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# Assessment of Consumer Motivations to Attend Farmers' Markets, Their Preferences, and Their Willingness To Pay for Differentiated Fresh Produce: Three Essays

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# ASSESSMENT OF CONSUMER MOTIVATIONS TO ATTEND FARMERS' MARKETS, THEIR PREFERENCES, AND THEIR WILLINGNESS TO PAY FOR DIFFERENTIATED FRESH PRODUCE: THREE ESSAYS

by

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# ABSTRACT

Assessment of Consumer Motivations to Attend Farmers' Markets, Their Preferences, and Their Willingness to Pay for Differentiated Fresh Produce: Three Essays

by

Jean Dominique Gumirakiza, Doctor of Philosophy

Utah State University, 2013

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This dissertation analyzed consumer primary motivations for attending farmers' markets, preferences for product features, and differentiated produce. We used consumer survey data collected at farmers' markets in Nevada and Utah during summers of 2008 and 2011, respectively. This dissertation consists of three essays. The first essay employed binary and multinomial logistic models to assess primary consumer motivations for attending farmers' markets. Results indicate that many consumers attend farmers' markets primarily to purchase fresh produce. Other motives such as social interaction, purchasing ready-to-eat food, and buying packaged foods, arts, and crafts were also analyzed. In this first essay, consumers who attended farmers' markets were clustered into three groups based on their similar characteristics. Results from this essay are useful to vendors at farmers' markets for they indicate primary motivations to attend. It also provides guidelines to farmers' markets managers in their efforts to meet attendees' expectations.

The second essay used an ordered logistic model to analyze consumer preferences for eight fresh produce features. These features are product variety, quality, appearance, pricing, local, organic, freshness, and knowledge of local growers. Findings show that consumer preferences are strong for product quality, freshness, local and organic production. Policy makers can use results from this essay to provide necessary assistance to farmers to feature their products based on consumers' preferences. Health-related policy makers can use the results to implement programs aimed at increasing fresh produce consumption.

The last essay used a multinomial logistic, conditional and ordinary least squares models to respectively investigate consumer preferences for differentiated fresh produce, willingness to pay, and stated demands for green peppers, cucumbers, and yellow squash. Comparison between preferences before and those after information about production and place of production was also done. Results demonstrate that consumer willingness to pay and the probability of purchasing each of the three products grown conventionally in Utah overweigh those for either organically or conventionally grown of unknown origin. This essay provides information pertaining to produce differentiation through labels. The information has significant impact on preferences for conventionally grown local produce and negative effect on conventionally grown fresh produce of unknown origin. Green peppers, cucumbers, and yellow squash are ordinary goods with inelastic stated demands. Produce growers can use results from this essay to adopt production practices to meet consumer preferences. Results are useful to policy makers in enforcing local and organic certification regulations. They can also be used for pricing and marketing strategies.

(151 pages)

# PUBLIC ABSTRACT

**Assessment of Consumer Motivations to Attend Farmers' Markets, Their Preferences, and Their Willingness to Pay for Differentiated Fresh Produce: Three Essays**

The purpose of this public abstract is to present research objectives, societal benefits, and costs associated with this dissertation. This dissertation is one the outcomes of a three-year $155,450.86 project whose number is UTA01008. Kynda Curtis, Associate Professor, Department of Applied Economics proposed the project to assess consumer demand and purchase motivations for differentiated produce across direct marketing outlets. In general, this dissertation seeks to analyze consumer primary motivations for attending farmers' markets, their preferences, and their willingness to pay for differentiated fresh produce. To accomplish this task, we develop three essays.

Specific objectives for the first essay are to describe consumer characteristics that explain reasons for attending farmers' markets, determine the probabilities to attend for each of four primary motives, and describe clusters among fresh produce purchasers with similar traits. Specific objectives for the second essay are to describe levels of importance consumers assign to product features when purchasing fresh produce, estimate the likelihood of purchasing fresh produce on the basis of a given product feature, and discuss consumer types that significantly explain such probabilities. Specific objectives for the last essay are to estimate relative likelihood of purchasing a product with labels showing either conventionally grown local or organically grown of unknown origin over conventionally grown of unknown origin, compute consumer willingness to pay for differentiated fresh produce, make a comparison analysis before and after information about location and production practices, and form stated demand functions for fresh produce and quantify price elasticities. The analyses are performed on green peppers, cucumbers, and yellow squash as examples of fresh produce.

This dissertation has several societal benefits. Precisely, local farmers and vendors at farmers' markets will use results to revise their production practices and their marketing strategies to meet consumers' preferences and eventually attract more individuals to such markets. In addition, this dissertation will be useful for farmers' markets managers in recruiting vendors, attracting more attendees, and improving markets features. Furthermore, policy makers will use results from this dissertation to provide assistance to farmers to feature their products according to consumers' preferences. Those in the health sector will use the results to implement programs like WIC and Senior Farmers' Markets Nutrition Programs. Increased consumption of fresh produce is expected as a result of this dissertation. Local and organic certification regulations and food safety standards will be reinforced.

Jean Dominique Gumirakiza

# DEDICATION

This dissertation is dedicated to my wife, Speciose Nyiramana, and my three children,

Divine Senga Ange Irakiza, Honette Sangwa Irakiza

and Holy Blessing Irakiza.

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Jean Dominique Gumirakiza

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# INCLUSIVE INTRODUCTION

The number of farmers' markets in the US has grown rapidly over the last decade, demonstrating increased consumer interest in purchasing products as local markets from local growers, consuming ready-to-eat food and packaged foods, attending music events and concerts, as well as purchasing arts/crafts. Among the products found at farmers' markets, fresh produce is the most common product available and due to the differences in production styles and grower management, the produce found at farmers' markets also has differing features or attributes. Common features include product variety, quality, appearance, pricing, local, organic, freshness and knowledge of product grower. When making purchasing decision, consumers assign levels of importance to each of these product features. Furthermore, some products are differentiated in terms of origin and production practices. The purpose of this dissertation is to explain consumer primary motivations for attending farmers' markets, their preferences for various product and market features, and their willingness to pay and demand for differentiated produce. This task is accomplished in three essays.

The general objective of the first essay is to assess consumer primary motivations for attending farmers' markets. The existing literature primarily limits the discussion of consumer attendance at farmers' markets to purchasing produce. Since there are other goods and services available at farmers' markets such as opportunities to socialize, music events and concerts, arts and crafts, ready-to-eat foods, beverages, breads, and packaged products, is important to investigate the types of consumers attending for various reasons. The analysis conducted here examines four primary motivations such as to purchase fresh

produce, to purchase ready-to-eat foods, for social interaction, and buy packaged foods, arts and crafts.

Specifically, the first essay strives to (1) describe consumer characteristics which explain the reasons for attending farmers' markets, (2) determine the probability of visiting a farmers' market to primarily purchase produce, (3) determine relative probabilities to attend a farmers' market for any primary motive over purchasing produce, (4) describe clusters among fresh produce purchasers with similar traits, and (5) formulate managerial and policy implications pertaining to consumer primary motives to attend farmers' markets in Nevada and Utah. As a result, this essay fills in the knowledge gap that exists in the current literature and provides information in terms of who attends farmers' markets and why.

Consumers' preferences for fresh produce differ on the basis of product features. The general objective of the second essay is to analyze consumer preferences for product features. The levels of importance for these product features vary across consumers. Past studies have investigated consumer demand and willingness to pay for certain types of fruits and vegetables. However, emphasis has primarily focused on local and organically grown produce. An examination of a variety of fresh produce attributes, both intrinsic and extrinsic, that induce consumers to purchase produce is not currently available in the literature. Understanding the attributes that encourage consumer spending is an important part in understanding consumer preferences in the direct marketing experience. This essay is inclusive in the sense that it extends the analysis to investigate eight product features including consumer preferences for product variety, quality, appearance,

freshness, and pricing, as well as the importance of local origin, organic production, and the knowing the grower.

The specific objectives for the second essay are to (1) describe the levels of importance consumers assign to product features when purchasing fresh produce, (2) estimate the likelihood of purchasing fresh produce on the basis of a given product feature, (3) identify and discuss consumer types that significantly explain such probabilities, and (4) formulate a set of managerial, marketing and policy implications to meet consumer preferences and increase of consumption of fresh produce; which will eventually contribute in addressing dietary issues. The rationale behind this essay is to fill the gap in the literature and provide relevant information to local fresh produce growers, interested in understanding consumers' preferences, their likelihood to purchase produce with a particular feature, and how to adjust their practices accordingly. This information is also useful for market managers and policy makers in making well informed decisions regarding consumer preferences.

The general objective of the third essay is to investigate consumer preferences for differentiated fresh produce, including willingness to pay and stated demand for green peppers, cucumbers and yellow squash as examples. Fresh produce may be differentiated based on production practices, place of origin, and/or nutritional facts. This essay builds from the conclusions of Howard and Allen (2010), showing that differentiation of food products by production practices and origin is prominent in farmers' markets and community supported agriculture (CSA) programs. It also builds upon a recent study by Onozaka and Thilmany-McFadden (2011) which analyzes the potential differentiation

and interaction among designations of production location and other claims in food markets.

This third essay examines three differentiated produce types—conventionally grown of unknown origin, conventionally grown local (in the State), and organically grown of unknown origin—for each of three products (green peppers, cucumbers, and yellow squash). We identify and assess consumer characteristics that explain the preferences for each product with the differentiating attributes. Furthermore, we estimate demand functions, and calculate price elasticities for each of the three products. We test whether these products are ordinary goods for consumers who attend farmers' markets, and if the stated demands are elastic or inelastic. Doing so allows us to inform farmers about the degree of responsiveness in demand to price changes for each of these products.

There are four specific objectives that this essay achieves. (1) Estimate relative likelihood of purchasing a product with labels showing either conventionally grown local or organically grown of unknown origin over conventionally grown of unknown origin, (2) compute consumer willingness to pay for a pound of conventionally grown local or organically grown of unknown origin over conventionally grown of unknown origin green peppers, cucumbers, and yellow squash, (3) compare the probabilities of purchasing each of the differentiated products and WTP before and after information about location and production practices are provided, and (4) form stated demand functions for green peppers, cucumbers, and yellow squash and quantify price elasticity for each of these food products.

This dissertation uses consumer data collected at farmers' markets in Utah and Nevada. Data were collected across 16 farmers' markets in Nevada and Utah during the

summers of 2008 and 2011, respectively. The total sample involved 1488 respondents, 669 consumers in Nevada and 819 consumers in Utah. The survey was initially designed in 2008 and distributed to respondents in Nevada. It was then updated, customized and distributed to respondents in Utah in 2011. The first two essays used data from Nevada and Utah while the last one used data from Utah. When the initial survey used in Nevada in 2008 was updated for data collection in Utah, several questions were added. These new questions were needed to accomplish objectives of the third essay. Thus, the third essay only uses data collected from the 819 farmers' market consumers who completed the survey in Utah during the summer of 2011.

The survey contained questions about consumer preferences and characteristics. The survey consists of closed questions that provided the respondent with a defined set of answers. Question structures can be found in the appendix. The questions sought both categorical and scaled responses. Categorical questions have no inherent ordering within them and include questions about marital status, gender, income, number of visits to farmers' market, program participation, etc. Conversely, scaled questions have some type of progressive order. Examples of such questions are those that ask respondents to rate degree of their agreement with statements, or rank the importance they place on produce features or market attributes.

In order to allow for variability in the bid prices of the differentiated fresh produce items under consideration, 20 versions of the survey were created. The prices of local origin and organically produced produce used in the bidding section of the survey were randomly generated by adding premiums to the prices of conventional produce (considered to be the bench mark in this study). These prices were compared to those in

traditional supermarkets and were found to be the same in most cases. The random bids ranged from a discount of 30% to a premium of 100% over the conventionally grown of unknown origin product. A copy of version 1 of the survey is appended herein.

Data collection was conducted using an in-person survey strategy. Data collectors visited various farmers' markets several different days across the market season; which starts in May and ends early October. In Utah, the data collection was conducted six times at each market location, two during the early season (May and June), two during the mid-season period (July and August), and two during the late-season (September and October). We followed the procedure used by Pascucci et al. (2011) where casual selection of survey respondents was made among farmers' markets attendees as they completed their purchases. Following the same strategy, a non-probability convenience sampling was undertaken. The overall sample size was large enough to enable the drawing of inferences. Data collectors approached attendees, introduced themselves, explained the purpose of the survey and asked them to take survey. Those attendees who accepted were handed a random copy from the 20 versions of the survey. For the sake of convenience, a chair, a clipboard and a pen were provided to the respondent. When completing the survey, each respondent was self-guided, but could ask for explanation regarding questions that he/she did not understand accurately. Upon completion of the survey, the respondent handed it back to a data collector. When the entire data collection was completed, data were entered and analyzed using Stata software.

A number of consumer characteristics were used as explanatory variables for the binary and multinomial logistic models. According to Belch (2008), consumer characteristics form consumers' personality and reflect their lives or lifestyles.

Consequently, Belch posits that changes in such characteristics often lead to changes in consumers' behavior. He also urges that studying the consumer characteristics allows marketers to do psychographic (dividing market on the basis of lifestyle, personality culture and social class) and demographic (dividing the market on the basis of demographic and socioeconomic variables) segmentation.

The characteristics which are considered in this dissertation include program participation, dietary and consumptions patterns, and consumer attitudes, demographic and socioeconomic. Characteristics that relate to program participation are; willingness to join a CSA (Community Supported Agriculture) program, WIC (Women Infant and Children) participation and home gardening. There are studies that suggest that program participation can influence consumption of fresh produce. For example Lang (2005) found that CSA clients increase purchases of fresh produce. Russell and Zepeda (2007) found that CSA consumers get a new level of understanding and appreciation for farming and increase behavior change towards purchasing fresh produce. They also indicate that attitude and behavior changes are generated by the structural elements of CSA including interactions with the farmer.

The characteristics that pertain to dietary and consumption patterns are; concerns about food safety and health/diet, vegetarian and time to prepare meals at home. Those that relate to consumer attitudes are; buying products with low environmental impact, agriculture enthusiasts, and attitudes towards farmers' market attributes. Thilmany-McFadden, Bond, and Keeling-Bond (2008) and Keeling-Bond, Thilmany-McFadden, and Bond (2009) reported that consumers likelihood to purchase locally-produced goods is explained by public attributes, such as supporting local agriculture/business and

promoting environmentally friendly products and by private attributes such as superior quality, freshness, and food safety.

Finally, consumer demographic and socioeconomic characteristics include age, gender, income, family size, shopping habits and grocery bills, expenditure at farmers' market, farmers' market visits, location, favorite vendor, marital status, shopping habits and education. For instance, Carpio and Isengildina-Massa (2009) sought to identify the socio-demographic characteristics affecting consumer preferences and found that the premiums for local products are influenced by age, gender, and income as well as by perceived product quality, a desire to support the local economy, patronage of farmers' markets, and consumer ties to agriculture. Giraud, Bond, and Bond (2005) found differences in consumer preferences for fresh produce across different locations in different States (New Hampshire, Maine, and Vermont).

Slama and Tashchian (1985) indicated that such consumer characteristics are important as they determine consumer choices and reactions to marketing techniques. Likewise, Kassarjian (1981) and Lian and Lin (2008) said that there are differences between individuals that explain differences in consumer decisions and consumer characteristics are very important when considering issues related to shopping. Thus, the characteristics used in this dissertation are those whose changes or differences can alter the chooser's decision. They are therefore considered as explanatory/independent variables while consumer choices/preferences are the explained/dependent variables.

This dissertation is limited to consumers who attended farmers' markets. More specifically, inferences, conclusions, and recommendations are applicable to consumers primarily in the States of Nevada and Utah in the United States.

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# CHAPTER 1

# ANALYSIS OF CONSUMER MOTIVATIONS FOR ATTENDING FARMERS' MARKETS

## 1.1 Abstract

The existing literature concerning consumer motives for attending farmers' markets is limited to purchasing produce. This essay uses binary and multinomial logistic models with data collected from 1488 in-person consumer surveys conducted at farmers' markets in Nevada and Utah to assess primary consumer motivations for attending farmers' markets. Results indicate that the primary reason consumers attend farmers' markets is to purchase fresh produce. The relative probability that an individual attends primarily for purchasing produce is 78%. The second primary motive is to socialize (with the relative likelihood of 14%). The third motive is purchasing packaged foods, arts, and crafts with relative probability of 5%. The least primary motivation is buying ready-to-eat food. Only 3% of the attendees come primarily for ready-to-eat food. Consumer characteristics that explain the relative probabilities of attending farmers' markets for each of the motives are discussed herein. A cluster analysis was also performed and grouped fresh produce purchasers into three groups. These results are useful to vendors at farmers' markets as they indicate consumer characteristics and primary motivations to attend the markets. Farmers' market managers can use them to increase attendance and meet attendees' expectations.

## 1.2 Introduction

Farmers' markets offer opportunities for local produce growers and small businesses to sell directly to consumers. Likewise, consumers have the chance to purchase fresh and high quality produce. In addition to produce, there are other goods and services available at farmers' markets such as arts and crafts, ready-to-eat foods, beverages, breads, and packaged products (USDA-AMS, 2009). Additionally, farmers' markets provide opportunities for social and educational events (Farmers' Market Federation of New York, 2006). Friends, farmers and consumers meet, socialize, attend concerts, and learn about various themes. According to Neil (2002), farmers' markets are important for a number of reasons. First, they give local growers the chance to sell produce they grow directly to customers. Second, they allow consumers to buy fresh food directly from growers. Third, they help create new farms and food businesses. He also argues that farmers' markets provide communities with ways to create excitement and activity in downtown areas and neighborhoods. Finally, farmers' markets provide an opportunity for consumers to learn about food production.

Past literature has primarily focused on consumer preferences and willingness to pay for locally grown and organic produce (Loureiro and Hine, 2002; Dimitri and Greene, 2004; Gifford and Bernard, 2004; Zepeda and Leviten-Reid, 2004; Garmon, Huang, and Lin, 2007; Thilmany-McFadden, Bond, and Keeling-Bond, 2008; Keeling-Bond, Thilmany-McFadden, and Bond, 2009; Curtis, 2010). However, the literature examining a complete set of primary consumer motives for attending farmers' markets is limited. This essay clearly investigates a complete set of motivations for attending farmers' markets.

The few existing studies (Trobe, 2001; Brown, 2002; Darby et al., 2008; George, Kraschnewski, and Rovniak, 2011; Alonso and O'Neill, 2011) indicate that consumers attend farmers' markets to purchase fresh healthy produce. However, they solely state other potential motives with limited analysis. A more detailed analysis is necessary to both policy and decision makers who are interested in other goods and services available at the markets. Studies indicate that it is not always clear who is more likely to purchase fresh produce. For example, Zepeda and Li (2006) conclude that income and demographic characteristics are not dominant factors; nor are attitudes or behaviors related to the environment and health significant influences on whether shoppers buy locally grown produce. Rather, they found that the attitudes and behaviors related to food and shopping habits significantly increase the probability that shoppers buy local food.

Two subsquent studies by Thilmany-McFadden, Bond, and Keeling-Bond (2008) and Keeling-Bond, Thilmany-McFadden, and Bond (2009) report that consumers with a higher propensity to purchase locally produced goods were influenced by public attributes, such as supporting local agriculture/business and promoting environmentally friendly products, and by private attributes such as superior quality, freshness, and safety. Keeling-Bond, Thilmany-McFadden, and Bond used a multinomial logistic model to analyze a national dataset of fresh produce consumers with a focus on exploring differences among those that prefer to purchase direct always, occasionally, and never.

This essay attempts to fill the gap in the literature. Four primary motivations are investigated in this essay. They are to purchase produce, to purchase ready-to-eat food, for social interaction, and to buy packaged foods, arts and crafts. The ultimate goal of this essay is to fully investigate the primary reasons why consumers choose to attend farmers'

markets. Specifically, we seek to accomplish five objectives: (1) describe consumer characteristics which explain farmers' market attendance, (2) determine the probability of visiting a farmers' market to primarily purchase produce, (3) determine relative probabilities to attend a farmers' market for any primary motive over purchasing produce, (4) describe clusters among fresh produce purchasers with similar traits, and (5) formulate managerial and policy implications pertaining to consumer primary motives to attend farmers' markets.

## 1.3 Review of Literature

This section presents a review of empirical studies. The focus is made on those that are relevant to the increase in farmers' markets and the associated consumption of fresh produce.

### *1.3.1 Increase in Farmers' Markets in the US*

Farmers' markets or open air markets have existed worldwide for many years. According to Cole (2010) and the Redmond Farmers' Market (2009), farmers' markets have existed since mankind started farming the land, and the first organized markets originated in Egypt over 5,000 years ago when farmers along the Nile brought their fresh produce to be sold at farmers' markets. Informal markets in the US have been around since the early 17$^{th}$ century starting in Jamestown. The modern farmers' markets, which are characterized by tents on-stands lined up in rows with tables and common eating areas, started in the 19$^{th}$ century in Philadelphia, PA.

There is a growing number of farmers' markets in the United States. Brown (2001) and Cole (2010) indicate that between 1970 and 1986, farmers' markets in some states increased tenfold, with the national total rising nearly 500%. They also claim that

beginning in the late 1980s, farmers' markets entered another growth phase, which still continues today. They are rapidly growing in popularity as Americans increasingly demand fresher, healthier food. In fact, USDA-AMS (2011) reports a growth from 2,863 in 2000 to 7,175 by mid-2011 in the number of farmers' markets operating throughout the US. This represents an increase of 151% in 10 years.

Farmers' markets in the US have expanded greatly in the last decade due to their reputation for locally grown fresh and in most cases organic produce. Brown (2002) found that the growth of farmers' markets during the 20$^{th}$ century can be attributed to economic factors such as the need for local growers to diversify their sources of income. The studies by Oberholtzer and Grow (2003) and Brown and Miller (2008) argue that farmers' markets have increased as consequence of the socioeconomic effects that they have on communities. It was suggested that on top of boosting local economies and providing fresh healthy produce, these markets provide a setting for social interaction and a sense of community. Curry and Oland (1998) found that jobs development motives contributed to the wide increase in farmers' markets. Other studies like Hilchey, Lyson, and Gillespie (1995) and Sommer, Herrick, and Sommer (1981) concluded respectively that the existence of farmers' markets allows for the preservation of open spaces and psychological satisfaction. Sommer, Herrick, and Sommer (1981) found farmers' markets were perceived by their customers as friendlier, more personal, rural, smaller, and happier settings than traditional supermarkets.

### *1.3.2 Farmers' Markets and Consumption of Fresh Produce*

Fresh produce consumption has been shown to be an important part of any diet leading towards good health. It helps address diet and malnutrition issues among people

across the globe. As a result of the US government guidelines and dietary recommendations for healthy eating established in 1894, Pollack (2011) states that there has been a substantial increase in fresh produce consumption over the past decades in the US. It has also been shown that consumers show an increasing willingness to purchase fresh produce in general.

