

**ANALYZING THE CONSUMER SWEET TOOTH:
A FIELD EXPERIMENT ON CONSUMER PREFERENCES
FOR CHOCOLATE**

by

Lenna Hildebrand

A thesis submitted to the Faculty of the University of Delaware in partial fulfillment of the requirements for the degree of Master of Science in Agricultural and Resource Economics

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ABSTRACT

In an environment of increasingly health conscious consumers, how they feel about the quality and safety of foods from different regions could have significant impact on their impressions of, and willingness to pay (WTP) for, origin labeled products leading to more government involvement in creating origin labeling programs. This study aimed to determine if regional labels on chocolate bars: 1) influenced consumers' taste perceptions, and 2) changed their WTP. In order to complete these objectives both a taste evaluation and BDM auction mechanism were employed in five field experiment sessions conducted at different locations in Delaware.

Results showed a higher perceived food safety, food quality, and economic status for Europe and the U.S. over South America and Africa. When comparing labeled versions, participants preferred the taste of, and were willing to pay more for, chocolate from more-developed (Europe and the U.S.) over the less-developed regions. However, in comparing labeled and unlabeled versions of the same chocolate, it was found that origin labels did not hinder taste evaluations or WTP, and instead typically resulted in premiums. This was counter to initial hypotheses and suggests implementing voluntary or mandatory origin label can raise product evaluations and increase sales.

Taste evaluation and WTP bid difference models were conducted in order to identify variables that had a significant impact on the premium origin labeled products obtained over unlabeled products. Even though significant variables varied widely by model, there were a few that had an impact on both taste evaluation and WTP differences including income, children, post graduate education, and consumer importance placed on quality.

Chapter 1

INTRODUCTION

1.1 Origin Labeling Background

Product labeling provides both product-specific information and quality reassurance to consumers, and has gained increasing attention as consumers are becoming concerned with how their food is produced and where it comes from. However, it was not until more recently that high importance has been placed on origin labeling legislation for many governments worldwide. This trend comes in response to increased knowledge about food safety recalls and food scares, a rise in knowledgeable health conscious consumers, and increased concerns of the quality of food from certain regions.

Safety concerns about food from different regions may be a large driver behind consumer demand for origin labeling schemes in the United States as well as other countries. For instance, outbreaks of antibiotic resistant *Salmonella* associated with ground turkey in August 2011 forced 26 states to recall 36 million pounds of turkey (Watkins, 2011). More recently, in May 2013, cadmium levels surpassed the national limit in nearly half the rice tested at restaurants in Guangzhou, China, angering citizens and raising concerns for all rice produced in China (Buckley, 2013). Origin labeling provides the ability of consumers to respond to such scares involving food

products, aids in the development of perceptions on the country's food safety and quality levels, and assists in shaping their demand for food from different regions.

More and more countries are beginning to explore the idea of origin labeling without a complete understanding of how this labeling will influence consumer WTP and perhaps even taste preferences for products. Before such labeling requirements are implemented, knowing this information would be vital in determining its success and profitability for producers and consumers alike. For instance, there is currently no mandatory origin label law for chocolate bars in the U.S., but some companies throughout the world are including origin labels voluntarily on their products. Due to this, two questions come to the forefront: 1) is there a benefit from including chocolate bars in a mandatory origin labeling law, and 2) would it be beneficial for producers to implement a voluntary origin labeling scheme?

With this in mind, this research is devoted to studying how consumer perceived WTP and taste preferences, when production origin is labeled, match up with their actual WTP and taste preferences, when production origin is not labeled, for chocolate bars from different regions from around the world. By doing this, any potential premiums for origin labeling will be examined to analyze if origin information made a difference in consumer purchase decisions, the influence of labels on consumer's taste preferences will be investigated, and what factors and/or perceptions behind such premiums will be identified. This will lead to valuable insight for countries, policy makers and producers worldwide in order to assist them in making more educated and profitable decisions for all parties involved.

1.2 Why Chocolate?

According to the National Confectioners Association (NCA) 52% of Americans claim chocolate as their favorite flavor (Bradford, 2013). Statistics show that the average American consumes at least a half-pound of chocolate per month (Sena, 2013; Bensen, 2008). In 2010, retail sales for chocolate products reached \$18 billion, and shows a 3 to 4 percent annual increase each year (Bradford, 2013). The United states is the leading producer for chocolate products in North America, with a market share of 86% and over a \$1 billion in exports during 2010 (Bradford, 2013). Due to its reputation of being an “affordable luxury”, it is estimated that the global market will acquire annual sales of \$98.3 billion by 2016 (Sena, 2013; Bradford, 2013).

While the global chocolate market expands by approximately 3% each year, cocoa supplies have failed to meet demand in 10 of the 20 past years according to the International Cocoa Organization (ICCO) in London (Almeida and Monnier, 2013). By the end of the decade, demand is projected to outpace production by one million tons. During the recent shortages, cocoa experienced annual price swings of more than 20%. In 2011, cocoa prices reached a 32-year high, but have proceeded to fall by 74% since then. Some factors that have been reducing cocoa production levels and prices for producers include: lack of funding for sustainable development and disease resistant cocoa plants, rising temperatures due to climate change, and political instability in countries were cocoa is produced (Sena, 2013; Almeida and Monnier,

2013). Cocoa farms are too small to be economical, and are being abandoned in favor of more profitable and stable crops such as rubber.

Chocolate is an ideal candidate for an origin labeling experiment for several reasons: 1) as stated above, it is a preferred flavor and sweet treat among many consumers, 2) it is easily manipulated to fit the needs of our experimental design discussed later on, 3) it is common perception that European chocolate is superior to chocolate from other regions and that chocolate from the U.S. is also of good quality, allowing an analysis of perceived preferences versus actual preferences to be conducted, and 4) there is a lack of knowledge regarding how people would respond to chocolate produced in developing regions where the majority of cocoa is actually produced.

1.3 Objectives

There are several ways that this study aims to identify motivations behind WTP premiums for origin labeling, and to help bring insight to possible avenues to alleviate some of the strain that has been placed on chocolate producers around the world. The primary objective is to compare consumer true taste preferences and willingness to pay (WTP) premiums, those found when production origin is labeled, to their perceived taste preferences and WTP premiums, those found when production origin is not labeled, for chocolate from different regions around the world. This will provide valuable information as to whether a premium could be obtained by the producer (potentially raising profitability for all sectors of the industry) if they developed an origin labeling scheme for their products. Mean comparisons of bids

and taste evaluations for the chocolates that have region labels will be performed to indicate any overall difference between the taste evaluations and WTP figures for the different regions. Any differences would also assist in providing evidence of consumer demand for origin information. Lastly, consumer perceptions and opinions on the food quality, food safety, and economic development status for each region, as well as other key variables will be examined to see if they influence the consumer's WTP and taste preferences for chocolate from that region. This will allow for an investigation of what causes the bids to be different between the labeled versus unlabeled versions and highlight potential variables that could indicate target markets or profitable marketing avenues.

1.4 Organization of Thesis

Following this introduction chapter, a thorough literature review expands upon previous studies and findings pertaining to origin labeling, consumer WTP for products from “more-developed” versus “less-developed” regions, overall consumer chocolate perceptions, and WTP for chocolate. In chapter three, the experimental design will be presented including the sampling procedure, the experimental layout, and the reasoning for the questions embodied in the survey. Chapter four begins with the discussion of the descriptive statistics followed by the data analysis methods adapted to this thesis to examine taste preferences and WTP. In the chapter five, overall mean bid comparisons for the chocolate bars from the different regions will be analyzed to determine any suggested premium differences between “more-developed” versus “less-developed” regions. Detailed interpretation of the results from the

individual models will also be provided. Lastly, the final part of the thesis will first focus on the implications and limitations of the study, as well as possible future research.

Chapter 2

LITERATURE REVIEW

2.1 Impact of Origin Labeling

The expansion of international trade has increased consumer exposure to the international market, increasing the number of purchase decisions involving product country-of-origin (Nayir and Durmusoglu, 2008). For example, Chern and Chang (2012) found that 87.2% of respondents in Taiwan viewed country of origin to be important when making food purchasing decisions. Schnettler et al. (2009) found that consumers in the southern part of Chile were found to view origin as the most important attribute in the decision to buy beef.

However, the true impact of origin labeling is highly debated. For example, a Kansas State University study in November of 2012, found no significant impact on consumer demand for beef or other covered products due to Country-of-Origin Labeling (COOL)(Packer, 2013). In general, consumer studies consistently provide evidence of beneficial impacts from origin labeling including WTP premiums and increased consumer demand. Several critics suggest that the success of a geographical labeling program at creating market premiums is only possible if the reputation of the product is superior to alternatives (Loureiro and McCluskey, 2000; Quagraine et al., 2003; and Winfree and McCluskey, 2005). Chern and Chang (2012) conducted a benefit evaluation of COOL in Taiwan through the use of an auction experiment.

Premiums for Taiwan products over their alternatives of China olives, China oolong tea, and Vietnam oolong tea, were estimated to be 67.5%, 84.7% and 99% respectively. A domestic COOL premium for pork of 5% in Britain, and 11% in France, when compared with pork labeled as “imported”, was obtained in a study conducted by Dransfield et al. (2005).

The impact of mandatory and voluntary labeling programs related to traceability and origin of beef have been studied at great length due to Bovine Spongiform Encephalopathy (BSE) health concerns in the past decade (Dickinson and Bailey, 2002; Hobbs, 2003; Lusk et al., 2003; Roosen et al., 2003; Verbeke and Ward, 2003; Alfnes and Rickertsen, 2003; Alfnes, 2004; Enneking, 2004; Dickinson and Bailey, 2005; Loureiro and Umberger, 2005). Umberger et al. (2003) found that Chicago and Denver consumers’ preferences for steaks, after a visual evaluation and bidding on two steaks differentiated only in package labels, resulted in an average premium of approximately 20% for the US-labeled steak. Lim et al. (2012) support these results when they employed a Latent Class Model (LCM) which implied that U.S. consumers preferred domestic-originated beef to imported beef. The estimated range of discount required for consumers to switch from U.S. to Canadian steak was \$1.09 to \$35.12 per pound. In Feuz et al. (2004) bids for domestic U.S. steaks were also found to be significantly higher than for Canadian or Australian steaks. A clear preference for domestically produced beef steaks, along with many other products, has emerged, supporting the demand for origin labeling as a method of search cost reductions for consumers who desire domestic products.

2.1.1 Origin Labeling as a Food Quality and Safety Determinant

According to Chern and Chang (2012) respondents considered safety and freshness (quality) to be highly important for their food choices. Proponents for COOL claim that origin labels can provide assistance to consumers through indicating product quality and safety based on known information and developed perceptions toward each region. Van der Lans et al. (2001) reported that regional product preferences can be influenced indirectly by geographical indications through perceived quality. Hoffmann (2000), Grunert (2005) and Lusk et al. (2006) also suggested that consumers use origin labeling as a cue in evaluation of the quality of the product by invoking knowledge and perceptions towards the products production origin. Loureiro and Umberger (2007) claimed that the origin label could only signal enhanced quality if the source-of-origin is associated with higher food safety or quality. Van Ittersum et al. (2007) found perceived quality to be an important determinant of WTP for protected regional products.

Quality is not the only attribute that can be signaled by origin labeling. The food safety perceptions of regions can influence a consumer WTP when labeling allows consumers to link products to specific regions. For instance, Loureiro and Umberger (2003) concluded that high food safety perceptions of U.S. beef were one of the key driving factors for the large premiums Colorado consumers were willing to pay to obtain “Certified US” beef. Chen and Lin (2012) results showed that 68% of participants were concerned about the safety of imported foods, but only 16% felt as if the government was handling food safety matters properly. Freshness (or quality) and

safety of imported foods was indicated to be very important to purchase decisions by 98% of these participants. There is still the question of if these perceptions would hold in reality.

2.2 “More-Developed” vs. “Less-Developed”

Schooler (1971), and Wang and Lamb (1983) found that products produced in less-developed countries are considered of lesser value than those produced in more-developed countries, which implies a positive relationship between product evaluations and degree of economic development. Ahmed and d’Atous (2008) support this finding by indicating that the quality of a country’s products are a reflection of the perceived quality of workers which is influenced by the industrialization level of the country. Their results suggest that consumers viewed the manufacturing process, and in return the products themselves, of less-developed nations as less favorable due to perceived lower quality, than those in more-developed nations.

Two years later, Teo et al. (2010) conducted a study on chocolate brand familiarity and product-country evaluation among young consumers in Malaysia. In order to investigate differences in young consumers’ evaluations of developed nations, the countries selected included Malaysia and eight foreign developed countries. Using a Likert-scale to indicate quality perceptions, the results from this study supported those of Ahmed and d’Atous (2008) by suggesting that both male and females evaluated chocolate from all eight developed nations to have higher quality compared to comparable chocolate from Malaysia, a less-developed country. Alfnes and

Rickertsen (2003) and Alfnes (2004), examined Norwegian consumers' preferences for beef produced with or without hormones, and originating from several different countries. In general, they found that Norwegian consumers preferred beef originating from developed countries to developing countries.

