that because consumers tend to judge quality based on perceived reliability of the seafood producer and retailer, quality labeling was not as effective a signal which reduced preference for the quality labels. In addition, they pointed out that the safety labels provided minimal information as the salmon and crab presented were not associated with any health risks or consumption advisories. Despite the relatively minimal information presented by these labels, they found no evidence that

adding additional labels to a product diminished preference for a local label, and that each label was found to have a significant influence on consumer choice. The thesis differs from this study in that the minimal information label being presented will be the actual local label, as opposed to observing effects of other minimal information labels on preference for a local label. In addition, the thesis will use non-hypothetical field experiments as opposed to choice experiments, and will not have four distinct classes of information in order to better study the impact of minimal information labels.

Heng, Peterson and Li (2016) examined consumers' preference towards various labels of eggs to examine the impact of multiple labels, including superfluous labels providing no new information. They used an online survey, and some randomly selected individuals also received a choice experiment. To test superfluity, they used eggs, because they can bear a hormone-free label. However, the USDA prohibits the use of hormones in poultry products, therefore all eggs are hormone-free, yet a hormone-free label indicates to consumers that some eggs may contain hormones. In addition, eggs labeled as organic can also have labels saying that they are cage-free, antibiotic-free, or natural, which are all redundant given the definition of organic. To fully test the impacts of redundant information, respondents were presented with the superfluity of the labels in a statement that "all egg laying hens in the United States are not given hormones, and certified organic eggs are produced by hens living in a cage-free environment". Despite being told of their superfluity, consumers still valued the labels. Stated WTP values for additional labels increased with the addition of a

label at a decreasing rate up to four labels, after which WTP decreased significantly. While the thesis will also study the impact of relatively redundant information, it is not as superfluous as the Heng, Peterson and Li study. However, it will be non-hypothetical through the use of field experiments, and will specifically focus on a local label instead of food quality attributes.

2.5 Contribution to Literature

To the author's knowledge, there have been no non-hypothetical field experiments conducted to determine the impact of a label that conveys minimal information. In addition, no studies concerning impacts of minimal information in labeling have studied a local label, they have all relied on food attribute labels. Using a local label conveying minimal information will not only allow researchers to study the impacts of this label, it will also allow further examination of what local means to consumers. If consumers value the local label providing no new information on location of production, it could imply that a label helps define local to consumers more than actual knowledge of the location of production.

Chapter 3

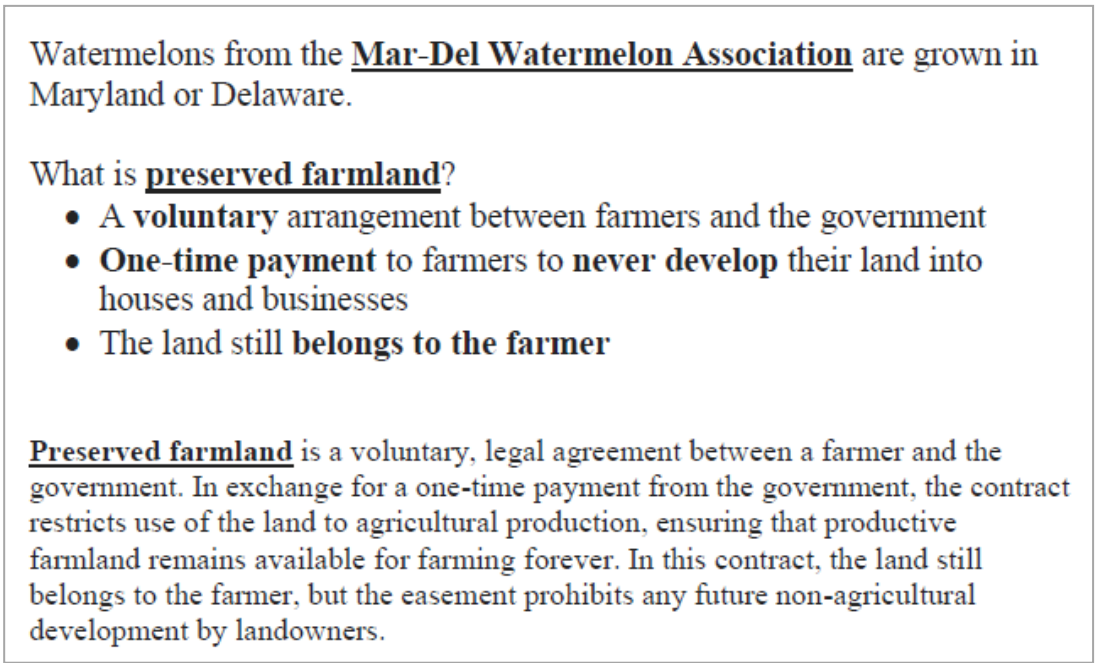
EXPERIMENTAL DESIGN

3.1 Organization of Experimental Design

Field experiments consisted of two main parts: the BDM auction where WTP values were collected, and a survey. As part of the BDM auction, participants were provided with definitions and shown different labels. This chapter will first describe how the definitions used in the experiments were created. Next, the chapter will describe the process through which the labels used in the experiments were created and selected. Following these descriptions, the chapter will discuss pretesting of the full experiment. The chapter will then describe the locations and dates of field experiments, followed by a discussion of the set up and recruitment process used in the field experiments. Following the overall description of locations and setup of experiments, the chapter will then detail the experimental design of the experiments and will then provide a more detailed description of the bidding mechanism used. The chapter will conclude with a description of the survey that participants completed after the bidding procedure.

3.2 Survey to Determine Definitions and Slogans for Study

In order to determine the best definition of a preserved farm and to select a slogan used in the labels for experiments, an online Qualtrics survey was conducted throughout January 2016. The full survey is presented in the Appendix A. The purpose of determining the best definition to use in field experiments was to maximize comprehension and thus elicit accurate willingness to pay for produce from a preserved farm. Another purpose for finding one definition to use was to minimize bias by always presenting experiment participants with one single, clear definition. The definition chosen as the clearest while providing the most information was the one used in the field experiments, depicted in Figure 3.1.


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.

Figure 3.1: Definition card provided to participants

The survey also served to select the ideal slogan for a preserved farm label, the design of which is detailed in the next section. Out of five possible slogans, "Preserving our farms, preserving our future" was selected as the favorite. In addition, the survey collected data on shopping habits, opinions on local produce, and familiarity with preserved farmland which was later used in the design of the field experiment survey. The survey was distributed to the entire University of Delaware College of Agriculture and Natural Resources via email and also distributed through the social media of the two graduate students working on the project via Facebook. There were 203 surveys started and 163 fully completed.

The survey determined that 63.3% of respondents either had never heard about preserved farms, or had heard about them but knew very little about them. Out of the remaining participants, 26.9% said they were somewhat familiar with preserved farms and only 9.8% stated that they were very familiar with preserved farms. This lack of knowledge concerning farmland preservation emphasized the need for a clear and consistent definition, particularly because the sample of College of Agriculture and Natural Resource students would presumably yield more knowledge about agricultural policies such as farmland preservation than a more random sample used during field experiments.

3.3 Design and Selection of the Preserved Farmland Label

For field experiments, a label indicating that produce was grown on preserved farmland was required. To create this label, students were recruited from the

University of Delaware Department of Art and Design. They were first contacted and given a brief description of the research project, and what would be required from them. It was explained to them that they would be entering their designs in a competition, and they would be awarded money if their design was chosen as one of the finalists. Eleven designers expressed interest in participating. Those who expressed interest were given exact specifications for the labels. The deadline for submission was Monday, April 25, 2016. Three designers submitted one to three designs each, for a total of six different designs submitted. Each design featured the slogan "Preserving our farms, preserving our future", which had been selected as the favorite slogan during the online survey noted above.

To determine consumers' favorite label design for preserved farm products out of the six possible label designs, a survey was conducted on Saturday, April 30, 2016 at Ag Day, hosted by the University of Delaware. Ag Day is a community event that celebrates and educates the public on agriculture and natural resources. Approximately 8,000 people attend the event each year. The experimenters had a table with a poster displaying all the different labels. The designs were not numbered to reduce any bias. Participants either came to look at the poster of their own accord and then were asked to select their favorite, or were approached by an experimenter and asked to select their favorite label if they were within close proximity to the table.

Participants were told that the labels were indicating that the product was grown on preserved farmland, and that with their help one of the designs may eventually be used in the real world for this purpose. If participants asked about

preserved farmland, they were given a brief statement saying that preserved farmland is when the government pays farmers not to sell their land for further development. The researchers deemed this short explanation the best as it was easy to repeat and did not confuse the participants with more information than necessary. There were 130 people who participated when asked to select their favorite, and only 7 people did not wish to participate when asked. Data was only collected from people 18 years of age and older. The label that received the most votes is depicted on the left side of Figure 3.2 and was used in the field experiments. Out of the six labels, it received 35% of all votes.

Figure 3.2: Images and explanations of labels shown to participants

3.4 Pretesting

Pretesting was conducted on July 19, 2016 outside of the UDairy Creamery to ensure the experimental design was being conducted in the most clear and efficient manner possible. In addition, the survey was pre-tested thoroughly to eliminate any unnecessary or confusing questions and to help reduce the effects of boredom or fatigue. Fifteen participants were recruited. The pretesting was conducted in a hypothetical situation, as watermelons were not yet available at this stage of the season. Participants were paid $5 each to run through the experiment hypothetically, and then answer several questions after the experiment about what was clear and unclear. Participants then completed the survey, and provided experimenters with feedback on whether any questions were confusing. Pretesting allowed experimenters to perfect a script to use throughout the experiments so that the bidding mechanism and definitions were always clear to participants.