As a consequence of the increased consumer demand for fresh produce, produce growers use farmers' markets to expand outlets and sell their produce directly to consumers. Research has found that attending farmers' markets results in increased consumption of fresh produce (Holloway and Kneafsey, 2000; Archer et al., 2003; McGarry, Spittler, and Ahern, 2005; Zepeda and Deal, 2009; Lyon et al., 2009). Consumers attend farmers' markets mostly to purchase high-quality, fresh, organic and local products for their consumption at home. In addition, Trobe (2001) focused on Stour Valley Farmers' Market in the UK, which commenced trading in 1999. Customers who attended the first three of these monthly markets were interviewed to investigate the reasons for their attendance at the market and their attitudes towards a number of food issues including organic and genetically modified food, local and seasonal food and concerns they had over the way their food was produced. Trobe indicated that most customers visited the markets initially out of curiosity, although some attended specifically to buy healthy fresh foods. In addition, the vast majority of interviewees expressed a preference for food which is organically grown and free from genetic modification.

Research has found that fresh produce plays a vital role in addressing diet/health problems. But Wells and Buzby (2008) found that Americans eat less than the

recommended amount of fresh produce; averaging only 68% of the recommend 2.5 cups per day. Basiotis et al. (2002) concluded that diets are particularly a problem among low-income Americans, especially in regard to the consumption of fresh produce. USDA-AMS (2002) has also indicated that while the number of farmers' markets in the US has increased dramatically in recent years, many low income customers, particularly in urban areas, have not benefited from this growth. Many low-income consumers have difficulty accessing fresh produce. Indeed, Dong and Lin (2009) have estimated that a 10% subsidy would encourage low-income Americans to increase their consumption of fruits by 2.1–5.2% and vegetables by 2.1–4.9%. This assessment addresses the need for policy interventions.

In order to allow WIC[1] (Women, Infants, and Children) and seniors to increase consumption of fresh produce, USDA initiated a Farmers' Market Nutrition Program (FMNP) and Senior Farmers' Market Nutrition Program (SFMNP). The former provides fresh, unprepared, locally grown fresh produce to WIC participants, and expands awareness, use of, and sales at farmers' markets. Statistics provided by USDA–FNS (2011) indicate that currently 46 State agencies operate the FMNP.

In the fiscal years 2004, 2006, 2008, and 2010 approximately 2.5, 2.4, 2.3, and 2.2 million WIC participants received farmers' market coupons to buy fresh produce from a number of farmers, farmers' markets and farm stands (USDA–FNS, 2011). These numbers show a decline of about 14% in the number of WIC participants using farmers'

[1] WIC (Women Infants and Children) is a nutrition program that helps pregnant women, new mothers, and young children eat well, learn about nutrition, and stay healthy. Nutrition education and counseling, nutritious foods, and help accessing health care are provided to low-income women, infants, and children through the Special Supplemental Nutrition Program, popularly known as WIC (http://health.utah.gov/wic/ retrieved on October 25, 2012).

markets nationwide. It appears that this decline was a result of increasing cuts in the federal funds allotted to this program. Yet, a study by Herman et al. (2008) concluded that women who shopped at farmers' markets were eating on average three additional servings of fresh produce per day, compared to supermarket shoppers who were consuming 1.5 extra servings a day.

The SFMNP provides low–income seniors with coupons that can be exchanged for fresh fruits, vegetables and herbs at authorized farmers' markets, roadside stands, or through Community Supported Agriculture (CSA) programs. According to USDA–FNS (2011), in the fiscal year 2007, SFMNP operated in 35 states, six tribal organizations, Puerto Rico, and the District of Columbia with an appropriation of $15 million. In 2004 and 2006, there were 802,102; 825,691 seniors who participated in the farmers' markets nutrition programs respectively while 833,026 and 844,999 participated in 2008 and 2010 respectively. This represents a 5% increase in participants between 2004 and 2010.

### 1.4 Models Specification

The analysis for this essay falls within a random utility framework, wherein an individual *i* is assumed to choose the alternative that gives the highest utility among *J* alternatives. In this essay, four alternatives are analyzed. Those are purchasing produce, purchasing ready-to-eat food, social interaction and buy packaged foods, arts and crafts.

The utility function takes the form

$$U_{ij} = V_{ij} + \varepsilon_{ij} \text{ for } i = 1,\ldots,I \text{ and } j = 1,\ldots,J. \quad (1.1)$$

where $V_{ij}$ is the deterministic component of the utility and $\in_{ij}$ is the random component.

We assume that the random component term is independently and identically distributed (iid) according to an extreme value $F(\in_{ij}) = exp(-exp(-\in_{ij}))$ so that logistic

model becomes appropriate (Kennedy, 2008). We also assume a linear-in-parameter utility functional form for the deterministic component of utility (Onozaka and Thilmany-McFadden, 2011). The choice of one out of *J* unordered motives is driven by a latent variable or indirect utility.

The indirect utility $V_{ij}^{*}$ for individual *i* choosing an alternative *j* (in this case, it a given primary motivation to attend a farmers' market) is

$$V_{ij}^{*} = \beta' X_{ij} + \mu_{ij} \text{ for } i = 1,...,I \text{ and } j = 1,...,J. \quad (1.2)$$

where $X_{ij}$ is a vector of characteristics of the chooser. The parameter $\beta$ is to be estimated and differs across alternatives. The $\mu_{ij}$ is the disturbance that account for unobserved factors.

Two models are used in this essay, a binary logistic and a multinomial logistic model. First, in order to explain the effects of consumer characteristics on the probability of attending a farmers' market to purchase fresh produce, we use a logistic model for binary responses. We follow a modeling strategy proposed by Wooldridge (2009) and consider a class of binary response model of the form;

$$P(y=1|X) = G(\beta_0 + \beta_1 X_1 + \ldots + \beta_k X_k) = G(\beta_0 + X\beta) \quad (1.3)$$

where *y* is the response that we observe as reseacher and *G* is a logistic function taking on values strictly between zero and one for all real numbers *z*. In other words, the functional form of *G* is given by

$$G(z) = \frac{exp(z)}{1+exp(z)} \quad (1.4)$$

The logistic model is derived from an underlying latent variable model. We let *y** be an unobseved, or latent, variable determined by

$$y^* = \beta_0 + X\beta + e, \quad y = 1[y^* > 0] \tag{1.5}$$

where $y = 1[y^* > 0]$ defines a binary outcome and serves as an indicator function which takes on a value of one if the event in brackets is true and zero otherwise. The error term e is assumed to be independent of *X* and has a standard logistic distribution. The coefficients give the sign of the partial effects of each $x_j$ on the response probability.

Second, in order to estimate the relative probabilities of attending a farmers' market due to a particular motive as opposed to purchasing produce, a MNL (multinomial logistic) model is appropriate. Chan (2005) indicates that the structure of this model allows us to predict the probability that the $j^{th}$ alternative of the whole set of motives is chosen to be the best primary reason for which the respondent came to the farmers' market. Chan also claims that a MNL model is preferred because there are more than two choice alternatives and the systematic utility is modeled in terms of characteristics of the individuals and that there is an interest in examining relative probabilities of primary consumer motives provided in unordered way. The strategy of using MNL model also allows answering the research questions outlined in the introductory part.

The observed choice $y_i$ of an individual i is

$$[y_i = 1 \Leftrightarrow V_{i1}^* > V_{ij}^* \forall j,\ y_i = 2 \Leftrightarrow V_{i2}^* > V_{ij}^* \forall j,\ \ldots,\ y_i = J \Leftrightarrow V_{iJ}^* > V_{ij}^* \forall j] \tag{1.6}$$

The probability (*P*) that an individual *i* chooses to attend primarily due to a motive *j* is

$$P_{ij} = P(y_i = j) = \frac{exp(\beta_k' X_{ij})}{\sum_j \beta_k' X_{ij}} \tag{1.7}$$

The $\beta$'s are identified by setting the $\beta_{j*} = 0$ for one reference motive. Purchase produce is the reference category in this analysis. By looking at the log of the odds ratio, one can generate a direct interpretation of the parameter estimates:

$$\frac{\delta log(P_j|P_{j*})}{\delta X_k} = \beta_{ik} - \beta_{j*} \tag{1.8}$$

which reduces to

$$\frac{\delta log(P_j|P_{j*})}{\delta X_k} = \beta_{ik} \tag{1.9}$$

for comparison with the reference outcome $j$*. According to Schmidheiny (2007), a positive parameter $\beta_{jk}$ means that the relative probability of choosing $j$ increases relative to the probability of choosing the reference motive $j$*. Dummy variable effects are measured and interpreted as the probability difference between $X_{ij}$ values of zero and one. The marginal effect of an independent variable $X_k$ on the choice probability for a motive $j$ is given by

$$\frac{\delta P(y = j|X)}{\delta x_k} = P(\beta_{jk} - \overline{\beta}_{jk}) = P(\beta_{jk} - \frac{\sum_j \beta_{jk}}{J}) \tag{1.10}$$

In this essay, it assumed that consumers attend farmers' markets to purchase produce. Therefore, the probability of being motivated by any other motive compared to the probability of being motivated by purchasing produce at farmers' markets is insignificantly different from zero. The null hypothesis is that each independent variable has no impact on the relative probability of being motivated by social interaction, ready-to-eat food, or packaged foods, arts and crafts over purchasing produce. That is $H_0 \equiv \beta_{kj} = 0; \forall k = 1,\ldots,K; j = 1,\ldots,J$ for $K$ regressors and $J$ choice alternatives/motives. The alternative hypothesis is that each independent variable has a significant impact on

the relative probability of being motivated by social interaction, ready-to-eat food, or packaged foods, arts and crafts over purchasing produce. That is; $H_1 \equiv \beta_{kj} \neq 0; \forall k = 1,\ldots,K; j = 1,\ldots,J$ for $K$ regressors and $J$ choice alternatives/motives.

Throughout this assessment, we rely on three main assumptions. First, the individuals who attend farmers' market are rational; that is their preferences are both complete and transitive (Mas-Colell, Whinston, and Green, 1995), and that consumers are utility maximizers. Thus, it is a random utility model (RUM) as described by Train (2009). Second, a consumer with a finite set of choice alternatives will select the one that he/she believes gives him/her the maximum amount of utility. A consumer's utility derived from a choice set is specified as a linear function of the consumer's characteristics, along with an error term. The probability of selecting a particular option is equal to the probability that the utility derived from that option is greater than the utility derived from all other available choices (Keeling-Bond, Thilmany-McFadden, and Bond, 2009). Another assumption is that the Independence from Irrelevant Alternatives (IIA) holds true. In other words, adding a new motive to the set of alternatives does not affect the relative odds among the existing choice set (Train, 2009).

### 1.5 Presentation and Discussion of Results

A set of four primary consumer motives to attend farmers' markets are analyzed herein. An examination of whether there are motivations that are significantly different from attending due to purchasing fresh produce is performed. This section presents regression results and their interpretations.

*1.5.1 Descriptive Statistics of Variables of Interest*

Respondents were asked to choose one motive from a set of seven. As indicated in question number two of the survey, those motives were to purchase produce, to purchase packaged foods, to purchase arts/crafts, for social interaction, for events/activities, for concerts/music, and to purchase ready-to-eat food (food vendors). For the binary logistic model, we considered zero or one responses whereby one is for the primary motive of purchasing produce and zero otherwise. In the MNL model, factor analysis was conducted to condense the seven motives into four outcomes. One reason for doing this was to deal with the possible violation of the IIA assumption. Kennedy (2008) recommended that there should be a combination of similar options so that the multinomial analysis is done with fewer categories and to account for the low frequency of some motives. The independent variables included consumer characteristics which we deemed relevant.

The four primary motivates for farmers' market attendance used in this analysis are (1) to purchase produce, (2) to purchase ready-to-eat food, (3) for social interaction (condensing social interaction, concerts/music and event/activities), and (4) to buy packaged foods, arts and crafts (condensing purchase arts/crafts, and purchase packaged foods). The dependent variable for the MNL consists of these four discrete categories. A full list of the variables and their corresponding mean values are in Table 1.1. The same table describes both dependent and independent that are included in the model.

**Table 1.1: Variable Descriptive Statistics**

| Variable Name | Description | Mean |
|---|---|---|
| Outcome 1: Purchase_produce | Primary motivation to attend a farmers' market is to purchase produce | 0.73 |
| Outcome 2: Ready-to-eat_food | Primary motivation to attend a farmers' market is to buy ready-to-eat food | 0.04 |
| Outcome 3: Social_interactions | Primary motivation to attend a farmers' market is to socialize, attend concerts/music and event/activities | 0.15 |
| Outcome 4: Buy_packaged_foods_ arts_crafts | Primary motivation to attend a farmers' market is to purchase arts/crafts, and purchase packaged foods | 0.07 |
| age | Actual age of a respondent | 42 (15) |
| visits | Number of farmers' market visits per season | 4 to 7 |
| family_size | Total number of people in a household | 2.6 (1.43) |
| education | Respondent' level of education. 1=middle school, 2=high school, 3=some college, 4=2-year associate degree, 5=4-year college degree, and 6=graduate | 4.4 (1.33) |
| time_for_meals | 5 point scale degree of agreement a respondent has about having little time to prepare meals | 3.5 (0.72) |
| food_safety | 5 point scale degree of agreement about food safety | 3.7 (0.70) |
| concern_for_diet | 5 point scale degree of agreement about diet concerns | 3.1 (1.22) |
| environment_impact | 5 point scale degree of agreement a respondent has about buying products with low environmental impact | 4.4 (0.81) |
| agri_enthusiast | 5 point scale level of mean of the agreements about importance for agricultural open space and supporting local growers | 4.4 (0.77) |
| fm_pres_attributes | 5 point scale level of mean of importance for a number of vendors, family/child activities, variety of products, and food/beverage vendors | 3.5 (0.91) |
| fm_conv_attributes | 5 point scale level of mean of importance for hours of operation, convenient location, free parking and music | 4.2 (0.74) |
| spend_abovemean | Spends at farmers' market above average ($24.78); Yes=1 and 0 below the average | 0.48 |
| income_abovemean | Income is above average ($75,420); No=0, Yes=1 | 0.567 |
| primary_shopper | Is a primary shopper; No=0, Yes=1 | 0.80 |
| csa | Would join a CSA program; No=0, Yes=1 | 0.44 |
| vendor | Has a favorite vendor; No=0, Yes=1 | 0.33 |
| home_gardening | Does home gardening; No=0, Yes=1 | 0.58 |
| female | Respondents' gender; Male=0, Female=1 | 0.66 |
| married | Respondents' marital status; Single=0, Married=1 | 0.60 |
| ut | Respondents' residence; Nevada=0, Utah=1 | 0.55 |

Standard errors in parentheses

Results indicate that 73% of respondents attend farmers' market primarily to purchase produce while others attended to socialize (15%), buy packaged foods, arts and crafts (7%), and buy ready-to-eat food (4%). This means that the market share for fresh produce growers (almost ¾) outweighs the share remaining for other vendors in the farmers' markets (almost ¼). A random seller of fresh produce is estimated to sell to almost three costumers before a vendor of any other good or service sells.

The average respondent was 42 years old, and has completed four years of college. The sample consisted of 55% respondents in Utah, and 45% in Nevada. The average household size was three. There were 66% females as opposed to 34% males, and 62% were married while 38% were single. The sample included 58% who home-garden, 80% who are the household's primary shopper, and 44% with willingness to join a CSA program.[2]

Two other dummy variables; spend_abovemean and fm_income_abovemean were included. Spend_abovemean is equal to one if a respondent spends more than a sample average (which is $24.78) in a farmers' market and zero if a respondent's spending falls below the sample mean. We found that 48% of respondents spend above $24.78 per farmers' market visit while 52% spend below. Fm_income_abovemean is equal to one if a respondent's income is above the sample average (which is $75,420) and zero otherwise. We found that 57% of consumers who attend farmers' markets in Utah and Nevada have annual income that is above the average. This tends to suggests that wealthier people enjoy attending farmers' markets than their counterparts.

[2] CSA is a subscription program where consumers purchase a weekly basket of fresh produce from a local farm. Most CSA farmers prefer that subscribers pay for the season up-front, but some farmers will accept weekly or monthly payments.

Table 1.1 also includes the average ratings of five attitudes such as having little time to prepare for meals at home, concerns for food safety, concerns for diet/health, buying products with low environmental impact, and enthusiasm for agriculture (see agri_enthusiast[3]). Each of these variables is rated on a scale of 1 = strongly disagree, 2 = disagree, 3 = unsure, 4 = agree, 5 = strongly agree. For example, on average, respondents were unsure about having enough time to make meals at home. They were generally concerned with their health/diet, food safety and buying products with low environmental impacts; meaning that the average rating was four. Consumers at farmers' markets agree that agricultural open space and supporting local farmers are important to them.

Furthermore, consumers' attitudes towards farmers' market attributes were included in the model. A factor analysis allowed reducing a number of explanatory variables by condensing those attributes into two categories. Prior to doing this, individual attributes were included in the model. Some of the attributes were individually insignificant, but were found to be collectively significant. The first category consisted of the attributes that relate to the physical setup and services that were present in the market. A number of vendors, family/child activities, variety of products, and food/beverage vendors are factored into farmers' market presence attributes (named fm_pres_attributes). The second category consisted of the attributes that make a farmers' market convenient for shoppers. Convenient location, hours of operation, free parking, and music/concert were factored into farmers' market convenience attributes (named fm_conv_attributes). This strategy allowed formulating well-informed policy measure/recommendation in relation to farmers' markets attributes in general. Survey respondents were asked to rate

[3] Agriculture enthusiasts refer to those individuals who consider "open space for agriculture use" and "supporting local farmers" to be important for them.

the farmers' market attributes on a scale of one to five (1 = not important, 2 = slightly important, 3 = somewhat important, 4 = very important, 5 = extremely important). On average, both presence and convenience attributes are very important; meaning they were assigned an average of 4 point of the rating.

### *1.5.2 Regression Results*

Each of the slope coefficients in the second column of Table 1.2 is interpreted as the rate of change in the log-odds as a corresponding variable changes. Each of these coefficient estimates shows the relationship and size of the contribution of that regressor. A positive coefficient estimate tells us that the regressor increases the probability of attending a farmers' market to primarily purchase produce. A negative coefficient estimate indicates that a specific regressor decreases the probability of attending a farmers' market to primarily purchase produce. The smaller the coefficient, the weaker the impact of that corresponding regressor on the probability of attending a farmers' market to primarily purchase produces.

The coefficient estimates are presented in the middle column, and the marginal effects in the column on the right of Table 1.2. For instance, being married, female, having a home garden, being an agriculture enthusiast, and visiting a farmers' market frequently has a relatively strong positive impact on the probability of attending to primarily purchase produce. Having a large family size and having little time to cook meals at home diminish the chances of attending a farmers' market to primarily purchase fresh produce. Table 1.2 shows a compiled presentation of the results of binary logistic model.

**Table 1.2: Logistic Coefficient Estimates and Marginal Effects**

| | | |
|---|---|---|
| | LR chi2(57)= | 217.89 |
| | Prob > chi2= | 0.00 |
| | Pseudo R2= | 0.13 |
| | Log likelihood = | -759.18 |
| Variables | Y= Pr(purchase_produce)(predict) = 0.7619 | |
| Purchase_produce | Coefficients | Marginal Effects (dy/dx) |
| age | 0.00295 | 0.000536 |
| visits | 0.166*** | 0.0302*** |
| family_size | -0.132*** | -0.0239*** |
| education | 0.109** | 0.0198** |
| time_for_meals | -0.182*** | -0.0331*** |
| food_safety | 0.124 | 0.0225 |
| concern_for_diet | 0.156* | 0.0283* |
| environment_impact | -0.0971 | -0.0176 |
| agri_enthusiast | 0.455*** | 0.0825*** |
| fm_pres_attributes | -0.154 | -0.0280 |
| fm_conv_attributes | -0.276*** | -0.0500*** |
| spend_abovemean | -0.0454 | -0.00824 |
| income_abovemean | 0.240* | 0.0440* |
| primary_shopper | 0.313** | 0.0594* |
| csa | 0.302** | 0.0542** |
| vendor | -0.314** | -0.0585** |
| home_gardening | 0.325** | 0.0596** |
| female | 0.526*** | 0.0994*** |
| married | 0.591*** | 0.111*** |
| ut | -0.274* | -0.0493* |
| Constant | -1.365** | |
| Observations | 1,488 | 1,488 |

The *, **, *** denote significance at 10%, 5%, and 1% level, respectively.

The marginal effects are listed in the third column of Table 1.2. We found that when all variables are at their means, the overall likelihood of attending a farmers' market to purchase produce is 76% and 24% otherwise. The marginal effects describe the amount of change in probability that an individual attends a farmers' market to purchase produce produced by a unit change in a given regressor. For example, holding all other variables at their means, one extra visit to the farmers' market increases the probability of attending a farmers' market primarily for purchasing fresh produce by 3%, while one

more household member decreases that probability by 2%. An additional level of education completed leads to a 2% chance of attending a farmers' market for the primary reason of buying produce. Families that have little time to prepare meals at home reduces the probability of making a visit to farmers' market for purchasing fresh produce by 3%. Individuals with high concerns for diet/health are more likely to attend farmers' markets to purchase produce.

This analysis finds that an extra unit of agreement with providing open space for agriculture and supporting local farmers leads to a 8% increase in the likelihood of attending a farmers' market to purchase produce. One additional degree of importance for farmers' market convenience attributes decreases by 5% the likelihood of attending primarily for purchasing produce. This implies that those consumers whose importance for hours of operation, convenient location, free parking are high attend farmers' markets for primary motivations other than to purchase produce.

As for the dummy variables, we estimated that on average, the predicted probability of visiting a farmers' market for the primary purpose of purchasing produce is 10% greater for a female than for male, 11% for a married person than for a single person, 6% for an individual with a home garden than the one without, and 6% for a primary shopper than a non-primary shopper. Consumers whose annual income is above the average are 4% greater than those with income below the mean. On the other hand, we estimated that on average, the predicted probability of visiting a farmers' market for the primary purpose of purchasing produce is 6% lower for an individual with a favorite vendor than for one without, and 5% for a Utah resident compared to a Nevada counterpart.

In the MNL model where we analyze a set of four motives, purchase produce was the reference category. This enables us to estimate the relative probability that any other motive (ready-to-eat food, social interaction, and buy packaged foods, arts and crafts) is a primary over purchasing produce. We can therefore conveniently interpret the coefficients as the effects on the choice between a specific motive and the purchase produce motive.

The frequency of visits to the farmers' markets has a large negative impact on the probability of attending for social interaction over purchasing produce. This suggests that those who attend farmers' markets frequently do so because they primarily want to purchase fresh produce. This result implies that encouraging people to attend farmers' markets more frequently is a viable policy and marketing strategy. It allows produce growers to increase produce sales and consumers to purchase healthy food products.

These MNL results are in line with the regular logistic coefficients above, confirming that those attendees with higher degrees of importance for farmers' market attributes are not likely to purchase fresh produce. This implies that improving farmers' market attributes does not induce people's attendance to primarily purchase fresh produce. Instead, it will likely attract more socially orientated individuals. However, this does not undermine the importance of the farmers' market attributes like parking, operating hours, recreational facilities, and number of vendors. It simply posits that those consumers who assign high importance on these attributes do not come to the market to primarily purchase produce. Table 1.3 presents the estimated coefficients that are associated with the MNL model.