2.3 Effects of Tasting on Consumer WTP and Demand for Origin Labeling

The effects of tasting on consumer WTP and demand for origin labeling has not been highly researched. Chern and Lin (2012) used Vickrey second-price sealed-bid auction and tastings to determine consumer's WTP for products from Taiwan versus those from China and Vietnam. Chern and Lin (2012) claim that auction results with tasting provide more credible data, because real market situations are then reflected. Before tasting, there was a 22.38 (New Taiwan Dollars per 150g) premium for the Taiwan plum over the China plum; however, following tasting, the premium was reduced to 17.58. Overall, tasting lowered the bids for Vietnam tea, but raised the bids for Taiwan and China teas, providing adequate evidence that product tasting did in fact impact the participants' WTP. Very high premiums for Taiwan tea ranged from 83 to 109%, and 55 to 66% for Taiwan charcoal-smoked plums. If food products imported from China, Vietnam and other Southeast Asian countries are clearly labeled with origin information they will encounter strong competition from their domestic counterparts.

Peterson et al. (2013) investigated Japanese consumers' valuation of Rice and Pork from domestic, U.S., and other origins using nonhypothetical, demand revealing auctions. U.S., Japanese, and third country products were valued similarly in a first

auction round based only on taste. When country of origin was revealed, the valuation for domestic rice increase by more than 20%, while the value of U.S. origin rice reduced by 30%. When participants were given information about both origin and taste, U.S. pork was valued at only 60% of its domestic counterpart and rice was valued at only 54%. These results suggest that taste does in fact impact consumer WTP when then products were not labeled, but origin information held a higher influence on consumer WTP when it was revealed in spite of taste evaluations.

2.4 Consumer Chocolate Perceptions

Chocolate is a favorite sweet delicacy for many people throughout the world and is typically considered to be an “affordable luxury”. It is used in a variety of ways from confectionary to baking. There are three general types of chocolate: milk chocolate, white chocolate and dark chocolate. Consumers generally view milk chocolate as being the generic form of chocolate, as it is the most commonly consumed (Gambaro and Ellis, 2012). Gambaro and Ellis (2012) conducted a study on consumer perceptions of different types of chocolate and found that chocolate is associated with positive feelings, good taste, sweetness and feelings of warmth, energy, creaminess and bitterness. No reference to the dislike of the chocolate was noted and very few occurrences of negative sensory attributes were found.

Through their study, Gambaro and Ellis (2012) identified three consumer clusters with different views of the healthiness for the different types of chocolate. Cluster one stated that they did not view any of the types (milk, white or dark) of chocolate to be very healthy. In contrast, cluster two considered dark chocolate as

very healthy and white chocolate as the least healthy. All three of the different types were perceived as being very healthy by cluster three. The authors go on to state that scientific evidence has been shown that dark chocolate is the healthiest option of the three due to the high cocoa content of dark chocolate which contains polyphenols.

2.5 Contribution to Literature

Numerous studies have been devoted to investigating the impact of origin labeling on consumer demand and WTP for meat and fresh produce. These studies have provided very valuable information for producers and policy makers yet there is an incomplete understanding of how this labeling will influence consumer WTP, and to the best of the author's knowledge, no information on how origin information impacts taste preferences for products. For instance, little is known about the impact of origin labeling on processed foods, especially chocolate. The chocolate industry has been expanding recently to include unique and novelty products of perceived higher quality from exotic regions around the world. Knowing if origin labeling would help chocolate producers to obtain premiums or if it would be desired by consumers to help aid in their purchasing decisions would be valuable for the success and profitability of all stakeholders.

Through the implementation of experimental economics this study aims to add to literature by providing such insight using chocolate from different regions around the world. Consumer true taste preferences and WTP premiums for chocolate produced in different regions will be determined for labeled versus unlabeled versions. The author is unaware of any studies which have implemented simultaneous, labeled and

unlabeled, taste evaluations to determine true preferences for products in past literature. Obtaining consumer perceptions on the quality and food safety for sweets from the selected regions, the region's economic development status, as well as other key variables, will expand knowledge on how these factors influence consumer WTP and demand for goods from different regions. These results will also provide additional insight as to what causes differences in WTP bids between labeled and unlabeled versions of chocolate from the same region, indicating potential target markets or variables of interest that should be exploited in search of profitable marketing strategies. Lastly, as international trade continues to expand rapidly, there is a need for more information on consumer demand for products from more developed and less developed regions.

Chapter 3

EXPERIMENTAL DESIGN

The main objective of this thesis was to analyze how region labeling impacts consumer taste preferences and WTP for chocolates from around the world. Second, consumer perceptions on the food quality, food safety, and economic development status for each region, as well as other key variables will be examined to see if they influence consumer's WTP for chocolate from that region. Thirdly, a brief comparison of mean bids for the chocolates that have region labels will be performed to indicate any overall difference between the taste evaluations and WTP figures for chocolates from more developed regions versus less developed regions. Field experiments using a combination of an experimental auction and taste evaluations were chosen to elicit consumer's WTP and true taste preferences for the different chocolates. Fox et al. (1996) stated that an experimental setting similar to the real world is created when using auctions since real money and real products are used to provide incentives for participants to reveal their true values. Taste evaluations will also encourage consumers to reveal their true preferences for the bar, and allow for an analysis of the impact that region labeling will have on taste. Additional information pertaining to perceptions on food safety, quality and economic status of the different regions, as well as important factors in purchasing decisions and social demographics, were collected through accompanying surveys.

3.1 Experimental Design

This study was a field experiment that utilized a taste evaluation and Becker-DeGroot-Marschak (BDM; Becker et al., 1964) auction mechanism to analyze consumer true taste preferences and WTP for chocolate from different regions. Milk chocolate was used throughout the experiment since it is viewed as the generic form, and most popular form, of chocolate by consumers (Gambaro and Ellis, 2012). The milk chocolate bars used for this study included bars from: the United States, Europe, South America and Africa. Items within the taste evaluation and WTP sections were randomized in order to avoid order effects bias.

The subjects completed taste evaluations of the different chocolate bars, and were asked to indicate his or her WTP for each bar. Following this, they filled out a questionnaire involving food safety, food quality, and economic status perceptions, as well as attribute importance, past purchase behavior and social demographics questions. Upon completion of the survey, a BDM auction mechanism was utilized to simulate market conditions and determine if the participant bought a chocolate bar and/or how much compensation was due.

3.2 Taste Evaluations

The first segment of the experiment analyzed consumer taste preferences when it came to chocolate bars from several different regions. Each subject was presented with three chocolate pieces to taste which were labeled with alphabetical letters to disguise their region of origin, one of each from the European, South American, and African chocolate bars. At the same time they were presented with four region labeled

chocolate pieces from the same three bars as well as one from an U.S. bar. It was decided to not have both a labeled and unlabeled piece from each bar as to avoid participants from automatically assuming that two of the pieces came from the same bar. Therefore, the U.S. chocolate was chosen as the base case and served as a reference for future comparisons.

Care was taken when selecting the chocolate bars used in the tasting. Size, color, shape, sweetness and texture were all examined with the goal in finding bars that were not blatantly distinguishable. Several bars were compared from each region until the final selection was made. To further avoid participants matching the chocolate pieces to each other, each piece was cut to similar size and all labels or images were removed (grated) from the chocolate so that the participants could not distinguish if they came from the same bar. The chocolate pieces were then presented to the subject in small plastic containers, each labeled with the region of production or a distinguishable letter. Water was provided for participants to drink between tastings so that their palate would not be tainted as was suggested by Lawless and Heymann, (2010).

Each person was asked to taste each piece of chocolate one at a time. As they tasted each chocolate they were asked to indicate on a sheet how they would rate the overall taste of the chocolate using a nine-point rating scale with one meaning “very unsatisfying” and nine meaning “very satisfying.” Though there are a wide variety of intensity scales that have been used in sensory evaluation, it is general practice to allow integer numerical responses of approximately nine points (Lawless and Malone, 1986a, b). They go on to suggest that intensity scales are well suited for consumer

work due to their simplicity, and have advantages for speed and accuracy in data coding and tabulation.

It was explained to participants that more than one piece of chocolate could have the same rating. The script used in the experiments can be found in Appendix A. In order to avoid order effects, three versions of the taste evaluation sheet were created with the chocolate types listed in different orders for all three. This procedure enabled true consumer preferences and ratings for chocolates from different regions to be analyzed to see if they matched with their stated preferences and ratings. According to Chern and Lin (2012), an additional benefit to including taste evaluations in an auction experiment is that the tasting will provide more credible data since real market situations are reflected. The taste evaluation sheet employed in the experiment is included in Appendix B.

3.3 Consumer Willingness to Pay

Following taste evaluations, the participants were asked to indicate their true WTP for each type of chocolate (both labeled and unlabeled versions). Again, to avoid order effects, three versions of the WTP sheet were created with the chocolate types listed in different orders for all three (an example sheet can be found in Appendix C). Participants were to assume that each bar was of similar size, 3.5 ounces. To reflect true chocolate bar prices found in stores, bids were limited to between \$0 and \$5. A Becker-DeGroot-Marschak auction mechanism (BDM) was chosen to elicit subjects' WTP. Use of a BDM in field experiments has become more popular since it simulates a real market experience, reduces participant time requirement and compensation

costs, and most importantly it allows for valuation in an individual setting (Lusk et al., 2001).

This BDM auction was thoroughly explained to the participant so that there was a complete understanding (see script in Appendix D). It was explained that the best strategy was to bid one's true value, or the maximum price he or she would be willing to pay, for the chocolate bar. BDM is found to be incentive compatible as WTP decisions will have real consequences on real sales at the end of the experiments, and that utility for each subject is only maximized if he or she states their true WTP. Entering too high a value could lead to the participant buying one at more than it is worth to him or her while entering a lower value could mean missing a chance to buy a bar at a price he or she would like.

Once participants finished stating all of the WTP bids for the different chocolate bars, the proctor then drew a random envelope from a pile. Each envelope contained a chocolate bar type and price. These combinations were produced by random draws from a non-uniform distribution. Due to budgetary constraints and availability of the chocolate, since they come from around the world, certain combinations were more likely, but all were still possible. The prices within the envelope ranged between \$0 and \$5. If the price within the envelope was higher than or equal to the participant's bid for that specific bar, the participant did not purchase the chocolate bar and was therefore paid the full \$5 for participating in the experiment. If the price in the envelope was lower than the participant's bid for that specific bar, the participant

purchased the chocolate bar for the price found in the envelope, received the chocolate bar to take home, and was paid any remaining compensation ($\$5 - \text{the price}$).

3.4 Questionnaire Design

Measurements of the following items were captured by the questionnaire conducted during the experiments: consumer perceptions on the safety and quality of sweets from the different regions, consumer perceptions on the economic status of each region, attribute importance, past purchase behavior and social demographic information. The main purpose was to determine which variables influenced the difference between the labeled and unlabeled chocolate versions for the different regions in regards to consumer WTP and taste preferences. The full version of the questionnaire is provided in Appendix E, and variable descriptions and summary statistics can be viewed in table 3.1.

3.4.1 Perceptions

It was essential to our analysis to capture consumer perceptions of food safety and quality of sweets from the different regions where the chocolates were produced. Such information provided valuable insight as to whether the perceived food safety levels and quality of food impacts consumer WTP or taste evaluations of food from each region. The participants were asked to indicate their perceived rating for food safety and quality, individually, for sweets from each region using a five-point scale with one meaning “poor” and five meaning “excellent.”

Table 3.1 Variable Definitions and Descriptive Statistics

Variable	Description	Mean	Std. dev.
<i>Demographics</i>			
Female	1 if subject is female, 0 otherwise	0.6788	0.4684
Age	Age, in years	40.4000	17.9409
Caucasian	1 if subject is Caucasian, 0 otherwise	0.7152	0.4527
Income	Income level, in ten-thousands	6.8409	5.8996
Children	1 if children in the household, 0 otherwise	0.2848	0.4527
College	1 if subject has college degree, 0 otherwise	0.4061	0.4926
PostGrad	1 if subject has a post doctorate degree, 0 otherwise	0.2848	0.4527
PrimaryShopper	1 if primary shopper, 0 otherwise	0.6485	0.4789
<i>Perceptions</i>			
SafetyofSweetsUS	Food Safety Perceptions of Sweets for the U.S., 1 = Poor to 5 = Excellent	3.9333	0.9761
SafetyofSweetsEurope	Food Safety Perceptions of Sweets for Europe, 1 = Poor to 5 = Excellent	3.9758	0.8968
SafetyofSweetsSA	Food Safety Perceptions of Sweets for South America, 1 = Poor to 5 = Excellent	3.0849	0.8294
SafetyofSweetsAfrica	Food Safety Perceptions of Sweets for Africa, 1 = Poor to 5 = Excellent	2.7212	0.9852
QualityofSweetsUS	Quality Perceptions of Sweets for the U.S., 1 = Poor to 5 = Excellent	3.5152	1.0336
QualityofSweetsEurope	Quality Perceptions of Sweets for Europe, 1 = Poor to 5 = Excellent	4.2061	0.8077
QualityofSweetsSA	Quality Perceptions of Sweets for South America, 1 = Poor to 5 = Excellent	3.0061	0.8869
QualityofSweetsAfrica	Quality Perceptions of Sweets for Africa, 1 = Poor to 5 = Excellent	2.5879	0.9938

Table 3.1 Variable Definitions and Descriptive Statistics Continued

Variable	Description	Mean	Std. dev.
<i>Perceptions Continued</i>			
EconomicStatusUS	Perceived Economic Status of the U.S., 1= Minimally Developed to 5 = Highly Developed	4.6727	0 .6822
EconomInStatusEurope	Perceived Economic Status of Europe, 1= Minimally Developed to 5 = Highly Developed	4.5455	0 .6576
EconomicStatusSA	Perceived Economic Status of South America, 1= Minimally Developed to 5 = Highly Developed	2.9879	0 .7570
EconomicStatusAfrica	Perceived Economic Status of Africa, 1= Minimally Developed to 5 = Highly Developed	2.1515	0 .8807
<i>Purchase Habits and Importance</i>			
TasteImportance	How important is purchasing better tasting food? 1 = Very Unimportant to 7 = Very Important	6.1091	1.1263
QualityImportance	How important is purchasing better quality food? 1 = Very Unimportant to 7 = Very Important	6.3273	1.0602
SafetyImportance	How important is purchasing safe food? 1 = Very Unimportant to 7 = Very Important	6.4121	1.0987
OriginImportance	How important is knowing where your food comes from? 1 = Very Unimportant to 7 = Very Important	5.2849	1.4134
PastPurchase	In the past 6 months have you purchased chocolate bars, 1 = Not at all to 5 = Very Often	3.1939	1.1629

Participant's perceptions of the economic development status of each region were also collected. This provided information on whether their perceptions directly impacted their WTP and taste evaluations for those regions. Each participant was asked to indicate their perception of the economic development status of each region using a five-point scale with one meaning "minimally developed" and five meaning "highly developed."