3.5 Locations and Dates

Non-hypothetical field experiments were conducted using real money and real watermelons that participants could potentially receive. Experiments were conducted at nine different locations. Experiments were conducted at a farmer's market and a public area (typically a park) in the following counties: New Castle County, Delaware, Sussex County, Delaware, Cecil County, Maryland, and Chester County, Pennsylvania. The following is a list of the venues sampled in each county:

- New Castle County, Delaware
    - Glasgow Park Farmer's Market
    - Battery Park
- Sussex County, Delaware
    - Historic Lewes Farmer's Market
    - Cape May – Lewes Ferry Terminal
- Cecil County, Maryland
    - North East Farmer's Market
    - North East Community Park
    - Calvert Regional Sports Park
- Chester County, Pennsylvania
    - Anselma Mill Farmer's Market
    - Nottingham County Park

The public area used was a park in all counties except Sussex County, where the experiments were conducted at the Cape May-Lewes Ferry Terminal. A park was used in an effort to sample the more general population of the counties. Farmer's markets were used to sample populations of shoppers who may have greater interest and potentially be more knowledgeable concerning food production. Two separate parks were used in Cecil County, Maryland, as the first park used (Calvert Regional Sports Park) was not highly attended and North East Community Park was used to ensure adequate participation. Experiments were chosen in the three adjacent counties (Chester, Cecil, New Castle) in the tri-state area and one non-adjacent county in Delaware (Sussex County) to examine the following questions: 1) Would participants in a county from one state have different WTPs for produce from a neighboring state, despite that states' proximity (e.g. would Pennsylvania consumers from Chester County care about produce from Delaware preserved farmland less than Delaware consumers, despite being directly adjacent to a Delaware county)? and 2) Would premiums for the Mar-Del label indicating watermelons from Maryland or Delaware

differ between Maryland, Delaware, and Pennsylvania consumers despite close proximity to the other states? The nine experiments were conducted on days from July 29, 2016 through August 9, 2016. Experiments at the parks and ferry terminal were always conducted on weekends to ensure sufficient attendance. Days of the experiments at the farmer's markets were both weekends and weekdays, depending on the schedule of the farmer's markets. Experimenters recruited 328 participants total for all locations.

3.6 Set Up of Experiment and Recruitment

Three experimenters were present at each experiment. The setup was a table under a canopy with two to three chairs, all on one side of the table. The experimenter would stand on the opposite side of the table to present information to the participants. On the table were the definition cards and label sheets with the label descriptions. In addition, there was one watermelon in the center of the table. Participants were told that the watermelon on the table was a size approximation of the watermelons that they could potentially receive. Although the same watermelon demonstrated to participants was used throughout the duration of one experiment, each experiment used a different display watermelon to ensure freshness, as experiments were conducted over the course of two weeks. However, experimenters were sure to select display watermelons that were nearly identical in size and coloration at each experiment location. The watermelons that participants could choose from were concealed within coolers. The coolers were critical, as the experiments were

conducted outside in the peak of summer when temperatures could be hot and thus ensured freshness. In addition, concealing the watermelons eliminated any potential bias introduced through sensory characteristics (Ellison et al. 2016). For instance, watermelons may have differed in size, shape, or color. By presenting one single watermelon to participants, it ensured that participants were all considering a watermelon of identical size instead of simply imagining a watermelon, reducing bias of participants revealing WTP for watermelons of differing imagined sizes.

To attract participants, signs were present both hanging from the canopy and stuck in the ground further away from the setup. There were signs declaring the following "Participate in UD research, earn cash," "Participate in watermelon research, earn cash," and University of Delaware banners. In addition to the signs, experimenters approached attendees at the farmer's markets and parks, asking if they would like to participate in an economic study to earn cash and potentially receive a watermelon. The full script used is available in Appendix B. Participants were read their informed consent (shown in Appendix B) and then would indicate that they had received the study procedures on the back of their bid sheet, as shown in Appendix C.

3.7 Experimental Design

Participants were recruited from the general public attending either the farmer's markets or parks in an attempt to generate a random sample. A classic random sample can reduce sampling error, which arises when a sample is not representative of the population (Friedman and Cassar 2004, 48). Using the general

public can also negate issues arising from using a convenience sample such as students (Harrison and List 2004). Although the experimenters were attempting to generate a random sample, there were potential limitations. Some participants approached experimenters of their own accord and asked to participate, which could introduce bias due to self-selection. In addition, the demographic distribution of the parks may not always represent a broader population. Comparisons of demographics at locations versus national demographics are provided in Chapter 4.

Potential participants were told that participation was voluntary, their responses would be anonymous and confidential, and that they must be 18 or older to participate. They were told that they could earn up to $12 and possibly receive a watermelon if they participated, which would involve writing down four numbers and completing a brief survey. They were told participating took approximately five to ten minutes. It was demonstrated to them how their surveys and bids could not be linked to their identities in any way through the use of ID numbers, and so they were urged to be as honest as possible in their responses. Ensuring anonymity is critical in economic experiments, as it helps to ensure that participants are not responding in an attempt to please the experimenters, which would threaten the dominance of the reward medium (Lusk and Shogren 2007, 65). Once participants agreed to these terms, the experiment could commence.

Participants were provided with information on farmland preservation and the Mar-Del Watermelon Association. Figure 3.1 shows the definition card provided to participants using the definition determined in the survey noted above. Participants

were told the information both by the experimenters, and they were also presented with the same information on the definition card that they were allowed to keep and reference throughout the experiment. Participants were then shown two separate labels with descriptions: the preserved farmland label and the Mar-Del Watermelon Association label. The design process of the preserved farm label was noted above, and the Mar-Del Watermelon Association label was already pre-existing. The experimenters explained the labels to the participants without introducing any new information. Figure 3.2 above shows the labels with descriptions shown to participants.

It was critical that participants all received the exact same definitions in order to minimize experimental error through loss of control. Loss of control can arise when participants receive different experiences in an experiment, so it is best to have set definitions to minimize any "on the spot" responses to participants (Friedman and Cassar 2004 pg 48). When participants asked questions that would provide them with more information than other participants, they were always told that due to the design of the study, they could not be given additional information on any other attributes. In addition, when participants wished to consult with each other, they were kindly asked not to, as controlling information flow between subjects also ensured that they each received the same experience (Harrison and List 2004). The experiment was conducted with between one to four participants at a time, who were all seated next to each other and could easily ask each other for their opinions on questions. Therefore, it was critical to clarify to participants that experimenters were looking for their own

personal opinions and did not want them to consult with other participants or bystanders. This also helped ensure anonymity, so that participants' responses were never available to others.

The order of whether participants were informed of preserved farms or the Mar-Del Watermelon Association first was randomized to negate order effects and ensure independence (Friedman and Cassar 2004, 34). Once the experimenters explained definitions and labels, they then explained the bidding mechanism to participants. Participants were told to write down the maximum amount that they would be willing to pay for a watermelon with four separate types of labels. Full bidding in which participants write their full WTP value was used as opposed to endowment bidding, where participants write only the additional values that they would pay for various attributes compared to a base product. Full bidding was selected over endowment bidding, as endowment bidding may be reference dependent and can send implicit quality signals (Lusk and Shogren 2007, 67). Experimenters explained the bidding mechanism to participants and verbally highlighted the following statements:

- 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 [WTP] 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.
- 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.
- [If you receive a watermelon…] you will be allowed to go pick the watermelon yourself from the corresponding labeled bin behind us.

Participants were urged to ask questions if they did not understand the mechanics of the auction. In addition, the explanation of the mechanism had been pretested thoroughly in this experiment and tested and employed in Ellison et al. (2016) which provides further explanation of the use and instructions for a BDM auction. Once participants wrote down their WTP values, it was determined whether they'd receive a watermelon and how much cash they would receive for participating in the experiment. Once the bidding process was complete, participants completed a survey (further detailed in section 3.9) while the experimenters prepared their cash, receipt, and then showed them from which watermelons they could choose if they received a watermelon.

3.8 Bidding Mechanism

To determine participants' WTP for four types of labeling, the incentive compatible BDM mechanism was employed (Becker, DeGroot and Marschak 1964). The BDM mechanism was identified as the correct mechanism to use for the experiments as it is a one-person mechanism, making it uniquely adaptable to field experiments (Lusk and Fox 2003). Figure 3.3 depicts a flow chart of the bidding mechanism.

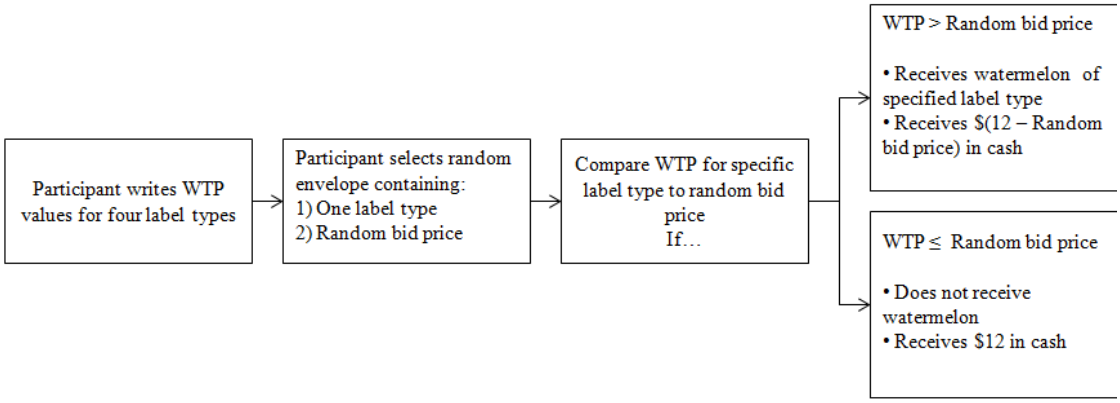
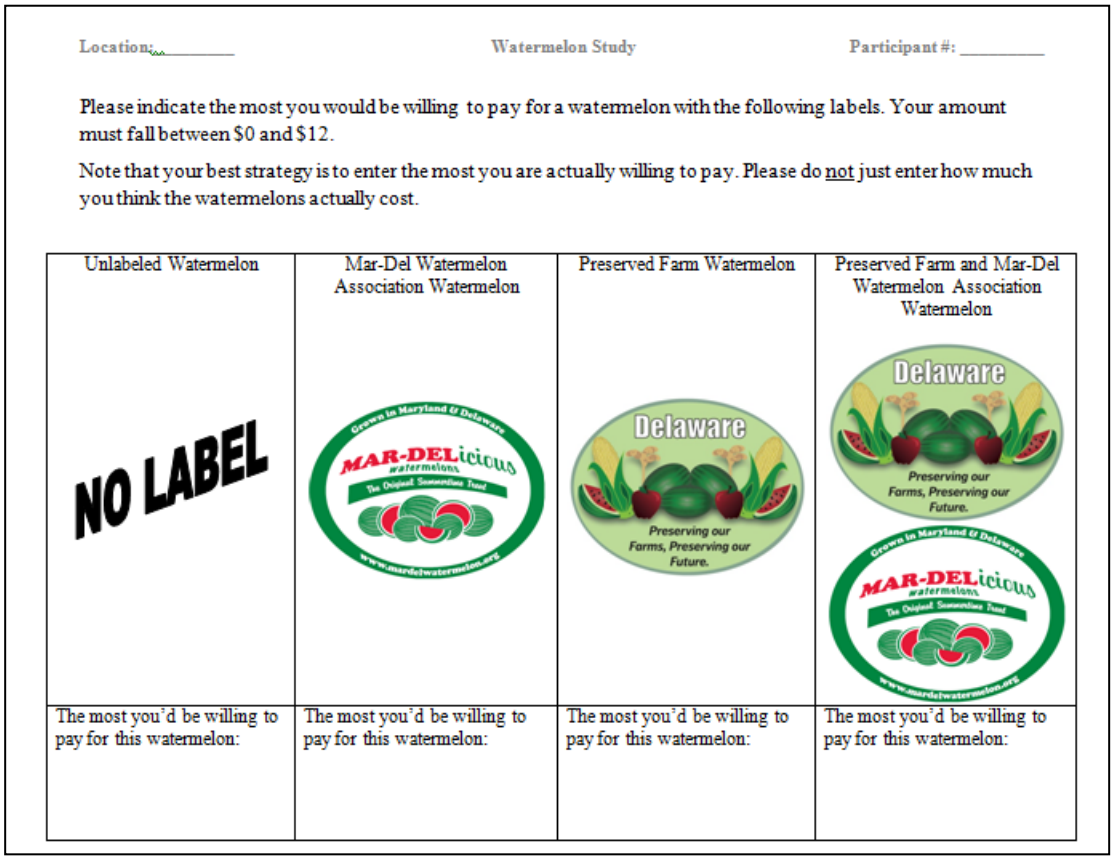