**Table 1.3: MNL Coefficients Estimates**

LR chi2(57) = 328.52
Prob > chi2 = 0.00
Pseudo R2 = 0.13
Log likely = -1092.35

| Variables | Coefficient estimates | | |
|---|---|---|---|
| | Ready-to-eat_food | Social_interaction | Buy_packaged_foods_arts_crafts |
| age | -0.00415 | -0.00351 | -0.00129 |
| visits | -0.129 | -0.276*** | 0.0410 |
| family_size | -0.00259 | 0.158*** | 0.135* |
| education | 0.0387 | -0.0890 | -0.239*** |
| time_for_meals | 0.0608 | 0.160** | 0.318*** |
| food_safety | 0.0227 | -0.114 | -0.229* |
| concern_for_diet | -0.207 | -0.188* | -0.0452 |
| environment_impact | 0.0150 | 0.0745 | 0.199 |
| agri_enthusiast | -0.183 | -0.457*** | -0.582*** |
| fm_pres_attributes | 0.0262 | 0.295** | -0.0937 |
| fm_conv_attributes | 0.147 | 0.263** | 0.389** |
| spend_abovemean | -0.348 | -0.248 | 0.923*** |
| income_abovemean | 0.0162 | -0.307* | -0.242 |
| primary_shopper | -0.216 | -0.326* | -0.259 |
| csa | -0.967*** | -0.111 | -0.348 |
| vendor | 0.827*** | 0.603*** | -0.757*** |
| home_gardening | -0.740*** | -0.286* | -0.135 |
| female | -1.065*** | -0.530*** | -0.199 |
| married | 0.0254 | -0.717*** | -0.707*** |
| ut | 0.248 | 0.459** | -0.0259 |
| Constant | -0.614 | 0.660 | -0.238 |
| Observations | 1,488 | 1,488 | 1,488 |

The *, **, *** denote significance at 10%, 5%, and 1% level, respectively.
purchase_produce is the base outcome

Both farmers' market presence and convenience attributes attract consumers with social interaction. This result suggests that consumers whose primary motive is to purchase produce are less concerned with farmers' market attributes. Furthermore, the results show that home gardening has a large positive effect on attending farmers' market to purchase fresh produce over both ready-to-eat food and social interaction. The negative coefficient on home gardening suggests that those who home-garden are less

likely to attend farmers' market for the primary purpose of socializing or to buy cooked food. Likewise, females were found to attend farmers' market for the main purpose of purchasing fresh produce over both ready-to-eat food and social interaction. In addition, married individuals are less likely to visit farmers' markets for social reasons or packaged foods, arts and crafts compared to purchasing fresh produce.

The results also indicate that the willingness to join CSAs has a highly significant negative impact on attending farmers' market to buy ready-to-eat food. This is not a surprising result as these individuals are highly interested in fresh local produce. Similarly, agriculture enthusiasts and primary shoppers are significantly less likely to attend farmers' market due to social motives, an indication that they are more likely to attend to buy fresh produce. It is important to point out that CSAs do not compete with farmers' market since those consumers who are willing to join CSAs are also willing to attend farmers' market to purchase produce over buying ready-to-eat food.

Another finding is that high concerns about health/diet impact negatively on the probability of attending farmers' market for social reasons. Additional high concerns for the food safety have a negative impact on attending farmers' market to buy packaged foods, arts and crafts as opposed to purchasing fresh produce. This means that consumers with strong concerns regarding diet or food safety increases the chance of attending for the purpose of purchasing produce. Farmers' market attendees in Utah and Nevada believe that fresh produce from farmers' market is safe and will help them address their dietary concerns. This suggests that having high food safety standards for fresh produce at farmers' markets is important to maintaining consumer confidence.

In comparison to purchasing produce, the results show that the farmers' market attributes have relatively strong positive impact on attending for social reasons. Similarly, family size, having little time to prepare meals at home, having a favorite vendor, and being a resident of Utah have significant positive impacts on attending farmers' market for social interaction. In other words, additional members in a household of farmers' market attendees reduce the probability of purchasing fresh produce.

In addition, as people become busier with work, school, and other activities that interfere with the time available for cooking, they are less likely to purchase produce at farmers' market. Instead, farmers' markets become an opportunity for social interaction. These results suggest that farmers' market attendees in Utah are significantly more social than those in Nevada. A Utah resident is more likely to attend a farmers' market for social motives over purchasing produce than a Nevada resident. This result suggests that social programs might induce more Utah residents to attend and purchase produce at farmers' market.

The magnitude of the estimated coefficients itself provides limited information about the effects of the independent variables on the probability. Hence, the marginal effects are discussed below. The discussion focuses only on those variables that have significant effects. We interpret these results as partial derivatives or elasticities of a motive relative probability with respect to the predictor of interest. They measure changes in predicted relative probability for a unit change in the continuous predictor or discrete change of dummy variable from zero to one. The marginal effects pertaining to each of the four motivations were computed. Relative probabilities for four primary motivations are reported.

First, the relative probability that a person attends farmers' market to purchase produce is 78%. After controlling for all other variables in the model, one additional visit increases this probability by 3%. One additional level of education increases the relative probability of attending farmers' market due to purchasing produce by 2% and one degree of agreement over concerns for health/diet and for agriculture enthusiasts increases the relative probability of attending farmers' market due to purchasing produce by 3% and 8%, respectively. This essay reports a 5% greater in the likelihood of attending a farmers' market to primarily purchase fresh produce among primary shopper compared to their counterparts.

In addition, consumers who are willingness to join a CSA program are 5% more likely to attend to primarily purchase produce. Compared to singles, married people are 11% more likely to purchase produce. There is a 6% higher chance for a home gardener to attend a farmers' market to primarily purchase produce. The results indicate that an extra member in a household decreases the probability by about 2%. Similarly, an extra degree of agreement with having little time to prepare meals leads to a decline of 3% in the relative likelihood of attending a farmers' market to primarily purchase produce. Unlike males, a female is 10% more likely to purchase fresh produce at a farmers' market. An additional level of importance for farmers' markets convenience attributes translates into a 5% fall in the relative probability of attending for purchasing produce. In addition, having a favorite vendor, and residing in Utah decrease the relative probability of attending farmers' market for the purpose of purchasing fresh produce by 6% and 5%, respectively. Table 1.4 presents the marginal effects of each of the four primary motives.

**Table 1.4: MNL Marginal Effects**

| Variables | y=Pr(purchase produce)= 78% | y=Pr(ready-to-eat food)=03% | y=Pr(social interaction)=14% | y=Pr(buy packaged foods, arts/crafts)= 05% |
|---|---|---|---|---|
| | dy/dx | dy/dx | dy/dx | dy/dx |
| Age | 0.000519 | -0.000119 | -0.000367 | -3.27e-05 |
| Visits | 0.0297*** | -0.00312 | -0.0307*** | 0.00413 |
| family_size | -0.0214*** | -0.00102 | 0.0168*** | 0.00562 |
| education | 0.0178** | 0.00210 | -0.00854 | -0.0113*** |
| time_for_meals | -0.0308*** | 0.000736 | 0.0155** | 0.0146*** |
| food_safety | 0.0203 | 0.00166 | -0.0113 | -0.0107* |
| concern_for_diet | 0.0264* | -0.00593 | -0.0199* | -0.000604 |
| environment_impact | -0.0161 | -0.000188 | 0.00695 | 0.00933 |
| agri_enthusiast | 0.0749*** | -0.00298 | -0.0465*** | -0.0255*** |
| fm_pres_attributes | -0.0266 | -0.000264 | 0.0336** | -0.00668 |
| fm_conv_attributes | -0.0464*** | 0.00300 | 0.0262* | 0.0172* |
| spend_abovemean | -0.00541 | -0.0120 | -0.0326* | 0.0500*** |
| income_abovemean | 0.0410* | 0.00234 | -0.0333* | -0.0101 |
| primary_shopper | 0.0519* | -0.00529 | -0.0360 | -0.0106 |
| Csa | 0.0505** | -0.0300*** | -0.00594 | -0.0146 |
| Vendor | -0.0636** | 0.0292** | 0.0732*** | -0.0388*** |
| home_gardening | 0.0557** | -0.0244** | -0.0280 | -0.00332 |
| Female | 0.0971*** | -0.0381*** | -0.0552*** | -0.00378 |
| Married | 0.107*** | 0.00547 | -0.0802*** | -0.0320** |
| Ut | -0.0513** | 0.00618 | 0.0499*** | -0.00478 |
| Observations | 1,488 | 1,488 | 1,488 | 1,488 |

The *, **, *** denote significance at 10%, 5%, and 1% level, respectively.

Second, the relative probability that a person attends farmers' market for the primary purpose of social interaction is 14%. Keeping constant all other variables in the model, an additional member in a household increases this probability by another 2%. A one point scale in the agreements with having little time to prepare meals at home increases the probability of likelihood of attending a farmers' market for social interaction by 2%. A one increment in importance assigned to either convenience or presence attributes shows an increase of 3% in the relative probability of attending farmers' market for the primary purpose of socializing.

Conversely, after controlling for all other variables, one more trip to a farmers' market decreases the relative likelihood of social interaction by 3%. Females and married persons, as opposed to males and single people decrease this likelihood by 6% and 8% respectively. Being female and married have high negative effects on the likelihood of visiting a farmers' market for the purpose of socializing over purchasing produce. This assessment also finds that a consumer whose income is above the sample mean is 3% less likely to visit farmers' markets to socialize than those with income that is below the sample average. Similarly, a consumer who spends above the sample average in a farmers' market is 3% less likely to attend to primarily socialize.

Third, the relative probability for a person to attend farmers' market primarily for other purposes is 5%. Other purposes here consist of the purchase of arts/crafts and packaged foods. Results show that ceteris paribus, one additional level of education leads to a decline of 1% in the relative probability of attending farmers' market to primarily buy packaged foods, arts and crafts. Likewise, high concerns about food safety decreases the relative probability of attending farmers' market for buying packaged food, arts and crafts by 1%. Having a favorite vendor and being married also decrease this probability by 4% and 3%, respectively. Similarly, an additional level in agriculture enthusiasm reduces this probability by 3%. The only consumer characteristics that increase this probability are having little time to prepare for meals at home, convenience attributes, and spending above the average in a farmers' market. Specifically, a one increment in the degree of agreement with having little time to prepare for meals and in the importance of convenience attributes each translates into a 2% chances in the likelihood of attending farmers' market to purchase either arts/crafts or packaged foods. Furthermore, this

analysis posits that a consumer who spends above the sample average in a farmers' market is 5% more likely to attend to primarily buy packaged foods, arts and crafts.

Lastly, the relative probability of that a person attends farmers' market for the primary purpose of buying ready-to-eat food is only 3%. Only 4 out of 20 consumer characteristics significantly explain the relative probability of attending farmers' market to primarily buy ready-to-eat food. Specifically, ceteris paribus, the willingness to join a CSA program and home gardening reduces that probability by 3%, and 2% respectively. In comparison with male, there is a 4% lower chance for a female to attend a farmers' market primarily for purchasing ready-to-eat food over purchasing produce. Having a favorite vendor has a 3% increase in the relative chances of visiting a farmers' market to buy ready-to-eat food.

### *1.5.3 Fresh Produce Consumers at Farmers' Markets*

To group fresh produce consumers into different categories, a cluster analysis was conducted. We followed the partitioning clustering process proposed by Halkidi, Batistakis, and Vazirgiannis (2001). Three categories were produced using the K-Means algorithm. This algorithm allowed minimizing the distance of each point from the center value of the group to which the point belongs (Halkidi, Batistakis, and Vazirgiannis, 2001). Cluster analysis was conducted based on consumer income, age, frequency of farmers' market visits, family size, education, time to make meals at home, food safety, diet/health concerns, buy products with low environment impact, agriculture enthusiasm, home gardening, gender, marital status and state (Utah and Nevada).

Based on these consumer characteristics, the K-mean algorithm initialized a set of cluster centers and assigned each observation in the dataset to the cluster whose center

was the nearest. The process was continued until the centers of the clusters stopped changing. Hence, we believed to have produced clusters whose members have a high degree of similarity and well separated. This cluster analysis was done only for 1086 consumers who attended the farmers' markets to primarily purchase produce. The main purpose for this clustering was to provide the related information to fresh produce growers. The analysis resulted into three clusters namely low spenders, high spenders and medium spenders. There 312 (that is 29%) individuals in the first cluster, 85 (that is 8%) in the second cluster and 689 (that is 63%) in the third.

High spenders cluster is the smallest and the majority consists of married people (84%), primary shoppers (80%), those who are willing to join the CSA program (57%), and those who home-garden (66%) and those who spend above the sample mean (64%). Wealthier individuals fall under this category. In fact, an average person earns $173,259 which is about five times more than the low spender. The average age is 47 years old. In comparison to other two clusters, a representative respondent in this group has a 4-year college degree as opposed to 2-year associate's degree. In addition, the high spenders are significantly more concerned about both food safety and diet/health.

Low spenders cluster is the medium size group. In comparison to the high spenders, this group consists of younger and low-income individuals. The average person in this group is 39 years old, has 2-year associate's degree, and earns $34,053 per year. His/her farmers' market visits are significantly higher than those of both high and medium spenders. There are 70% females, 87% primary shoppers, 63% Utahans, 61% home gardeners, and 51% who would join the CSA programs. Table 1.5 reports summary stats on all the characteristics of interest for each group.

**Table 1.5: Characteristics of Fresh Produce Consumers at Farmers' Markets**

| Consumer Characteristics | Low Spenders | High Spenders | Medium Spenders |
|---|---|---|---|
| | Mean | Mean | Mean |
| income | $34,053*** | $173,259 | $84,764*** |
| age | 39*** | 47 | 45 |
| visits | 3.00*** | 2.69 | 2.73 |
| family_size | 2.401*** | 2.882 | 2.594* |
| education | 4.353** | 5.235 | 4.480*** |
| time_for_meals | 2.968 | 3.129 | 2.940 |
| food_safety | 4.433** | 4.635 | 4.427** |
| concern_for_diet | 4.410*** | 4.659 | 4.424*** |
| environment_impact | 3.603 | 3.600 | 3.567 |
| agri_enthusiast | 4.325 | 4.265 | 4.257 |
| fm_pres_attributes | 3.534 | 3.447 | 3.497 |
| fm_conv_attributes | 3.648 | 3.618 | 3.616 |
| fm_spend_abovemean | 0.423*** | 0.635 | 0.502** |
| primary_shopper | 0.865* | 0.800 | 0.824 |
| csa | 0.506 | 0.565 | 0.438** |
| vendor | 0.353 | 0.412 | 0.311* |
| home_gardening | 0.609 | 0.659 | 0.626 |
| female | 0.699 | 0.682 | 0.694 |
| married | 0.481*** | 0.835 | 0.730** |
| ut | 0.625*** | 0.471 | 0.502 |
| Observations | 312 | 85 | 689 |

The *, **, *** denote consumer characteristics for which low or medium spenders are significantly different from high spenders (reference cluster) at 10%, 5%, and 1% levels, respectively.

The percentage of low spenders in Utah is significantly high. The medium spenders cluster is the largest. The average person in this group is 45 years old with a 2-year associate's degree and earns $84,764. This group consists of 50% who spend above sample average, 82% primary shoppers, 62% home-gardeners, 69% females, 73% married individuals. While most low and high spenders would join CSA programs, only 44% of medium spenders would join.

Consumers in all clusters have some similar characteristics. The proportions of females, and those who home-garden are statistically the same across three groups. Fresh

produce consumers at farmers' markets in all clusters are unsure about having time to make meals at home. They agree that an open space for agriculture use and supporting local farmers are important to them. The majority in each of the clusters does not have a favorite vendor at farmers' market. Another common trait across clusters is that farmers' market attributes; both presence and convenient, are important.

### 1.6 Conclusions

While much has been reported on farmers' markets, econometric studies of consumers' motivations for attending these types of markets are limited. The few existing studies indicate that consumers attend farmers' markets to purchase fresh healthy produce. However, they state other motives without any analysis. This essay used both binary logistic and MNL models to assess various motivations for attending farmers' markets above and beyond purchasing fresh produce. A cluster analysis was also performed to examine consumers who spend more at farmers' market. Data were collected during the summer seasons of 2008 and 2011 from consumers who attended farmers' markets in Nevada and Utah, respectively. The sample consisted of 1,488 respondents. Data collection was completed using an in-person survey strategy.

Results indicate that the primary motivation for consumers to attend farmers' markets is to purchase produce, followed by social interaction, purchase ready-to-eat food, and buying packaged foods, arts and crafts. The consumer characteristics that significantly increase the probability of attending a farmers' market primarily for purchasing produce are frequency of visits, education level, concerns for diet/health, agriculture enthusiasm, income above the sample mean, primary shopper, willingness to join a CSA program, home gardening, female and married. On the other hand, consumer

characteristics that significantly diminish the probability of attending a farmers' market primarily for purchasing produce are family size, having little time to prepare meals at home, importance of farmers' market convenience attributes, having a favorite vendor, and being a resident of Utah.

Second, consumer characteristics that significantly increase the probability of attending a farmers' market primarily for social interaction are family size, having little time to make meals at home, importance for farmers' market both presence and convenient attributes, having a favorite vendor and being a Utah resident. Conversely, consumer characteristics that significantly decrease this probability are frequency of visits, concerns for diet/health, agriculture enthusiasm, spending above the sample average at farmers' market, having annual income above the sample mean, being a female, married and a Utah resident.

Third, three consumer characteristics significantly increase the likelihood of attending a farmers' market to primarily buy packaged foods, arts and crafts. Those are having little time to make meals at home, importance for farmers' market convenient attributes and spending above the sample average at farmers' market. On the other hand, the characteristics that significantly decrease this probability are education, concerns for food safety, agriculture enthusiasm, having a favorite vendor, and being married.

Fourth, the only consumer characteristic which increases significantly the relative likelihood of attending a farmers' market to primarily buy ready-to-eat food is having a favorite vendor. The characteristics that decrease this probability are the willingness to join CSA program, home gardening and being a female. Other characteristics have

insignificant effects on this relative probability. Three clusters together with their individual characteristics were identified.

Results suggest a number of recommendations for farmers' markets managers, local produce growers and policy makers. First, encouraging people to attend farmers' markets more frequently is a viable policy and marketing strategy to increase sales and fresh produce consumption. Second, improving farmers' market attributes does not induce people to attend farmers' markets for the primary motive of purchasing fresh produce. Instead, it will likely attract more social orientated individuals. Third, marketing strategies aimed at home gardeners, those who are interested in CSA programs, females, and married individuals will lead to an increased number of consumers attending farmers' markets to buy fresh produce. Fourth, having high food safety standards for fresh produce is an important component in maintaining consumer confidence. Fifth, the results suggest that an effort to induce more Utah residents to attend farmers' market could lead to an increase in the sale of fresh produce.

Finally, this essay contributes to the existing literature by providing information pertaining to consumer primary motivations for attending farmers' markets. In addition to findings from previous studies which suggest that farmers' markets attract more fresh produce customers, this essay indicates that other primary motivations are social interaction, ready-to-eat food and buying packaged foods, arts and crafts. Another contribution is that consumer characteristics that explain relative probabilities of attending for a specific reason were identified and discussed. Furthermore, consumers who attended farmers' markets were clustered into three groups based on their similar characteristics. Consequently, the essay contributes by providing useful information to

vendors at farmers' markets and guidelines to farmers' markets managers in their efforts to meet attendees' expectations. However, this essay has not covered the entire scope of possible investigation in this line of research. It is limited to consumers who attended farmers' markets in Utah and Nevada. Subsequent research would consider surveying those who do not attend farmers' markets to enquire why they do not. It would also be relevant for future studies to assess the willingness to pay for either a sample of fresh produce, or farmers' market attributes like family/child recreational activities/facilities, and parking especially among those who attend farmers' market primarily to socialize. Another interesting analysis would be to focus on consumer preferences for a specified set of goods and services available at farmers' markets.

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# CHAPTER 2

# ASSESSMENT OF FARMERS' MARKET CONSUMER PREFERENCES FOR VARIOUS FEATURES OF FRESH PRODUCE

## 2.1 Abstract

This essay assesses consumer preferences for fresh produce features such product variety, quality, freshness and appearance, as well as pricing, local origin, organic production and familiarity of the grower. An ordered logistic model is employed using data collected from 1488 farmers' markets consumers in Nevada and Utah during the summers of 2008 and 2011, respectively. Results indicate that product quality and freshness attributes are extremely important for farmers' market shoppers, especially among females and consumers whose concerns for food safety and for diet/health are high. Females assign higher importance to product variety, appearance, local origin, and product freshness. Older individuals or seniors place higher importance on product variety and appearance. Consumers who buy products with low environmental impact, those willing to join community supported agriculture programs, and agriculture enthusiasts are more likely to favor locally grown produce. Utahans have more affinity for locally grown fresh produce and knowing local growers. Overall, products of local origin were more important than organic production, and knowing the specific grower.

## 2.2 Introduction

Farmers' markets are now a common outlet for growers selling fresh, local fresh produce directly to consumers. They have gained popularity with consumers evidenced by the 64% increase in the number of farmers' markets in the US since 2006 (USDA-AMS, 2011). The purpose of this essay is to assess consumers' willingness to purchase fresh produce at farmers' markets in Nevada and Utah, based on various product features. We investigate the importance consumers place on product features when purchasing fresh produce, estimate the probabilities associated with each, and explain the factors influencing these probabilities. We formulate a number of best practices for consumer satisfaction and develop policy recommendations.

Several studies have investigated the demand for fresh produce worldwide, but more recent studies have focused on the US (Lin et al., 2009; Nzaku, 2009; Mikonnen, Huang, and Fonsah, 2012). Other research investigates consumer willingness to pay for certain types of produce with emphasis on local (Darby, 2006; Rodriguez-Ibeas, 2007; Darby at al., 2008; Hu, Woods, and Bastin, 2009) and organic (Govindasamy and Thornsbury, 2006; Huang and Lin, 2007; Bernard and Bernard, 2010; Rickard et al., 2011). Zepeda and Leviten-Reid (2004) concluded that there is enthusiastic support for local food production, although there is no consensus on what local means. Zepeda and Li (2006) found that income and demographic characteristics are not dominant factors related to purchasing practices. Garmon, Huang, and Lin (2007) found no consistent positive association between household income and expenditures on organic produce.

The existing literature concerning consumer preferences for fresh produce based on its various features is light. Several attempts have been made to understand consumer

motivation for local and organic features (Brown, 2003; Darby et al., 2008; Roig, Royoz, and Garcia, 2000; Moser, Raffaelli, and Thilmany-McFadden, 2011). Understanding the additional attributes that encourage consumer spending is an important part in understanding the direct marketing experience.

While the existing studies focus on local and organic product attributes, this essay extends the analysis to investigate eight product features. The product features that are assessed are product variety, quality, freshness, appearance, pricing, local origin, organic production, and the familiarity of the grower. This essay seeks to respond to a series of questions. (1) What are the levels of importance consumers assign to product features when purchasing fresh produce? (2) What is the likelihood of purchasing fresh produce on the basis of a given product feature? (3) What are the consumer characteristics and attitudes that significantly explain such probabilities? (4) What are the managerial, marketing and policy implications?