3.4.2 Purchase Habits and Importance

When making purchase decisions, consumers consider many different attributes that differentiate products from each other. Importance placed on each attribute will vary by consumer with some having a strong influence and others having relatively little influence. Four different items were included in the attribute importance section. These included how important it was to participants that they knew they were purchasing better tasting food, better quality food, and safe food, as well as how important it was to participants to know where their food is produced. A scale of one, meaning "very unimportant", to seven, meaning "very important", was employed to capture the importance level of each attribute. More than one attribute was allowed to have the same rating. As was discussed in the literature review section, all four of these attributes have been suggested to be significantly important in shaping consumer purchase decisions which is why they have been included in this analysis.

As found by past literature, past purchase behavior is expected to have an impact on consumer WTP and taste evaluations for products, and therefore is another

important factor when conducting this analysis. Participants were asked to indicate how often they have purchased chocolate bars in the past six months on a scale of one, meaning “not at all”, to five, meaning “very often”.

3.4.3 Social Demographics

The survey was completed by obtaining social demographic information. This information was collected in order to help identify consumer attributes that impact their WTP and taste evaluations for products from different regions. Analyzing this information provided additional insight as to why there might be differences in taste evaluations and WTP bids for labeled versus unlabeled versions of the chocolate which aided in testing the validity of origin labeling. The questions in this section were designed to start with easier, less personal, questions and then gradually transition to a more personal level. The seven items in this section were gender, age, ethnicity, income, presence of children in the household, education, and whether or not the participant was the primary shopper for the household.

3.5 Session Information and Location Selection

Five field experiment sessions were conducted from July 20, 2013 to September 18, 2013 resulting in a total of 169 participants. After one participant was removed from the data due to stating all zeroes as bids for chocolate implying lack of interest in the experiment, and three more removed due to missing income data, the final count came to 165 participants. Each participant was compensated between \$0 and \$5 plus a possible chocolate bar depending on the outcome of the experimental auction.

Three sessions were held in Battery Park located in the City of New Castle, DE, one was held at a farmer's market at the Newark Natural Foods store in Newark, DE, and the last one was held at the University of Delaware in the College of Agriculture and Natural Resources. The first two locations were chosen because they have provided a good general population sample in previous studies conducted by graduate students in the Department of Applied Economics and Statistics at the University of Delaware. The final sample composed primarily of students and faculty from the College of Agriculture and Natural Resources was taken in order to help diversify the sample and help to represent the population demographics potentially not captured at the other two locations.

Chapter 4

METHODOLOGY

4.1 Socio-demographic Variables Descriptive Statistics

Table 3.1 displays the descriptive statistics for the socio-demographic variables used in the models, as well as variable definitions. There were more females, 67.88%, than males which is higher than the census data for Delaware which shows the population as 51.5% female (DEcensus, 2013). The average age of respondents was 40.4 years with a spread of 17.94 years. The Delaware census shows 71.4% of the population as Caucasian, which is close to that found in the results from this study of 71.52%. This confirms that proper care was taken to ensure that the sample was properly diversified. Of the respondents, 64.85% stated that they were the primary shopper in their household, and 28.48% indicated children under the age of 18 lived in the household.

Data from the Delaware census showed that the percent of people age 25 or older who have a Bachelor's degree or higher in Delaware was found to be 28.0% which shows that this sample has a higher level of education than the population. Subjects having (or working towards) at least a Bachelor's degree or equivalent made 40.61% of the sample, with post-doctorate degrees reaching 28.48%. This left 30.91% of participants having only completed up to some college at most. Average income

varied widely with a mean of \$68,408.74 and standard deviation of \$58,995.67. This was slightly higher than the state median income which is found at \$59,317.

4.2 Taste Evaluation and WTP Analysis Method

Two sets of models were devised for the purpose of this study: one for taste preference analysis and another for WTP analysis. The models' dependent variables were the differences in taste evaluations, and differences in bids for the labeled versus unlabeled versions of chocolate from the same region, respectively. Potential for taste evaluations at the limits of one and nine, and WTP bids at the limits of \$0 and \$5, made constructing models for taste evaluation and WTP differences complex. Censored regression techniques were necessary to account for the presence of both upper and lower censoring of the dependent variables. The potential for heteroskedasticity which lead tobit, probit, and similar models to produce inefficient estimates was of concern (Haefele and Loomis, 2001). Similar to Bernard et al. (2007), a model was fitted that estimated the variance as a function of the variables for the differences in taste and WTP between the labeled and unlabeled versions of the chocolate from each region.

For purposes of this study, it was assumed that there exists a latent variable $TasteDifference_{i,jkc}^*$ in the model representing subjects i 's actual difference in taste evaluations for the labeled version j to the unlabeled version k of chocolate from the same region c . The value of the latent variable could only be observed when the relevant taste evaluations in both rounds were between the two extremes of one and nine. The true value of $TasteDifference_{i,jkc}^*$ was unobserved if either or both taste

evaluations were at an extreme, resulting in the indication of only a potential range.

The information about the values of $TasteDifference_{i,jkc}^*$ found from the data was

$$(1) \quad TasteDifference_{i,jkc}^*$$

$$= \begin{cases} TasteDifference_{i,jkc} = x\beta + \varepsilon_i & \text{if } 9 > t_{i,jc} > 1 \text{ and } 9 > t_{i,kc} > 1 \\ [t_{i,kc}, \infty) & \text{if } t_{i,jc} = 1 \\ [-t_{i,jc}, \infty) & \text{if } t_{i,kc} = 1 \\ [t_{i,kc} - 9, -\infty) & \text{if } t_{i,jc} = 9 \\ (\infty, 9 - t_{i,jc}] & \text{if } t_{i,kc} = 9 \\ (\infty, -\infty) & \text{if } t_{i,jc} = 9 \text{ and } t_{i,kc} = 1 \\ (\infty, -\infty) & \text{if } t_{i,jc} = 1 \text{ and } t_{i,kc} = 1 \end{cases}$$

where $t_{i,jc}$ and $t_{i,kc}$ represented subject i 's taste evaluations for the labeled and unlabeled versions of the chocolate pieces from the same region c respectively, x was a vector of relevant independent variables, and β was a vector of coefficients. The error term, ε_i , was independent and normally distributed with mean zero and variance $\sigma^2(\exp(z_i\gamma))$, where z_i represented a second vector of relevant independent variables, γ was a second vector of coefficients and σ^2 was the variance when $z_i\gamma$ was zero. Based on the latent variable, censored as above, the models were estimated.

A similar approach was needed when constructing models for bid differences since bids were limited to between zero and five to reflect real market chocolate prices. Once again, a double censored Tobit model was required as it was possible for a zero or five to appear for the labeled, unlabeled, or both versions of the chocolate pieces from the same region, making differences potentially upper and lower censored (Long, 1997). A latent variable $BidDifference_{i,jkc}^*$ was assumed to exist in the

model representing subjects i 's actual difference in WTP for the labeled version j to the unlabeled version k of chocolate from the same region c . As with differences in taste evaluations, the true value of $BidDifference_{i,jkc}^*$ was unobserved if either or both bids were at an extreme, resulting only a potential range. The information about the values of $BidDifference_{i,jkc}^*$ found from the data was

$$(2) \quad BidDifference_{i,jkc}^* = \begin{cases} x\beta + \varepsilon_i & \text{if } 5 > b_{i,jc} > 0 \text{ and } 5 > b_{i,kc} > 0 \\ [b_{i,kc}, \infty) & \text{if } b_{i,jc} = 0 \\ [-b_{i,jc}, \infty) & \text{if } b_{i,kc} = 0 \\ [b_{i,kc} - 5, -\infty) & \text{if } b_{i,jc} = 5 \\ (\infty, 5 - b_{i,jc}] & \text{if } b_{i,kc} = 5 \\ (\infty, -\infty) & \text{if } b_{i,jc} = 5 \text{ and } b_{i,kc} = 0 \\ (\infty, -\infty) & \text{if } b_{i,jc} = 0 \text{ and } b_{i,kc} = 0 \end{cases}$$

where $b_{i,jc}$ and $b_{i,kc}$ represented subject i 's bids for the labeled and unlabeled versions of the chocolate pieces from the same region c respectively, x was a vector of relevant independent variables, and β was a vector of coefficients. The error term, ε_i , was independent and normally distributed with mean zero and variance $\sigma^2(\exp(z_i\gamma))$, where z_i represented a second vector of relevant independent variables, γ was a second vector of coefficients and σ^2 was the variance when $z_i\gamma$ is zero. Based on the latent variable, censored as above, the models were estimated.

4.3 Models and Hypothesis

Two similar econometric models were derived, one for differences regarding taste evaluations between the labeled and unlabeled versions of chocolate from the

same region, and another for the differences in WTP bids between the labeled and unlabeled versions of chocolate from the same region. As discussed in chapter three, there are many variables that may influence individual taste evaluations for chocolate from difference regions. Such variables include: socio-demographics, food safety and quality perceptions, economic development status perceptions, attribute importance, and past purchase behavior. Variable definitions and descriptive statistics can be found in table 3.1.

4.3.1 Differences in Taste Evaluations

The final form of the model for differences in taste evaluations was

$$\begin{aligned}
 (3) \quad TasteDifference_c^* &= \beta_0 + \beta_1 Female + \beta_2 Age + \beta_3 Caucasian + \beta_4 Income \\
 &\quad + \beta_5 Children + \beta_6 College + \beta_7 PostGrad \\
 &\quad + \beta_8 PrimaryShopper + \beta_9 SafetyofSweets_c \\
 &\quad + \beta_{10} QualityofSweets_c + \beta_{11} EconomicStatus_c \\
 &\quad + \beta_{12} TasteImportance + \beta_{13} QualityImportance \\
 &\quad + \beta_{14} SafetyImportance + \beta_{15} OriginImportance \\
 &\quad + \beta_{16} PastPurchase
 \end{aligned}$$

where c represented the regions of interest, and when the variables are specific per region (the ones with c as a subscript), only the variable pertaining to that region was selected.

It was hypothesized that due to the findings of prior studies indicating perceived quality to be higher for more-developed versus less developed regions, European

chocolate would obtain the highest average taste rating followed closely by the U.S. Consisting of less-developed nations, South American chocolate was expected to have the third highest average taste rating with African chocolate following in fourth since it is typically viewed as the least-developed region.

Taste preference differences between the labeled and unlabeled versions of the chocolate from the same region were also expected. For instance, when labeled, the European chocolate was expected to obtain a higher taste rating than the unlabeled version. However, it was expected that the labeled versions for South American and African chocolate would have a lower taste rating than the unlabeled versions since they are generally considered less-developed, and previous studies show consumers perceive products from lesser-developed regions to be of lower quality than comparative products from more-developed regions. Therefore, consumers may associate a negative quality to chocolate from South America and Africa, leading to a perceived lower taste rating. The remaining hypotheses pertain to the relationship between individual variables and the size of the gap between taste evaluations of the labeled and unlabeled versions of the chocolate from the same region. Please note that the following discussions relate to whether or not the variable has a significant impact on the difference between the labeled and unlabeled versions of the same chocolate, and if it increases or decreases the difference size.

The relationship between gender or ethnicity and the size of the difference between taste evaluations for the labeled and unlabeled versions was not immediately clear. In general, women were expected to enjoy the sweetness of the chocolate more

so than their male counterparts, but this may not impact the size of the difference between the taste evaluations for the labeled and unlabeled versions of chocolate from the same region. Younger generations were expected to be more open to chocolate from different regions which could lead to a positive relationship between the size of the taste differences and age for all regions. If a higher income allowed subjects to have more exposure to chocolates from different regions, their perceptions on the quality of the chocolate from the regions may increase the size of the taste rating differences for the labeled and unlabeled pieces. The relationships between the presence of children in the household, or the participant's ethnicity, and taste differences were uncertain.

Both college degree and post graduate were expected to have a positive relationship with taste differences for the labeled versus unlabeled chocolates due to the expanded knowledge of subjects on the food safety, quality and economic status of each region, which could influence their tastes. Those who consider themselves the primary shopper were also expected to have a positive relationship with the magnitude of the taste differences between the labeled and unlabeled versions of the chocolate due to more exposure to the product leading to increased perceptions of the product.

If a subject has a higher food safety rating for a region, the difference between the taste evaluations of the labeled and unlabeled versions was expected to increase, indicating a positive relationship. The same was true for quality perceptions for each region – the higher the quality perception, the larger the taste difference. Economic development status perceptions for each region were expected to have a positive

relationship with taste evaluation differences, as this may influence quality and food safety perceptions.