Figure 3.3: Flow chart of bidding mechanism

Participants were asked to indicate their maximum willingness to pay (WTP) values on the bid sheets for the following types of labeling: an unlabeled watermelon, a watermelon with a preserved farmland label, a watermelon with a Mar-Del Watermelon Association label, and a watermelon with both a preserved farmland and Mar-Del Watermelon Association label where the two individual labels were displayed together. These values were written on a bid sheet, depicted in Figure 3.4.

Full factorial design was conducted for the order in which the labels were presented on bid sheets so that all 24 possible orders of the four labels were presented to negate any order effects.



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.

Unlabeled Watermelon	Mar-Del Watermelon Association Watermelon	Preserved Farm Watermelon	Preserved Farm and Mar-Del Watermelon Association Watermelon
NO LABEL	Grown in Maryland & Delaware MAR-DELicious watermelons The Original Summertime Treat www.mardelwatermelon.org	Delaware Preserving our Farms, Preserving our Future.	Delaware Preserving our Farms, Preserving our Future. Grown in Maryland & Delaware MAR-DELicious watermelons The Original Summertime Treat www.mardelwatermelon.org
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 3.4: An example of a bid sheet used in field experiments

The mechanism was never described to participants using the terms "bid", "auction", "win" or "lose" in order to promote dominance (Lusk and Shogren 2007, 63). "Bids" were only ever expressed to participants as the maximum amount they personally would be willing to pay. However, for ease of reading, these values will be referred to as their bids or WTP. They could state a WTP as low as $0 and as high as

$12, as this was the maximum amount participants were being allotted in the experiment towards their bids. After they wrote down these values, participants were told to select one envelope out of many envelopes presented to them. Within the envelopes, there was a slip of paper indicating one of four types of labels, and a binding bid price. The bid price was a random number ranging from $0 to $12 with $0.50 intervals, a method devised by Bernard and Bernard (2009) and detailed in Ellison et al. (2016). Participants had an equal probability of drawing any combination of label type with binding bid price.

Once they drew their random envelope, the envelope was opened and the slip of paper was examined to determine whether they would or would not receive a watermelon. Only the participant's one WTP value for the specific label type indicated on the slip of paper was considered in determining whether they'd receive a watermelon. Their WTP value for the specific label type was compared to the paper slip's binding bid price. If the participants' WTP was higher than the binding bid price, they would receive a watermelon of the indicated label type, and $12 minus the value from the slip of paper. If their WTP was equal to or lower than the value from the slip, they would not receive a watermelon, but they would receive $12 in cash.

3.9 Survey Design

After completing the bidding process, participants completed a brief survey which appears in Appendix A. The survey began with several questions related to the participants and their experience with watermelon purchases. The survey first asked

participants to state how much they thought a watermelon cost at a grocery store. They were told to look at a watermelon displayed on the table in front of them for a size approximation for their estimate, as watermelons of different sizes can have different costs. It is important to control for the price of field substitutes in economic experiments by determining what participants believe to be the cost of the good and then using this variable in regression analysis, as WTP values tend to be rely heavily on individuals' perceptions of the actual cost of the good (Lusk and Shogren 2007, 80). They were then asked how many watermelons their household typically consumed on average during one summer month, and when was the soonest they were planning on purchasing a watermelon. It was hypothesized that consumers who were planning on purchasing a watermelon sooner would have a higher WTP for the watermelon.

Consumers were then asked to rate how familiar they were with both preserved farmland and the Mar-Del Watermelon Association using a Likert scale where 1=Not at all familiar and 5=Very familiar. The following three questions asked participants to rate three aspects of the four different label types (no label, Mar-Del Watermelon Association label, preserved farmland label, and both the Mar-Del Watermelon Association label and preserved farmland label). First, participants rated how well each type of watermelon met their perception of what it means to be local using a Likert scale where 1=Definitely Not Local and 5=Definitely Local. Second, participants rated each type of watermelon in terms of how they'd expect the watermelon to taste using a Likert scale where 1=Very Bad and 5=Very Good. Third,

participants rated how safe they would expect each watermelon to be in terms of food safety where 1=Very Unsafe and 5=Very Safe. The order in which the label types appeared was randomized to reduce bias.

The following questions focused on the importance of various attributes and location of farmland preservation. All questions were rated using a Likert scale where 1= Not at all important and 5=Very important. Participants were asked to separately rate the importance of there being preserved farmland in Maryland, Delaware, and Pennsylvania. Then, they rated the importance to them that farmland preservation does not increase taxes, has widespread support in the community, focuses on smaller/medium-sized farms, and is guaranteed to be permanent. The order in which the states and attributes appeared was randomized to reduce bias.

Lastly, participants answered shopping habit and demographic questions. On a Likert scale where 1=Never, 3=Sometimes, and 5=Always, participants responded to how frequently they go to farmer's markets, try to buy local foods, read food labels, and try to buy organic foods. The demographic questions then asked for gender, age, ethnicity, level of education completed, how many children under 18 were in their household, and their annual household income.

Chapter 4

METHODOLOGY

4.1 Organization of Methodology

The chapter begins with an explanation of exploratory factor analysis, which was used in data analysis. The chapter then describes Tobit regression models which were also used in data analysis. The chapter then provides a summary of demographic variables, and concludes with a summary of the variables used in Tobit regressions.

4.2 Exploratory Factor Analysis

Factor analysis attempts to represent a set of observed variables in terms of common factors plus a factor that is unique to each variable. The common factors (latent variables) are hypothetical variables that explain why a number of variables are correlated with each other (Taylor 2004). Factor analysis can help establish that a set of observed survey items are all measuring the same underlying factor, so the variables are combined to form a more reliable and economic measure of that factor (Taylor 2004).

In order to better understand consumers' motivations behind their WTP values for varying labels, an exploratory factor analysis was first conducted using all of the survey questions detailed in the survey questions section of Table 4.1 to isolate

potential factors which would then be included in WTP models described more fully in the following section. The principal factors method with an orthogonal varimax (Kaiser on) rotation was used to develop the theoretical factors. Using the eigenvalue > 1 rule led to the retention of four factors. The eigenvalue is the amount of variance explained by each factor, and the rule of only retaining factors with an eigenvalue greater than one is used to determine the appropriate number of factors to use as a balance between sufficient explanation of variance and economy of description and explanatory power (Taylor 2004). Table 4.2 shows the resulting rotated factor loadings (pattern matrix) which represent how much a factor explains a variable (Taylor 2004). Loadings under 0.40 are dropped as recommended by Stevens (1992).

Table 4.1: Variable definitions

Variable Type	Variable Description	Variable Name
WTP Values		
	WTP for watermelon with no label	WTP_{NL}
	WTP for watermelon with Preserved Farm label	WTP_{PF}
	WTP for watermelon with Mar-Del label	WTP_{MD}
	WTP for watermelon with Mar-Del and Preserved Farm label	WTP_{PFMD}
County Location of Experiment		
	Cecil County	Cecil County
	Chester County	Chester County
	New Castle County	New Castle County
	Sussex County	Sussex County

Variable Type	Variable Description	Variable Name
Venue of Experiment		
	1 if venue is a farmer's market, 0 if otherwise	Farmer's Market
Demographics		
Gender		
	1 if participant is male, 0 if participant is female	Male
Age		
	Participant's age in years	Age
Ethnicity		
	1 if participant is white, 0 if participant is non-white (Hispanic/Latino, Black/African American, Asian or Other)	White
Highest level of education completed		
	1 if participant did not complete high school, 0 otherwise	Less than high school
	1 if participant has only completed high school, 0 otherwise	High school
	1 if participant only completed some college or only completed an Associate's degree, 0 otherwise	Some college/Associate's
	1 if participant has only completed a Bachelor's degree, 0 otherwise	Bachelor's degree
	1 if participant completed a graduate or professional degree, 0 otherwise	Graduate or professional degree
Number of children under 18 in household		
	Children under 18 in household	Children under 18
Annual Household Income	Midpoint of household income bracket selected (in thousands); 12.5, 30, 42.5, 62.5, 87.5, 125, 175, 225, 275, 325, 375, 500	Household Income ($1000's)
Survey Questions		
How much do you think one watermelon of the size displayed would cost at a grocery store?		
	Price estimate of watermelon	Price Estimate
How many watermelons does your household buy in one month during the summer?		
	Average household watermelon purchase	Household Purchase