This essay provides crucial information that allows fresh produce growers to target specific consumers with specific characteristics. Furthermore, results are useful for managers and policy makers in making well informed decisions. For example, policy makers in the agriculture sector can use results from this essay to provide necessary assistance to farmers to feature their products based on consumers' preferences. Similarly, health related policy makers can use the results to implement programs aimed at increasing fresh produce consumption.

## 2.3 Review of Literature

This section presents a review of empirical studies. As noted before, the existing literature heavily focuses on locally and organically grown produce. The following review points out those that are relevant to this essay.

### *2.3.1 Consumer Preferences for Organic Products*

Consumers have expressed their interests in consuming organic food products. USDA-ERS (2012) has indicated that consumer demand for organically produced goods has shown double-digit growth for well over a decade, providing market incentives for US farmers across a broad range of products. Similarly, Laux (2012) indicated that in the US, markets for organic foods have grown rapidly over last few years an indication of high preferences for these types of products. Moser, Raffaelli, and Thilmany-McFadden (2011) found that regular organic consumers are willing to pay a significant premium price for organic fruit.

Organic products are marketed and sold in different places. Dimitri and Greene (2004) identified three major selling venues for the organic produces. First, organic products are sold in natural foods stores. Natural product retailers comprised 1% of all food stores in the United States, and sold 48% of all organic food in 2000. Second, conventional grocery stores sold 49% of all organic products. The remaining 3% was sold to consumers through direct-to-consumer markets and a small amount was exported to foreign markets. Likewise, USDA-ERS (2012) found that organic food is sold to consumers through three main venues in the US, namely natural food stores, conventional grocery stores, and direct-to-consumer markets.

Food safety is one of many reasons why consumers prefer organic food. Loureiro and Hine (2002) found in their study of willingness to pay for organic potatoes that organic consumers tend to be concerned about food safety. Likewise, Gifford and Bernard (2004) reported that people who were concerned about the safety of their food, in terms of health risks associated with pesticide use, were more likely to be organic food shoppers. These studies suggest clear evidence establishing a link between food safety concerns and organic purchase propensity.

Huang (1996) used a two-equation bivariate logistic model to analyze consumers' preferences and attitudes toward organically grown produce. It was found that consumers who are nutritionally conscious, concerned about the use of pesticides, and wanting produce free from residues—substance that is left after a chemical process—would prefer organically grown produce. The study concluded that the profile of potential buyers of organically grown produce are consumers who are concerned about the use of chemical pesticides on fresh produce, who demand that produce should be tested and certified residue-free, and who are nutritionally conscious.

Brown, Gandee, and D'Souza (2006) used ordinary least squares (OLS) modeling to identify significant consumer demographic, land use, marketing, and location characteristics that impact the amount of direct-market sales by farms in West Virginia at a county level. They found that consumer characteristic such as age and education influenced county-level direct sales. Counties with a lower percentage of seniors (over 65 years of age) saw an increase of sales while counties with residents with higher educational degrees experienced lower direct-marketing sales. They further reported a positive impact on direct market-sales as a result of a diversity of fresh produce grown in

the counties. However, the analysis consists of twelve explanatory variables; eight of which were not statistically significant at the 5% level. Their model may have been over fitted, leading to incorrect estimates.

Roig, Royoz, and Garcia (2000) found that environmental attributes are more important in fresh and perishable products, and that consumers were willing to pay a higher premium for organic fresh produce. Likewise, Moser, Raffaelli, and Thilmany-McFadden (2011) did a review of the literature and found that regular organic consumers were willing to pay a premium price that ranged from 17 to 67% for organic fruit and from 13 to 37% for organic vegetables, while occasional or unlikely consumers accepted premiums ranging from three to 16% for organic fresh produce.

In contrast, Garmon, Huang, and Lin (2007) used the Nielsen Homescan data from 2001 and 2004 to analyze consumer purchase patterns of fresh organic produce. Their analysis showed that Asian and African Americans tend to purchase organic over conventional produce more often than Whites and Hispanics. Households residing in the western US region spent more on organic produce per capita than those residing in other regions. These researchers did not find any consistent positive association between household income and expenditures on organic produce. They also found that the proportion of African Americans who purchased organic produce increased from 34% in 2001 to 37% in 2004, while the proportion of organic users among other groups remained relatively stable. Moser, Raffaelli, and Thilmany-McFadden (2011) found that US consumers perceived pesticide free and organic differently, and that organic claims were only somewhat important. They concluded that organics are still not well understood by consumers.

*2.3.2 Consumers' Preferences for Local Food Products*

The concept of "local" food is still controversial, as there is no consensus on what is local. This concept is generally associated with geographical boundaries such as state or region. Consumer interest in locally produced foodstuffs has attracted a number of academic studies. Brown (2003) gathered information from the primary food buyer in random households in southeast Missouri to analyze consumer preferences for locally grown food. The study concluded that when purchasing produce, most consumers perceived local produce at farmers' markets to be of higher quality and lower price. In households where a member was raised on a farm or had parents who were raised on a farm, the primary food purchaser had a preference for locally grown food and was willing to pay a premium for it. The study suggested that marketing local products should stress quality, freshness, and price competitiveness and will appeal to environmentalists and those with a favorable attitude towards family farms.

Darby et al. (2008) used stated preference data from a choice-based conjoint instrument to address two issues surrounding consumer demand for locally produced goods. They indicated that the value consumers place on local production is distinct from what is placed on farm size and product freshness. Their results suggest that consumer demand does indeed exist for locally produced foods. They claimed that this demand is independent of other attributes such as greater freshness and affiliation with "less corporate" production and marketing methods. Furthermore, they found that respondents failed to distinguish between products marked as "produced nearby" and "produced in Ohio," suggesting that state boundaries may serve as a natural point of geographic delineation for local production in the minds of consumers.

Zepeda and Leviten-Reid (2004) did a focus-group study to investigate shoppers' beliefs and behaviors regarding local foods. The study consisted of four groups, two of which consisted of organic food shoppers. These shoppers were found to be more committed to purchasing local foods and were able to identify a much wider array of such foods. Their research revealed enthusiastic support for local food production, though there was no consensus on what local meant. Because alternative food shoppers tended to view local food as providing direct environmental, economic, community, and health benefits, they are more predisposed to look for labels indicating locally produced items than were conventional food shoppers.

Keeling-Bond, Thilmany-McFadden, and Bond (2009) used a multinomial logit model to analyze a national dataset of fresh produce consumers. They reported that consumers with a higher propensity to purchase locally-produced goods were influenced by public attributes, such as supporting local agriculture/business and promoting environmentally friendly products and by private attributes such as superior quality, freshness, and safety. Their results are in line with the conclusions posited by Curtis and Cowee (2011). According to this study, the recent increased consumer demand for local foods resulting from food safety and health concerns provides an excellent market opportunity for local producers. They suggest producers establish food safety plans for their business in order to maintain and expand this market. They also argue that the producers should provide information regarding their good agricultural practices to customers.

Previous research reported that consumers were willing to pay significant premiums for locally produced foodstuffs. For example, Carpio and Isengildina-Massa

(2009) used a contingent valuation framework to evaluate South Carolina consumers' willingness to pay for ''locally grown'' characteristic in produce and animal products and to identify the socio-demographic characteristics affecting consumer preferences for these characteristics. The findings were that South Carolina consumers were willing to pay an average premium of 27% for local produce and 23% for local animal products. The premiums for local products were influenced by age, gender, and income as well as by perceived product quality, a desire to support the local economy, patronage of farmers' markets, and consumer ties to agriculture.

Another finding by Carpio and Isengildina-Massa (2009) is that the primary motivation for choosing South Carolina grown produce was to support local farmers and the local economy (71% of respondents) rather than price and quality factors (29% of respondents). This research has presented results on both crop and animal products. It was found that as the number of years the consumers live in South Carolina increases, their willingness to pay for local crop produce increases while it decreases for the animal produce. The findings suggest good prospects for the produce branding and promotion campaign in South Carolina if marketers are able to differentiate and consumers are able to identify local products.

In the same vein, Giraud, Bond, and Bond (2005) used survey data to examine northern New Englanders' knowledge of, and convenient access to, locally produced specialty food items, and to estimate the willingness to pay for local quality traits. They investigated two food categories, low-end ($5 per item) and high-end ($20 per item) specialty food products. They compared premia estimates across states and across base prices within states using dichotomous choice contingent valuation methods. They found

that the three states of northern New England had many similarities, including comparable price premia for the lower-priced good. However, there was some evidence that the premium for the higher-priced good was greater for the pooled Vermont and Maine treatment than for the New Hampshire treatment. Vermont and New Hampshire residents were willing to pay a higher premium for a $20 food item than a $5 food item, while the evidence suggests that Maine residents are not. The research suggests that a key factor influencing purchase behavior is that New Hampshire's state labeling and promotion program was newer and smaller than those of Maine and Vermont.

Moser, Raffaelli, and Thilmany-McFadden (2011) conducted a summary of selected studies on credence attributes and did a critique of the research methodologies encountered in those studies. Their aim was to identify and rank a number of attributes, focusing on how their statistical significance across consumer studies of fresh produce buying decisions They conluded that, in general, regular organic consumers were willing to pay a premium ranging from 17 to 67% for organic fruit, and from 13 to 37% for organic vegetables, while occasional or unlikely consumers accept premiums ranging from three to 16% for organic fresh produce.

In conclusion, the previous studies about fresh produce have heavily focused on local and organic attributes, and leave out or only discuss slightly other product features that may influence consumer preferences. Consequently, it remains relatively unclear as to the likelihood of purchasing fresh produce given a specific product feature and the consumer characteristics that explain such probabilities. This study seeks to provide such information by analyzing consumer preferences for product variety, quality, local origin, organic production, product appearance, pricing, freshness, and familiarity to the grower.

**2.4 Model Specification**

The objective of this section is to describe the model framework that was adopted. Due to the nature of the research questions, an ordered logistic model was determined to be the best approach. According to Kennedy (2008), an ordered logistic model is appropriate for polychotomous dependent variables with a natural order of ranking. It generalizes the binary logistic analysis which is used as an explained variable to more than two ordinal outcomes.

This analysis falls within a random utility framework, wherein an individual *i* is assumed to choose a ranking order that gives the highest utility among *j* ranking levels. The utility function takes the form

$$U_{ij} = V_{ij} + \in_{ij} \text{ for } i = 1,...,I \text{ and } j = 1,...,J. \quad (2.1)$$

where $V_{ij}$ is the deterministic component of the utility and $\in_{ij}$ is the random component.

We assume that the random component term is independently and identically distributed (iid) according to an extreme value $F(\in_{ij}) = exp(-exp(-\in_{ij}))$ so that logistic model becomes appropriate (Kennedy, 2008). We also assume a linear-in-parameter utility functional form for the deterministic component of utility (Onozaka and Thilmany-McFadden, 2011). The choice of a given ranking level out of *J* ordered levels of importance is driven by a latent variable or indirect utility.

The indirect utility $V_{ij}^{*}$ for individual *i* choosing an alternative *j* (in this case, it is a given level of importance for specific produce feature)

$$V_{ij}^{*} = \beta' X_{ij} + \mu_{ij} \text{ for } i = 1,...,I \text{ and } j = 1,...,J. \quad (2.2)$$

where $X_{ij}$ is a vector of characteristics of the chooser *i*. The parameter $\beta$ is to be estimated and differs across alternatives. The $\mu_{ij}$ is the disturbance that accounts for unobserved factors.

In practice, the $V_{ij}^{*}$ cannot be observed. We instead observe the response *y* whereby

$$y = \begin{cases} 1 \; if \; 0 < V_{ij}^{*} \leq \mu_{1,} \\ 2 \; if \; \mu_1 < V_{ij}^{*} \leq \mu_2, \\ \ldots, \\ J \; if \; \mu_{J-1} < V_{ij}^{*} \leq \mu_J \end{cases} \tag{2.3}$$

where the $\mu$'s are the unknown threshold parameters to be estimated along with the parameter vector $\beta$, and *j* is the number of categories of the dependent variable. The *j* in this essay is represented by 1 (not important), 2 (somewhat important), 3 (important), 4 (very important), and 5 (extremely important).

As researchers, we do not observe the utility a decision maker receives, but we observe the level of importance he/she assigns to each product feature. A high number signals that the individual receives high utility from that product feature and vice versa. The response a respondent gives allows us to detect his/her preferences. We can then represent such preference relations by a utility function due to the rationality assumption (Mas-Colell, Whinston, and Green, 1995).

We have considered eight product features (product variety, quality, local origin, organic production, product appearance, pricing, freshness, and familiarity to the grower); leading to eight equations. Each represents a specific product feature. Each product feature is ranked by consumers according to the importance they assign to it when making decisions about their purchases of fresh produce. They expressed their

levels of importance by choosing one number out of the five rankings. Therefore, this model results in ordered log-odds, which provide a measure of the variable's impact on the chances of a specific product attribute falling into the highest category--extremely important--over chances of it falling into categories of lesser importance, such as very important, important, somewhat important and not important. Dummy variable effects are measured and interpreted as the probability difference between $X_{ij}$ values of zero and one.

This analysis assumes that respondents are rational, which means that their preferences are both complete and transitive (Mas-Colell, Whinston, and Green, 1995). In addition, it is assumed that the consumers strive to maximize utility. Thus, it is a random utility model (RUM) as described by Train (2009). This RUM allows the assumption that a consumer with a finite set of choice alternatives will select the one that he/she believes gives him/her the maximum amount of utility. Keeling-Bond, Thilmany-McFadden, and Bond (2009) note that a consumer's utility derived from a choice is specified as a linear function of the consumer's characteristics and the specific attributes of the choice, in addition to an error term. The probability of selecting a particular option is equal to the probability that the utility derived from that option is greater than the utility derived from all other available choices.

The null hypothesis is that there is no relationship between consumer characteristics and the degree of importance consumers assign to each of the product features. That is $H_0 \equiv \beta_{ki} = 0; \forall k = 1,\ldots,K;\ i = 1,\ldots,I$ where *i* denotes a product feature, and *k* denotes an explanatory variable. The alternative is that there are significant relationships between consumer characteristics and levels of importance consumers assign to each product feature. That is $H_1 \equiv \beta_{ki} \neq 0; \forall k = 1,\ldots,K;\ i = 1,\ldots,I$

## 2.5 Presentation and Discussion of Results

The main purpose of this essay is to assess the levels of importance consumers assign to the various features of fresh produce and to estimate the probabilities associated with each of these features. We examine whether consumers characteristics have significant impact on the probabilities of falling into higher [versus lower] categories of importance for eight product features purchasing fresh produce. This section presents the findings and their interpretation.

This subsection presents a description of the variables of interest. We start with a description of the product features which are considered for dependent variables; each for a specific equation. The average levels of importance that consumers assign for product variety, appearance, local origin, and organic produce is rounded to 4. This means that each of these four features is very important for consumers when they are purchasing produce. Likewise, product pricing and knowing the grower of the produce are very important for consumers. As for quality and freshness, the average level for each is rounded to five, an indication that each of these two features is considered to be extremely important for the consumers when purchasing fresh produce.

An average respondent was 42 years old with a 4-year college degree. There were 66% females, 62% married, 58% with home gardens, and 44% would join the CSA program. Respondents agree with being concerned with food safety and buying products with low environmental impact. However, they are unsure about being concerned with diet/health. Table 2.1 describes all variables; both dependent and regressors that have been deemed relevant to this part of analysis.

**Table 2.1: Variable Descriptive Statistics**

| Variable name | Description of the variables | Mean |
|---|---|---|
| pf_variety | 5 point scale level of importance for product variety | 3.96 (0.92) |
| pf_quality | 5 point scale level of importance for product quality | 4.59 (0.64) |
| pf_appearance | 5 point scale level of importance for product appearance | 4.10 (0.92) |
| pf_local | 5 point scale level of importance for local produce | 3.99 (1.08) |
| pf_pricing | 5 point scale level of importance for product pricing | 3.92 (0.94) |
| pf_organic | 5 point scale level of importance for organic produce | 3.60 (1.19) |
| pf_freshness | 5 point scale level of importance for product freshness | 4.60 (0.66) |
| pf_know_grower | 5 point scale level of importance for knowing produce grower | 3.55 (1.19) |
| age | Actual age of a respondent | 42 (15) |
| visits | Number of farmers' market visits per season | 4 to 7 |
| groc_bill | Monthly grocery bill | $116 ($74) |
| education | 1=middle school, 2=high school, 3=some college, 4=2-year associate, 5=4-year college, 6=grad | 4.41 (1.33) |
| time_for_meals | 5 point scale degree of agreement about having little time to prepare meals | 3.54 (0.72) |
| food_safety | 5 point scale degree of agreement about food safety concerns | 3.66 (0.70) |
| concern_for_diet | 5 point scale degree of agreement about health/diet concerns | 3.07 (1.22) |
| environment_impact | 5 point scale degree of agreement with buying products with low environmental impact | 4.39 (0.81) |
| agri_enthusiast | 5 point scale level of agriculture enthusiasm | 4.38 (0.77) |
| food_origin | 5 point scale degree of agreement about knowing the product origin | 4.16 (0.84) |
| vegan | 5 point scale degree of agreement about being a vegan | 1.77 (1.18) |
| fm_pres_attributes | 5 point scale level of mean of importance for presence attributes of farmers' markets | 3.55 (0.91) |
| fm_conv_attributes | 5 point scale level of mean of importance for convenient attributes of farmers' markets | 4.18 (0.74) |
| csa | Would join a CSA program; No=0, Yes=1 | 0.44 |
| home_gardening | Does home gardening; No=0, Yes=1 | 0.58 |
| wic | Participate in the WIC program; No=0, Yes=1 | 0.03 |
| female | Respondents' gender; Male=0, Female=1 | 0.66 |
| married | Respondents' marital status; Single=0, Married=1 | 0.60 |
| ut | Respondents' residence; Nevada=0, Utah=1 | 0.55 |

Standard deviations are in parenthesizes.

In addition, we included consumer's attitudes towards farmers' market attributes. In order to reduce a number of explanatory variables, we conducted a factor analysis, and condensed those attributes into two categories; farmers' market presence attributes, and convenience attributes. On average, both presence and convenience attributes were very important. To conduct the factor analysis, we used the principle component method with Varimax rotation using the Kaiser Normalization. With this method, a basis believed to be the best combination of similar attributes was found. The original farmer markets' attributes were number of vendors, family/child activities, product variety, food and beverages, free parking, concerts/music, hours of operation and convenient location. The first four attributes fell under one category that we named "farmers' market presence attributes." This category combines physical things that are consumers expect to find at a farmers' market. Table 2.2 shows the attributes and their corresponding average ratings. The ratings are on a scale of one to five; one being "not important" and five being "extremely important."

**Table 2.2: Farmers' Market Attribute Ratings**

| Farmers' Market Attribute | Mean | Standard Deviation |
|---|---|---|
| Fm_pres_attributes | 3.55150 | .90896 |
| 1. Number of vendors | 3.97110 | .92843 |
| 2. Family/child activities | 2.30914 | 1.30948 |
| 3. Product variety | 4.32393 | .75511 |
| 4. Food and beverages | 3.56183 | 1.18620 |
| Fm_conv_attributes | 4.18012 | .73910 |
| 1. Hours of operation | 4.21532 | .93979 |
| 2. Convenient location | 4.43656 | .85272 |
| 3. Free parking | 4.30403 | 1.18532 |
| 4. Concert/music | 3.35511 | 1.24516 |

The last four attributes fall into a category named “farmers’ market convenience attributes.” This category essentially consists of non-physical things that characterize a farmers’ market. The attributes receiving the highest average are convenient location, product variety, free parking, and hours of operation, number of vendors, and food and beverages. Their average rating is four, which means that respondents view them as very important attributes. Music/concerts are viewed as important while family/child activities are the only slightly important attribute at farmers’ markets.

The model predicts that the probability that the product feature falls into extremely important level is much higher for product freshness and quality. Among the eight product features, the product freshness and quality are dominantly extremely important with 70% and 67% chances respectively. This result posits that people like these two features more than the others. This finding supports Brown (2003), which suggested that marketing local products should stress quality and freshness. However, this result differs from Glanz et al. (1998) who reported that taste was the most important consideration when purchasing produce.

The probability that the product feature falls into very important ranking is dominantly higher for product variety, appearance, pricing, local, familiarity of the grower and organic produce. When purchasing fresh produce, the probability that a shopper gives a “very important” rating for product variety is 48%. It is most likely that any shopper in farmers’ market will perceive product variety as a very important feature of fresh produce. Table 2.3 shows the overall probabilities for each of the five levels of importance for each of the eight product features under consideration.

**Table 2.3: Ordered Logistic Probabilities**

| | Probability | | | | |
|---|---|---|---|---|---|
| Product Features | Not important | Somewhat important | Important | Very important | Extremely important |
| Product variety | .0087 | .0311 | .2026 | .4783 | .2794 |
| Product quality | .0031 | .0023 | .0333 | .2874 | .6740 |
| Product appearance | .0098 | .0238 | .1434 | .4645 | .3585 |
| Produced locally | .0236 | .0438 | .1676 | .3950 | .3701 |
| Pricing | .0088 | .0378 | .2419 | .4270 | .2846 |
| Organic produce | .0381 | .1028 | .2769 | .3470 | .2352 |
| Product freshness | .0036 | .0041 | .0350 | .2535 | .7038 |
| Know the grower | .0532 | .0975 | .2697 | .3590 | .2207 |

Local produce ranks third with 37% probability amongst features which receive a "very important" ranking. This is similar to Darby et al. (2008) who found that the importance consumers assign to local produce is distinct lower than product freshness. The organic produce is fifth with a 24% likelihood among the "very important" features. The fact that local produce has higher probability of falling under "very important" category than organic is consistent with several studies (Onozaka, Nurse, and Thilmany-McFadden, 2010; Curtis and Cowee, 2011) where the number of respondents who favored organic fresh produce was lower than that of locally grown fresh produce.

The fact that produce quality is extremely important and that Brown (2003) and Keeling-Bond, Thilmany-McFadden, and Bond (2009) found that most consumers perceive local produce at farmers' markets to be of higher quality and freshness, our study reminds produce growers that these two features [quality and freshness] are the vital tips to meet consumer preferences.

The results in Table 2.3 show that the likelihood that a product feature falls into the "not important" or "somewhat important" raking is extremely small. The vast majority of consumers who attend farmers' markets believe that all of the features are at

least important. This sends a signal to fresh produce vendors that no product feature should be completely neglected. However, primary attention must be given to product quality and freshness followed by product appearance and local origin.

Coefficients for each of the eight equations corresponding with the eight features under consideration are reported. They are interpreted as the expected changes in the probabilities of falling into the extreme importance (highest level of importance) to the specific product feature versus lower levels (from very important to low important) as a result of a one unit change in the predictor while the other variables in the model are held constant.

The cuts with subscripts below the coefficients are the estimated cut points on the latent variables used to differentiate the observed levels of importance assigned on a specific product feature. For instance, Cut1 is the estimated cut-point on the latent variable used to differentiate not important product features from somewhat important, important, very important and extremely important product feature when values of the predictor variables are evaluated at zero. This signifies that individuals with a value of 2.73 or less on the underlying latent variable that gave rise to our variety variable would be classified as of low importance for variety given all predictors are evaluated at zero. Cut2 is the estimated cut-point on the latent variable used to differentiate not important and somewhat important product feature from important, very important and extremely important product feature when values of the predictor variables are evaluated at zero. For example, individuals with a value between 2.73 and 4.29 on the underlying latent variable would be classified as of somewhat importance for product variety. Table 2.4 presents the ordered logistic coefficients for each of the product features.