For the attribute importance variables, consumers who placed a high importance on purchasing better tasting food, better quality food and more safe food would have a positive relationship with the size of taste evaluation differences. Having the label would help remove the uncertainty linked with the unlabeled versions. Those who viewed knowing where their food comes from as important were expected to have a positive impact on taste differences for all regions. Lastly, those who purchased chocolate more often may have a larger difference in taste evaluations due to their familiarity with the product, as they may have more perceptions on the quality of chocolate from those different regions.

4.3.2 Differences in WTP

As mentioned above, the equation for differences in WTP was rather similar to that for differences in taste evaluations. However, since taste plays a large role in how much people were willing to pay for a product, the variable pertaining to taste evaluation differences, $TasteDifference_c^*$, was also included in this model. The final form of the model pertaining to differences in bids was

$$\begin{aligned}
(4) \quad BidDifference_c^* = & \beta_0 + \beta_1 Female + \beta_2 Age + \beta_3 Caucasian + \beta_4 Income \\
& + \beta_5 Children + \beta_6 College + \beta_7 PostGrad \\
& + \beta_8 PrimaryShopper + \beta_9 SafetyofSweets_c \\
& + \beta_{10} QualityofSweets_c + \beta_{11} EconomicStatus_c \\
& + \beta_{12} TasteImportance + \beta_{13} QualityImportance \\
& + \beta_{14} SafetyImportance + \beta_{15} OriginImportance \\
& + \beta_{16} PastPurchase + \beta_{17} TasteDifference_c
\end{aligned}$$

where c represents the regions of interest, and when the variables are specific per region (as noted by the c subscript) only the variable pertaining to that regions was selected. Again, the variables selected for the variance portion of the models varied by model.

Hypothesis for WTP data were expected to be similar to what was expected for taste preferences. European chocolate was expected to obtain the highest WTP bid, followed by chocolate from the U.S., then chocolate from South America, with African chocolate coming in last. Differences in WTP bids between labeled and unlabeled versions of chocolate from the same region were also expected. European chocolate was expected to obtain a higher bid than the unlabeled version. At the same time, labeled versions of South American and African chocolate would have a lower bid than the unlabeled versions due to the association of lower quality products with less-developed nations. The remaining hypotheses pertained to the relationship between the size of the gap between bids of the labeled and unlabeled versions of the

chocolate from the same region and individual variables. As with the taste evaluation gaps, please note that the following discussions relate to whether or not the variable has a significant impact on the difference between the labeled and unlabeled versions of the same chocolate, and if it increases or decreases the size of the difference.

There was an uncertain relationship between gender or ethnicity and the size of the difference between bids for the labeled and unlabeled versions of chocolate. The relationship between age and the size of the bid difference was expected to be positive as younger generations may be more open to chocolate from different regions. Individuals with higher incomes were expected to be willing to pay more for labeled versions of chocolate from the different regions (especially for European chocolate which is associated with higher quality) leading to a positive relationship with bid difference size. Households with children are generally concerned with the quality and safety of the food that their family is consuming, making chocolate from more-developed regions more attractive. This would increase the bid differences for European chocolate, and decrease bid differences for chocolate from South America and Africa.

A positive relationship with the size of bid differences was hypothesized for both college degree and post doctorate. This could be attributed to the expanded participant knowledge of the food safety, quality and economic status of each region, which could influence their WTP for the different versions of the chocolate. More exposure and experience with the product allows primary shoppers to develop more perceptions about the perceived quality and safety of sweets from the different

regions. Therefore, a positive relationship between the magnitude of the bid differences and primary shoppers was expected.

As was expected with taste differences, if a country was expected to have a higher food safety rating, the difference between the bids of the labeled and unlabeled versions was expected to increase, indicating a positive relationship. Likewise, the higher the quality perceptions for a region, the higher the bid differences between the labeled and unlabeled chocolate versions. It was expected that economic development status perceptions for each region would have a positive relationship with the size of bid differences, since such perceptions may impact quality and food safety perceptions.

Having high importance placed on purchasing better tasting food, better quality food and more safe food was expected to increase the size of the bid differences for European chocolate, but decrease it for South America and Africa as these are considered less-developed regions. If consumers placed high importance on these attributes, they would pay more for products they believed satisfy such requirements, and vice versa. If knowing the origin of their food was of high importance, subjects were expected to be willing to pay more for chocolate with region labels. Due to increased experience with the product, leading to more in depth perceptions, subjects who purchased chocolate more often were hypothesized to have larger bid difference for each region. Finally, the taste difference variable was included in order to capture the relationship between taste evaluations and WTP. Based on the previously discussed literature, taste was expected to impact consumer WTP and helps secure a

more accurate model of WTP. Therefore, the larger the difference in taste evaluations, the larger the expected difference between bids for the labeled versus unlabeled versions of chocolate from each region.

Mean bids comparisons and tobit regression analysis were performed in order to test the above hypothesis regarding overall ratings, “more-developed” versus “less-developed” preferences, and the impact variables have on taste evaluations and WTP differences for the labeled and unlabeled versions of chocolate from the different regions. Detailed discussions on the study’s findings can be found in chapter five.

4.3.3 Variance Modeling Analysis

As stated above, a model was fitted that estimated the variance as a function of the variables for the differences in taste evaluations and then again WTP differences between the labeled and unlabeled versions of the chocolate from each region (Bernard et al., 2007). Each variable was removed individually from the variance model and then this reduced model was compared to the full model. If the models were deemed significantly different due to the chi-square test, the variable was considered significant for the variance portion of the model for that specific region and was included in the variance portion of the final model. Once the model was run, the variance variables were re-checked to make sure they remained significant. If they were not, they were removed from the model. It should also be noted that a few variables had standard error issues that were not resolved even after all variables were properly scaled. These variables were also removed from the variance portion of

those specific models. The chosen variables for the variance portion of the models varied by model and are shown in the results tables.

The model of the variance portion for the taste evaluations differences for Europe is shown here as a reference on how it was set up.

with $\varepsilon_i \sim N(0, \sigma^2 \exp(z_i \gamma))$ where

$$(5) \quad z_i \gamma = y_1 \textit{Age} + y_2 \textit{College} + y_3 \textit{Postgrad} + y_4 \textit{SafetyofSweetsEurope} \\ + y_5 \textit{OriginImportance} + y_6 \textit{PastPurchase}$$

where ε_i was the error for the i^{th} respondent. The errors are independent and normally distributed with mean zero and variance $\sigma^2 \exp(z_i \gamma)$. Maximum likelihood with the QLIM procedure in SAS was used to estimate the models (SAS, 2011a).¹

¹ For heteroskedastic tobit it is possible for the log likelihood function to have multiple local maxima. To help ensure that the true maximum was obtained, several convergence methods were used. For both, it was also necessary to make some scaling adjustments to the variables to achieve convergence, with all converted back in the results.

Chapter 5

RESULTS AND DISCUSSION

5.1 Perceived Regional Food Safety for Sweets and Quality Mean Comparisons

As discussed previously, consumer perceptions on the food safety from different regions impacts their WTP and taste evaluations for such products. Table 5.1 shares insight on the perceived food safety ratings for sweets from each of the regions. In order to compare the perceived safety differences between regions, a Wilcoxon sign-rank test was employed. The Null hypothesis was that both distributions are the same – meaning no differences between the means. Rejection of this Null would imply that there was a significant difference in food safety ratings between the regions.

Table 5.1 Regional Perceived Food Safety Ratings for Sweets

Region	Mean	S.D.	Group
Europe	3.98	0.90	A
U.S.	3.93	0.98	A
South America	3.08	0.83	B
Africa	2.72	0.99	C

All means are based on a scale of 1 (Poor) to 5 (Excellent).

Regions with the same group letter imply that their mean food safety ratings for sweets are not significantly different from each other.

Europe, with a mean food safety rating for sweets of 3.98, and the United States, with a mean of 3.93, were tied for the highest food safety rating for sweets amongst

the four regions. Both of these regions are seen as more-developed and are known to be active in the control of the safety of the food that is produced within them.

Loureiro and Umberger (2003) found that high food safety perceptions associated with U.S. beef were key factors in Colorado consumers' premiums for "Certified US" beef. Perceived food safety for sweets from South America was third with a mean rating of 3.08, followed by Africa with a mean rating of 2.72. These findings were expected as both of these regions are generally considered to be less-developed regions. For similar reasons as quality, food from more-developed regions is often thought of as more "safe" than food from less-developed regions.

Table 5.2 displays the mean perceived quality ratings for sweets from each region. All of the regions perceived quality ratings were found to be significantly different. In compliance with general perceptions, European chocolate was found to hold the highest perceived quality rating at 4.21. This was not surprising as many European countries produce and are well-known for quality specialty chocolates (i.e. Belgium and Swiss chocolates) which are imported into the U.S. on a regular basis due to high consumer demand. The U.S. holds the second highest perceived quality rating at 3.52, which was also expected since the U.S. is generally known to produce quality products, including sweets, and U.S. residence have been exposed to such products for the majority of their lives.

Table 5.2 Regional Perceived Quality Ratings for Sweets

Region	Mean	S.D.	Group
Europe	4.21	0.94	A
U.S.	3.52	0.86	B
South America	3.01	0.95	C
Africa	2.59	0.92	D

All means are based on a scale of 1 (Poor) to 5 (Excellent).

Regions with the same group letter imply that their mean quality ratings for sweets are not significantly different from each other.

South America obtained an average perceived quality rating of 3.01 which placed it in third, followed by Africa which holds the lowest perceived quality rating at 2.87. These findings were not surprising as many prior studies have found that consumers perceive the quality of domestic products to be superior to imported goods (Feuz et al., 2004; Dransfield et al., 2005). Also, South America and Africa were viewed as less-developed regions and according to Schooler (1971) and Wang and Lamb (1983) products produced in less-developed countries are considered of lesser value than those produced in more-developed countries. Works by Ahmed and d'Atous (2008), and Teo et al. (2010) showed similar findings.

5.2 Perceived Regional Economic Development Status Mean Comparisons

Subject perceptions on the economic status of each region were highly important for this study as they were expected to have a high influence on WTP and taste evaluations. Table 5.3 shows the average perceived economic status for each region. As expected, the U.S. obtained the highest mean of 4.67, followed by Europe with a

4.55. South America came in third with a mean of 2.99. Africa was perceived to have the lowest economic development status with a mean of 2.15, which was expected due to the low standard of living, low average income, and political unrest that is very apparent throughout the region.

Table 5.3 Regional Perceived Economic Status

Region	Mean	S.D.	Group
U.S.	4.67	0.68	A
Europe	4.55	0.66	B
South America	2.99	0.76	C
Africa	2.15	0.88	D

All means are based on a scale of 1 (Minimally Developed) to 5 (Highly Developed). Regions with the same group letter imply that their mean perceived economic status are not significantly different from each other.

5.3 Purchase Habits and Importance

Table 5.4 provides insight on important variables that impact consumer purchase decisions for food. All of the means were found to be significantly different than four implying that they were viewed as at least moderately important for making purchase decisions. Knowing that they are purchasing safe food and better quality food were given the highest importance ratings, 6.41 and 6.33 respectively, and were found to not be significantly different from each other. Chern and Chang (2012) found similar results in their evaluation of COOL in Taiwan. Consumers' importance ratings for knowing that they are purchasing better tasting food placed it in third with a mean of 6.11. Knowing the food's production origin was rated as the least important with a

mean of 5.28 which was still moderately important. Loureiro and Umberger (2007) support this finding as they stated that COOL was found to carry a premium for steak in the US, but food safety incurred the highest premium. Lastly, it should also be noted that, on a scale of one meaning “not at all” to five meaning “very often”, the mean past purchase frequency of chocolate bars in the past six months was 3.19.

Table 5.4 Attribute Importance When Making Food Purchase Decisions

Variable	Mean	S.D.	Group
Purchase Safe Food	6.41	1.10	A
Purchase Better Quality Food	6.33	1.06	A
Purchase Better Tasting Food	6.11	1.13	B
Know Where Your Food Is Produced	5.28	1.41	C

All means are based on a scale of 1 (Very Unimportant) to 7 (Very Important). A score of 4 implies neutrality.

Variables with the same group letter imply that their mean importance levels are not significantly different from each other.

5.4 Taste Evaluations Mean Comparisons

Mean comparisons were also run for the taste evaluations in order to evaluate overall taste differences between regions, as well as between the labeled and unlabeled versions of chocolate bars produced in the same region. Table 5.5 displays the descriptive statistics for the taste evaluations for each chocolate type as well as the results from the mean comparison tests. Overall differences between regions would help suggest a taste preference for chocolate produced in more-developed regions versus less-developed regions, whereas differences between the labeled and unlabeled versions of the same chocolate would help indicate influences that labeling might have

on taste evaluations if implemented. Before the comparisons could be run, normal distribution had to be addressed for both taste evaluations and WTP bids. A Skewness/Kurtosis test for normality was run, and the null hypothesis of normal distribution was rejected (at the 10% significance level) for all bids, taste evaluations, and differences for bids and taste evaluations between the labeled and unlabeled versions.

Table 5.5 Mean Taste Evaluations per Chocolate Type

Chocolate Type	Mean Taste	S.D.	Group
European Chocolate – Labeled	6.58	1.94	A
European Chocolate – Unlabeled	6.15	1.88	B
U.S. Chocolate – Labeled	6.02	1.9	B
South American Chocolate – Labeled	5.25	2.15	C
South American Chocolate – Unlabeled	5.04	2.02	C
African Chocolate – Labeled	4.10	2.23	D
African Chocolate – Unlabeled	3.36	1.87	E

Chocolate types with the same group letter are not significantly different from each other.