Variable Type	Variable Description	Variable Name
Before starting this experiment, when was the **soonest** you were planning on purchasing a watermelon?		
	Today	Purchase today
	Within 1-3 days	Purchase within 1-3 days
	Within one week	Purchase within one week
	Within 2-3 weeks	Purchase within 2-3 weeks
	Within one month	Purchase within one month
	More than a month from now	Purchase more than a month
Before today, how familiar were you with…(1=Not at all familiar, 5=Very familiar)		
	Preserved farmland	Familiarity PF
	Mar-Del	Familiarity MD
Rate how well each type of watermelon meets your perception of what it means to be "**local"** (1=Definitely Not Local, 5=Definitely Local)		
	No Label	$Local_{NL}$
	Preserved Farmland	$Local_{PF}$
	Mar-Del	$Local_{MD}$
	Preserved Farmland and Mar-Del	$Local_{PFMD}$
Rate each type of watermelon in terms of how you'd expect them to **taste** (1=Very Bad, 5=Very Good)		
	No Label	$Taste_{NL}$
	Preserved Farmland	$Taste_{PF}$
	Mar-Del	$Taste_{MD}$
	Preserved Farmland and Mar-Del	$Taste_{PFMD}$
In terms of **food safety**, rate each watermelon in terms of how **safe** you'd expect it to be (1=Very Unsafe, 5=Very Safe)		
	No Label	$Safety_{NL}$
	Preserved Farmland	$Safety_{PF}$
	Mar-Del	$Safety_{MD}$
	Preserved Farmland and Mar-Del	$Safety_{PFMD}$

Variable Type	Variable Description	Variable Name
Rate the importance **to you** of there being preserved farms in the following states (1=Not Important, 3=Moderately Important, 5=Very Important)		
	Maryland	Importance MD
	Delaware	Importance DE
	Pennsylvania	Importance PA
How important is it **to you** that farmland preservation… (1=Not Important, 3=Moderately Important, 5=Very Important)		
	Does not increase taxes	Tax Increase
	Has widespread support in the community	Community
	Focuses on smaller/medium sized farms	Size
	Is guaranteed to be permanent	Permanent
How often do you... (1=Never, 3=Sometimes, 5=Always)		
	Go to farmer's markets	Attend FM
	Try to buy local foods	Local Food
	Read food labels	Food Label
	Try to buy organic foods	Organic

Table 4.2: Results of exploratory factor analysis

	Preserved Farm Opinions & Shopping Habits	*Taste and Safety Perceptions with Labels*	*Local Perceptions with Labels*	*Local, Taste, Safety Perceptions with No Label*
Price Estimate				
Household Purchase				
Familiarity PF				
Familiarity MD				
$Local_{NL}$				0.513
$Local_{PF}$			0.476	
$Local_{MD}$			0.791	
$Local_{PFMD}$			0.841	
$Taste_{NL}$				0.761
$Taste_{PF}$		0.488		
$Taste_{MD}$		0.443		
$Taste_{PFMD}$		0.517		
$Safety_{NL}$				0.635
$Safety_{PF}$		0.816		
$Safety_{MD}$		0.793		
$Safety_{PFMD}$		0.894		
Importance MD	0.765			
Importance DE	0.764			
Importance PA	0.717			
Tax Increase				
Community	0.535			
Size	0.555			
Permanent	0.641			
Attend FM	0.439			
Local Food	0.600			
Food Label				
Organic	0.419			
Eigenvalue	5.612	2.722	1.467	1.086

The loadings made strong intuitive sense and were named accordingly. The first factor displayed was named *Preserved Farm Opinions & Shopping Habits*. This factor contains all variables concerning opinions related to farmland preservation except for Tax Increase, which was dropped due to a loading below 0.40. This includes the ratings of importance of farmland preservation in Maryland, Delaware, and Pennsylvania, in addition to the three remaining questions concerning the importance of various attributes of farmland preservation to respondents. This factor also contains the three shopping habit questions of how frequently respondents attend farmer's markets, try to buy local, and try to buy organic.

The additional shopping habit question concerning how frequently participants read food labels (Food Label) had a loading value under 0.40 for all factors and thus was not included in any factors. In addition, the variables Price Estimate, Familiarity PF, and Familiarity MD did not have high enough loadings to be placed in any factors, so they were run as individual variables in the regressions further detailed in the following section. Although the variables Household Purchase and Tax Increase were dropped out, unlike the other dropped variables they were not run in regression models. Concerning Tax Increase, it was not believed that participant views of the importance of their taxes not being affected through farmland preservation would be a logical variable in determining the impacts of a Mar-Del label. Concerning Household Purchase, it was felt that the question asking how soon participants were planning on purchasing a watermelon would capture similar information as to how many

watermelons their household purchased, as those who purchased more watermelons would be more likely to purchase watermelons more regularly.

The remaining factors all dealt with participants' perceptions of taste, safety, and locality of the various label types. The second factor *Taste and Safety Perceptions with Labels* contained all ratings of expectations for the three label types with physical labels (preserved farm label, Mar-Del label, and both labels together). The third factor *Local Perceptions with Labels* was all of the ratings of whether participants considered the watermelons local or not for the three label types with physical labels (preserved farm label, Mar-Del label, and both labels together). The fourth factor *Local, Taste, Safety Perceptions with No Label* consisted of the taste, safety, and locality ratings for all of the watermelons with no label, with the exception of the taste expectation rating for the Mar-Del label which appeared in both the second and fourth factor. These factors were all included as variables in WTP regression models detailed in the following section.

4.3 Tobit Regression Models

Two separate dependent variables were modeled. First, there was the difference in WTP between WTP for no label and WTP for the Mar-Del label (WTP_{MD}-WTP_{NL}). Second, there was the difference in WTP between WTP for the preserved farm label and WTP for both the preserved farm and Mar-Del label (WTP_{PFMD}-WTP_{PF}). To analyze differences in WTP for a watermelon with a local Mar-Del Watermelon Association label presenting minimal information, two-limit

Tobit regression models were used. A two-limit regression was needed because WTP values could only fall within the range of \$0 to \$12. Therefore, a difference in WTP values was censored if either of the original values was \$0 or \$12.

In the Tobit model, it is assumed that there is a latent variable $rdiff^*_{i,jk}$ which represents subject i's actual difference in WTP for the watermelon without a Mar-Del label j (either no label or preserved farm label) and the watermelon with a Mar-Del label k (either the Mar-Del label or both the Mar-Del and preserved farm label, respectively). When WTP is between \$0 and \$12, the true value of the latent variable can be observed, but can not be observed when either WTP values are at an extreme. The latent variables are related to observed difference $rdiff_{i,jk}$ by

$$\text{rdiff ijk} = \begin{cases} -12 & \textit{if} \quad WTP_j = 0 \text{ and } WTP_k = 0 \quad \textit{or} \\ & \quad WTP_j = 12 \text{ and } WTP_k = 12 \\ rdiff^*ijk = x\beta + \varepsilon i & \textit{if} \quad 0 < WTP_j < 12 \text{ and } 0 < WTP_k < 12 \\ 12 & \textit{if} \quad WTP_j = 0 \text{ and } 0 < WTP_k < 12 \quad \textit{or} \\ & \quad WTP_j = 12 \text{ and } 0 < WTP_k < 12 \ \textit{or} \\ & \quad WTP_k = 0 \text{ and } 0 < WTP_j < 12 \quad \textit{or} \\ & \quad WTP_k = 12 \text{ and } 0 < WTP_j < 12 \end{cases}$$

Here, x represents a vector of relevant independent variables, and β is a vector of coefficients. The error term εi is independently and normally distributed with mean zero. It was likely that the model would suffer from heteroscedasticity as is typically the case in consumer studies of this type (Bernard, Zhang and Gifford 2006).

The regressions include the defined factors from the previous section, survey questions that were not placed in the factors, demographics described in the next section, and location effects. As noted in the previous section, the survey questions

not included in factors were a participant's estimate of how much the average watermelon costs in stores and their familiarity with preserved farmland and with the Mar-Del Watermelon Association. Including the explanatory variables (described in Table 4.1), the final form of the Tobit models when demographics were included was:

$$WTP_{i,MDLabel} - WTP_{i,NoMDLabel} = \beta_0 + \beta_1 \text{Cecil County} + \beta_2 \text{Chester County} + \beta_3 \text{Sussex County} + \beta_4 \text{Farmer's Market} + \beta_5 \text{Price Estimate} + \beta_6 \text{Within 1-3 weeks}^1 + \beta_7 \text{Within one month}^1 + \beta_8 \text{More than a month}^1 + \beta_9 \text{Food Labels} + \beta_{10} \text{Familiarity PF} + \beta_{11} \text{Familiarity MD} + \beta_{12} \textit{Preserved Farm Opinions \& Shopping Habits} + \beta_{13} \textit{Taste and Safety Perceptions with Labels} + \beta_{14} \textit{Local Perceptions with Labels} + \beta_{15} \textit{Local, Taste, Safety Perceptions with No Label} + \beta_{16} \text{Male} + \beta_{17} \text{White} + \beta_{18} \text{Some college/Associate's}^2 + \beta_{19} \text{Bachelor's degree}^2 + \beta_{20} \text{Graduate or professional degree}^2 + \beta_{21} \text{Household Income} + \beta_{22} \text{Age} + \beta_{23} \text{Children under 18} + \varepsilon_i$$

where $WTP_{i,NoMDLabel}$ is an individual i's WTP for either no label or the preserved farm label, and $WTP_{i,MDLabel}$ is i's WTP for the Mar-Del label or combination of the preserved farm and Mar-Del label respectively. β_0 is a constant representing the base difference in WTP with the addition of the Mar-Del label, and the remaining β's are coefficient estimates for the explanatory variables. The error term ε_i is described above.

4.4 Summary of Demographic Variables

Table 4.3 shows a summary of average demographic variables across all experiment locations compared to the 2015 US Census. In each county, there was one experiment conducted at a farmer's market, and one experiment conducted at a park, except for Sussex County, Delaware where the experiment was at the Cape May-Lewes Ferry terminal instead of a park. Because approximately half of each county's

sample was collected at a farmer's market, this could skew the averages for the demographic variables away from a more general sample.