**Table 2.4: Ordered Logistic Coefficient Estimates**

| Regressors | Variety | Quality | Appearance | Local | Pricing | Organic | Freshness | Know_Grower |
|---|---|---|---|---|---|---|---|---|
| age | .0078** | -0.0007 | .0106*** | 0.0040 | -0.0049 | -0.0044 | 0.0015 | -0.0001 |
| visits | 0.0270 | .1153** | -.0805* | -0.0117 | -.1291*** | -0.0558 | 0.0645 | .0824* |
| groc_bill | 0.0012 | .0016* | 0.0010 | -.0014* | -0.0005 | .0022*** | 0.0012 | 0.0000 |
| education | -0.0578 | -0.0023 | -.1487*** | -0.0416 | -.1154*** | 0.0089 | -0.0203 | -.0699* |
| time_for_meals | -.0993** | -0.0744 | 0.0381 | 0.0022 | 0.0444 | -0.0293 | 0.0011 | -.1245*** |
| food_safety | 0.1121 | .2060** | 0.1091 | 0.0892 | .2585*** | .3238*** | .2114*** | 0.0502 |
| concern_for_diet | .2074*** | .1790** | .2839*** | -0.0043 | 0.0595 | 0.0153 | .2830*** | 0.0655 |
| environment_impact | 0.0452 | -0.0004 | -.3005*** | .2633*** | -0.0275 | .4859*** | 0.0715 | .3010*** |
| agri_enthusiast | 0.0678 | 0.1587 | -0.0203 | .6936*** | 0.0548 | 0.0173 | .1817* | .4342*** |
| food_origin | 0.0761 | .1692* | 0.1032 | 0.1192 | -0.1150 | .4441*** | 0.0736 | .1653** |
| vegan | -0.0609 | -.1470*** | -.1067** | -0.0254 | -0.0409 | .2034*** | -.2476*** | 0.0212 |
| fm_pres_attributes | 1.1608*** | .5583*** | .7684*** | .3636*** | .6730*** | .4866*** | .5197*** | .7026*** |
| fm_conv_attributes | .3949*** | .6162*** | .6518*** | .2205*** | .6520*** | .1816** | .5424*** | 0.0637 |
| csa | -0.0457 | 0.0830 | -.2588** | .2298** | -.2266** | 0.1456 | -0.0344 | -0.0095 |
| home_gardening | -.1898* | 0.0937 | -.1759* | 0.0973 | -.2276** | -.3059*** | -0.0710 | -.2236** |
| WIC | .9648*** | 0.3954 | -0.4711 | 0.2456 | -0.0525 | .8416** | .8214* | 0.2343 |
| female | 0.0696 | .2589** | .4511*** | .3255*** | 0.1109 | -0.1505 | .3845*** | 0.0656 |
| married | -0.1019 | 0.0165 | .2904*** | 0.1013 | .1847* | -.2114** | 0.1467 | -0.1594 |
| ut | -0.0182 | -0.0113 | 0.1284 | 1.1512*** | .1959* | 0.0427 | 0.0622 | .2253** |
| cut1 | 2.73*** | 1.77** | 1.45** | 3.93*** | 0.1067 | 4.24*** | 1.88*** | 3.45*** |
| cut2 | 4.29*** | 2.32*** | 2.70*** | 5.02*** | 1.81*** | 5.65*** | 2.65*** | 4.59*** |
| cut3 | 6.32*** | 4.33*** | 4.51*** | 6.45*** | 3.92*** | 7.13*** | 4.41*** | 6.00*** |
| cut4 | 8.41*** | 6.82*** | 6.62*** | 8.15*** | 5.74*** | 8.63*** | 6.65*** | 7.57*** |
| chi2 | 391.31 | 226.78 | 378.42 | 403.27 | 308.00 | 432.77 | 216.66 | 308.57 |

The *, **, *** denote significance at 10%, 5%, and 1% level, respectively.

Age has significant effects on the importance for product variety and appearance. Unlike Byrne at al. (1991) who concluded that advancing age, higher education, and males demonstrate negative effects on organic produce demand, none of these three characteristics has a significant effect on the probability of falling in higher ranking for organic produce. A one year increase in age increases the probability that product variety and product appearance fall into the extremely important category, by .7% and 1% respectively. Hence, older adults will value these attributes more than younger adults. However, while Brown, Gandee, and D'Souza (2006) and Carpio and Isengildina-Massa (2009) found that premiums for local products were influenced by age, this study indicates that age has no significant impact on the likelihood of purchasing local produce.

Consumers who attend farmers' markets frequently value the quality of fresh produce and knowing local growers. An extra visit to farmers' market increases the probability that a consumer assigns higher importance to product quality by 13%. People who attend farmers' markets often value high quality of the fresh produce. They are also interested in knowing the produce grower. In fact, one more visit leads to an increase of 8% in the probability that knowing the grower falls into higher raking. Conversely, that extra visit increases the chances that a consumer assigns lower importance to product appearance and to pricing by 13% and 8%, respectively. In other words, people who attend famers' markets frequently care about the quality and association with local growers, and care less about product appearance and prices. This result suggests that produce growers who ensure good quality of their produce can build relationships with customers and receive higher revenues for their products through potential increased sales.

Monthly expenditures on foodstuffs matter in explaining consumer's importance for product quality and organically grown produce. We find that $1 increase in the monthly grocery bill leads to a .2% increase in the likelihood of both product quality and organic produce falling into extremely important rank. Those with high expenditures on groceries are more likely to purchase organic and good quality produce equally. However, these types of consumers are less likely to buy locally grown produce, indicating an inverse relationship between groceries spending and the probability of assigning a higher importance to local produce.

Surprisingly, education has a negative impact on the extremely important ranking for three of the features. For a one unit increase in the level of education; say from high school to an associate degree, there is an expected decrease in the probability that product appearance falls into extremely important category by 15%. Likewise, the probability that product pricing and the familiarity of the grower are assigned higher importance drop by 12% and 7%, respectively. Hence, low educated people value product appearance, pricing, and knowing the grower attributes more than highly educated ones. This result implies that consumers with high levels of education do not care much about knowing local growers, prices, or product appearance.

We now turn our attention to consumer agreements with statements pertaining to health and dietary habits. The model predicts a negative relationship between having little time to make meals at home and higher importance for product quality. Specifically, a one unit increase in the levels of agreement with having little time to prepare meals at home diminishes the probability of assigning higher importance to product variety by 10%. Similarly, that incremental unit leads to a 12% decrease in the probability for the

familiarity of the grower to fall into the extremely important rank. In other words, the more people feel like they have enough time to cook at home; the more likely they are to value product variety and to strive to know the growers of the food they eat.

Concerns about food safety and diet/health have huge positive impacts on rankings of most of the product features. For example, a one unit increase in the levels of agreement with being concerned about food safety increases the likelihood of giving higher importance to product quality by 21%, to pricing by 26%, and to product freshness by 21%. Similar to Loureiro and Hine (2002) and Gifford and Bernard (2004), concerns for food safety and oganic produce are positively correlated. This study posits that a 32% increase is expected in the likelihood of giving higher importance to organic produce for a one unit increase in the levels of agreement with being concerned about food safety. Concerning with those consumers concerned with diet/health, a one unit increase in levels of their agreement increases the probability of assigning higher importance to product variety by 21%, to product quality by 18%, to product appearance by 28% and to product freshness by 28%. These results illustrate that people with high concerns for food safety care more about quality, freshness and organic production. High importance for the origin of food is associated with high importance for product quality, organic produce and the familiarity of the grower. Those with strong concerns for their health/diet highly favor product variety, quality, appearance and freshness. It is therefore implied that having various fresh and organic food products with good quality and appearance at farmers' markets will attract consumers whose concerns for food safety and health/diet are high.

There is a significantly high preference for local and organically grown produce among consumers who want to buy products with a low environmental impact. Such consumers value the familiarity of the grower as well. An incremental unit in the levels of agreement with buying product with low environmental impact increases the likelihood of assigning higher importance to local and organic produce by 23% and 49% respectively. Thus, the more people are concerned about the environmental impact, the more likely they are to buy organic and local food products. They perceive both local and organic products as relatively environmentally friendly. In addition, they are more likely to place a high importance on "know the grower." The probability for this feature to fall into higher importance ranking increases by 30%. Growers providing organic produce should focus on consumers with strong environmental concerns as well as those concerned with their diet/health.

Agriculture enthusiasts place a high importance familiarity of produce growers, and are more likely to buy fresh locally-grown produce. This result is closely related to the finding by Carpio and Isengildina-Massa (2009) who reported that 71% of respondents choose South Carolina-grown produce to primarily support local farmers and the local economy. A unit increase in the level of agriculture enthusiasm results in a 69% increase in the likelihood of assigning extreme importance to local products, 18% increase to product freshness, and a 43% increase to "know the grower." This means that people who value open space for agriculture in their localities, and those to whom supporting local farmers is important are more likely to purchase fresh local produce and associate with the growers of their food products. This result is similar to the findings of Keeling-Bond, Thilmany-McFadden, and Bond (2009) where consumers with a higher

propensity to purchase locally-produced goods were influenced by public attributes, such as supporting local agriculture.

Results show that consumers with concerns about the origin of foodstuffs are more likely to purchase organic products with good quality. They value knowing the grower as well. Specifically, an additional degree of agreement with food origin concerns leads to an increase of 17% in the probability that product quality falls into the extremely important category. That unit also leads to 44% increase in the likelihood of giving extreme importance to organic produce and 17% to knowing the grower This suggests that labels indicating origin are more important for consumers who are looking for high quality and organic food products.

There is a positive relationship between the importance of organic produce and being a vegetarian or a vegan. A unit increase in the levels of agreement with being a vegetarian or vegan results in a 20% increase in the probability of giving extreme importance to organic produce. The more people consider themselves to be vegetarian; they are more likely to purchase organic produce. Surprisingly, those consumers who are vegetarians are less likely to value product quality, appearance, and freshness. We would expect the opposite. A unit increase in the levels of agreements with being a vegetarian or vegan leads to 15% decrease in the probability of assigning higher importance to product quality, 11% to product appearance, and 25% to product freshness.

Results indicate strong significant effects of consumer attitudes towards farmers' markets attributes. Consumers with high levels of importance for market attributes assign higher importance to almost all product features when making fresh produce purchasing decisions. Specifically, a unit increase in the levels of importance of presence attributes

of farmers' market increases the likelihood of assigning extreme importance to product quality by 56%, to product appearance by 77%, to locally grown produce by 36%, to organic produce by 49%, and to product freshness by 52%. Likewise, a unit increase in the levels of importance for convenience attributes of farmers' market increases the probability of giving extreme importance to product variety by 40%, to product quality by 62%, to product appearance by 65%, to locally produced product by 22%, to organic product by 18%, and to product freshness by 54%. This suggests a significant correlation between people' attitude towards farmers' market attributes and the importance of product features.

Individuals with preferences for CSA programs participation are more likely to assign extreme importance for locally-grown produce than those without (23% higher). However, the probability of placing lower levels of importance on product appearance and pricing is 26% and 23% higher than their counterparts respectively. This means that those consumers who are willing to join CSA programs are motivated by purchasing locally grown food products more than anything else. Product appearance and pricing are not a factor for them.

This analysis shows negative effects of having a garden at home on the importance for product variety, appearance, pricing, organic and knowing the grower. The probability of being in lower rankings of importance for product variety is 19% greater for home gardeners than non-gardeners. The probability of being in lower rankings of importance for product appearance is 18% greater for home gardeners than non-gardeners. The chances of being in lower rankings of importance for product pricing are 23% greater for home gardeners than non-gardeners. Likewise, the home gardeners

are 31% more likely to assign lower levels of importance for organic produce than their counterparts. Non-gardeners are 22% more likely to value knowing the grower feature than those who home-garden. In other words, those consumers without home gardens care for product variety, appearance and organically grown produce. Because they constitute the majority of consumers who attend farmers' markets, meeting their preferences would be beneficial for vendors. In addition, they show significant interest in knowing local growers. Since they are not engaged in home gardening, they may want to learn about food production methods from local growers. As they have high preference for organic produce, providing instructional classes or promotional materials may result in increased sales of organically grown produce.

WIC (Women, Infants and Children) participants like product variety, freshness, and organically grown produce. The chances for WIC participants to fall into higher rankings of importance for product variety are 97% than those who are not participating. Furthermore, being a WIC participant increases the probability of extreme importance for organic produce by 84% and for product freshness by 82%. This result is quite different from a survey by Trainer and Gradziel (2013) concerning California WIC participant food shopping and consumption habits. In that survey, 34.6% of their respondents feel that organic produce is better for them, but only 2% stated the WIC should offer organic food. In our study, produce growers who accept WIC vouchers will meet clients' expectations by providing various types of food products which are fresh and organically grown. The results show insignificant differences between WIC participants and those who are not with regard to the importance for locally grown produce, unless it is organically grown. Expanding the WIC Farmers' Market Nutrition Program to Utah and

Nevada may increase the probability that the targeted consumers purchase more fresh produce.

Females are more likely to assign higher importance for a number of product features. The probability of a higher ranking of importance for product quality is 26% greater for females than for males. Furthermore, a female at farmers' market is 45%, 39% and 33% more likely to fall in the highest category of importance for product appearance, freshness and local produce respectively. These results imply that females are more likely to purchase produce of high quality, freshness, good appearance, and locally grown. In order to increase sales, marketing strategies targeting females should focus on these features. These results can be compared to Akpinar et al. (2009), showing similar results regarding gender and the levels of importance of organic produce. On the other hand, our results are quite different regarding gender and the importance of product freshness and appearance. However, their analysis was solely based on correlation coefficients, no econometric modeling was conducted.

Married respondents are more likely to assign higher importance to product appearance and pricing than single individuals. The likelihood for the former to fall into the extreme category of importance for product appearance is 29% greater than for the latter. In addition, married individuals are 19% more likely to assign higher importance to product pricing than their counterparts. Conversely, the likelihood of being in the highest category of importance assigned to organic produce is 21% greater for singles than it is for married individuals. This means that in comparison with single people, married individuals are less likely to purchase organic produce and are more likely to purchase fresh food with a good appearance that is fairly priced.

Lastly, this study found that Utahans have more affinity for locally grown fresh produce than Nevadans. They are also more likely to assign a high level of importance on knowing the grower. This suggests that, in comparison to Nevadans, Utahans are more interested in knowing local produce growers and have strong preferences for the produce grown in their state.

## 2.6 Conclusions

This essay investigates consumer characteristics which explain the probability of assigning a higher ranking for each of eight fresh produce features. An ordered logistic model was employed using data collected from 669 consumers in Nevada in 2008 and 819 consumers in Utah in 2011. Data collection was completed using an in-person survey strategy at a total of 16 farmers' market outlets. This essay is important as it provides information about consumer shopping habits, preferences, and likely choices among fresh produce features. It also provides a baseline for future studies regarding the importance consumers assign to various product attributes.

Results from this essay indicate the extreme importance of product quality and freshness. This finding is significantly apparent among females and consumers whose concerns for food safety and for diet/hearth are high. It is also common among consumers who place a higher importance on farmers' markets attributes. Product variety, appearance, pricing, local origin, know the grower and organic produce are more likely to fall into the "very important" category. Those consumers with high concerns for diet/health and older individuals are more likely to assign higher importance for product variety and appearance. Those consumers who buy products with low environmental impact, who are willing to join community supported agricultural program and those who

consider themselves to be agriculture enthusiasts are more likely to purchase locally-grown produce. WIC participants show high preferences for product variety, organic and freshness. Females assign higher importance for product variety, appearance, local origin and product freshness.

Based on the findings of this analysis, a number of suggestions are formulated herein. First, in order for vendors of fresh produce to attract senior consumers, they should carry a variety of food products with good appearance. Second, local produce growers are encouraged to ensure high quality of the produce and build relationships with customers. This is especially true for consumers who attend farmers' markets frequently and those who are very concerned about food origin. Third, since consumers with high grocery expenditures are more likely to purchase organic and high quality produce, organic produce growers should label accordingly and use organic certification programs.

Fourth, having various fresh local and organic produce with good quality and appearance at farmers' markets will attract more consumers with both food safety and health/diet concerns. Fifth, marketing strategies targeting consumers with environmental concerns will likely lead to increased sales of local and organically grown produce. Sixth, results imply that expanding CSA programs will likely lead to increased consumption of local fresh produce. The introduction of WIC Farmers' Market Nutrition Program in Utah and Nevada will likely increase sales of organic fresh produce.

This essay contributes to the existing literature by providing information pertaining to consumer preferences for various produce features. As mentioned before in the introduction, previous studies were limited on preferences for local and organic produce. This essay expanded the horizon by examining more features such as product

variety, appearance, quality, freshness, pricing and knowing the grower. Consumer characteristics which explain preferences for each specific feature were identified and discussed. Hence, these results can be used to stimulate future research and most importantly to effectively implement and/or extend programs and policies aimed at providing produce of high quality and promoting products with specific attributes to targeted consumers. New studies could investigate whether there are significant differences in consumer willingness to pay for products with specific features like product variety and product freshness, organic production and product appearance.

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# CHAPTER 3

# ASSESSMENT OF CONSUMER PREFERENCES, WILLINGNESS TO PAY, AND STATED DEMAND FOR DIFFERENTIATED PRODUCE

## 3.1 Abstract

Product differentiation has been shown to be an effective strategy for increasing market share and providing pricing premiums over undifferentiated products. In most cases, attributes of differentiated products are revealed through product labels, which convey specific information as production practices, place of origin, nutritional facts, etc. This essay uses consumer survey data collected from 819 farmers' market shoppers in Utah in 2011 to assess consumer preferences for and willingness to pay for three differentiated fresh produce. We compare preferences before and after information about location and production practices, estimate stated demand functions and compute price elasticities. Results indicate that WTP and the probability of purchasing produce grown conventionally in Utah (local) outweigh those for either organically or conventionally grown of unknown origin. The information significantly increased the likelihood of purchasing fresh produce conventionally grown in Utah and diminished preferences for conventionally grown produce of unknown origin. Fresh produce at farmers' markets is ordinary with inelastic demand. Local produce growers should clearly label the produce to indicate the place of origin as well as special production practices used.

## 3.2 Introduction

The attributes of differentiated products are often revealed through product labels. Labels convey specific information about differentiate products that otherwise look similar in the market place. Food labels, in particular, indicate production practices, origin, nutritional facts, etc. Examples of labels related to production practices include organically grown, local, grass-fed, natural, hormone or pesticide free, etc. Origin labels indicate a specific geographic area of production, such as region, state, country, etc.

Studies show that labels affect consumers' preferences and willingness to pay for differentiated products. For example, a recent study by Onozaka and Thilmany-McFadden (2011) explicitly analyzes the potential differentiation and interaction among designations of production location and other claims in food markets. They also investigate how consumer willingness to pay varies depending upon multiple combinations of label claims. They use data collected through a national, web-based survey, whereby a total of 1,889 primary grocery shoppers were invited to participate in the survey and 67% responded. They found some significant interactive effects among production practice and origin claims and concluded that consumers do differentiate some production claims if information on production location is provided, or vice versa. In addition, Howard and Allen (2010) find that differentiation of food products by production practices and origin is prominent in farmers' markets and community supported agriculture programs.

This essay examines the likelihood of consumption and willingness to pay for multiple labeled (by both production style and origin) differentiated produce among farmers' market shoppers in Utah. Three primary differentiating claims are investigated,

including (1) conventionally grown of unknown origin (CGUO), (2) conventionally grown local (in state) (CGL) and (3) organically grown of unknown origin (OGUO). The analysis is applied to three products; green peppers, cucumbers, and yellow squash.

This essay uses survey data from 819 consumers who attended farmers' markets in Utah in 2011 to accomplish four tasks. First, we employ a multinomial logistic regression model to assess preferences for differentiated green peppers, cucumbers, and yellow squash. We predict the likelihood of purchasing each differentiated product and identified consumer characteristics and attitudes which explain the preferences. Second, we use a conditional logistic regression model and compute consumer willingness to pay for each differentiated product. Survey respondents were asked to express their preferences for the three differentiated products prior to and after information was provided regarding organic production practices and local produce attributes. Thus, the third task in this study is to compare respondent ante-information and post-information preferences. This allows us to test the impact of this information on consumer preferences. Finally, we use an ordinary least squares model to estimate stated demand functions and compute own price elasticities for each of the three products. We test whether these products are ordinary goods for consumers who attend farmers' markets, and if the demands for them are elastic, unitary or inelastic. Doing so allows us to inform farmers about the degree of responsiveness of quantity demanded to price changes for each of these products.

Results indicate that consumer willingness to pay and the probability of purchasing each of the three products grown conventionally in Utah (locally) outweigh that for either organically or conventionally grown of unknown origin. The new

information provided to survey respondents increased the likelihood of purchasing products conventionally grown in Utah, while it had negative impacts on preferences for conventionally and organically grown of unknown origin. The three products were shown to be ordinary goods with relatively inelastic demand functions. This study is relevant in the sense that it provides vital information and recommendations for farmers' market vendors regarding consumer preferences, their willingness to pay for multiple labeled differentiated products, including the effects of the information on location and production methods, as well as price elasticities for each of the products under investigation. Results suggest a number of recommendations regarding marketing, pricing, and production decisions, as well as the potential effectiveness of certain labeling programs when weighed against the cost of program participation.

## 3.3 Review of Literature

This section explores the existing literature examining consumer willingness to pay and preferences for products that are differentiated by production method and origin. This allows us to better understand the existing information and therefore discuss our contribution accordingly.

### *3.3.1 Demand and Willingness to Pay for Differentiated Produce*

Demand and willingness to pay for differentiated fresh produce differs across consumers because of several reasons. Previous studies identified a number of the reasons such as nutritional facts resulting from production processes, price, place of production and consumer perceptions and characteristics. This section visits the existing literature on each of the reasons.

In terms of nutritional facts, Akgüngör, Miran, and Abay (2010) explored the Turkish consumers' perceptions towards food safety and the trade-offs between chemical residues and cosmetic quality in fresh produce. They found that consumer choices depend largely on their perception of nutritional value and health risk. They also found that, in comparison with conventional produce, consumers do not perceive that organic products have higher prices. In fact, their study reported that consumer willingness to pay for products with organic labels and certified products was up to 36%.

Williams and Hammitt (2001) sought to examine consumers' subjective risk judgments for a range of food safety hazards and to identify factors most predictive of perceived food safety risks. They used survey data from 700 conventional and organic fresh produce buyers in the Boston area and found that consumers perceived relatively high risks associated with consuming conventionally grown produce. A large majority of respondents perceived a reduced risk associated with organically grown produce.

Huang (1996a) formulated a two-equation bivariate probit model to simultaneously examine consumers' preferences and attitudes toward organically grown produce. He posited that consumers who are nutritionally conscious, concerned about the use of pesticides, and wanting produce tested for freedom from residues would have a higher propensity to prefer organically grown produce, and that consumers who are white, better-educated, and have large families are more likely than others to tolerate sensory defects.