Looking at the labeled versions for the chocolate, chocolate produced in Europe commanded the highest mean taste rating at 6.58, which was significantly higher than chocolate produced in the U.S. which scored an average of 6.02. This was roughly a 9.3% taste premium for European chocolate over U.S. chocolate, which was not extremely high and was consistent with the hypothesis. South American chocolate placed third, as predicted, with a mean taste of 5.25, which resulted in a 14.7% premium for U.S. chocolate over South American Chocolate, and a 25.3% premium

for European chocolate over South American chocolate. As hypothesized, chocolate produced in Africa came in last with a mean taste evaluation of 4.10. Compared to chocolate produced in Africa, European chocolate obtained a 60.5% premium, U.S. chocolate obtained a 46.8% premium, and South America obtained a 28% premium. These results gave supporting evidence that consumers prefer the taste of chocolate from more-developed regions over less-developed regions. These taste premiums may be influenced by the perceived higher quality and food safety ratings, as well as economic status of these more-developed regions, as prior literature has also shown (Schooler, 1971; Wang and Lamb, 1983; Ahmed and d'Atous, 2008; Teo et al., 2010; Alfnes and Rickertsen, 2003; Alfnes, 2004). Therefore, the region of production does play a key role in taste evaluations for chocolate.

How labeling impacts individual taste evaluations for each chocolate type was also of interest. In order to analyze this relationship, means of the labeled and unlabeled versions were compared, for Europe, Africa and South America, to see if they were significantly different. Results showed that the labeled version of the chocolate produced in Europe was significantly higher than the unlabeled version, with a premium of 7%. This was expected due to the fact that Europe is generally viewed as a more-developed region with a higher quality perception, as was previously noted in tables 5.2 and 5.3. Such perceptions may lead to a higher premium for the European chocolate since there lacks information as to where the unlabeled version originated from, leading to perceived quality uncertainty.

For South America, the labeled version of the chocolate pieces obtained a mean taste evaluation of 5.25, whereas the unlabeled version obtained a value of 5.04. However, these means were not significantly different. This indicated that when it comes to taste, the presence of a label had no influence on the evaluations. This did not match the projected hypothesis that it would lower taste evaluations, and may be due to a lack of perceptions of sweets from South America due to unfamiliarity, even though participants see them as generally lower quality than European sweets.

Contrary to what was hypothesized, the chocolate labeled from Africa had a mean taste evaluation of 4.10, which was 22% higher than that of the unlabeled version with a mean score of 3.36. It was hypothesized, based on past literature, that when it was known the product was coming from a less-developed region, it would obtain a lower quality (and in this case taste) rating. However, these results suggested otherwise and provided support for the implementation of an origin label as it aids in obtaining a taste premium. This could be due primarily to the fact that even though the product was from a less-developed region, labeling still eliminated the uncertainty aspect of the unlabeled version, leading to a positive influence on taste.

It should be noted that the results suggested that labeling does not harm the taste evaluations of chocolate. In fact, in two out of three cases it resulted in a premium for the product. Knowing this helped provide confidence that implementing a voluntary labeling scheme could potentially raise product evaluations and increase sales for chocolate producers from both more-developed and less-developed regions. If a mandatory labeling requirement was implemented for chocolate products, such

information should not hinder consumer evaluations of the product and could potentially benefit chocolate producers in the long-run.

5.5 Mean Bid Comparisons

Two relationships were of interest when focusing on mean bids for the different chocolate types. The first pertained to the relationships between the regions overall, whether more-developed regions commanded a higher premium than less-developed regions. The second was concerned with the bid premiums between the labeled and unlabeled versions of chocolate from the same region (i.e. would region labeling increase or decrease bids for the chocolates from each region). Mean bid comparisons were performed for all of the different chocolate types and can be found in table 5.6.

Table 5.6 Mean Bid Prices per Chocolate Type and Significant Relations

Chocolate Type	Mean Bid (\$)	S.D.	Group
European Chocolate – Labeled	\$2.71	1.31	A
European Chocolate – Unlabeled	\$2.52	1.27	B*, C
U.S. Chocolate – Labeled	\$2.22	1.10	C
South American Chocolate – Labeled	\$2.00	1.22	D
South American Chocolate – Unlabeled	\$1.94	1.22	D
African Chocolate – Labeled	\$1.56	1.27	E
African Chocolate – Unlabeled	\$1.22	1.08	F

Chocolate types with the same group letter are not significantly different from each other. *means significant at 10% all others significant at 5%.

When analyzing overall regional differences, the mean bids for the labeled versions of the chocolate from each region were the only bids of concern. It was hypothesized that European Chocolate would command the highest bid, followed by

chocolate from the U.S. The results from this study confirmed this, as European and U.S. chocolate obtained mean bids of \$2.71 and \$2.22 respectively. These means were significantly different, and showed a premium of 22.1% for European chocolate over chocolate from the U.S. Higher perceived food safety, quality and taste scores could influence participants WTP bids for European chocolate over that of U.S.

South American chocolate came in third with a mean bid of \$2.00, with African chocolate falling into fourth place, as hypothesized, with a mean bid of \$1.56. Both of these bids were significantly different from one another as well as from the bids for European and U.S. chocolate. South American chocolate held a 28.2% premium over chocolate from Africa, which could be a result of the higher perceived quality, food safety and economic status of South America. European chocolate obtained a 35.5% premium over South American chocolate, and a 73.7% premium over that from Africa. Chocolate produced in the U.S. obtained an 11% premium over chocolate from South America, and a 42.3% premium over that from Africa. Consistent with prior research (Schooler, 1971; Wang and Lamb, 1983; Ahmed and d'Atous, 2008; Teo et al., 2010; Alfnes and Rickertsen, 2003; Alfnes, 2004), this research suggested that products from Europe and the U.S. were seen to have higher food safety and quality ratings, and economic status, which may be influencing the higher WTP for European and U.S. chocolate as was found in this study. Clearly, knowing the region where their food comes from impacted the amount consumers were willing to pay.

Differences between the labeled and unlabeled versions of chocolate from the same region also provide valuable insight on the impact origin labeling would have on

consumer's WTP for products. It was hypothesized that the labeled version of chocolate from Europe would demand a higher WTP bid than the unlabeled version. Evidence in support of this hypothesis was found at the 10% level, implying that consumers would pay more for the European chocolate when labeled. It should be noted that the p-value for the mean comparison test was 0.053, which was extremely close to being significantly different at the 5% confidence level. Such a relationship implied consumers WTP bids for European chocolate would be influenced by an origin labeling scheme if it were implemented.

Labeled and unlabeled versions of chocolate produced in South America also showed no significant difference in mean bids. This contradicts the estimated hypothesis that region labeling would result in a lower WTP bid due to lower quality and food safety perceptions for chocolate from South America. A general lack of knowledge of chocolate from South America may have caused such a relationship. Without preconceived notions to influence WTP bids, bids for the labeled versions would most likely match bids for the unlabeled versions of chocolate from the same region. The label would therefore have no value to the customer, resulting in no impact of origin information on their WTP.

Finally, the labeled version of chocolate produced in Africa obtained a mean WTP bid of \$1.56, whereas the unlabeled version only obtained a mean WTP bid of \$1.22. These results suggested a premium of 27.9% for the labeled version of African chocolate. This premium provided support for the implementation of an origin label as it suggested that chocolate producers in Africa could obtain a premium for their

product. This did not match the hypothesized relationship, but could be due to the fact that the uncertainty factor of origin was removed adding value to the consumer and making the product more attractive. At the same time, the new and exotic features of African chocolate may also spark consumer interest and lead them to be willing to pay more for the labeled versus unlabeled bar.

As with the taste evaluation mean comparisons, the evidence showed that labeling did not reduce consumers' WTP bids for chocolate. Both European and South American chocolate were unaffected by the implementation of a region label, while a region label only increased subject WTP for chocolate produced in Africa. Therefore, profitability for chocolate producers could potentially increase if an origin label was voluntarily implemented. There should be limited objection from producers of chocolate if a mandatory origin labeling requirement was implemented for chocolate products as labeling should not reduce profits and could benefit them in the long-run.

5.6 Tobit Regression Results for Taste Evaluation Differences

Below are the results and discussions of the implications from the models for taste evaluation differences between the labeled and unlabeled chocolate versions from each region. Again, the focus was on whether or not the variable had a significant impact on the difference of taste evaluations between the labeled and unlabeled versions of the chocolate from the same region, and if the variable increased or decreased the difference.

5.6.1 European Taste Differences

The resulting estimates for the mean and variance portion of the model for taste differences between the labeled and unlabeled versions of European chocolate are displayed in Table 5.7 below. Two variables were found to be significant for the means portion of the final model for taste differences between the labeled and unlabeled versions of chocolate from Europe including female at a 10% significant level, and income at a 5% significance level. It was interesting that none of the perception or attribute importance variables had an impact on taste evaluation differences, but this could potentially be due to lack of concern or attention paid to the food safety or quality of products from more-developed regions compared to less-developed regions.

Female was found to have a negative impact of 1.17 on the size of the taste evaluation difference, therefore bringing the taste rating of the unlabeled version closer to that of the labeled version for European chocolate when compared to taste differences displayed by their male counterparts. This would suggest that the inclusion of an origin labeling system would decrease the taste labeled products would have over unlabeled products if purchased by females. Income was also found to have a negative impact of 0.11 on taste differences for every \$10,000 increase in income. This conflicted with the projected hypothesis of a positive relationship between income and taste evaluation difference. Such a contrast may be due to the fact that since they have more disposable income, they may be able to afford chocolate

from various regions around the world and have found the quality of chocolate from other regions more appealing through first-hand experience.

Table 5.7 Tobit - Taste Differences for Labeled v. Unlabeled Europe

Parameter	Coefficient	P-Value
Means		
Intercept	5.2088	0.0458*
<i>Demographics</i>		
Female	-1.1710	0.0658**
Age	-2.3373	0.1365
Caucasian	0.3588	0.5464
Income	-0.1127	0.0286*
Children	-0.0713	0.9080
College	-0.5204	0.4614
PostGrad	-0.7288	0.3336
PrimaryShopper	0.2161	0.9869
<i>Perceptions</i>		
SafetyofSweetsEurope	-0.0444	0.8985
QualityofSweetsEurope	0.4861	0.2047
EconomicStatusEurope	-0.5005	0.2635
<i>Purchase Habits and Importance</i>		
TasteImportance	0.2478	0.4925
QualityImportance	0.2993	0.5198
SafetyImportance	0.3280	0.3743
OriginImportance	-0.0040	0.9836
PastPurchase	0.3507	0.1480
Variance		
Sigma	2.3232	<.0001*
Age	-4.7917	0.0727**
College	-1.3703	0.0582**
PostGrad	-1.6952	0.0710**
PastPurchase	0.8199	0.0012*

*means significant at 5% level **means significant at 10%

Four variables were selected, following the procedure outlined in chapter four, to be included in the variance portion of the model. These included age, college

degree, post graduate degree, and past purchase behavior, all of which were significant at 5% confidence levels. An increase in consumer age was found to decrease the heteroskedasticity of taste evaluation differences for European chocolate by 4.79. Having a higher level of education was found to also lead to lower heteroskedasticity within participant taste evaluation differences. However, having a higher frequency of past purchases of chocolate increased the variance by 0.82.

5.6.2 South American Taste Differences

Slightly different results were found for South American taste differences than for European taste differences. The resulting estimates for the mean and variance portion of the model are displayed in Table 5.8. Female and income were not significant; however, the perceived quality of sweets from South America, and the importance placed on quality both were significant at the 5% level, with post graduate degree showing as significant at 10%.

Having a post-graduate degree was suggested to have a negative impact of 1.48 on the taste evaluation differences. This meant that having an origin label from South America would lower the taste premium obtained by the labeled version if purchased by an individual with a post graduate degree. This was contrary to the projected hypothesis; however, a more expanded world view may give the individual a wider knowledge base on the products from that region, leading to lower quality expectations for less-developed regions, like South America, resulting in lower taste premiums for the labeled versions when bought by such individuals.

The last two significant variables for the mean portion deal with the perceptions of the quality of sweets produced in South America, and the importance an individual placed on the quality of food. As was expected, perceptions on the quality of sweets produced in South America was projected to have a positive impact on taste evaluation differences of 0.92, meaning that as their perceptions of the quality increased, so did their taste premium for the labeled version over the unlabeled version of chocolate from South America. This indicated that quality perceptions can indeed impact taste evaluations for chocolate from South America, a less-developed region.

In contrast, the importance placed on the quality of food revealed a negative impact on taste evaluation differences indicating that as quality became more important to the individual, the taste premium for the labeled version of chocolate from South America decreased. This was not the expected relationship, but makes sense as having a negative relationship like this showed that consumers may view the quality of chocolate from South America as more questionable than European chocolate, as previously confirmed by the mean bid comparisons on quality perceptions, resulting in lower taste evaluations for the labeled product, and ultimately decreasing taste differences. Overall, it can be suggested that since South America was perceived to be of lower economic status than that of Europe, the quality of sweets produced in South America may be under greater scrutiny by consumers, making the perceived quality of sweets and importance of quality variables more important for this model than for the taste difference model for Europe.