Table 4.3: Summary of demographic variables for all locations compared to 2015 U.S. census

		All Locations	US Census (2015)
	N	%	%
Gender			
Male	120	37.0%	49.2%
Female	204	63.0%	50.8%
Ethnicity			
White	276	86.0%	61.6%
Hispanic	13	4.0%	17.6%
Black	16	5.0%	13.3%
Asian	9	2.8%	5.6%
Other	7	2.2%	1.9%
Education			
Less than high school	8	2.5%	13.5%
High school	61	18.9%	28.0%
Some college/Associate's	79	24.5%	31.3%
Bachelor's degree	89	27.6%	17.3%
Graduate degree	86	26.6%	9.9%
Household Income Level			
Less than $25,000	27	8.5%	23.1%
$25,000 to $34,999	28	8.8%	10.1%
$35,000 to $49,999	42	13.2%	13.4%
$50,000 to $74,999	60	18.9%	17.8%
$75,000 to $99,999	45	14.2%	12.1%
$100,000 to $149,999	62	19.6%	13.1%
$150,000 to $199,999	29	9.1%	5.1%
$200,000 to $249,999	6	1.9%	5.3%[1]
$250,000 to $299,999	5	1.6%	

		All Locations	US Census (2015)
	N	%	%
$300,000 to $349,999	2	0.6%	
$350,000 to $399,999	0	0.0%	
$400,000 or above	11	3.5%	
Age (average years)	46.95		37.6
Children under 18 (average)	0.66		

[1]National data only available for income category $200,000 and above
Source of U.S. Census Data: U.S. Census Bureau, 2011-2015 American Community Survey 5-Year Estimates

When comparing total demographics across all locations to the national averages, women were overrepresented in the sample, with an average of 63.0% of respondents being female compared to the national average of 50.8%. White people were overrepresented whereas Hispanics, blacks, Asians, and other racial groups were all underrepresented. Hispanics were the most underrepresented minority with only 4.0% of respondents compared to the national average of 17.6%.

Concerning levels of education, people who had not achieved high school degrees, people who had achieved only a high school degree, and people with only some college or with an Associate's degree were underrepresented within the sample. People who had achieved a Bachelor's degree or a graduate degree were overrepresented. Deviations from education levels could be due to the fact that only adults 18 years of age or older could participate in experiments, which would result in fewer who had only a high school education or less. Income ranges within $35,000 to $74,999 were fairly representative of national averages. However, groups under

$35,000 were underrepresented and groups over $75,000 were overrepresented. National data for income ranges was only available up to $200,000 or above, which comprised 5.3% of the national population.

Table 4.4 shows a summary of demographic variables by county. There were some notable deviations from average experimental demographics based on individual counties. For instance, Cecil County, Maryland was the only county that closely approximated national gender demographics with 50.7% male participants and 49.3% female participants. New Castle County, Delaware showed the closest approximation to national racial demographics with only 71.9% white participants, 7.3% Hispanic participants, 13.5% black participants, and 4.2% Asian participants.

Sussex County, Delaware and Chester County, Pennsylvania both showed the least representation of minorities with 92.9% and 95.5% white participants, respectively. A potential explanation for this deviation in Sussex County was that the two experiment venues were the Historic Lewes Farmer's Market and the Lewes Ferry Terminal, both of which are popular tourist destinations. The higher amount of tourists could skew demographics. This is particularly observed in income ranges, where participants from Sussex County in the income range of $400,000 or above were heavily overrepresented at 10.0% compared to a national average of only 5.3% in the range of $200,000 or above.

Overrepresentation of white people in Chester County could be explained by the farmer's market venue being in a much more rural location than all other farmer's market venues, which would over represent rural populations. Both Sussex County

and Chester County also featured the highest overrepresentation of graduate degrees with 43.5% and 25.0%, respectively. The drastic deviation in Sussex County could again be explained by the high amount of tourism in this county. Given that higher levels of education attained typically results in higher income, it could be possible that those with higher levels of education would have more disposable income to spend on traveling, resulting in a large overrepresentation of higher levels of education in Sussex County where many participants could have been tourists.

Table 4.4: Summary of demographic variables by county

	New Castle County, DE		Sussex County, DE		Cecil County, MD		Chester County, PA	
	N	%	N	%	N	%	N	%
Gender								
Male	34	34.7	26	30.6	37	50.7	23	33.8
Female	64	65.3	59	69.4	36	49.3	45	66.2
Ethnicity								
White	69	71.9	79	92.9	64	87.7	64	95.5
Hispanic	7	7.3	3	3.5	3	4.1	0	0.0
Black	13	13.5	1	1.2	2	2.7	0	0.0
Asian	4	4.2	1	1.2	2	2.7	2	3.0
Other	3	3.1	1	1.2	2	2.7	1	1.5
Education								
Less than high school	4	4.1	0	0.0	4	5.6	0	0.0
High school	20	20.4	11	12.9	17	23.6	13	19.1
Some college/Associate's	25	25.5	13	15.3	23	31.9	18	26.5
Bachelor's degree	33	33.7	24	28.2	12	16.7	20	29.4
Graduate degree	16	16.3	37	43.5	16	22.2	17	25.0

	New Castle County, DE		Sussex County, DE		Cecil County, MD		Chester County, PA	
	N	%	N	%	N	%	N	%
Household Income Level								
Less than $25,000	11	11.5	1	1.3	8	11.0	7	10.3
$25,000 to $34,999	5	5.2	9	11.3	9	12.3	5	7.4
$35,000 to $49,999	20	20.8	4	5.0	13	17.8	5	7.4
$50,000 to $74,999	21	21.9	8	10.0	17	23.3	14	20.6
$75,000 to $99,999	10	10.4	14	17.5	10	13.7	11	16.2
$100,000 to $149,999	14	14.6	21	26.3	10	13.7	17	25.0
$150,000 to $199,999	11	11.5	9	11.3	5	6.8	4	5.9
$200,000 to $249,999	2	2.1	3	3.8	0	0.0	1	1.5
$250,000 to $299,999	1	1.0	2	2.5	0	0.0	2	2.9
$300,000 to $349,999	0	0.0	1	1.3	0	0.0	1	1.5
$350,000 to $399,999	0	0.0	0	0.0	0	0.0	0	0.0
$400,000 or above	1	1.0	8	10.0	1	1.4	1	1.5
Age (average years)	41.2		55.0		43.8		48.2	
Children under 18 (average)	0.76		0.39		0.81		0.72	

4.5 Variables Used in Regression

To reduce variables in the regressions for sample sizes that were too small, some demographics groups were combined. On average, only 5.0% percent of respondents were Black, 4.0% were Hispanic, 2.8% were Asian, and 2.2% identified as “Other”. Due to these groups having less than 10% of participants each, the variable for ethnicity was reduced to either white (86.0% of respondents) or non-white (14.0%

of respondents). Concerning the education variable, only 2.5% of respondents said they had achieved less than a high school degree. Therefore, this group was combined with the High School group, so that the variable was for participants who had achieved a high school degree or less, comprising 21.4% of respondents. The midpoints of income ranges were used to have one variable for income in regressions, expressed in $1000's. Although samples deviate somewhat from general population averages within the U.S., once some groups are combined there are sufficient observations in each group to use them in regression models with a minimum of 10% of participants in a group.

In addition to demographic variables, the variable concerning the soonest consumers were planning on purchasing a watermelon was reduced from six levels to four levels. Initial testing indicated that only the levels of "within one month" and "more than a month from now" were statistically significant, therefore the shorter time period of potential consumption were reduced from four levels to two. The level "Today" was combined with "Within 1-3 days" so that the variable became "Within 3 days", with 43.6% of respondents falling in this category. The category "Within 1 week" and "Within 2-3 weeks" was combined to "Within 1-3 weeks", with 38.4% of respondents falling in this category. There were 10.4% of respondents who said they would purchase a watermelon within one month and 7.9% who said they were not planning on purchasing until more than a month from then.

Chapter 5

RESULTS AND DISCUSSION

5.1 Organization of Results and Discussion

This chapter begins with a description of the WTP values for watermelons with the four different label types previously discussed. Next, the effects of the addition of the Mar-Del label on expectations of locality, taste, and food safety is presented. Following this, the impact of the location and venue of the field experiments on differences in WTP with the addition of the Mar-Del label is analyzed. Lastly, the results of four Tobit regressions models are presented.

5.2 Willingness to Pay for Varying Label Types on Watermelons

At the eight locations of field experiments over four counties, 328 participants were recruited total. Each participant indicated the maximum amount that they would be willing to pay for a watermelon with four label types: no label, a preserved farm label, a Mar-Del Watermelon Association label, and both the preserved farm label and Mar-Del Watermelon Association label together. The Mar-Del Watermelon Association label indicated that the watermelon was grown in either Maryland or Delaware, although participants were told that all watermelons including the unlabeled watermelon were grown in Delaware. Therefore, the Mar-Del Watermelon

Association was not providing very much additional information, and was providing no new information concerning the origin of the watermelon. One hypothesis for this study was that consumers would be willing to pay more for the Mar-Del label despite the fact that it was not conveying significantly new information.

Table 5.1: Average WTP for each label type

Label Type	Mean WTP	Standard Deviation	Min WTP	Max WTP
No Label	$4.12	1.872	$0.00	$10.00
Preserved Farm	$6.41	2.115	$0.00	$12.00
Mar-Del	$5.94	2.056	$0.00	$12.00
Preserved Farm and Mar-Del	$7.01	2.270	$0.00	$12.00

Table 5.1 shows the average WTP values for all four label types. The unlabeled watermelon had the lowest WTP value at $4.12, followed by the Mar-Del labeled watermelon at $5.94. Next, consumers were willing to pay the second highest for the preserved farm labeled watermelon at $6.41 and were willing to pay the most at $7.01 for both the preserved farm label and Mar-Del label together. Despite the lack of significantly new information presented by the Mar-Del label in addition to no label, the maximum WTP for the unlabeled watermelon was $10.00, which was the only label category that never had a WTP at the upper limit of $12.00.