The study by Yiridoea, Bonti-Ankomah, and Martin (2005) reported that premiums for organically produced produce tend to increase with preferred attributes and that demand tends to depend more on the price differential with respect to conventionally

grown products, than on actual price. They posited that income elasticity of demand for organic foods is generally small. Speaking of the price factor however, Lin, Smith, and Huang (2008) found that consumers are buying organic food despite its relative expensiveness. Huang (1996b) found that vegetable demands are own-price and expenditure inelastic. The own-price elasticities ranged from a low of –0.08 for celery and –0.09 for lettuce to –0.62 for tomatoes, while the expenditure elasticities ranged from 0.08 for onions to 0.92 for tomatoes.

McCluskey and Loureiro (2003) conducted empirical research on consumer preferences and willingness to pay for several types of food quality or attribute labeling. They focused on eco-labels, GM food labels, U.S. state agricultural-product labels and European Protected Geographical Indication labels, BSE-tested-beef labels, and "Fair Trade" label. Their findings suggest that consumers must perceive high quality in order for the food product to command a premium.

A recent study by Briggeman and Lusk (2011) uses a model of inequality aversion and a set of real-money experiments to examine consumers willing to pay for a fair food system. It is reported that about 15% of consumers' willingness-to-pay a premium for organic foods is attributable to altruism and inequality aversion and that the fairness premium is significantly influenced by who receives this premium, and how much the consumer earns.

Owusu and Anifiri (2013) posit that consumer socioeconomic characteristics such as education, income, households with children under 15 years old, and product freshness and cleanness increase consumer willingness to a premium for organic as opposed to conventional watermelon. They also find that awareness and perception such as consumer

awareness of chemical residues in conventional food products, consumer beliefs that organic foods have better tastes, and that organic produce is expensive, all have positive impacts on the willingness to pay.

Similarly, Voon, Ngui, and Agrawal (2011) compared conventional with organic produce and found a positive relationship between consumer perception towards organic produce and the willingness to purchase it. On a locational perspective, Kremen, Greene, and Hanson (2004) found that consumers at farmers' markets near major urban areas, universities, religious communities, and health care facilities tended to have strong demand for organic products. Likewise, consumers at some farmers' markets in rural areas show strong demand for organic products due to the access to well-priced, fresh, local organic foods.

Consumers' willingness to pay for products of different origins has been examined. For example, Hu et al. (2012) have recently used stated preference data from Kentucky and Ohio to estimate consumer willingness to pay for varieties of a processed blackberry jam that are differentiated with respect to their local production labeling and a series of other value-added claims. They find that consumers are willing to pay more for the produce locally produced, produced in their state, or in a well-identified multi-state region.

Loureiro and Umberger (2003) analyzed data from consumer surveys conducted during 2002 in several grocery stores in Boulder, Denver, and Fort Collins, Colorado. They found that surveyed consumers were willing to pay an average of $184 per household annually for a mandatory country-of-origin labeling program. Their

respondents were also willing to pay an average of 38% and 58% more for U.S. certified steak and U.S. certified hamburger, respectively.

Likewise, Ahmadov (2008) found that consumers' perception of food quality and likelihood of purchasing food products are affected by product origin cues through perceptions of food safety. Ahmadov (2008) also indicated that, due to exogenous preferences for technologies used by domestic firms in respective markets, consumers perceive foreign firms' products relatively lower than domestic firms' products.

Another study by Novotorova and Mazzocco (2008) used a conjoint analysis methodology, and online survey, to measure consumers' preference for apple attributes such as place of production, method of production, and price. They conclude that place-oriented consumers may be willing to pay a 60% to 70% premium for locally grown apples. They also indicated that high consumer preferences for locally grown products combined with environmental benefits transferred through genetic modification provide an opportunity for producers to capture and build their markets, especially within certain market segments.

### *3.3.2 Organically Versus Conventionally Grown Products*

A number of studies exist regarding nutritional differences between organic and conventionally-grown produce. For instance, Zhao et al. (2007) used replicated side-by-side plots to produce organic and conventional vegetables for consumer sensory studies. They compared organically and conventionally grown tomatoes, cucumbers, and onions. They found that organically and conventionally grown vegetables did not show significant differences in consumer preference or consumer-perceived sensory quality. The only exception was in tomatoes where the conventionally produced tomato was rated

as having significantly stronger flavor than the organically produced tomato. They found that the overall consumer liking was the same for both organic and conventional samples.

Similarly, Dangour et al. (2009) sought to quantitatively assess the differences in reported nutrient content between organically and conventionally produced foodstuffs. Among 55 satisfactory-quality studies, they found that conventionally produced crops had significantly higher nitrogen content while organically produced crops had a significantly higher phosphorus content and higher titratable acidity. Overall, they concluded that there is no evidence of a difference in nutrient quality between organically and conventionally produced foodstuffs. Bourn and Prescott (2002) found that with the possible exception of nitrate content, there is no strong evidence that organic and conventional foods differ in concentrations of various nutrients, and no evidence for organic foods being more susceptible to microbiological contamination than conventional foods. A very recent study by Smith-Spangler et al. (2012) reviewed 237 studies to compare organic and non-organic food. Their review found that conventional foods contain pesticides within permitted boundaries. The study lacked strong evidence to make a sound difference in terms of nutrition.

On the other hand, Lima and Vianello (2011) conducted a review on the main characteristics and properties of plants cultivated following organic and conventional procedures. They found that there exist evidence for nutritional and safety properties of vegetable foods and qualitative differences observed between the two cultivation methods. Another recent study by Bernabeu, Tendero, and Olmeda (2012), which surveyed 421 Castilla-La Mancha lamb meat consumers during the month of January 2009 in Spain, measured the degree of influence that attributes such as price, organic

production, origin, and commercial type have on Spanish consumers when purchasing lamb meat. By means of conjoint analysis techniques, they posited that an additional potential differentiation strategy is to offer conventionally produced suckling lamb and organic ternasco lamb.

Lester and Saftner (2011) explored the existing literature on organically versus conventionally-grown produce and conclude that accurate and meaningful comparison of the nutritional quality of organic and conventional produce are difficult to ascertain and that recent studies of nutritional quality in organic versus conventional produce indicate that soil nitrogen delivery rates strongly affect nutritional quality. According to Lairon (2010) conventionally grown fresh produce possess lesser nutritional quality than organically grown ones.

In view of the existing literature, the purpose of this essay is to examine farmers' markets consumer preferences for conventionally grown and organically grown fresh produce. We specifically consider fresh produce that is produced locally using conventional methods, produced from unknown origin using conventional or organic practices. Consumer willingness to pay is also analyzed to examine whether farmers' markets consumers would pay different premiums for the differentiated fresh produce. This assay contributes to the clarification of consumer perspectives towards organic, conventional, and local fresh produce.

### 3.4 Models Specification

The purpose of this section is to present a theoretical framework of the models used in the analysis. Three models employed are multinomial logistic (MNL), conditional logistic (CL), and ordinary least squares (OLS). Both MNL and CL models are used to

analyze consumer preferences while OLS is employed to evaluate the stated demand functions for green peppers, cucumbers and yellow squash. We further present how consumer willingness to pay for each of these three products is computed.

This analysis relies on a couple of assumptions. It is assumed that consumers who attend farmers' markets are rational, that is, their preferences are both complete and transitive (Mas-Colell, Whinston, and Green, 1995). This assumption allows us to believe that individuals want more rather than less of a commodity, and that their behaviors are predictable. Another assumption is that consumers are utility maximizers. Thus, we are able to use a random utility model as described by Train (2009). The random utility model allows for a consumer with a finite set of choice alternatives to select the one that he believes gives him the maximum amount of utility. A consumer's utility derived from a choice is specified as a linear function of the consumer's characteristics, along with an error term. The probability of selecting a particular option is equal to the probability that the utility derived from that option is greater than the utility derived from all other available choices (Keeling-Bond, Thilmany-McFadden, and Bond, 2009). Under this random utility framework, an individual *i* is assumed to choose the alternative that gives the highest utility among *J* alternatives. The third important assumption for this analysis is the Independence from Irrelevant Alternatives (IIA). In other words; adding a new alternative to the existing set of alternatives does not affect the relative odds among the existing choice sets (Train, 2009).

First, to estimate relative probabilities of purchasing either CGL or OGUO type of produce over CGUO produce, a multinomial logistic (MNL) model was employed. Train (2009) and Greene (2008) indicate that the structure of a MNL model allows the

prediction of the probability that the $j^{th}$ alternative of the whole set of alternatives is chosen to be the best. They also posit that a MNL model is preferred because there are more than two choice alternatives and the systematic utility is modeled in terms of characteristics of the individuals and there is an interest in examining relative probabilities of alternatives provided in an unordered way. The strategy of using a MNL model also answers the research questions outlined in the introductory part.

The utility function takes the form below:

$$U_{ij} = V_{ij} + \in_{ij} \text{ for } i = 1, \ldots, I \text{ and } j = CGUO, CGL, OGUO \quad (3.1)$$

where $V_{ij}$ is the deterministic component of the utility and $\in_{ij}$ is the random component.

We assume that the random component term is independently and identically distributed (iid) according to an extreme value $F(\in_{ij}) = exp(-exp(-\in_{ij}))$ to make a logistic model appropriate (Kennedy, 2008). We also assume a linear-in-parameter utility functional form for the deterministic component of utility. The choices are driven by a latent variable, or indirect utility.

The indirect utility $V_{ij}^{*}$ for individual $i$ choosing an alternative $j$ (in this case, it a given type of differentiated any of fresh produce under consideration) is

$$V_{ij}^{*} = \beta' X_{ij} + \mu_{ij} \text{ for } i = 1, \ldots, I \text{ and } j = CGUO, CGL, OGUO \quad (3.2)$$

where $X_{ij}$ is a vector of $K$ characteristics of the chooser. The parameter vector $\beta$ is to be estimated and differs across the $j$s. The $\mu_{ij}$ is the disturbance that accounts for unobserved factors. The observed choice $y_i$ of an individual $i$ is

$$y_i = \begin{cases} CGUO\ if\ V^*_{iCGUO} > V^*_{ij} \forall j, \\ CGL\ if\ V^*_{iCGL} > V^*_{ij} \forall j, \\ OGUO\ if\ V^*_{iOGUO} > V^*_{ij} \forall j. \end{cases} \quad (3.3).$$

The probability that an individual *i* chooses product type *j* is

$$P_{ij} = P(y_i = j|X) = \frac{exp(\beta_j^{'} X_{ij})}{\sum_j \beta_j^{'} X_{ij}} \quad (3.4).$$

The $\beta$'s are identified by setting the $\beta_{j*} = 0$ for one reference category; which is CGUO in this model. Looking at the log of the odds ratio, we can generate a direct interpretation of the parameter estimates

$$\frac{\delta log(P_j|P_{j*})}{\delta X_k} = \beta_{ik} - \beta_{j*} \quad (3.5)$$

which reduces to

$$\frac{\delta log(P_j|P_{j*})}{\delta X_k} = \beta_{ik} \quad (3.6)$$

for comparison with the reference outcome *j**. A positive parameter $\beta_{jk}$ means, therefore, that the relative probability of choosing *j* increases relative to the probability of choosing the reference type *j** (Schmidheiny, 2007). The marginal effect of an independent variable $X_k$ on the choice probability for a type *j* is given by

$$\frac{\delta P(y = j|X)}{\delta x_k} = P(\beta_{jk} - \overline{\beta}_{jk}) = P(\beta_{jk} - \frac{\sum_j \beta_{jk}}{J}) \quad (3.7).$$

In this essay, we estimate the relative likelihood of purchasing either CGL or OGUO green peppers, cucumbers, or yellow squash over CGUO ones. The null hypothesis is that each independent variable has no impact on the probability of purchasing CGL or OGUO over CGUO. That is, for *K* regressors and *J* choice

alternatives/product types, $H_0 \equiv \beta_{kj} = 0; \forall k = 1,\ldots,K; j = CGUO, CGL, OGUO$. Alternatively, each independent variable has a significant impact on the probability of purchasing CGL or OGUO over CGUO. That is for $K$ regressors and $J$ choice alternatives/product types $H_1 \equiv \beta_{kj} \neq 0; \forall k = 1,\ldots,K; j = CGUO, CGL, OGUO$.

Second, a conditional logistic (CL) model is employed. It allows the use of the alternative attributes as predictors. With this strategy, we measure how much the odds ratios of switching from a base category to any of the remaining categories are multiplied. While the multinomial logistic model permits us to figure out how individual characteristics affect the likelihood of being in specific categories of a dependent variable, the conditional logistic model makes it possible to analyze how the characteristics of the categories affect individuals' probability of being in each category (Long, 2004; Greene, 2008).

With the use of the CL model, we are able to explain the effects of product attributes on the probability of purchasing a specific differentiated type of green peppers, cucumbers, and yellow squash. The structure of this model allows us to predict the probability that the $j^{th}$ alternative of the whole set of product types is the best type of green peppers, cucumbers, and yellow squash that the respondent is likely to purchase. As Train (2009) indicates, a conditional logit model is preferred because the systematic utility is modeled in terms of choice-specific attributes.

Under this model, data are organized as pair-wise combinations of each respondent/consumer *i* with each product type *j* (CGUO, CGL, and OGUO). The observations are therefore stratified by subjects into groups of *j*s. This arrangement of the dataset allows the conditional logit model to consist of *j* equations for each subject *i*.

Each equation describes one of the product types. This permits computation of the probability of purchasing each of the differentiated product types in the stratum in relation to all other alternatives. The dependent variable consists of either zero or one, whereby we have one for the product type that was chosen.

Assume consumer *i* is faced with *J* alternatives from which he/she chooses one that gives him/her the highest possible utility. Each alternative *j* can be described by a vector of attributes $Y_i$. In this analysis, $Y_i$ is a matrix of prices and product types. This allows us to view each product as a package with three attributes of different prices. Individual utility ($U_i$) from choosing to purchase the $j^{th}$ product type is now a function of the $Y_i$s, and can be represented by

$$U_{ij} = V_{ij} + \in_{ij} \text{ for } i = 1,\ldots,I \text{ and } j = CGUO, CGL, OGUO \tag{3.8}$$

where $V_{ij}$ is the deterministic component and $\epsilon_{ij}$ is the random component. The individual chooses the product type *j* that maximizes his/her utility. That is,

$$choose\ y_j\ iff\ \ U\left(y_j\right) \geq U\left(y_k\right) \forall k \neq j \tag{3.9}$$

Assuming that the deterministic utility ($V_{ij}$) is a linear function of the alternative attributes:

$$V_{ij}(Z) = Z_{ij}\beta' + \in_{ij} \tag{3.10}$$

where $Z_{ij}$ is a vector of *K* alternative attributes while $\beta$ is a vector of parameters to be estimated. Assuming that the $\epsilon_{ij}$s are independent and identically distributed with the extreme value distribution, we get a conditional logit functional form:

$$Prob\left(y_{ij}\right) = \frac{exp(Z_{ij}\beta')}{\sum_j Z_{ij}\beta'} \tag{3.11}$$

That is the probability of individual *i* purchasing product type *j* is given by (3.11) and is a function of the variables that define $Z_{ij}$.

The last part of analysis consists of stated demand for green peppers, cucumbers, and yellow squash. We seek to derive and estimate the demand function from consumers' stated preferences for each of the three products. We employ the ordinary least squares (OLS) regression. This strategy allows us to estimate the unknown price elasticities; assuming linear relationship between prices and quantities demanded. OLS will make it possible to minimize the sum of squared deviations found in the stated demand schedules for each of three products.

This sort of analysis assumes quasi-linear preferences. Brown and Calsamiglia (2003) indicated that demand functions generated from quasi-linear utility maximization, subject to income constraints, enjoy additional properties not possessed by monotone demands. That is, they are cyclically monotone, such demand functions are said to satisfy the strong law of demand. Brown and Calsamiglia reminded us that a demand function is cyclically monotone if for any set of:

$$\left(x_m,\ p_m\right);\ m=1,\ldots,M;\ x_0^*\left(p_1-p_0\right)+x_1^*\left(p_2-p_1\right)+x_2^*\left(p_3-p_2\right)+\ldots+x_M^*\left(p_0-p_M\right)\geq 0$$

(3.12), it is said to satisfy the strong law of demand if it is cyclically monotone. We have tested our $\left(x_m,\ p_m\right)$ correspondences and found them to satisfy the cyclically monotone condition.

We asked respondents to indicate how many pounds of green peppers, cucumbers, and yellow squash they would buy at various price levels presented to them. We acknowledge that these demands are stated and may, therefore, differ from the revealed or actual ones. However, it helps us understand how consumer preferences are consistent

with consumer theory. That is, there exists a utility function for each the product from which an individual demand can be derived, and that demand is downward sloping.

A representative consumer thrives to satisfy a quasi-linear utility function in the form of:

$$U(Q, y) = F(Q) + y \tag{3.12}$$

subject to a budget constraint;

$$P_i Q + P_y y = I \tag{3.13}$$

where

$U$ is the utility function;

$Q$ is a vector of quantities of fresh produce under consideration;

$y$ represents the composite good that stands for all other monthly grocery purchases the representative consumer makes and is assumed to be enter the utility function linearly;

$F(Q)$ is a strictly concave function, such that $F'(Q) > 0$ and $F''(Q) < 0$, to ensure a single optimal interior solution.

$P_Q$ is a vector of the prices for the fresh produce;

$P_y$ = The price of the composite good; which is normalized to one so that $y$ represents the amount of "money" spent on monthly grocery purchases other than green peppers, cucumbers and yellow squash.

$I$ = Monthly income allocated to grocery purchases. This allows us to narrow our analysis down to consumer behavior within the window of groceries.

Solving for this consumer's problem allows us to derive specific ordinary (Marshallian, or Walrasian) demand functions for each product. We propose a demand function in the form of:

$$log(Q) = log(P_Q) \tag{3.14}$$

When first order conditions are met, $y^* = I\text{-}1$ and $\lambda^* = 1$. In comparison with the CGUO type, the indirect utility function will have the form of:

$$V_i = \alpha_{1i} P_{Qi} + \alpha_{2i}(CGL)_i + \alpha_{3i}(OGUO)_i \tag{3.15}$$

for $i=1, 2, 3$ (green peppers, cucumbers, and yellow squash). This form of indirect utility assumes constant preferences for either CGL or OGUO type.

To evaluate the willingness to pay (WTP) for each of the three fresh produces, we assume an expenditure function; $e(P,Q,u)$. The representative consumer solves the problem: $Min\left[P_Q Q + y\right]$ $s.t.\ u = u(Q,y)$ to get this expenditure function. This expenditure function measures the minimum amount of money that this representative consumer spends in order to achieve his/her targeted utility level. This function is assumed to be increasing in $p$ and $u$ and decreasing in $Q$.

The WTP is the price for which a person with utility given by the function in equation (3.15) is indifferent between having the good, and therefore pays for it, and not having the good, and therefore not paying for it. In other words, it indicates the maximum amount of money the consumer would pay for $Q_i$. It is given by the form of:

$$WTP = e(P_Q, Q, u) - e(P_Q, Q^*, u) \tag{3.16}$$

where $Q$ is the quantity of base type (CGUO in our specific case) and $Q^*$ is either CGL or OGUO type of produce. We assumed that the targeted level of utility is $u^* = v(P, Q^*, I)$, where $v(P, Q^*, I)$ is the indirect utility function found by solving the problem in equation (3.12) subject to equation (3.13). Substituting this indirect utility function into the WTP function (3.16), we obtain the Hicksian variation function

$$WTP = e[P_Q, Q, v(P, Q^*, I)] - I \quad (3.17).$$

Equation (3.17) is the equivalent variation (EV) measure of welfare. This EV function is increasing in income for a normal good and decreasing for an inferior one (Mas-Colell, Whinston, and Green, 1995). Because the WTP is the price for which a person with utility given by the function in equation (3.15) is indifferent between having the good, and therefore pays for it, and not having the good, and therefore not paying for it, we can equate (3.15) to zero and solve for $P_{Qi}$. This yields equation (3.18) below:

$$P_{Q_i}^* = WTP_i = -\frac{\left[\alpha_{2i}\left(CGL\right)_i + \alpha_{3i}\left(OGUO\right)_i\right]}{\left(\alpha_{1i}\right)} \quad (3.18).$$

Equation (3.18) shows the total WTP for a good *i* with attributes CGL and OGUO. Using a marginal WTP leads us to obtain the WTP for a good *i* with a specific distinct attribute. Proceeding with derivation of (3.18), we obtain:

$$\frac{\delta\left(WTP_i\right)}{\delta CGL_i} = -\frac{\alpha_{2i}}{\alpha_{1i}} \quad (3.19).$$

Equation (3.19) posits that the consumer is willing to pay $\alpha_{2i}/(\alpha_{1i})$ for a good *i* that is conventionally grown locally and $\alpha_{3i}/(\alpha_{1i})$ for a good *i* that is organically grown from unknown origin. $\alpha_{1i}$, $\alpha_{2i}$ and $\alpha_{3i}$ are parameters to be estimated. These estimates will be computed for both ante-information and post-information scenarios.

To test for significance, confidence intervals (CI) are used. Brandstätter (1999) states that confidence intervals can be interpreted as significance tests. The null hypothesis under this is that the difference between ante-information and post-information WTP is zero. Alternatively, we hypothesize that the difference between ante-information and post-information WTP is significantly different from zero. We make the

difference between the post-information and ante-information sample WTPs. We then make a difference between upper limits and that between lower limits of the 95% true population confidence intervals. This gives us the possibility to gauge whether the difference in WTP lies within or outside the differenced confidence interval. In case it falls within this interval, we fail to reject the hull hypothesis and vice versa. In other words, we fail to reject the null in case the difference of samples means falls within the overlapped range of the two true population confidence intervals.

## 3.5 Presentation and Discussion of Results

A major purpose of this essay is to investigate consumer preferences for fresh produce differentiated by production practices and origin, compute WTP and estimate stated demands for these products. This section presents the results and their interpretation. We first of all describe the variables included in the models. We then present regression output in the order of MNL, CL, WTP, and OLS models.

### *3.5.1 Variables of Interest and Descriptive Statistics*

Under the ante-information scenario, 13% of respondents are willing to purchase CGUO green peppers while 61% and 26% favor CGL and OGUO, respectively. Only 9% prefer CGUO cucumbers as opposed to 66% who value CGL and 25% who would purchase OGUO. We found that 14% favor CGUO while 62% and 24% are willing to purchase CGL and OGUO yellow squash, respectively. Table 3.1 shows the descriptive statistics.