Table 5.8 Tobit – Taste Differences for Labeled v. Unlabeled South America

	Parameter	Estimate	P-Value
Means	Intercept	7.5434	0.0040*
	<i>Demographics</i>		
	Female	-0.0163	0.9826
	Age	1.4286	0.4622
	Caucasian	-0.7679	0.2705
	Income	0.0237	0.6929
	Children	0.1187	0.8695
	College	-0.7654	0.3084
	PostGrad	-1.4835	0.0761**
	PrimaryShopper	0.1604	0.8309
	<i>Perceptions</i>		
	SafetyofSweetsSA	-0.1800	0.6814
	QualityofSweetsSA	0.9213	0.0216*
	EconomicStatusSA	0.2072	0.6288
	<i>Purchase Habits and Importance</i>		
	TasteImportance	0.2588	0.5682
	QualityImportance	-1.2445	0.0268*
	SafetyImportance	0.6831	0.1272
	OriginImportance	0.2510	0.3014
	PastPurchases	-0.3372	0.2166
Variance			
	Sigma	3.4500	<.0001*
	EconomicStatusSA	-0.5055	0.1164

*means significant at 5% level **means significant at 10%

Again, the same procedure to determine significant variables in the variance portion of the model was performed. Only one variable is shown in table 5.8 for the variance portion, and though it is not significant in the final model, it was the only variable that appeared to be rather close to having a significant impact.

5.6.3 African Taste Differences

The model for taste differences between the labeled and unlabeled versions of chocolate for Africa revealed three significant variables for the mean portion. All the variables, their estimates and p-values can be found in table 5.9. The significant variables included two demographic variables, female and presence of children in the household, and one perception variable, perception of the quality of sweets from Africa. Female, as was found in the European model, was significant at the 10% confidence level and showed that, when compared to male, the WTP difference between the two versions would be 1.49 less, showing that they did not prefer the taste of the labeled chocolate as much as their male counter-parts.

The presence of children in the household was significant at the 5% level and suggested a positive relationship of 2.60 rating points. Therefore, the presence of children would increase the taste differences between the labeled and unlabeled versions. Having the certainty as to where the chocolate was coming from may be appealing to consumers with children as it removed origin uncertainty and may allow them to associate quality and safety to the product, even if it was not that high, giving them an idea on what to expect. This may be an important variable for the African model, compared to the two previous ones, due to the fact that participants viewed sweets from Africa as being of lesser quality and safety.

As was hypothesized and found in the South American model, participant perceptions on the quality of sweets from Africa was found to be the last significant variable, at 5% confidence level, for the means portion of the model. With an estimate

Table 5.9 Tobit – Taste Differences for Labeled v. Unlabeled Africa

Parameter	Coefficient	P-Value
Means		
Intercept	4.4061	0.1052
<i>Demographics</i>		
Female	-1.4898	0.0790**
Age	2.3570	0.2874
Caucasian	-0.4636	0.5527
Income	-0.0068	0.9225
Children	2.5958	0.0026*
College	-0.3298	0.6986
PostGrad	1.2010	0.2009
PrimaryShopper	1.3248	0.1204
<i>Perceptions</i>		
SafetyofSweetsAfrica	-0.0783	0.8523
QualityofSweetsAfrica	1.0047	0.0275*
EconomicStatusAfrica	-0.3228	0.4683
<i>Purchase Habits and Importance</i>		
TasteImportance	-0.0920	0.8626
QualityImportance	0.0278	0.9658
SafetyImportance	0.3122	0.5353
OriginImportance	0.1328	0.6419
PastPurchases	-0.2604	0.3971
Variance		
Sigma	4.0930	<.0001*
QualityofSweetsAfrica	-18.0751	<.0001*
Caucasian	19.0548	<.0001*

*means significant at 5% level **means significant at 10%

of 1.00, a positive relationship was suggested between perceptions on the quality of sweets from Africa and the taste differences. As the perceived quality rating increased, it would make sense for the taste rating differences between the labeled and unlabeled versions to also increase confirming the findings of the above model for South American chocolate.

When tests were conducted for the variance portion of this model, two variables stood out as having a significant impact on consumer variance for taste evaluation differences. The perceived quality of sweets for Africa obtained a negative estimate of 18.08. Such a relationship implied that as the perceived quality rating increased, the variance of taste evaluation differences decreased. Being of Caucasian ethnicity suggested the opposite relationship with a positive estimate of 19.05 indicating that Caucasians had more variance in their taste evaluation differences than other ethnicities.

5.7 Tobit Regression Results for WTP Bid Differences

Similarly, below were the results and implications from the Tobit Regression models on WTP differences between the labeled and unlabeled chocolate versions from each region. Again, the focus was on whether or not the variable had a significant impact on the difference in WTP bids between the labeled and unlabeled versions of the chocolate from the same region, and if the variable increased or decreased the difference.

5.7.1 European WTP Differences

The resulting estimates from the Tobit Regression analysis for the mean and variance portion of the model for WTP bid differences between the labeled and unlabeled versions of European chocolate are displayed in Table 5.10. This model indicated that only one variable, the difference in taste evaluations for the labeled versus unlabeled chocolate versions from Europe, had a significant impact on WTP differences between the labeled and unlabeled versions of the European chocolate.

Confirming the findings of Chern and Lin (2012) and Peterson et al. (2013), these results showed that taste did indeed have an influence on WTP bids when origin labels were present. Having a positive estimate of \$0.33 suggested that as the difference in taste evaluations increased between the labeled and unlabeled versions of the chocolate, the premium the participant was willing to pay for the labeled version increased by \$0.33. If the consumer was able to taste the product before purchase, it would have the potential to raise their WTP bids leading to increased profits. Similarly, if they have had a previous positive experience tasting the product, they may be more willing to pay a premium for it when faced with a similar purchase decision at the store.

The fact that the quality and safety of sweets produced in Europe were perceived to be high may be the reason no other variables were deemed significant as consumers may not be concerned with those aspects. Consumers may instead focus solely on their taste experience to help them decide. It could also imply that taste evaluations override all other potential influencers.

Four variables were found to have a significant influence on variance within the model including female, income, and importance of quality and safety. Females were found to have a higher variance than their male counterparts. However, variance tended to decrease as income level increased. The same negative relationship was found between the level of importance placed on quality and the amount of variance in the model. This means that the more importance consumers placed on quality products, the less variability was found within their bids. The opposite was found for

the importance of safety which suggested that as the consumers' importance placed on safety increased, so did the variance of their WTP bids.

Table 5.10 Tobit – WTP Differences for Labeled v. Unlabeled Europe

	Parameter	Coefficient	P-Value
Means	Intercept	1.3944	0.1475
	<i>Demographics</i>		
	Female	0.3381	0.1429
	Age	0.4827	0.4013
	Caucasian	0.0631	0.7742
	Income	-0.0213	0.2596
	Children	0.1580	0.4683
	College	-0.2286	0.3472
	Postgrad	-0.3665	0.1557
	PrimaryShopper	-0.2899	0.2133
	<i>Perceptions</i>		
	SafetyofSweetsEurope	0.0095	0.9434
	QualityofSweetsEurope	0.1968	0.1825
	EconomicStatusEurope	-0.0771	0.6365
	<i>Purchase Habits and Importance</i>		
	TasteImportance	0.0570	0.6808
	QualityImportance	0.0175	0.9276
	SafetyImportance	0.0488	0.7198
	OriginImportance	-0.0230	0.7647
	PastPurchase	0.0084	0.9176
<i>Taste Evaluation</i>			
TasteDifferenceEurope	0.3307	<.0001*	
Variance	Sigma	1.0138	<.0001*
	Female	3.4165	0.0141*
	Income	-1.5521	0.0003*
	QualityImportance	-2.4270	0.0015*
	SafetyImportance	2.6364	0.0002*
	PastPurchase	-0.2560	0.3773

*means significant at 5% level **means significant at 10%

5.7.2 South American WTP Differences

The resulting estimates for the mean and variance portion of the model for taste differences between the labeled and unlabeled versions of European chocolate are displayed in Table 5.11. Several variables were indicated as being significant for the means portion of the WTP difference model for South America. These included presence of children and perceptions on the safety of sweets from South America with 10% confidence levels, as well as post graduate degree and taste evaluation differences with a 5% confidence level. The two demographic variables that were indicated as significant showed a positive relationship of \$0.37 for the presence of children in the household, and \$0.62 for having a post graduate degree. The positive relationship between having children within the household and the WTP difference for South America was unexpected. Eliminating uncertainty through the inclusion of an origin label may be appealing to those with children in the household as it provides them with at least some sort of a quality and safety indicator when compared to the unlabeled version. Therefore, consumers who have children in their household were willing to pay \$0.37 more for the labeled version of the South American chocolate over the unlabeled version than those who did not.

As hypothesized, having a post graduate degree obtained a premium of \$0.62 for the labeled version over the unlabeled version when compared to having a college degree or no college experience at all. This was expected since these individuals may have a more expanded world view, giving them more confidence in what they are buying when origin is known versus when origin is not known.

Table 5.11 Tobit – WTP Differences for Labeled v. Unlabeled South America

	Parameter	Coefficient	P-Value
Means	Intercept	1.3652	0.1224
	<i>Demographics</i>		
	Female	-0.2081	0.3564
	Age	-0.3004	0.6383
	Caucasian	-0.3622	0.2021
	Income	-0.0198	0.3688
	Children	0.3660	0.0973**
	College	0.2934	0.2174
	Postgrad	0.6199	0.0250*
	PrimaryShopper	-0.1135	0.6163
	<i>Perceptions</i>		
	SafetyofSweetsSA	0.2725	0.0599**
	QualityofSweetsSA	-0.0943	0.5111
	EconomicStatusSA	-0.0686	0.6247
	<i>Purchase Habits and Importance</i>		
	TasteImportance	-0.0845	0.5717
	QualityImportance	0.1562	0.3938
	SafetyImportance	-0.1616	0.2714
	OriginImportance	0.0905	0.2596
	PastPurchase	0.1251	0.1479
<i>Taste Evaluation</i>			
TasteDifferenceSA	0.4050	<.0001*	
Variance	Sigma	0.8120	<.0001*
	Caucasian	-1.9813	0.0002*
	Income	0.1184	0.0042*
	PrimaryShopper	1.8948	<.0001*
	Children	-1.4170	0.0277*

*means significant at 5% level **means significant at 10%

Perception of the safety of sweets was found to have a positive relationship with WTP bid differences in agreement with the hypothesis. This indicated that as the perceived safety rating of sweets increased, so did the consumers bid for the product

by \$0.27. The safer the product seemed the more people were willing to pay for it in order to assure the safety of themselves and their household.

As was found above in the European model, taste evaluation differences were found to have a positive relationship with WTP bid differences. As the difference in taste evaluations for the labeled and unlabeled versions of the South American chocolate increased, the WTP bid differences increased by \$0.41. This was a significant increase, and suggested that participants were willing to increase their premium for the labeled product over the unlabeled product once it was tasted. This could lead to increased profits if origin labeling was combined with tasting opportunities or previous individual taste experiences with the products.

Using the procedure outlined in chapter four, variables that had an impact on the variance within the model were determined and included in the final model. Caucasians showed a lower variance in their WTP bid differences than other ethnicities, as did consumers from households with children versus those without children. Increases in income level led to an increased variance. Lastly, being the primary shopper also showed a positive relationship with the variance portion of the model.

5.7.3 African WTP Differences

Upon completion of the Tobit Regression analysis, the resulting estimates for the mean and variance portion of the model for taste differences between the labeled and unlabeled versions of African chocolate were obtained and are displayed in Table 5.12.

Table 5.12 Tobit – WTP Differences for Labeled v. Unlabeled Africa

	Parameter	Coefficient	P-Value
Means	Intercept	2.0423	0.0100*
	Demographics		
	Female	0.2562	0.3775
	Age	-0.1384	0.8390
	Caucasian	-0.1723	0.4798
	Income	0.0555	0.0047*
	Children	-0.3385	0.1670
	College	0.4005	0.1080
	Postgrad	0.3564	0.2106
	PrimaryShopper	0.1907	0.4687
	Perceptions		
	SafetyofSweetsAfrica	0.1121	0.3747
	QualityofSweetsAfrica	0.0795	0.5540
	EconomicStatusAfrica	-0.1116	0.3853
	Purchase Habits and Importance		
	TasteImportance	-0.2669	0.0970**
	QualityImportance	0.6141	0.0020*
	SafetyImportance	-0.4521	0.0037*
	OriginImportance	0.1628	0.0635**
	PastPurchase	0.0622	0.5215
	Taste Evaluation		
	TasteDifferenceAfrica	0.2413	<.0001*
Variance	Sigma	0.8954	<.0001*
	SafetyofSweetsAfrica	-0.7169	0.0080*
	Female	-1.5023	0.0095*
	PrimaryShopper	1.6249	0.0029*
	PastPurchase	-0.7662	0.0022*
	TasteDifferenceAfrica	0.4830	<.0001*

*means significant at 5% level **means significant at 10%

The final model for the means portion of WTP bid differences between the labeled and unlabeled versions of chocolate from Africa produced five significant variables:

income (at 5% confidence), importance of taste (at 10% confidence), importance of safety (at 5% confidence), importance of origin (at 10% confidence) and taste differences between the labeled and unlabeled versions of the chocolate from Africa (at 5% confidence).

Unlike the other two WTP difference models, the only demographic that was significant was income. Income was shown to have a positive relationship with WTP bid differences between the labeled and unlabeled chocolate versions for Africa as hypothesized. For every \$10,000 increase in income, the subject's WTP premium for the labeled version over the unlabeled version increased by \$.06. Considering that having a higher income may allow them the financial ability to experiment with chocolate from different regions, consumers with higher incomes may potentially have more exposure to such products. This exposure can help create perceptions and opinions of sweets from those areas, giving the consumer confidence when making purchase decisions.