Table 5.2: Hypothesis tests and results

Hypothesis	Variable1	Mean	Variable2	Mean	P-value[1]
1a. Participants will have higher WTP for the Mar-Del label versus no label.	WTP_{NL}	\$4.12	WTP_{MD}	\$5.94	0.0000
1b. Participants will have higher ratings for expectations of taste, food safety, and locality for the Mar-Del label versus no label.	$Local_{NL}$	2.05	$Local_{MD}$	4.22	0.0000
	$Taste_{NL}$	2.91	$Taste_{MD}$	4.23	0.0000
	$Safety_{NL}$	2.84	$Safety_{MD}$	4.28	0.0000
2a. Participants will have higher WTP for the Mar-Del and preserved farm label versus the preserved farm label.	WTP_{PF}	\$6.41	WTP_{PFMD}	\$7.01	0.0000
2b. Participants will have higher ratings for expectations of taste, food safety, and locality for the Mar-Del and preserved farm label versus the preserved farm label.	$Local_{PF}$	3.74	$Local_{PFMD}$	4.31	0.0000
	$Taste_{PF}$	4.26	$Taste_{PFMD}$	4.50	0.0000
	$Safety_{PF}$	4.36	$Safety_{PFMD}$	4.50	0.0000
3. There will be a larger increase in WTP for the Mar-Del label when it is added to no label versus the preserved farm label.	$WTP_{PFMD} - WTP_{PF}$	\$0.59	$WTP_{MD} - WTP_{NL}$	\$1.82	0.0000

Hypothesis	Variable1	Mean	Variable2	Mean	P-value[1]
4. Participants in Delaware will have higher WTP for the Delaware-grown watermelon with a Mar-Del label versus participants in Maryland or Pennsylvania.	WTP_{MD} Chester & Cecil County	$5.76	WTP_{MD} New Castle & Sussex County	$6.07	0.0879
5. Participants at farmer's markets will have a higher WTP for the Mar-Del label than participants at parks or the ferry terminal.	WTP_{MD} Park/Ferry Terminal	$5.08	WTP_{MD} Farmer's Market	$6.07	0.1183

[1]The alternative hypothesis is H_a: mean(Variable1-Variable2) < 0

Table 5.2 shows a summary of hypotheses with accompanying t-tests. Hypotheses 1 through 3 use paired t-tests, and hypotheses 4 and 5 use two-sample t-tests. Hypothesis 1 demonstrates that the addition of the Mar-Del label to no label caused an increase in WTP that was significant at the 1% level. Hypothesis 2 demonstrates that the addition of the Mar-Del label to the preserved farm label caused an increase in WTP that was also significant at the 1% level. These results indicate that the addition of a local label that is conveying minimal additional information still results in premiums when it is added to either no label, or to a preserved farm label. Hypothesis 3 tests whether there is a difference in the premiums generated by the Mar-Del label when it is added to no label versus a preserved farm label. Adding the Mar-Del label to no label resulted in a larger increase in premium compared to adding the Mar-Del label to a preserved farm label at the 1% level. This indicates that a label

representing minimal new information is valued less when another label indicating significantly new information is already present versus when there was no label prior.

5.3 Expectations of Locality, Taste, and Food Safety

Table 5.3: Average ratings of expectation of locality, taste, and food safety

Label Type	Local	Taste	Food Safety
No Label	2.05	2.91	2.84
Mar-Del	4.22	4.23	4.28
Preserved Farm	3.74	4.26	4.36
Preserved Farm & Mar-Del	4.31	4.50	4.50

Participants were asked to rate their expectations of each label type concerning the following: whether they considered the watermelon with each label type to be local or not, what they expected the taste to be, and what they expected the food safety level to be. It was hypothesized that the addition of a Mar-Del label would increase participants' belief that the watermelon was local, that it would taste better, and that it would have a higher level of food safety. Table 5.3 shows the average ratings of locality, taste, and food safety expectations for each label across all experiment locations. When the Mar-Del label indicating that the watermelon was grown in Maryland or Delaware was added to no label, expectations that the watermelon was local increased from 2.05 to 4.22 out of a possible 5, where 5 indicated that it was "Definitely Local" and 1 indicated that it was "Definitely Not Local." When the Mar-

Del label was added to the preserved farm label, this increased expectations of local from 3.74 to 4.31. Both of these increases are significant at the 1% level, as demonstrated in Hypothesis 1 and Hypothesis 2 in Table 5.2. In addition, the difference in local expectation between the Mar-Del label of 4.31 and the preserved farm & Mar-Del label of 4.22 are significantly different from each other at the 5% level as demonstrated in Table 5.4.

Table 5.4: Paired t-test of local expectations of Mar-Del vs. Preserved Farm & Mar-Del

Variable	Obs	Mean	Std. Err.	Std. Dev.
Local, Mar-Del	328	4.2226	0.0601	1.0875
Local, Preserved Farm & Mar-Del	328	4.3079	0.0598	1.0835
diff	328	-0.0854	0.0395	0.7159

mean(diff) = mean(local_md - local_pfmd)
t = -2.1595 degrees of freedom= 327
Ha: mean(diff) < 0 Pr(T < t) = 0.0158

The Mar-Del label also influenced expectations of taste. When the Mar-Del label was added to no label, expectations of taste increased from 2.91 to 4.23. When the Mar-Del label was added to the preserved farm label, this increased expectations of taste from 4.26 to 4.50. Both of these increases are significant at the 1% level, as demonstrated in Hypothesis 1 and Hypothesis 2 in Table 5.2. In addition, the difference in taste expectation between the Mar-Del label of 4.23 and the preserved farm & Mar-Del label of 4.50 are significantly different from each other at the 1% level as demonstrated in Table 5.5. Due to an increase in taste expectations with the

combination of labels, it is likely that the "MAR-DELicious" slogan is not the only factor of the Mar-Del label that is increasing expectations of taste. Therefore, it appears that any addition of a label, despite minimal information conveyed, is increasing consumer expectations that the product will taste better.

Table 5.5: Paired t-test of taste expectations of Mar-Del vs. Preserved Farm & Mar-Del

Variable	Obs	Mean	Std. Err.	Std. Dev.
Taste, Mar-Del	323	4.2322	0.0425	0.7633
Taste, Preserved Farm & Mar-Del	323	4.4954	0.0398	0.7153
diff	323	-0.2632	0.0368	0.6609

mean(diff) = mean(taste_md - taste_pfmd)
t = -7.1566 degrees of freedom= 322
Ha: mean(diff) < 0 Pr(T < t) = 0.0000

Lastly, the Mar-Del label also influenced expectations of food safety level. When the Mar-Del label was added to no label, expectations of how safe the watermelons were increased from 2.84 to 4.28. When the Mar-Del label was added to the preserved farm label, this increased expectations of food safety from 4.36 to 4.50. Both of these increases are significant at the 1% level, as demonstrated in Hypothesis 1 and Hypothesis 2 in Table 5.2.In addition, the difference in food safety expectation between the Mar-Del label of 4.28 and the preserved farm & Mar-Del label of 4.50 are significantly different from each other at the 1% level as demonstrated in Table 5.6.

Table 5.6: Paired t-test of safety expectations of Mar-Del vs. Preserved Farm & Mar-Del

Variable	Obs	Mean	Std. Err.	Std. Dev.
Safety, Mar-Del	323	4.2755	0.0458	0.8237
Safety, Preserved Farm & Mar-Del	323	4.5015	0.0424	0.7616
diff	323	-0.2260	0.0320	0.5751

mean(diff) = mean(safe_md - safe_pfmd)
t = -7.0627 degrees of freedom= 322
Ha: mean(diff) < 0 Pr(T < t) = 0.0000

5.4 Effects of Field Experiment Location and Venue on WTP

Location and venue were both studied as potential factors impacting WTP. It was hypothesized that when field experiments were conducted in Delaware in either New Castle or Sussex County, participants would have a higher WTP for the Mar-Del label while knowing that the watermelons were grown in Delaware than participants in either Cecil County, Maryland, or Chester County, Pennsylvania. Hypothesis 4 from Table 5.2 demonstrates that we can reject the null that WTP for the Mar-Del label in Maryland or Pennsylvania was greater than or equal to WTP for the Mar-Del label in Delaware at the 10% level but not at the 5% level. This indicates that consumers in Delaware have higher WTP for a local label conveying minimal additional information when they know the watermelon was grown in Delaware than consumers outside of Delaware.

When WTP values are considered for all four label types together, participants at farmer's markets had higher WTP values than participants at parks at the 1% level, as demonstrated in Table 5.7 However, when examining only the Mar-Del label,

venue did not have a significant impact on location. Hypothesis 5 of Table 5.2 demonstrates that the null hypothesis that WTP for the Mar-Del label at a park is greater than or equal to WTP at a farmer's market can not be rejected at the 10% level, although the p-value of 0.118 is close. This indicates that although participants from farmer's markets have higher WTP on average, they are more aligned with park participants in their views of the Mar-Del label since venue does not impact WTP for this label type.

Table 5.7: Two sample t-test with unequal variances of effect of venue on average WTP across all label types

Variable	Obs	Mean	Std. Err.	Std. Dev.
WTP at parks (all)	636	5.6708	0.0933	2.2354
WTP at farmers markets (all)	676	6.0564	0.0892	2.3181
diff		-0.3856	0.1291	

mean(diff) = mean(WTP at parks -WTP at farmer's markets)

t = -2.9874 Satterthwaite's degrees of freedom= 1302.41

Ha: mean(diff) < 0 Pr(T < t) = 0.0014

5.5 Tobit Regression Models

Table 5.8: Tobit regression models 1 and 2

Model	(1)		(2)	
	WTP_{MD} -WTP_{NL}	P-values	WTP_{PFMD} -WTP_{PF}	P-values
Constant	1.5250	0.373	3.9243***	0.010
Cecil County	-0.5089	0.414	0.0433	0.927
Chester County	-1.5199**	0.019	-1.0146	0.114
Sussex County	-1.0600	0.109	0.3059	0.600
Farmer's Market (=1, Park=0)	-0.2624	0.571	-0.1891	0.601
Price Estimate	0.4295**	0.014	-0.1983	0.340
Purchase within 1 – 3 weeks	0.1243	0.795	-0.4092	0.388
Purchase within one month	0.5826	0.508	0.7469	0.317
Purchase more than a month	-0.3949	0.679	0.6966	0.332
Read food labels	-0.5035*	0.093	-0.2032	0.477
Familiarity PF	0.1803	0.277	-0.1696	0.186
Familiarity MD	0.6837**	0.032	-0.6344**	0.027
Preserved Farm Opinions & Shopping Habits	-0.0445	0.875	-0.3027	0.123
Taste and Safety Perceptions with Labels	0.9381***	0.006	0.4058	0.185
Local Perceptions with Labels	0.1786	0.530	-0.0140	0.946
Local, Taste, Safety Perceptions with No Label	-0.4901	0.123	-0.5036**	0.021