**Table 3.1: Variable Descriptive Statistics**

| Variable Name | Description, N=819. | |
|---|---|---|
| Product Types | Differentiated types (CGUO, CGL, and OGUO). Used for the MNL and CL models. The following six outcomes are applicable for green peppers, cucumbers, and yellow squash | |
| CGUO_BeforeInfo | Respondents who prefer CGUO before information about location and production practices is presented to them. | |
| CGL_BeforeInfo | Respondents who prefer CGL before the information is provided. | |
| OGUO_BeforeInfo | Respondents who prefer OGUO before information is provided. | |
| CGUO_AfterInfo | Respondents who prefer CGUO after the information is provided | |
| CGL_AfterInfo | Respondents who prefer CGL after the information is provided. | |
| OGUO_AfterInfo | Respondents who prefer OGUO after the information | Mean |
| Logpeppers | Logarithm of quantities of green peppers a respondent is willing to purchase at given prices. | 0.52(0.30) |
| Logcucumbers | Logarithm of quantities of green peppers a respondent is willing to purchase at given prices. | 0.51(0.29) |
| Logsquash | Logarithm of quantities of green peppers a respondent is willing to purchase at given prices. | 0.49(0.32) |
| age | Actual age of a respondent | 39 (14) |
| visits | Number of farmers' market visits per season | 4 to 7 |
| family_size | Total number of people in a household | 2.6(1.43) |
| food_safety | 5 point scale degree of agreement about food safety concerns | 4.29(0.86) |
| concern_diet | 5 point scale degree of agreement about health/diet concerns | 4.32(0.80) |
| environment_impact | 5 point scale degree of agreement with buying products with low environmental impact | 3.52(0.89) |
| agri_enthusiast | 5 point scale degree of agreements about importance for agricultural open space, and supporting local growers | 4.20(0.73) |
| primary_shopper | Respondent is a primary shopper; No=0, Yes=1 | 0.76 |
| csa | Would join a CSA program; No=0, Yes=1 | 0.52 |
| wic | Participates in the WIC program; No=0, Yes=1 | 0.04 |
| home_gardening | Does home gardening; No=0, Yes=1 | 0.63 |
| female | Respondents' gender; Male=0, Female=1 | 0.62 |
| spend_above | Respondent's spending at farmers' market is above average ($24.78); No=0, Yes=1 | 0.49 |
| location_SLC | 1 if a respondent was at Salt Lake City market; 0 otherwise | 0.35 |
| location_PC | 1 if respondent was at Park City market, 0 otherwise | 0.24 |
| income_above | Respondent's income is above average ($70,000); No=0, Yes=1 | 0.26 |
| logprice | Logarithm of prices | 0.72(0.55) |

Standard deviations are indicated in parentheses

Under the post-information scenario, 9% of respondents are willing to purchase CGUO while 67% and 24% are willing to purchase CGL and OGUO green peppers, respectively. As for cucumbers, 8% indicated that they would buy CGUO, 70% favor CGL and 22% will likely purchase OGUO. We found that while 11% prefer CGUO, 67% value CGL, and 22% are willing to purchase OGUO yellow squash.

The sample average age is 39 years old. An average respondent goes to farmers' market in Utah four to seven times per summer season. This season typically starts in May and ends in September. The majority of those who attend farmers' markets in Utah are females (62%) and primary shoppers (76%). This investigation involved 63% who do home-gardening and the majority (52%) of participants expressed interest in joining a CSA program. Only 4% of the respondents participate in the WIC program.

In addition, 53% of respondents in Utah reported annual incomes above sample mean ($70,000). On average, respondents agree that they are concerned with their diet/health and with food safety. They also support buying food products that have a low environmental impact. Likewise, participants showed a strong enthusiasm towards agriculture in their communities. They value open space for agricultural use, and supporting local farmers is very important for them.

### *3.5.2 Regression Results*

Three fresh produce items were examined namely green peppers, cucumbers, and yellow squash. For each of these products, there are three differentiated types; CGUO, CGL, and OGUO. As mentioned, respondents were asked to indicate their preferences before they were given information about origin and production practices as well as after

the information was provided. A comparison between the ante-information and post-information results is provided.

The question number 29 on the survey posed a respondent to indicate which product he/she is likely to purchase given the differences in production practices, origin (location of production) of the product, and its price. The types of produce were conventionally grown of unknown origin, conventionally grown from respondent's state, and organically grown from unknown origin. Different prices were presented for the three differentiated types of produce. To allow for variability in the bid prices of the differentiated fresh produce items under consideration, 20 versions of the survey were created. For each version, roughly 1488/20=74 (the total number of respondents divided by the number of survey versions) copies were printed. The surveys were then distributed randomly; suggesting that those who randomly responded to the same version were faced with the same bid prices, but different from those in other versions. The prices of local origin and organically produced produce used in the bidding section of the survey were randomly generated by adding premiums to the prices of conventional produce. The random bids ranged from a discount of 30% to a premium of 100% over the conventionally grown of unknown origin product.

Upon completion of question 29, the information was provided to respondents. The information was about organic and local produce. In question 30 there was the following information: Synthetic fertilizers, herbicides, and pesticides are not allowed in the production of organically grown fruits and vegetables. Organic growers generally use compost and manure to improve the soil quality and plant health. They generally pull weeds and use mulch to control weeds and use garlic, oils, and soaps to control pests.

Finally, the information about local produce was in question 31. We indicated to the respondents that locally produced foods (within the state) are generally grown in small local farms, are fresher than non-local foods due to the short distance to market, and are more energy efficient than non-local foods as they are not transported large distances. After the information, respondents were asked the same question, which was to indicate which product they are likely to purchase given the differences in production practices, origin (location of production) of the product, and its price. The purpose of this strategy was to test whether the information about production practices and place of production changes consumer preferences and their willingness to pay for fresh produce.

*3.5.2.1 MNL Estimates*

This section is focused on results that are associated with the differentiated fresh produce with examples of green peppers, cucumbers and yellow squash. The section covers consumer characteristics, preferences, and attitudes which impact the probability of purchasing local or organic produce. Then, the willingness to pay estimates, stated demands, and own prices elasticities for each of the three produce items are provided with discussion of commonalities in results across three products. The results discussion points out similarities or differences between the three products, instead of an in-depth discussion on each one since they represent fresh produce as a whole. A grower would grow multiple products and sales and promotion strategies would be across the entire set of fresh produce items.

Using the unordered responses to questions 29 and 31 as dependent variables and the characteristics of the chooser/consumer, the MNL regression was performed. Among the three differentiating attributes, CGUO is a reference/base category. This signifies that

we report relative probabilities estimates for selecting either a CGL or OGUO over a CGUO type. For the two production practices and origins (CGL, and OGUO), we conveniently interpret the coefficients as being the effects on the choice between that specific type and the CGUO. It also signals the magnitude of the contribution of that regressor. A positive coefficient estimate indicates that the regressor increases the likelihood of purchasing either CGL or OGUO over the CGUO. A negative coefficient estimate indicates the opposite. The smaller the coefficient, the weaker the impact of that corresponding regressor is on the relative probability.

Before information is provided, age and agriculture enthusiasm have significant positive impact on the probability of purchasing CGL across all three fresh produce items under consideration. Except for yellow squash, high importance for organic produce is associated with high chances to shop for CGL over CGUO. The degree of relationship between both agriculture enthusiasm and importance for organic production and preferences for local and organic fresh produce is strong. Likewise, high importance for local produce increases the probability of purchasing for CGL fresh produce, but green peppers. When the information about origin and production practices is provided, the probability of purchasing CGL over CGUO is increased by agriculture enthusiasm, importance for organic production, and importance for local production. This analysis finds no significant gender and marital status based differences in preferences for CGL fresh produce. Shopping habits, willingness to join the CSA programs, WIC participation and spending categories have no influence on preferences for CGL fresh produce as well. Table 3.2 presents both ante- information and post-information estimates.

**Table 3.2: MNL Estimates**

| Variables | Green Peppers | | | | Cucumbers | | | | Yellow Squash | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ante-Information | | Post-Information | | Ante-Information | | Post-Information | | Ante-Information | | Post-Information | |
| | CGL | OGUO | CGL | OGUO | CGL | OGUO | CGL | OGUO | CGL | OGUO | CGL | OGUO |
| age | 0.0393*** | 0.0306*** | 0.0169 | 0.00868 | 0.0254** | 0.0106 | 0.0176 | 0.00973 | 0.0303*** | 0.0173* | 0.0130 | -0.00586 |
| visits | 0.206** | 0.265** | -0.0851 | -0.0158 | 0.185 | 0.280** | 0.143 | 0.242* | 0.151 | 0.217** | 0.153 | 0.200* |
| family_size | 0.414* | 0.283 | -0.346 | -0.639** | 0.760** | 0.659* | 0.440 | 0.0992 | 0.320 | -0.000523 | 0.108 | -0.284 |
| pf_variety | -0.257 | -0.601*** | -0.366** | -0.631*** | -0.295 | -0.662*** | -0.0980 | -0.339 | -0.200 | -0.535*** | -0.115 | -0.389** |
| pf_quality | 0.00497 | 0.292 | -0.365 | 0.130 | 0.0284 | 0.329 | -0.331 | 0.270 | -0.314 | -0.0116 | -0.261 | 0.144 |
| pf_local | 0.0184 | -0.239 | 0.277* | -0.0988 | -0.0856 | -0.481** | 0.0708 | -0.449** | 0.264* | -0.150 | 0.432*** | -0.0283 |
| pf_organic | 0.243** | 0.685*** | 0.286** | 0.686*** | 0.286** | 0.767*** | 0.348** | 0.702*** | 0.0431 | 0.447*** | -0.0411 | 0.338** |
| pf_freshness | 0.110 | 0.0846 | 0.218 | 0.0678 | 0.0881 | 0.185 | 0.0270 | -0.229 | 0.191 | 0.236 | 0.0838 | 0.103 |
| food_safety | -0.0527 | 0.0801 | 0.144 | 0.230 | 0.0208 | 0.0754 | 0.0456 | 0.249 | 0.177 | 0.335** | 0.122 | 0.252 |
| concern_diet | -0.0883 | -0.102 | 0.0623 | 0.154 | -0.274 | -0.151 | 0.0184 | -0.0414 | -0.0297 | -0.288* | -0.120 | -0.234 |
| enviro_impact | 0.128 | 0.0906 | -0.112 | 0.0449 | 0.0986 | 0.124 | -0.103 | 0.103 | 0.311** | 0.312* | 0.175 | 0.308* |
| agri_enthusiast | 0.345** | 0.236 | 0.568*** | 0.413* | 0.530*** | 0.397* | 0.558*** | 0.358 | 0.393** | 0.430** | 0.542*** | 0.348* |
| primary_shopper | 0.0692 | 0.247 | 0.0586 | 0.196 | 0.307 | 0.293 | -0.0899 | -0.0654 | 0.321 | -0.00534 | 0.440 | 0.273 |
| csa | 0.229 | 0.660** | -0.172 | 0.353 | 0.481* | 0.689** | -0.159 | 0.335 | -0.0747 | 0.402 | -0.224 | 0.356 |
| home_garden | -0.194 | -0.0662 | 0.0478 | 0.0535 | -0.581** | -0.258 | -0.692** | -0.554 | -0.280 | -0.172 | -0.331 | -0.113 |
| female | 0.188 | -0.118 | 0.274 | -1.51e-07 | 0.548* | 0.182 | 0.758** | 0.455 | 0.101 | 0.128 | -0.0964 | -0.199 |
| wic | 0.196 | -0.0818 | 0.0451 | -0.518 | -0.693 | -0.391 | -0.428 | -0.918 | 0.849 | 0.881 | 0.485 | 0.411 |
| spend_above | 0.0902 | 0.230 | 0.129 | 0.00241 | 0.0364 | 0.0244 | 0.433 | 0.292 | 0.0984 | 0.0589 | -0.00714 | -0.0210 |
| location_SLC | 0.152 | -0.0219 | 0.214 | 0.126 | 0.0691 | 0.259 | 0.0357 | 0.188 | 0.0612 | -0.0957 | 0.246 | -0.0330 |
| location_PC | -0.0295 | 0.421 | 0.149 | 0.347 | 0.304 | 0.130 | 0.290 | 0.0685 | 0.356 | 0.848** | 0.820** | 1.233*** |
| income_above | 0.297 | 0.436 | 0.351 | 0.686* | -0.0362 | 0.248 | 0.327 | 0.569 | 0.250 | 0.504 | 0.418 | 0.901** |
| Constant | -2.812** | -4.157*** | -1.138 | -3.190** | -1.936 | -3.500** | -1.244 | -2.494 | -3.857*** | -4.205*** | -2.696** | -3.328** |

Base outcome is CGUO. The *, **, *** denote significance at 10%, 5%, and 1% level, respectively. N=819.

Concerning with preferences for OGUO, consumers who visit farmers' markets frequently and those with higher importance for organic produce exhibit strong preferences. Those consumers who value highly the product variety are less likely to buy OGUO over the CGUO fresh produce. Except for yellow squash, those consumers who would join CSA programs prefer OGUO fresh produce. When information about origin and production practices is provided to consumers, those who highly value organic produce, income above the sample mean, those who visit farmers' markets frequently, and agriculture enthusiasts show significant interests in OGUO produce. Results indicate that, except for yellow squash, there are no significant differences between preferences for CGUO and those for CGL or OGUO fresh produce among consumers with concerns about food safety and diet/health.

Tables 3.3, 3.4, and 3.5 present the ante-information and post-information marginal effects of consumer characteristics and attitudes on the preferences for differentiated green peppers, cucumbers and yellow squash respectively. The numbers included in the second row are the estimated relative probabilities for the types of fresh produce under consideration. For example, the ante-information probabilities of purchasing CGL are 65%, 70% and 66% for green peppers, cucumbers and yellow squash respectively. The post-information ones are 71%, 74%, and 70% and are significantly different from those under the ante-information scenario. This significance illustrates that the information has a positive impact on preferences for conventionally grown local fresh produce. This result encourages local growers to clearly label the fresh produce by indicating places of production. It demonstrates that consumers have strong preferences for local produce. Table 3.3 shows the marginal effects for green peppers.

**Table 3.3: MNL Marginal Effects for Green peppers**

| Variables | Ante-Information MNL Marginal Effects | | | Post-Information MNL Marginal Effects | | |
|---|---|---|---|---|---|---|
| | y=Pr(green pepper=1=CGUO) =.1044 | y=Pr(green pepper=2=CGL)= .6510 | y=Pr(green pepper=3=OGUO) = .2446 | y=Pr(green pepper=1=CGUO) = .0698*** | y=Pr(green pepper=2=CGL) = .7088*** | y=Pr(green pepper=3=OGUO) = .2210 |
| age | -0.00345*** | 0.00406*** | -0.000608 | -0.000970 | 0.00213* | -0.00116 |
| visits | -0.0208** | 0.00458 | 0.0162 | 0.00445 | -0.0151 | 0.0106 |
| family_size | -0.0354 | 0.0489 | -0.0135 | 0.0270* | 0.0289 | -0.0559* |
| pf_variety | 0.0328** | 0.0373* | -0.0700*** | 0.0278** | 0.0234 | -0.0513*** |
| pf_quality | -0.00780 | -0.0454 | 0.0532 | 0.0161 | -0.0958*** | 0.0798** |
| pf_local | 0.00486 | 0.0423* | -0.0472** | -0.0122 | 0.0727*** | -0.0605*** |
| pf_organic | -0.0340*** | -0.0538*** | 0.0878*** | -0.0248*** | -0.0485*** | 0.0733*** |
| pf_freshness | -0.00964 | 0.0115 | -0.00189 | -0.0118 | 0.0344 | -0.0226 |
| food_safety | 0.00154 | -0.0247 | 0.0232 | -0.0107 | -0.00634 | 0.0170 |
| concern_diet | 0.00860 | -0.00382 | -0.00478 | -0.00545 | -0.0112 | 0.0167 |
| enviro_impact | -0.0110 | 0.0146 | -0.00362 | 0.00486 | -0.0302 | 0.0254 |
| agri_enthusiast | -0.0295* | 0.0409 | -0.0114 | -0.0345*** | 0.0524** | -0.0179 |
| primary_shopper | -0.0111 | -0.0226 | 0.0337 | -0.00598 | -0.0181 | 0.0240 |
| csa | -0.0325 | -0.0525 | 0.0850*** | 0.00305 | -0.0903*** | 0.0873*** |
| home_garden | 0.0147 | -0.0333 | 0.0187 | -0.00321 | 0.00148 | 0.00173 |
| female | -0.00961 | 0.0622* | -0.0525 | -0.0137 | 0.0573 | -0.0436 |
| wic | -0.0113 | 0.0551 | -0.0438 | 0.00433 | 0.0785 | -0.0828 |
| spend_above | -0.0120 | -0.0162 | 0.0282 | -0.00644 | 0.0263 | -0.0199 |
| location_SLC | -0.00975 | 0.0378 | -0.0280 | -0.0122 | 0.0241 | -0.0119 |
| location_PC | -0.00953 | -0.0776* | 0.0871* | -0.0123 | -0.0252 | 0.0375 |
| income_above | -0.0295 | -0.00396 | 0.0335 | -0.0259 | -0.0398 | 0.0657* |

The *, **, *** denote significance at 10%, 5%, and 1% level, respectively. N = 819

Both ante-information and post-information probabilities of purchasing OGUO fresh produce are moderate while CGUO fresh produce receive very small preferences. Except for cucumbers, the information about production practices and place of production has not significant effect on consumer preferences for OGUO fresh produce whereas it significantly reduces preferences for conventionally grown produce of unknown origin.

Preferences for CGL are strong and are explained by a quite number of consumer characteristics and attitudes. For instance, after controlling for all other variables in the model under the anti-information scenario, an additional 10 years of age increases the probabilities of purchasing CGL fresh produce by 4%. An additional increment in the levels of importance placed on local produce leads to 4%, 6%, and 8% increase in the probabilities of purchasing CGL green peppers, cucumbers, and yellow squash, respectively.

Looking at cucumbers as an example of the fresh produce at farmers' markets, Table 3.4 presents MNL marginal effects that pertain to preferences for cucumbers. An extra degree of agreement with being an agricultural enthusiast increases the likelihood of buying CGL cucumbers by 5%. A female consumer at a farmers' market is 9% more likely to purchase CGL cucumbers than a male. An additional degree of importance for local product and for agriculture enthusiasm leads to a 7% and 5% increases, respectively.

**Table 3.4: MNL Marginal Effects for Cucumbers**

| Variables | Ante-Information MNL Marginal Effects | | | Post-Information MNL Marginal Effects | | |
|---|---|---|---|---|---|---|
| | y=Pr(cucumber =1=CGUO) = .0636 | y=Pr(cucumber= 2=CGL) = .7004 | y=Pr(cucumber= 3=OGUO) = .2359 | y=Pr(cucumber= 1=CGUO) = .0560 | y=Pr(cucumber =2=CGL) = .7390** | y=Pr(cucumber =3=OGUO) = .2050* |
| age | -0.00129** | 0.00357*** | -0.00228* | -0.000841 | 0.00192 | -0.00108 |
| visits | -0.0124* | -0.00746 | 0.0199 | -0.00871 | -0.00893 | 0.0176 |
| family_size | -0.0438** | 0.0505 | -0.00677 | -0.0194 | 0.0699** | -0.0506 |
| pf_variety | 0.0231** | 0.0476** | -0.0707*** | 0.00795 | 0.0325* | -0.0405** |
| pf_quality | -0.00621 | -0.0484 | 0.0546 | 0.0106 | -0.105*** | 0.0942*** |
| pf_local | 0.0110 | 0.0615*** | -0.0726*** | 0.00222 | 0.0817*** | -0.0839*** |
| pf_organic | -0.0243*** | -0.0667*** | 0.0910*** | -0.0224*** | -0.0392** | 0.0617*** |
| pf_freshness | -0.00671 | -0.0121 | 0.0189 | 0.00151 | 0.0399 | -0.0414 |
| food_safety | -0.00206 | -0.00809 | 0.0101 | -0.00475 | -0.0290 | 0.0337 |
| concern_for_diet | 0.0145 | -0.0324 | 0.0180 | -0.000284 | 0.00981 | -0.00953 |
| environment_impact | -0.00626 | 0.000204 | 0.00605 | 0.00308 | -0.0354* | 0.0323* |
| agri_enthusiast | -0.0296** | 0.0457* | -0.0161 | -0.0272** | 0.0535** | -0.0263 |
| primary_shopper | -0.0194 | 0.0168 | 0.00255 | 0.00439 | -0.00736 | 0.00297 |
| csa | -0.0323* | -0.0124 | 0.0447 | 0.00275 | -0.0809** | 0.0782** |
| home_gardening | 0.0284* | -0.0774** | 0.0489 | 0.0338 | 0.0401 | -0.0739 |
| female | -0.0283 | 0.0865** | -0.0582* | 0.0329** | -0.0479 | 0.0150 |
| wic | 0.0464 | -0.0887 | 0.0424 | -0.0397** | 0.0800** | -0.0403 |
| spend_above | -0.00199 | 0.00360 | -0.00161 | -0.0213 | 0.0393 | -0.0180 |
| location_SLC | -0.0150 | 0.0416 | -0.0266 | -0.0124 | 0.0447 | -0.0323 |
| location_PC | -0.00233 | -0.0503 | 0.0527 | -0.0186 | -0.0261 | 0.0447 |
| income_above | -0.00689 | -0.0291 | 0.0360 | -0.00363 | -0.0221 | 0.0258 |

The *, **, *** denote significance at 10%, 5%, and 1% level, respectively. N = 819

Examples of marginal effects pertaining to preferences for OGUO are provided as well. All other things equal, one more member of a household reduces the chances of purchasing OGUO green peppers by 6%. An additional degree of importance for product variety and for local produce diminishes the likelihood of purchasing OGUO green peppers by 5% and 6% respectively. A consumer who is willing to join the CSA program is 9% more likely to purchase OGUO green peppers or yellow squash. This essay further finds that when information about origin and production practices is given, those consumers with income above $75,240 like OGUO green peppers only with the probability equal to 7%. This posits that by providing explanations on labels about how organic produce is practiced, vendors of green peppers induce more consumers whose annual income is above the average.

Beside the characteristics with positive effects, there are some other characteristics that negatively affect consumer preferences for CGL fresh produce. For instance, results in table 3.5 indicate that an additional degree of importance for product quality leads to 7% decrease in the likelihood of purchasing CGL yellow squash. One degree of importance for organic produce lessens the chances of purchasing CGL yellow squash by 6%. This analysis posits that an additional level of importance for organic produce leads to a 7% reduction in the likelihood of purchasing CGL cucumbers. Furthermore, a consumer with a home-garden is 8% less likely to purchase CGL cucumbers than one without a garden. Under the post-information scenario, an additional degree of importance for product quality reduces chances for purchasing CGL green peppers by 10%.