Importance of taste was found to have a negative relationship with WTP differences which contradicted the expected hypothesis. For each increase in the importance of taste, the consumer's WTP premium for the labeled versus unlabeled version of chocolate from South America was projected to fall by \$0.27. Consumers may be leery about the quality of taste for chocolate produced in Africa, as shown by the mean comparisons on perceived quality of sweets from earlier, causing the premium in WTP for the labeled version over the unlabeled version to fall as the importance of taste increased. In other words, if the consumer did not feel as if it was

of good quality, the more and more importance he or she placed on taste, the less and less they were willing to pay for the labeled chocolate over the unlabeled chocolate. Importance of quality showed an opposite relationship with WTP bid differences with an estimate of \$0.61. This suggests that as the level of importance placed on quality increased, so did WTP bid differences.

Importance of safety also showed a negative relationship with WTP bid differences with an estimate of negative \$0.45. For every increase in importance placed on safety, there was a decrease of \$0.45 in what the consumer was willing to pay for the labeled version over the unlabeled version. Again, if consumers were uncertain or leery of the safety of food or sweets produced in Africa, as they placed more and more importance on that attribute the premium they were willing to pay for the labeled African chocolate over the unlabeled version decreased. Both negative relationships of importance of taste and importance of safety with WTP differences can be justified by the fact that sweets from Africa were perceived as being of lesser quality and safety than all the other regions.

If a consumer placed higher importance on origin the premium he or she would be willing to pay for the labeled versus unlabeled version of African chocolate would increase by \$0.16. This confirms the previously stated hypothesis that premiums can be increased if origin labeled products were provided to those that desire them. The fact that this was the only model that showed this variable as important is interesting. However, it should be noted that importance of origin was the least important attribute when it came to important things to consider when making purchases by participants.

Since Africa is one of the markets coming out with more exotic chocolates, it would make sense that more interest was paid to origin for this region than the other regions that are better known for their chocolate production.

Taste evaluation differences were found to have a positive relationship with WTP bid differences as was apparent in both the European and South American models. With a premium of \$0.24 for the labeled over the unlabeled version of African chocolate, the findings suggested that participants would be willing to pay for a labeled over unlabeled chocolate once it was tasted. Providing tasting opportunities could increase profits for chocolate producers, and those who have experience with the product taste may also be willing to pay more.

The variance portion of the final model revealed five significant variables including the perceived safety of sweets in Africa, female, primary shopper, past purchase behavior and taste evaluation differences between the labeled and unlabeled versions of the African chocolate. As the perceived level of safety for sweets in Africa, as well as the past purchase frequency of chocolate, increased, so did the variance within the model. Females were again found to have a lower variance than their male counterparts. However, primary shoppers were found to have a higher variance than those who were not primary shoppers. Lastly, as the taste evaluation differences between the labeled and unlabeled versions of the African chocolate increased, so did the variance for this model.

5.8 Significant Variable Comparisons

When examining both the taste evaluation and WTP bid difference models, there were several variables that were found to be significant across the two model types for different regions. Income is one of these variables being significant in the European taste evaluation and African WTP bid differences models. Income could impact taste evaluation differences between labeled and unlabeled versions since those with a high income may have increased exposure to such products, giving them experience that may influence their taste preferences. It was not a surprise that Income could impact WTP bid differences since those with more disposable incomes may be willing to pay more for a chocolate bar.

Having children present in the household also showed to have a significant impact on taste evaluation (African chocolate) and WTP bid (South American chocolate) difference models. This is logical as consumers who have children in their household may be more concerned with the quality and safety of the products they are purchasing. Having the origin label would help indicate such quality and safety levels, removing uncertainties associated with unlabeled products. Removing uncertainties found with unlabeled chocolate, could increase consumer confidence in the product, increasing their taste evaluation and WTP bid differences.

Post graduate education level was found to have a significant impact on both taste evaluation and WTP bid differences for South America. However, the sign of the relationships were opposite. Having a higher education level tended to lower taste evaluation differences potentially due to of more overall knowledge about the region's

food safety and quality levels. This wider knowledge span may create perceptions for different regions, impacting the consumer's taste evaluations. At the same time, having a post graduate education increased WTP bid differences between the labeled and unlabeled versions of South American chocolate. This could be attributed to similar circumstances as discussed previously with the fact that labels remove an element of uncertainty in a consumers purchase choice, making the labeled product more appealing to purchase and raising WTP bids.

Finally, the level of importance placed on the quality of sweets was determined to have an influence in taste evaluation differences for South America, and WTP bid differences in Africa. The consumer's level of importance for quality had a negative impact on taste evaluations differences for South America which may be due to the fact that consumers viewed the quality of chocolate from South America as more questionable, previously confirmed by the mean comparisons on quality perceptions, resulting in a lower taste evaluation premium for the labeled product as more importance is placed upon that attribute. In contrast, importance of quality was found to have a positive relationship with WTP bid differences for Africa. Even though Africa was perceived to have a low quality compared to the other regions examined in this study, when compared with an unknown region of production (the unlabeled version), the labeled version of African chocolate may be seen as potentially higher quality due to the unlabeled chocolate not providing any quality evaluation cues resulting in increased product uncertainties. If the consumer had no idea where the other chocolate is produced, eliminating potential quality or safety indicators, and they

placed higher importance on quality, they were found to have increased premiums for the labeled version over the unlabeled version for African chocolate. As one can see, there is potential for several key variables to have an impact on both taste evaluation and WTP differences between labeled and unlabeled versions of chocolate from different regions.

Chapter 6

CONCLUSION

The use of origin labeling has increased greatly the past two decades. For many products in the U.S. such labeling is mandatory, while on other foods some producers voluntarily provide the information. This is being done however without a solid understanding of how this information influences consumers. In an environment of increasingly health conscious consumers, how they feel about the quality and safety of foods from different regions could have a significant impact on their impressions of, and willingness to pay (WTP) for, country-of-origin labeled products.

This study examined these issues for chocolate bars, where origin information is not required but several producers provide the information. Three different regions, along with domestic, were selected as origins: Europe, Africa, and South America. The objectives were thus to determine if origin labeling on chocolate bars: 1) influences consumers' taste perceptions, and 2) changes their WTP. In order to complete these objectives both a taste evaluation and BDM auction mechanism were employed in the setting of a field experiment. Data was collected through five field experiment sessions conducted at different locations in Delaware between July and September 2013 with a total of 169 participants.

Results showed a higher perceived food safety, food quality, and economic status for Europe and the U.S. over South America and Africa. When comparing labeled

versions, participants preferred the taste of, and were willing to pay more for, chocolate from more-developed (Europe and the U.S.) over the less-developed regions. However, in comparing labeled and unlabeled versions of the same chocolate, it was found that origin labeling did not hinder taste evaluations or WTP, and instead typically resulted in premiums. This was counter to initial hypotheses and suggests implementing voluntary or mandatory origin labeling scheme can raise product evaluations and increase sales. Therefore, there should be little or no objection by producers to a mandatory origin labeling law for chocolate.

Variables impacting taste evaluation and WTP bid differences varied by region. For Europe, gender and income were found to have a negative relationship with taste evaluation differences, whereas only the taste evaluation difference between the labeled and unlabeled versions of European chocolate was found to have an impact, positive, on WTP bid differences between the labeled and unlabeled versions. The taste evaluation difference model for South America revealed three significant variables of post graduate education, perceived quality of sweets from South America, and the level of importance placed on quality. Having a higher education level also had a significant impact on South American's WTP bid difference model, along with presence of children, safety of sweets, and taste evaluation differences. Gender, presence of children, and perceived quality of sweets were revealed as having a significant influence on taste evaluation differences between the labeled and unlabeled versions of the African chocolate. However, only income, taste difference, and importance placed on taste, quality, safety, and origin played an important role in

determining consumer WTP bid differences. Even though significant variables varied widely by model, there were a few that had an impact on both taste evaluation and WTP differences including income, children, post graduate education, and importance placed on quality.

Some limitations in this study included a smaller sample size, and geographic limitations due to limited budget and available sites for conducting the field experiments. Access to a limited amount of different chocolate bars per region also limited the ability to assure compatibility between chocolate bars for the taste evaluation portion. Further expansions to this study could include increasing the sample size, including more regions for chocolate comparisons or focusing on specific countries. Finding a wider variety of locations (i.e. grocery stores, more parks, community events) to conduct the field experiments could also help increase the validity of the results, as well as expanding the sample across a wider number of states.

REFERENCES

- Ahmed, Z.U., Johnson, J.P., Xia, Y., Chen, K.F. Han, S.T. and Lim, C.B. (2004). Does country of origin matter for low involvement products. *International Marketing Review* 21(1): 102-120.
- Ahmed, S.A. and d'Atous, A. (2008). Antecedents, moderators and dimensions of country-of-origin evaluations. *International Marketing Review* 25 (1):75-106.
- Alfnes, F., and Rickertsen, K. (2003). European consumers' willingness to pay for US beef in experimental auction markets. *American Journal of Agricultural Economics* 85: 396-405.
- Alfnes, F. (2004). Stated preferences for imported and hormone-treated beef: application of a mixed logit model. *European Review of Agricultural Economics* 31(1): 19-37.
- Almeida, I., and Monnier, O. (2013). Higher Chocolate Prices May Follow Africa's Shortfall. BloombergBusinessWeek. Accessed at <http://www.businessweek.com/articles/2013-02-07/higher-chocolate-prices-may-follow-africas-cocoa-shortfall> (Viewed on 09 Sept. 2013).
- Becker, G. M., Degroot, M. H., and Marschak, J. (1964). Measuring utility by a single-response sequential method. *Behavioral Science* 9 (3): 226-232.
- Bensen, A. (2008). A brief History of Chocolate. Smithsonian.com. Accessed at <http://www.smithsonianmag.com/arts-culture/brief-history-of-chocolate.html> (Viewed on 20 Aug. 2013).
- Bernard, J.C., J.D. Pesek, Jr., and X. Pan. (2007). Consumer Likelihood to Purchase Chickens with Novel Production Attributes. *Journal of Agricultural and Applied Economics* 39:581-596.
- Bradford, C. (2013). How large is the Chocolate Industry? Houston Chronicle. Accessed at <http://smallbusiness.chron.com/large-chocolate-industry-55639.html> (Viewed on 28 Sept. 2013).

- Buckley, C. (2013). Rice Tainted with Cadmium is Discovered in Southern China. The New York Times. Accessed at http://www.nytimes.com/2013/05/22/world/asia/cadmium-tainted-rice-discovered-in-southern-china.html?_r=0 (Viewed on 10 Aug. 2013).
- Chern, W., and Chang, C. (2012). Benefit evaluation of the country or origin labeling in Taiwan: results from an auction experiment. *Food Policy* 37(5): 511-519.
- Chern, W., and Lin, H. (2012). Taiwanese Consumer Valuation of Country of Origin Labeling Using Auction Experiment with Tasting. *Journal of Family and Economic Issues* 33(2): 184-198.
- Dickinson, D.L., and Bailey, D. (2002). Meat traceability: are US consumers willing to pay for it? *Journal of Agricultural and Resource Economics* 27(2): 348–364.
- Dickinson, D., and Bailey, D. (2005). Experimental evidence on willingness to pay for red meat traceability in the United States, Canada, the United Kingdom, and Japan. *Journal of Agricultural and Applied Economics* 37(3): 537–548.
- Dransfield, E., Ngapo, T. M., Nielsen, N. A., Bredahl, L., Sjöodén, P. O., Magnusson, M., Campo, M. M., and Nute, G. R. (2005). Consumer Choice and Suggested Price for Pork as Influenced by its Appearance, Taste and Information Concerning Country of Origin and Organic Pig Production. *Meat Science* 69:61–70.
- Enneking, U. (2004). Willingness to pay for safety improvements in the German meat sector: the case of the Q&S label. *European Review of Agricultural Economics* 31(2): 205–223.
- Feuz, D. M., W. J. Umberger, C. R. Calkins, and B. Sitz. (2004). U.S. Consumers' Willingness to Pay for Flavor and Tenderness in Steaks as Determined with an Experimental Auction. *Journal of Agricultural and Resource Economics* 29:501–516.
- Fox, J. A., Hayes, D. J., Shogren, J.F., and Kliebenstein, J. B. (1996). Experimental Methods in Consumer Preference Studies. *Journal of Food Distribution and Research* July 1996.
- Gambaro, A., and Ellis, A. (2012). Exploring consumer perception about the different types of chocolate. *Brazilian Journal of Food Technology* 15(4): 317-324.
- Grunert, K. G. (2005). Food quality and safety: Consumer perception and demand. *European Review of Agricultural Economics* 32(3): 369–91.