* significant at the 10% level, ** significant at the 5% level, *** significant at the 1% level

Table 5.9: Tobit regression models 3 and 4

Model	(3)		(4)	
	WTP_{MD} -WTP_{NL}	P-values	WTP_{PFMD} -WTP_{PF}	P-values
Constant	2.2995	0.234	4.2486***	0.009
Cecil County	-0.4551	0.492	0.1256	0.805
Chester County	-1.1448	0.105	-0.9263	0.159
Sussex County	-0.3388	0.660	0.4306	0.511
Farmer's Market (=1, Park=0)	-0.0423	0.927	-0.1530	0.690
Price Estimate	0.3692**	0.039	-0.2614	0.201
Purchase within 1 – 3 weeks	0.6895	0.161	-0.5196	0.261
Purchase within one month	1.1295	0.212	0.7530	0.362
Purchase more than a month	-0.0511	0.961	-0.0603	0.915
Read food labels	-0.4018	0.186	-0.2213	0.455
Familiarity PF	0.0844	0.609	-0.1949	0.146
Familiarity MD	0.6651**	0.037	-0.6232**	0.031
Preserved Farm Opinions & Shopping Habits	0.1091	0.703	-0.1561	0.523
Taste and Safety Perceptions with Labels	0.6634**	0.039	0.2919	0.291
Local Perceptions with Labels	0.4131	0.150	-0.0023	0.992
Local, Taste, Safety Perceptions with No Label	-0.4239	0.177	-0.4098*	0.055
Male (=1, Female=0)	-0.7417	0.116	0.3733	0.364
White (=1, Non-white=0)	-1.0355	0.204	0.1496	0.818
Some college/Associate's	-0.6857	0.376	1.0322	0.138
Bachelor's degree	-1.2160	0.139	1.3735*	0.055
Graduate or professional degree	-2.3717***	0.001	0.6686	0.370
Household Income ($1000's)	-0.00477***	0.010	-0.0004	0.842
Age	0.0267*	0.097	-0.0219	0.129
Children under 18	0.4644**	0.038	0.1964	0.276

* significant at the 10% level, ** significant at the 5% level, *** significant at the 1% level

Tables 5.8 and 5.9 show output from the Tobit models. Models 1 and 3 use the difference between WTP for the Mar-Del label and WTP for no label as the dependent variable, and models 2 and 4 use the difference between WTP for the preserved farmland and Mar-Del label compared to WTP for just the preserved farm label. The models show the impacts of adding a Mar-Del label conveying minimal additional information to no label (models 1 and 3) and to a preserved farm label (models 2 and 4). Table 5.8 shows models 1 and 2 without demographic variables, and Table 5.9 shows models 3 and 4 with demographic variables. The constants represent the base increase in WTP by adding the Mar-Del label, and coefficients represent WTP changes due to the analyzed variables. All models include location effects using county and venue. In addition, all models use the variables of soonest planned watermelon purchase, familiarity with preserved farmland and with the Mar-Del Watermelon Association, and the four factors identified in Chapter 4.

The constants represent the base amount of additional money that participants were willing to pay for the addition of the Mar-Del label, whether it was to no label or the preserved farm label. All of these constants are positive, as participants were almost always willing to pay more for the Mar-Del. However, it is noteworthy that only the constants for models 2 and 4, when the Mar-Del label is added to the preserved farm label, were statistically significant.

In all models, experiments being conducted in Cecil County, Maryland as opposed to New Castle County, Delaware had no significant impact on differences in WTP with the addition of the Mar-Del label. However, experiments being conducted

in Chester County, Pennsylvania were significant at the 5% level and negative for model 1. Being in Chester County reduced the difference in WTP with the addition of the Mar-Del label by $1.52 in model 1. Chester County was nearly significant in model 3 with a p-value of .105, and the effect of reducing the difference in WTP for the Mar-Del label by $1.14. This indicates that participants in Chester County did not value the Mar-Del label more than the no label or just a preserved farm label as much as participants in New Castle County. For model 1, Sussex County, Delaware was nearly significant at the 10% level with a p-value of 0.109 with a negative impact of -1.06, indicating that participants in Sussex County were only willing to pay approximately $0.47 (1.53-1.06) more for the Mar-Del label versus no label, compared to $1.53 more for participants in New Castle County. However, once demographic variables are added to this model in model 3, Sussex County is no longer even close to being a significant variable (p-value=0.660), indicating that differences in WTP found in model 1 due to Sussex County were potentially a matter of differences in demographics as opposed to a true effect of county.

Although when considering WTP across all labels, the impact of being in a farmer's market was positive and significant, venue was never significant when considering differences between WTP with the addition of the Mar-Del label. This indicates that being at a farmer's market meant participants were more likely to have higher WTP values overall, but did not value the addition of the Mar-Del label more relative to the more general population at parks.

Participants' estimates of how much watermelons cost was positive and significant at the 1% level for models 1 and 3, but not significant for models 2 and 4. For model 1, for every one dollar increase in participants' estimates of how much a watermelon costs, participants were willing to pay an extra $0.43 more for the Mar-Del labeled watermelon than for no label. For model 3, they were willing to pay $0.37 more. Price estimates of watermelons were significant in increasing the difference in WTP for the Mar-Del label when the label was added to no label, but not significant when adding the Mar-Del label to a preserved farm label. This may be due to the fact that participants were told to consider an average watermelon at an average grocery store when making their price estimate, which out of the four label types might best be represented by the unlabeled watermelon, helping the price estimate factor more into models when no label is being considered. However, in models 2 and 4, participants are being presented with more information in the form of the preserved farmland label, which deviates from an average watermelon at a grocery store, making the price estimate variable potentially less relevant. The soonest a participant was planning on purchasing a watermelon was not significant in any models, indicating that whether a consumer actively planned on purchasing a watermelon or not did not impact their difference in valuation for the Mar-Del label, regardless of whether it was in addition to no label or to the preserved farm label.

The frequency with which participants read food labels was significant for model 1 at the 10% level. The effect is to reduce the difference in WTP for the addition of the Mar-Del label to no label by $0.50 as participants' frequency of

reading food labels increases. This indicates that participants who read food labels more frequently are less likely to have a much higher WTP for the label conveying minimal additional information, compared to participants who read food labels less frequently. It is possible that participants who are more diligent in reading food labels were more likely to notice that the Mar-Del label was not conveying significantly new information, due to their experience in more carefully examining labels. Frequency of reading food labels was not significant in the other models.

Consumer familiarity with preserved farmland was not significant in any models. However, consumer familiarity with the Mar-Del Watermelon Association was significant at the 5% level in all models. It was positive and significant for models 1 and 3, and negative and significant for models 3 and 4. For models 1 and 3, an increase in familiarity with the Mar-Del Watermelon Association increased the gap in WTP for the Mar-Del label versus no label by $0.68 and $0.67, respectively. In contrast, increase in familiarity with the Mar-Del Watermelon Association had the opposite effect for models 2 and 4, decreasing the gap in WTP by $0.63 and $0.62 respectively. Therefore, compared to those with less familiarity with the Mar-Del Watermelon Association, familiarity caused participants to value the Mar-Del label compared to no label more, but value the Mar-Del label compared to the preserved farm label less. A possible explanation for this is that familiarity with the association caused participants to view Mar-Del label more favorably and thus place greater value on it compared to no label. However, perhaps with greater familiarity with the association, they found the associated attributes of the watermelon to be more

interchangeable with potential attributes of a preserved farm watermelon, causing them not to place as high a value on the combination of the two labels if they viewed them as conveying similar attributes.

The statistical significance of the four factors varied among models. The factors *Preserved Farm Opinions & Shopping Habits* was not significant in any models. This indicates that a higher rating of the importance of various potential attributes of farmland preservation in addition to higher frequencies of buying local, buying organic, and attending farmer's markets did not lead to an increase in higher WTP for the Mar-Del label, regardless of whether it was added to no label or to the preserved farm label. The factor *Local Perceptions with Labels* was also never significant in models. This indicates that as participants were more likely to believe that the labeled watermelons met their personal definitions of local, this still did not increase their difference in WTP for the Mar-Del label. This seems counterintuitive, as it was hypothesized that higher confidence that the Mar-Del label met their definitions of local would result in a significant increase in WTP for the Mar-Del label compared to no label. A potential explanation is that participants who ranked the locality of the Mar-Del label more highly also ranked the locality of the unlabeled watermelon more highly, and thus did not have a significantly greater valuation for the Mar-Del label based solely off of an increase in perception of the watermelon being more local.

Taste and Safety Perceptions with Labels was significant at the 1% level and 5% level in models 1 and 3 respectively. In models 1 and 3, as participants' expectations of taste and safety increased with the presence of a label, the increase in

WTP for the Mar-Del label compared to no label increased by $0.94 and $0.66, respectively. These positive values indicate that as participants ranked the taste and safety of watermelons that were labeled (Mar-Del label, preserved farm label, and both Mar-Del and preserved farm label) more highly, the gap in WTP for the Mar-Del label compared to no label increased, showing a preference for the Mar-Del label over no label due to an increase in expectations that a labeled watermelon was safer and would taste better than an unlabeled watermelon. It is noteworthy that an increase in taste and safety expectations for a labeled watermelon did not result in an increase in WTP for the Mar-Del label in models 2 and 4 when the preserved farm label was already present. This indicates that higher expectations of taste and safety for a labeled watermelon led to greater valuation of the Mar-Del label when there was no label present, but not when labels were already present. This could potentially be because participants were already satisfied with the higher expected level of taste and safety presented by the preserved farm label, so the addition of the Mar-Del label was not as important in influencing their higher WTP for both the two labels together.

Local, Taste, Safety Perceptions with No Label was significant at the 5% and 10% level for models 2 and 4 with coefficients of -0.5036 and -0.4098 respectively. This indicates that as participants' expectations of locality, taste, and safety increased for the unlabeled watermelon, their differences in WTP for the labeled watermelons decreased. Therefore, consumers who had higher expectations that the unlabeled watermelon was local, tasted good, and was safe were not willing to pay as much additional money for a watermelon with a Mar-Del label compared to a preserved

farm label, indicating the importance of perceptions of local, taste, and food safety in consumer WTP. It is noteworthy that this factor is only significant when the Mar-Del label is added to the preserved farm label, but not when added to no label.