- Haefele, M.A. and J.B. Loomis, (2001). Improving the Connection between Theory and Empirical Analysis of Stated Preference and Conjoint Data: Improving Statistical Efficiency and Testing Robustness of Conjoint Marginal Valuations. *American Journal of Agricultural Economics* 83:1321-1327.
- Hobbs, J.E. (2003). "Consumer demand for traceability." Working Paper 03-01. International Agricultural Trade and Research Consortium. ISSN 1098-9218.
- Hoffmann, R. (2000). Country of origin—a consumer perception perspective of fresh meat. *British Food Journal* 102(3): 211–29.
- Lawless, H. T., and Heymann, H. (2010). *Sensory Evaluation of Food: Principles and Practices*. Food Science Text Series. Springer Science+Business Media, LLC. New York, New York.
- Lawless, H. T., and Malone, J. G. (1986a). The discriminative efficiency of common scaling Methods. *Journal of Sensory Studies* 1:85-96.
- Lawless, H. T., and Malone, J.G. (1986b). A comparison of scaling methods: Sensitivity, replicants and relative measurements. *Journal of Sensory Studies* 1: 155-174
- Lim, K., Hu, W., Maynard, L., and Goddard, E. (2012). U.S. Consumers' Preference and Willingness to Pay for Country-of-Origin-Labeled Beef Steak and Food Safety Enhancements. *Canadian Journal of Agricultural Economics* 61(1): 93-118.
- Long, J.S. (1997). "Regression Models for Categorical and Limited Dependent Variables." Sage Publications, Inc., Thousand Oaks, CA.
- Loureiro, M.I., and McCluskey, J.J. (2000). Assessing consumer response to protected geographical identification labeling. *Agribusiness: An International Journal* 16 (3) : 309–320.
- Loureiro, M. L., and Umberger, W. J. (2003). Estimating consumer willingness to pay for country-of-origin labeling. *Journal of Agricultural and Resource Economics* 28(2): 287-301.

- Loureiro, M.L., and Umberger, W.J. (2005). Assessing Consumer Preferences for Country-of-Origin Labeling. *Journal of Agricultural and Applied Economics* 37(1): 49–64.
- Loureiro, M.L., and Umberger, W.J. (2007). A choice experiment model for beef: what US consumer responses tell us about relative preferences for food safety, country-of-origin labeling and traceability. *Food Policy* 32: 496–514.
- Lusk, J. L., Fox, J. A., Schroeder, T. C., Mintert, J., Koohmaraie, M. (2001). In-Store Valuation of Steak Tenderness. *American Journal of Agricultural Economics* 83(3): 539-550.
- Lusk, J.L, Roosen, J., and Fox, J.A. (2003). Demand for beef from cattle administered growth hormones or fed genetically modified corn: a comparison of consumers in France, Germany, the United Kingdom, and the United State. *American Journal of Agricultural Economics* 85(1): 16–29.
- Lusk, J. L., Brown, J., Mark, T., Proseku, I., Thompson, R., and Welsh, J. (2006). Consumer behavior, public policy, and country-of-origin labeling. *Applied Economic Perspectives and Policy* 28(2): 284–92.
- Nayir, D.Z. and Durmusoglu, S.S. (2008). Country image in the context of European Union membership: the Turkish case. *Journal of Management Development* 27(7): 791-808.
- The Packer Editorial Board. (2013). “COOL Isn’t Working.” The Packer. Accessed at <http://www.thepacker.com/commodity-fruits/apples/COOL-isnt-working-211571181.html> (Viewed on 10 Oct. 2013).
- Peterson, H.H., Bernard, J.C., Fox, J.A., and Peterson, J.M. (2013). Japanese Consumers’ Valuation of Rice and Pork from Domestic, U.S., and Other Origins. *Journal of Agricultural and Resource Economics* 38(1): 93 – 106.
- Quagraine, K.K., McCluskey, J.J., and Loureiro, M.L. (2003). A latent structure approach to measuring reputation. *Southern Economic Journal* 69(4): 966–977.
- Roosen, J., J. L. Lusk, and J. A. Fox. (2003). Consumer demand for and attitudes toward alternative beef labeling strategies in France, Germany and the UK. *Agribusiness* 19: 77-90.
- SAS Institute Inc. SAS/ETS® 9.3 User’s Guide. (2011a). Cary, NC: SAS Institute Inc.

- Schnettler, B., Vidal, R., Silva, R., Vallejos, L., and Sepulveda, N. (2009). Consumer willingness to pay for beef meat in a developing country: The effect of information regarding country of origin, price and animal handling prior to slaughter. *Food Quality and Preference* 20(2): 156-165.
- Schooler, R.D. (1971). Bias phenomena attendant to the marketing of foreign goods in the US. *Journal of International Business Studies* 2:71-81.
- Sena, Matt. (2013). Chocolate Industry Analysis 2013 – Cost & Trends. Franchise Help. Accessed at <http://www.franchisehelp.com/industry-reports/chocolate-industry-report> (Viewed on 10 July 2013).
- Teo, P., Mohammad, O., and Fernando, Y. (2010). Chocolate brand familiarity and product- country evaluation among young consumers in Malaysia. *Business Review* 5(1):117-130.
- United States Census Bureau. “Delaware: State and County QuickFacts.” Accessed at <http://quickfacts.census.gov/qfd/states/10000.html> (Viewed on 12/15).
- Umberger, W.J., Feuz, D.M., Calkins, C.R., and Sitz, B.M. (2003) Country-of-origin labeling of beef products: US consumers’ perceptions. *Journal of Food Distribution Research* 34(3): 103–116.
- Van der Lans, I. A., van Ittersum, K., De Cicco, A., and Loseby, M. (2001). The role of the region of origin and EU certificates of origin in consumer evaluation of food products. *European Review of Agricultural Economics* 28(4): 451-477.
- Van Ittersum, K., Meulenberg, M.T.G, van Trijp, H.C.M., and Candel, M.J.J.M. (2007). Consumers’ appreciation of regional certification labels: a pan-European study. *Journal of Agricultural Economics* 58(1): 1-23.
- Verbeke, W., and Ward, R.W. (2003). “Importance of EU label requirements: an application of ordered probit models to Belgium beef labels.” Paper Presented at the American Agricultural Economics Association Annual Meetings. Montreal, Canada. July.
- Wang, C., and Lamb, C. (1983). The impact of selected environmental forces upon consumers’ willingness to buy foreign products. *Journal of the Academy of Marketing Science* 11(2): 71-84.

Watkins, T. (2011). Cargill recalls 36 million pounds of ground turkey. CNNHealth. Accessed at <http://www.cnn.com/2011/HEALTH/08/03/turkey.recall/> (Viewed on 30 Sept. 2013).

Winfrey, J.A., and McCluskey, J.J. (2005). Collective reputation and quality. *American Journal of Agricultural Economics* 87(1): 206–213.

Appendix A

FIELD EXPERIMENT SCRIPT

Hi, I'm _____ and this is _____ and we are graduate students at the University of Delaware.

We are conducting an economic study looking at possible consumer preferences for different types of milk chocolate. You can earn some money and enjoy some chocolate! Participating includes telling us your value for the different types of chocolate, tasting some chocolate and answering a few survey questions. It should take no more than ten minutes of your time. You need to be a consumer of milk chocolate and over 18 to participate. 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:

For the first part of our study, we will be asking you to taste several pieces of milk chocolate. Some will be labeled with their region of origin and some will just have a letter for identification. Here are the different chocolates. Please take your time, carefully tasting each one and then rating its overall taste. Between tastings, please feel free to drink some cold water from this bottle so flavors are not mixed.

Place cups on table/Hand them sheet to rate their taste/Give them water bottle

We ask that you now state your true amount that you would be willing to pay for each chocolate bar. While we will be asking you your willingness to pay for several different chocolate bars between \$0 and \$5, only one auction will count so at most you would be purchasing one bar using the money you get for participating in the study. The auction that counts will be revealed in one of these randomly selected envelopes. Since you may end up buying a bar it is very important to enter your true willingness to pay for each. Entering too high 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 bar at a price you would like. Note that the price you'd pay for any bar would be less than what you bid by rules of the auction.

Get their offer

Please take the time to answer these questions on your willingness to pay for, and perception of quality and safety of different foods from the same regions.

Hand them the sheet of questions. Get Answers

Now that we have your bids for the chocolate bars, we will use these numbers you have given in a two person auction, where I will be the other person and I will randomly draw one of these envelopes. In the envelopes, there is a chocolate bar type and a binding bid price. If the number I draw is higher than your number for that bar, I will pay you \$5 and you will not receive the chocolate bar. If the number I draw is lower than your number, than you will receive the chocolate bar and whatever money is left over ($\$5 - \text{the number drawn}$).

Conduct random draw / Compare values

If random draw < offer:

Your offer is higher than the one in the envelope, which means you have bought the bar. We will pay you _____ ($\$5 - \text{the number drawn}$) and you will also receive the chocolate bar. While we count out your money and get your chocolate, please fill out our short survey.

**Hand person survey on a clipboard (make sure they see it is front and back).
Have money and receipt ready for when the survey is completed.**

Lastly, since we need to account for our funds, we need you to sign a receipt for your payment.

Hand over money once you have the signed receipt.

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

Make any notes needed on the survey (e.g. person did not eat the chocolate).

If random draw > offer:

Your offer is less than the one in the envelope, which means you did not purchase the chocolate bar and will receive \$5 as payment for this study. While we get you your money, please fill out our short survey.

**Hand person survey on a clipboard (make sure they see it is front and back).
Collect survey. Have money and receipt ready for when the survey is completed.**

Lastly, since we need to account for our funds, we need you to sign a receipt for your payment.

Hand over money once you have the signed receipt.

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

Make any notes needed on the survey (e.g. person did not eat the chocolate).

If random draw = offer:

Both offers were the same. Since the auction requires a higher subject price number to determine purchase we will just be giving you \$5. While we get your money and receipt, please fill out our short survey.

**Hand person survey on a clipboard (make sure they see it is front and back).
Collect survey.**

Lastly, since we need to account for our funds, we need you to sign a receipt for your payment.

Hand over money once they have the signed receipt.

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

Make any notes needed on the survey (e.g. person did not eat the chocolate).

Appendix B

TASTE RATING

1. Rate the overall taste for each bar. 1 being “Extremely Unsatisfying” and 9 being “Extremely Satisfying”.

	1	2	3	4	5	6	7	8	9
	Extremely Unsatisfying								Extremely Satisfying
U.S.	○	○	○	○	○	○	○	○	○
B	○	○	○	○	○	○	○	○	○
South America	○	○	○	○	○	○	○	○	○
A	○	○	○	○	○	○	○	○	○
Europe	○	○	○	○	○	○	○	○	○
Africa	○	○	○	○	○	○	○	○	○
C	○	○	○	○	○	○	○	○	○

Appendix C

WILLINGNESS TO PAY SHEET

2. Please indicate the price (bid) you would be willing to pay for each chocolate bar. Assume all the bars are the same size (2.5 ounces). Your price must fall between \$0 and \$5

	Price (Bid)
U.S.	_____
B	_____
South America	_____
A	_____
Europe	_____
Africa	_____
C	_____

Appendix D

QUESTIONNAIRE

4. In your opinion, how would you rate the **QUALITY of FRESH FRUITS** produced in the following regions?

	Poor	Fair	Good	Very Good	Excellent
U.S.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Europe	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
South America	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Africa	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

5. In your opinion, how would you rate the **QUALITY of SWEETS** produced in the following regions?

	Poor	Fair	Good	Very Good	Excellent
U.S.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Europe	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
South America	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Africa	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

6. In your opinion, how would you rate the **FOOD SAFETY of FRESH FRUITS** produced in the following regions?

	Poor	Fair	Good	Very Good	Excellent
U.S.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Europe	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
South America	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Africa	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7. In your opinion, how would you rate the **FOOD SAFETY** of **SWEETS** produced in the following regions?

	Poor	Fair	Good	Very Good	Excellent
U.S.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Europe	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
South America	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Africa	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

8. In your opinion, how would you rate the economic development status of the following regions? 1 being “Minimally Developed”, 3 being “Moderately Developed” and 5 being “Highly Developed”.

	1 Minimally Developed	2	3 Moderately Developed	4	5 Highly Developed
U.S.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Europe	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
South America	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Africa	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

9. What is your gender?

- Male
- Female

10. What is your age?

- 18 to 30
- 31 to 40
- 41 to 50
- 51 to 60
- 61 to 75
- Over 75

11. What is your ethnicity?

- White, not of Hispanic origin
- Black or African American
- Hispanic or Latino
- Asian
- Other

12. What is your total household income?

- Less than \$25,000
- \$25,000 to \$49,999
- \$50,000 to \$74,999
- \$75,000 to \$99,999
- \$100,000 to \$149,999
- \$150,000 to \$199,999
- \$200,000 or more

13. What is your highest education you have completed?

- Less than High School
- High School
- Some College
- College
- Post Graduate

14. Are you the Primary Shopper in your household?

- Yes
- No

15. Do you have children under 18 in your household?

- Yes
- No

16. When you are purchasing food, how important is it to you that you do or know the following? 1 being “Very Un-Important”, 4 being “Neutral” and 7 being “Very Important”.

	1 Very Un- important	2	3	4 Neutral	5	6	7 Very Important
Purchase better tasting food	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Purchase better quality food	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Purchase safe food	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Know where your food is produced	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

17. How often in the past six months have you purchased chocolate bars?

Not at all	Rarely	Occasionally	Often	Very Often
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Appendix E

HUMAN SUBJECT APPROVAL



RESEARCH OFFICE

210 Hullihen Hall
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Newark, Delaware 19716-1551
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DATE: June 20, 2013

TO: Lenna Hildebrand
FROM: University of Delaware IRB

STUDY TITLE: [480915-1] Analyzing the Consumer's Sweet Tooth: A Field Experiment on Consumer Preferences for Chocolate

SUBMISSION TYPE: New Project

ACTION: DETERMINATION OF EXEMPT STATUS
DECISION DATE: June 20, 2013

REVIEW CATEGORY: Exemption category # 2, 6

Thank you for your submission of New Project 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 Jody-Lynn Berg at (302) 831-1119 or jlberg@udel.edu. Please include your study title and reference number in all correspondence with this office.