Models 3 and 4 both include demographic variables. Neither gender nor ethnicity was ever significant in determining the difference in WTP for the Mar-Del label, regardless of whether it was added to no label or to the preserved farm label. The only demographic variable that was significant in model 4 was whether the participant had achieved a Bachelor's degree, which was significant at the 10% level with a coefficient of 1.3735. This means that participants with a Bachelor's degree were willing to pay an additional $1.37 more for the Mar-Del label compared to just a preserved farm label than those with an education level of high school or less. Neither income level, age, nor number of children under 18 in the household was significant for model 4.

More demographic variables were significant for model 3 than for model 4. Although possession of a Bachelor's degree was not significant, a graduate degree was significant in model 3 at the 1% level with a coefficient of -2.372, meaning that participants with high school or less would pay $2.37 additional for the Mar-Del label versus no label than participants with graduate degrees. It is possible those with graduate degrees were more likely to consider the labels more diligently and thus better comprehend that the Mar-Del label was not conveying significantly new information, reducing the additional amount that they were willing to pay for this label. Household income was significant at the 1% level for model 3 with a coefficient

of -0.00477, meaning that for every $1,000 increase in household income, participants' increase in WTP between the Mar-Del label and no label decreased by $0.0048. Age was significant at the 10% level for model 3 with a coefficient of 0.0267, indicating that as age increased, participants were more willing to pay more for the Mar-Del label versus no label. The number of children under 18 in the household was significant at the 5% level, meaning that with every additional child in the household, participants were willing to pay an additional $0.46 for the Mar-Del label versus no label. This is potentially due to an increased desire to provide food to children that is expected to be of higher taste and food safety.

Chapter 6

CONCLUSION

6.1 Summary of Experiment and Conclusion

A rise in consumers' social consciousness and desire to know the location and means of production concerning food has led to an increase in the presence and manner of food marketing and labeling (Auger et al. 2006; Zepeda et al. 2013). There is a wide range of possible labeling options in food production, including origin labeling, sustainability/environment-related labeling, attribute labeling, and health/nutrition labeling. However, as more and more types of labeling emerge, it is important to understand how consumers are reacting to these labels. Researchers have determined premiums associated with many label types such as organic, local, and eco-friendly, but it is critical to understand why consumers are willing to pay more for these products. To begin to understand consumers' preferences for labels, it must be understood what consumers believe they are obtaining from the labels, and whether their perceptions deviate from what they are truly being guaranteed by a label.

To study this question, this thesis examined the impact of adding a label that conveyed minimal additional information on consumer WTP for a watermelon. The label conveying minimal additional information was a Mar-Del Watermelon Association label. The main information that the label conveyed was that the

watermelon had been grown in either Maryland or Delaware, meaning that this label conveyed the potential for the watermelon to be local. However, consumers were told that all watermelons available to them regardless of labeling had been grown in Delaware, theoretically negating the main additional information being conveyed by the local label. Although participants were also told the label meant the watermelon growers were part of an association, no other information on this was provided besides the state of origin of the growers. To study the impact of the Mar-Del label, changes in WTP were observed when the label was added both to no label and when added to a preserved farm label, which told participants that the watermelon had been grown on preserved farmland in Delaware.

Field experiments were conducted in eight locations with a total of 328 participants in farmer's markets and parks in Cecil County, MD, Chester County, PA, and New Castle County, DE. Experiments were conducted at a farmer's market and a ferry terminal as opposed to a park in Sussex County, DE. A BDM mechanism was used to elicit WTP for four labeling types on a watermelon: no label, a Mar-Del label, a preserved farm label, and both the Mar-Del label and the preserved farm label together. Participants then completed a survey on shopping habits, demographics, perceptions of taste, safety, and locality, and perceptions of preserved farmland.

On average participants were willing to pay $1.82 more for a watermelon with the Mar-Del label compared to no label which was statistically significant increase at the 1% level. When the Mar-Del label was added to the preserved farm label, participants were willing to pay $0.60 more, an increase which was also significant at

the 1% level. The increase from adding the Mar-Del label to no label was statistically and significantly greater than the increase from adding the Mar-Del label to the preserved farm label at the 1% level. This indicates that consumers are willing to pay more for a label, even when it is conveying minimal additional information. However, their additional WTP decreases when another label is already present, indicating a diminishing marginal WTP for the label conveying minimal information when another label is present.

To seek to better understand what prompted these premiums placed on the labels conveying minimal information, consumers' perceptions of taste, food safety, and locality were analyzed for the varying label types. When the Mar-Del label was added to no label, consumers' expectations of taste, food safety, and belief that the watermelon was local all increased at the 1% level of statistical significance. Therefore, the addition of a label conveying minimal information made participants believe that the watermelon would taste better, was safer in terms of food safety, and was more likely to meet their definition of local. One concern was that the phrase "MAR-DELicious" on the Mar-Del label would result in an increase in expectations of taste, as opposed to just the impact of a label. However, given that taste expectations also increased with the addition of the preserved farm label to no label, it would appear that the addition of any label to no label could potentially increase taste expectations.

What is particularly noteworthy is the increase in participant's belief that the watermelon was local with the addition of the Mar-Del label. They had been told by

experimenters that all watermelons including the unlabeled watermelon were grown in Delaware. Given this information, in theory the presence of a label shouldn't have changed expectations of locality given that all watermelons were grown in the same state. However, perceptions did increase with the addition of the Mar-Del label, even if it was not conveying any new information on the origin of the watermelon. This implies a potential inherent lack of trust in any unlabeled food product if consumers were told its location, but they still did not trust that it was as local as its labeled counterpart. In addition, participants' beliefs that a labeled watermelon would taste better and be safer than an unlabeled watermelon imply a lack of trust in unlabeled food products.

Statistically significant increases in expectations of taste and food safety were present at the 1% level with the addition of the Mar-Del label to the preserved farm label, and were significant at the 5% level for expectations of whether the watermelon was local. Therefore, even when a label providing significantly different information from no label is present, adding the Mar-Del label conveying minimal additional information still increases expectations of taste, food safety, and the watermelon being local. In this case, the preserved farm label said "Delaware" on the label and participants were told that all the watermelons were grown in Delaware. Despite this, there was still an increase in participants' belief that the combination of the Mar-Del label and the preserved farm label best met their definition of local. Unlike the addition of the Mar-Del label to no label, here the origin of the base label (the preserved farm label) was specifically written on the label, whereas participants relied

on just the experimenters to tell them that the unlabeled watermelons were grown in Delaware. The fact that participants still felt the combination of the two labels was more local than just the preserved farm label indicates an increase in trust of locality with the addition of a label, as opposed to participants simply not trusting the experimenters when they say the unlabeled watermelons were also grown in Delaware. These increases in belief that the food product is local with the addition of labels conveying minimal additional information indicate that some perception of what local means to individuals relies more heavily on labeling than on actual origin of production.

In conclusion, the addition of a local label, regardless of actual additional information provided, increases consumer's trust that the food product will taste better, has a higher level of food safety, and is local. In addition, consumers are willing to pay more for a local label conveying minimal information regardless of whether the label is added to no label, or to a label indicating that the product originated on preserved farmland. However, consumers are willing to pay a greater premium for the Mar-Del label when it is added to no label versus when it is combined with another label. This finding could have significant impact for both farmers within the Mar-Del Watermelon Association, and have a more widespread impact on farmers across the U.S. Farmers in the Mar-Del Watermelon Association currently do not display individual labels on their watermelons. However, if they were to display such label, consumers would be willing to pay more for their watermelons. In broader applications, simply including a label, even if it does not convey significant

information, could result in consumers willing to pay more for a watermelon grown at any farm across the U.S., resulting in increased profits for the farmers, and a higher trust on behalf of the consumers that their food will taste good, will be safe, and is local. It is possible these findings could apply to any food product, although further studies would be required to establish this effect.

6.2 Limitations to Study and Future Work

This study focuses specifically on watermelons grown in Delaware with field experiments conducted in Delaware, Maryland, and Pennsylvania. The study observed three adjacent counties and one non-adjacent county in these states to determine whether state or proximity played more of a role in determining whether consumers viewed a food product as local or not. Additional studies could increase distance between locations of field experiments, to determine if and at what distance consumers stop placing a premium on a label indicating origin of production without conveying significantly new information. In addition, different types of food products could be tested to determine whether this effect can be observed across all food products.

The main limitation to this study was in the potential for information conveyed in the Mar-Del label. Although experimenters expected the main information conveyed to simply be the two states of origin (Maryland and Delaware), there were two identifiable potential sources of information. One source was the phrase "MAR-DELicious," which could be an indication of taste to participants, and one was the fact that the label told consumers that the watermelon growers were part of an association.

There was no other information provided by the label to verify the claim that the watermelons were delicious as implied, although there was the potential for this advertising slogan to sway participants. In addition, although the only information participants were told about the Mar-Del Watermelon Association was it was for watermelon growers in Maryland and Delaware, it is possible there were preconceived notions about associations held by participants. Given the overall lack of familiarity with the Mar-Del Watermelon Association, this was not a major concern, but still a source of potential bias. Therefore, in order to fully isolate the impacts of just a local label conveying no additional information, a label would need to be used that only conveyed state of origin without any information such as a slogan or association.

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Appendix A

SURVEY USED IN FIELD EXPERIMENTS

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 rate 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 confidential 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

B

SCRIPT USED IN FIELD EXPERIMENTS

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.

If Yes:
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

A card will say:
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.

Hand them the card

This definition card will provide you with some information on preserved farmland and the Mar-Del 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.

C

INFORMED CONSENT ON BACK OF BID SHEET

I have been informed about the study procedures. I agree to participate and I am at least 18 years of age.

_____ Yes

D

IRB LETTER OF VERIFICATION

RESEARCH OFFICE

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DATE:	December 22, 2015
TO:	Joshua Duke, PhD
FROM:	University of Delaware IRB
STUDY TITLE:	[844941-2] FSMIP Preserved Farm Project
SUBMISSION TYPE:	Amendment/Modification
ACTION:	DETERMINATION OF EXEMPT STATUS
DECISION DATE:	December 22, 2015
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.