**Table 3.5: MNL Marginal Effects for Yellow Squash**

| Variables | Ante-Information MNL Marginal Effects | | | Post-Information MNL Marginal Effects | | |
|---|---|---|---|---|---|---|
| | y=Pr(squash=1=CGUO) = .1167 | y=Pr(squash=2=CGL) = .6578 | y=Pr(squash=3=OGUO) = .2255 | y=Pr(squash=1=CGUO) = .0904 | y=Pr(squash=2=CGL) = .7040** | y=Pr(squash=3=OGUO) = .2056** |
| age | -0.00277*** | 0.00414*** | -0.00137 | -0.000715 | 0.00355*** | -0.00283** |
| visits | -0.0175* | 0.00356 | 0.0140 | -0.0135 | 0.00295 | 0.0105 |
| family_size | -0.0258 | 0.0747** | -0.0489 | -0.00160 | 0.0636* | -0.0620* |
| pf_variety | 0.0316** | 0.0357 | -0.0672*** | 0.0146 | 0.0323 | -0.0468*** |
| pf_quality | 0.0211 | -0.0680* | 0.0470 | 0.0140 | -0.0753** | 0.0613* |
| pf_local | -0.0172 | 0.0822*** | -0.0650*** | -0.0270** | 0.0942*** | -0.0672*** |
| pf_organic | -0.0138 | -0.0567*** | 0.0705*** | -0.00366 | -0.0574*** | 0.0611*** |
| pf_freshness | -0.0210 | 0.00762 | 0.0134 | -0.00725 | 0.00254 | 0.00470 |
| food_safety | -0.0226* | -0.0109 | 0.0335 | -0.0124 | -0.0110 | 0.0234 |
| concern_for_diet | 0.0105 | 0.0342 | -0.0447** | 0.0120 | 0.00890 | -0.0209 |
| environment_impact | -0.0335** | 0.0238 | 0.00963 | -0.0169 | -0.00806 | 0.0249 |
| agri_enthusiast | -0.0389** | 0.0237 | 0.0152 | -0.0409*** | 0.0626** | -0.0216 |
| primary_shopper | -0.0336 | 0.0385 | -0.00484 | -0.0359 | 0.0544 | -0.0185 |
| csa | -0.0522 | -0.0366 | 0.0888* | 0.00765 | -0.0975*** | 0.0899*** |
| home_gardening | 0.0237 | -0.0357 | 0.0120 | 0.0226 | -0.0518 | 0.0292 |
| female | -0.0639 | -0.0154 | 0.0793 | 0.00975 | 0.00898 | -0.0187 |
| wic | -0.0654* | 0.0338 | 0.0317 | -0.0324 | 0.0370 | -0.00459 |
| spend_above | -0.00759 | 0.0165 | -0.00891 | 0.000844 | 0.00155 | -0.00240 |
| location_SLC | -0.00168 | 0.0371 | -0.0354 | -0.0148 | 0.0550 | -0.0402 |
| location_PC | -0.0462* | -0.0518 | 0.0980** | -0.0632*** | -0.0229 | 0.0861** |
| income_above | -0.0304 | -0.0212 | 0.0516 | -0.0399* | -0.0522 | 0.0921** |

The *, **, *** denote significance at 10%, 5%, and 1% level, respectively. N = 819

Conversely, examples of negative effects on preferences for OGUO fresh produce include the fact that ten years of age reduce the likelihood of buying OGUO cucumbers by 2%. An extra level of importance for organic produce and for product quality decreases the likelihood of purchasing OGUO fresh produce like green peppers by 7% and 8% respectively. This finding suggests that by providing explanations on labels about how organic produce is practiced, vendors attract more consumers who are looking for product quality. An additional degree of importance for either product variety or local produce decreases the likelihood of purchasing OGUO cucumbers by 7%. Female consumers at farmers' markets are 6% less likely to purchase OGUO cucumbers than males.

Concerning with the CGUO fresh produce, the ante-information relative probabilities that a consumer at a farmers' market in Utah purchases are small (10% for green peppers, 6% for cucumbers and 12% for yellow squash). Most of the consumer characteristics have negative impacts on these probabilities. For instance, Ceteris paribus, 10 additional years of age reduces chances of purchasing conventionally grown green peppers of unknown origin by 4%. One extra visit leads to a reduction of 2%. The post-information relative probability that a consumer at a farmers' market in Utah purchases a pound of CGUO green peppers is 7%. Agriculture enthusiasts, those with high importance for organic produce, and those who are willing to join CSA program are not in favor of CGUO cucumbers. Only home gardeners and consumers who like product variety are willing to buy CGUO cucumbers. The associated respective marginal effects are 2% and 3%. A consumer with income above the sample average is 4% less likely to

purchase conventionally-grown yellow squash of unknown origin. We now turn our focus on conditional logistic results.

*3.5.2.3 Marginal Fixed Effects on Preferences for Fresh Produce*

Marginal fixed-effects were computed using the conditional logistic regression model. In this model, we used the responses from questions 29 and 31 on the survey, but only alternative attributes are included as explanatory variables. This analysis considers price, CGL, and OGUO attributes. As according to Long (2004) and Greene (2008), this model permitted to measure how much the odds ratios of switching from a base category (which is the CGUO) to any of the remaining categories such as CGL and OGUO are multiplied. While the multinomial logistic regression model permits us to figure out how individual characteristics affect the likelihood of being in specific categories of a dependent variable, the conditional logistic regression model makes it possible to analyze how the characteristics of the categories affect individuals' probability of being in each category.

All effects, both for ante-information and post-information ratios, are found to be significant at the 99% level. Price increase diminishes consumer likelihood to buy fresh produce. The ante-information odds ratios for price are -0.465 for green peppers, -1.002 for cucumbers, and -0.795 for yellow squash. This signifies that, other things equal, an additional dollar to the unit price leads to 47%, 100%, and 80% reduction in the odds of purchasing green peppers, cucumbers and yellow squash, respectively. This illustrates how price plays an important role in making consumer choices. Table 3.6 presents results for each of the three products.

**Table 3.6: CL Odds Ratios for Fresh Produce**

| | Ante-Information | | Post-Information | |
|---|---|---|---|---|
| Variables | Odds Ratios | Statistics | Odds Ratios | Statistics |
| | | Green Pepper | | |
| Price | -.465*** | LR chi2(3) = 331 | -.469*** | LR chi2(3) = 480 |
| | (.0787) | Prob > chi2 = 0.0000 | (.0789) | Prob > chi2 = .0000 |
| CGL | 2.227*** | Pseudo R2 = .1841 | 2.235*** | Pseudo R2 = .2666 |
| | (.132) | Log likelihood = -734 | (.144) | Log likelihood = -660 |
| OGUO | 1.159*** | N=2,457 | 1.148*** | N=2,457 |
| | (.139) | | (.131) | |
| | | Cucumber | | |
| Price | -1.002*** | LR chi2(3) = 447 | -.774*** | LR chi2(3) = 534.16 |
| | (.286) | Prob > chi2 = .0000 | (.298) | Prob > chi2 = .0000 |
| CGL | 2.219*** | Pseudo R2 = .2482 | 2.385*** | Pseudo R2 = .2968 |
| | (.141) | Log likelihood = -677 | (.148) | Log likelihood = -633 |
| OGUO | 1.248*** | N = 2,457 | 1.233*** | N = 2,457 |
| | (.149) | | (.158) | |
| | | Yellow Squash | | |
| Price | -.795*** | LR chi2(3) = 340 | -.751*** | LR chi2(3) = 443 |
| | (.119) | Prob > chi2 = .0000 | (.123) | Prob > chi2 = .0000 |
| CGL | 1.787*** | Pseudo R2 = .1887 | 2.107*** | Pseudo R2 = .2459 |
| | (.139) | Log likelihood = -730 | (.130) | Log likelihood = -679 |
| OGUO | .797*** | N = 2,457 | .977*** | N = 2,457 |
| | (.127) | | (.139) | |

CGUO is the base category. Standard errors are in parentheses. The *, **, *** denote significance at 10%, 5%, and 1% levels respectively.

Similar to Novotorova and Mazzocco (2008) who found that consumers have high preferences for locally grown products, our results clearly indicate that chances of purchasing CGL fresh produce are high compared to CGUO. Specifically, the ante-information odds of selling CGL fresh produce are multiplied by great numbers (2.227 for green peppers, 2.219 for cucumbers, and 1.787 for yellow squash) compared to those for the CGUO. This means that switching from CGUO green peppers to CGL for example, chances of selling more will be 123% higher. Compared to CGL, the ante-information odds of preferring for OGUO are multiplied by small amounts (1.159 for

green peppers, 1.248 for cucumbers, and .797 for yellow squash). This suggests that switching from CGUO to OGUO yellow squash, chances of getting buyers are estimated to be 20% lower. Results imply that local (grown in Utah) fresh produce is the most preferred. The post-information odds ratios follow the same pattern; showing strong preferences for local produce.

*3.5.2.4 Willingness To Pay Estimates*

Overall, consumers at farmers' markets in Utah are willing to pay high premiums for conventional local fresh produce than they are for organically grown of unknown origin. This results is similar to Hu et al. (2012) who found that consumers in Kentucky and Ohio were willing to pay more for the produce locally produced, produced in their states. This illustrates how important is local produce to farmers' markets attendees. Specifically, results indicate that on average, consumers at farmers' markets in Utah are willing to pay $4.00 per lb. of local conventionally grown green peppers. The post-information WTP increases from $4.00 to $4.77.

Compared to CGUO fresh produce, consumers at farmers' markets are willing to pay a premium for OGUO. This result supports Voon, Ngui and Agrawal (2011) who compared conventional with organic produce and found a positive relationship between consumer perceptions towards organic produce and would pay a premium. For example, the ante-information WTP for a pound of OGUO green peppers is $1.94 and the post-information WTP is $2.45. Table 3.7 shows the estimated willingness to pay for a pound of local and organic fresh produce items. Lower and upper limits for the 95% confidence interval are also provided. Estimates are presented under ante and post information scenarios to allow comparison.

**Table 3.7: Willingness to Pay for Fresh Produce (Per Pound)**

| | Ante-Information WTP | | Post-Information WTP | |
|---|---|---|---|---|
| | CGL (Local) | OGUO (Organic) | CGL (Local) | OGUO (Organic) |
| | | Green Pepper | | |
| WTP | $4.00 | $1.94 | $4.77 | $2.45 |
| lower limit | $3.02 | $1.29 | $3.62 | $1.68 |
| upper limit | $5.73 | $2.86 | $6.76 | $3.56 |
| | | Cucumber | | |
| WTP | $2.21 | $1.25 | $3.08 | $1.59 |
| lower limit | $1.47 | $.80 | $1.79 | $.90 |
| upper limit | $4.50 | $2.38 | $9.46 | $4.58 |
| | | Yellow Squash | | |
| WTP | $2.25 | $1.00 | $2.80 | $1.30 |
| lower limit | $1.79 | $.69 | $2.18 | $.91 |
| upper limit | $3.00 | $1.36 | $3.84 | $1.82 |

On average, consumers at farmers' markets in Utah are willing to pay $2.21 per lb. for cucumbers that are conventionally grown in Utah. The post-information WTP becomes $1.59; ranging from $.90 to $4.58. Results indicate that the ante-information willingness to pay for CGL yellow squash is $2.25 per lb and $1.00 for the OGUO.

In all cases, the differences between ante and post information WTP fall into the difference confidence interval between the two true population 90% confidence intervals. Hence, there is no evidence that the post-information and ante-information WTPs are statistically different. The fact that the information about origin and production practices do not change significantly the consumers' willingness to pay can be attributed mostly to the respondents' pre-knowledge. They already have a high level of understanding about the information provided to them. As a result, the information is not new to them to alter their reactions significantly.

*3.5.2.5 Stated Demands and Own-Price Elasticities*

Respondents were presented five different price levels for each of the produce (green peppers, cucumbers, and yellow squash) and asked to indicate the quantities (in pound) they would buy at each price level. Specifically, given his/her income level, tastes, and preferences, question 18 on the survey requests the respondent to indicate the quantity of each specified food product he/she would purchase given the price levels indicated in a table. Using these data, demand functions for the produce were estimated employing an ordinary least squares model. To obtain the elasticities, original data were converted into logarithms. Thus, we have both prices and quantities in log terms.

Price is the only variable considered to determine the quantity demanded. Other factors, such as income, tastes and preferences were assumed to be given. The $R^2$ is the coefficient of determination that indicates the proportion of demand variability that is explained by the variability in price. The coefficients of determination are 99% for green peppers and yellow squash and 97% for cucumber. This signifies that the proportion of variability in log quantities that are accounted for by the variability in log prices is high for each regression. Table 3.8 shows the parameters pertaining to these demand functions.

**Table 3.8: OLS Estimates for Stated Demands**

| Variables | logpeppers | Logcucumbers | logsquash |
|---|---|---|---|
| logprice | -0.549*** | -0.516*** | -0.586*** |
| | (0.0376) | (0.0534) | (0.0182) |
| Constant | 0.908*** | 0.881*** | 0.909*** |
| | (0.0327) | (0.0464) | (0.0158) |
| Observations | 5 | 5 | 5 |
| R-squared | 0.99 | 0.97 | 0.99 |

Standard errors are in parentheses. The *, **, *** denote significance at 10%, 5%, and 1% level, respectively.

Based on the results of this essay, the stated demands are:

$$logQ_{GreenPeppers} = 0.908 - 0.549 logP_{GreenPeppers} \quad (3.20),$$

$$logQ_{Cucumbers} = 0.881 - 0.516 logP_{Cucumbers} \quad (3.21),$$

$$logQ_{YellowSquash} = 0.909 - 0.586 logP_{YellowSquash} \quad (3.22).$$

Equations 3.20-3.22 imply that as prices of the fresh produce under consideration rise, the stated quantities demanded decrease. This is consistent with the law of demand, denoting an inverse relationship between price and quantity demanded for an ordinary good. Consequently, the fresh produce falls under the category of ordinary goods.

Figures 3.1-3.3 depict the stated demand curves for green peppers, cucumbers, and yellow squash, respectively. With price on the vertical axis and quantity demanded on the horizontal axis, each of the demand curves illustrates an inverse relationship between price and quantity. The slopes of the curves are also consistent with the coefficients in the demand functions (equations 3.20-3.22). They reflect the usual downward sloping demand curve. The own-price elasticities of these stated demands are determined by deriving each of them with respect to logprice. Doing so leads to the following:

$$\frac{dlogQ_{GreenPeppers}}{dlogP_{GreenPeppers}} = -0.549 \quad (3.23),$$

$$\frac{dlogQ_{Cucumbers}}{dlogP_{Cucumbers}} = -0.516 \quad (3.24),$$

$$\frac{dlogQ_{YellowSquash}}{dlogP_{YellowSquash}} = -0.586 \quad (3.25).$$

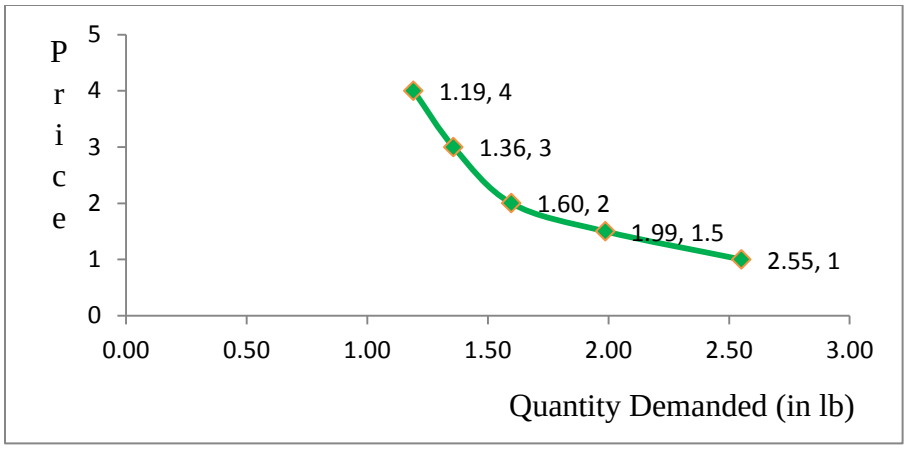


**Figure 3.1: Demand Curve for Green Peppers**

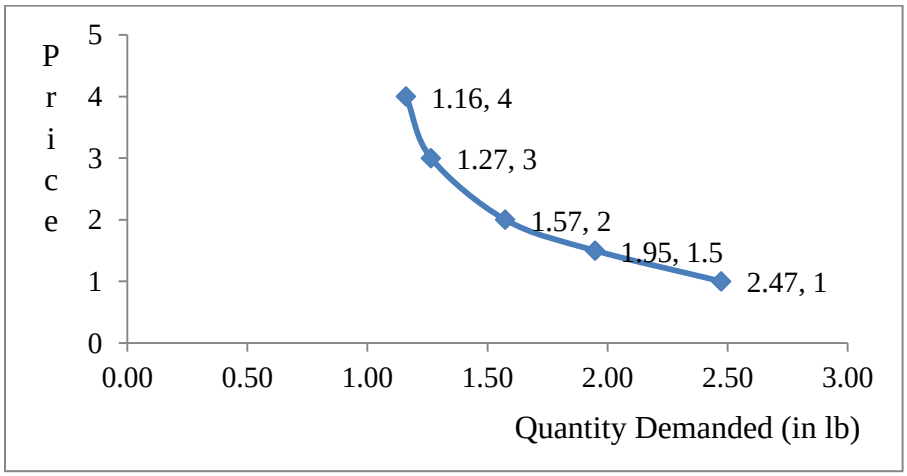


**Figure 3.2: Demand Curve for Cucumbers**

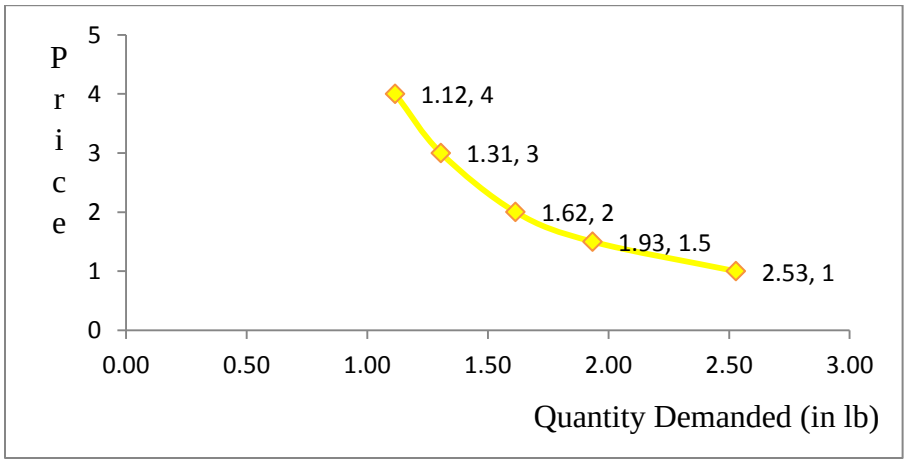


**Figure 3.3: Demand Curve for Yellow Squash**

Equations 3.23-3.25 show that the own-price elasticities of stated demands are 0.549 for green peppers, 0.516 for cucumbers and 0.586 for yellow squash. We infer from this finding that the stated demands for the fresh produce are inelastic. Any percentage change in the price leads to a lesser percentage change in quantity demanded. In other words, consumers are less responsive to fresh produce price changes. Thus, when produce growers cooperate and raise prices, increased total revenue are expected (McConnell, Brue, and Flynn, 2012). These results are consistent with Naanwaab and Yeboah (2012) who found that except for cabbage, all own-price elasticity estimates for fresh produce are negative, less than unity in absolute value, and statistically significant. You, Huang, and Epperson (1977) found demand for fresh vegetables were inelastic with respect to own-prices as well.

These inelastic stated demands imply that reduced prices will increase quantity demanded to small extend. In case of homogeneous products across many growers, each sole grower must make sure that others will match the price increase before making an independent decision. Should there be vendors with clearly differentiated local and fresher organic produce, the vendors will act as monopolistic competitors and can increase the price independently. Hence, fresh produce differentiation allows such vendors to defend their specific prices.

## 3.6 Conclusions

This essay assesses consumer preferences for differentiated fresh produce using green peppers, cucumbers, and yellow squash as examples. A multinomial logistic model was used to accomplish this task. The analysis was done before and after information regarding origin and production practices was presented to respondents. This allowed

comparing the ante-information to post-information preferences. Using a conditional logistic regression, odd ratios and consumer willingness to pay for each of the three products were estimated. Furthermore, this essay employed an ordinary least squares model to evaluate stated demand functions and compute own price elasticities of demand for each of the products. Data collection entailed the use of in-person survey data collected from a sample of 819 consumers at four farmers' market outlets in Utah during the summer of 2011.

Results posit a great popularity for locally-grown produce. Under both ante-information and post-information scenarios, a great majority of respondents were willing to purchase conventionally grown local fresh produce. Conventionally grown produce of unknown origin is the least preferred. Organically-grown produce of unknown origin received moderate preferences. Preferences for local fresh produce are generally influenced by agriculture enthusiasm, age, interests in the CSA programs, and high importance for local and organic production. Overall, the information about origin and production practices increased consumer preferences for conventional local produce.

Furthermore, the analysis reports high premiums for conventional local produce, medium for organic produce and no premiums for the conventionally-grown produce of unknown origin. There is not a sufficient evidence to claim that ante-information and post-information willingness to pay for each of the three products are statistically different. There is an inverse relationship between prices and quantities demanded of the fresh produce under consideration. As a result, fresh produce is found to be an ordinary good. Their individual demands are inelastic; consumers are less sensitive to price changes.

Results from this essay suggest that local produce growers should clearly label the products with origin and production practices. Marketing strategies should target the agriculture enthusiasts, older people and large families, individuals with interests in CSA programs, those with high importance for local produce. Finally, because the stated demands for the fresh produce items are all inelastic, for fresh produce that is clearly differentiated through organic production process and locally grown, increasing the prices shall raise total revenues. Results imply that the use of local and organic certification will meet consumer preferences and allow local growers to take advantage of the premiums associated with such differentiated fresh produce. The fact that both conventional local and organic production of unknown origin are preferred constitutes an argument for strong preferences for organically grown labeled local. Thus, local farming using organic methods has a great advantage.

This essay contributes to the existing literature. First, results fall in the same line with recent studies whereby preferences for locally grown produce is the most preferred, followed by organic production. Consumer characteristics that explain such preferences were discussed in this essay. Second, the unique contribution this essay brings to the literature is the effects of information about place of production and production practices used to produce fresh produce on consumer preferences. We found that this information increases significantly the preferences for conventional grown local produce and reduces those for conventionally grown of unknown origin.

Furthermore, while previous studies focused on local and organic, this essay contributes by differentiating those attributes to consider conventionally grown local, organically grown of unknown origin and conventionally grown of unknown origin.

Results indicate strong preferences for conventional grown local produce as opposed to organically or conventionally grown of unknown origin. The stated demand functions for fresh produce constitute another contribution for they enhance findings from previous studies. Ultimately, results from this essay are useful to produce growers for they provide guidelines to adopt production practices and produce labeling to meet consumer preferences. Policy makers can also use these results to promote the use of local and organic certification as it will meet consumer preferences and allow local growers to take advantage of the premiums associated with such differentiated fresh produce. Given the inelastic demands for fresh produce, results are vital for produce marketing and pricing strategies.

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## INCLUSIVE SUMMARY AND CONCLUSIONS

This dissertation has explained consumer primary motivations for attending farmers' markets, their preferences for various product features, and for differentiated produce. We have used survey data from consumers who attended farmers' markets in Nevada and Utah during summers of 2008 and 2011, respectively. There are three essays to this dissertation.

In the first essay, a lack of studies about consumer motivations to attend farmers was identified. We have shown that the existing literature is limited to attending for purchasing fresh produce using various analytical methods. We have used binary logistic model to examine the likelihood for a consumer to attend farmers' market to primarily purchase produce. Multinomial logistic model was used to assess various consumer motivations for attending farmers' markets and consumer characteristics which explain such motivations.

Results from this part of study indicate the majority of consumers attend farmers' markets to purchase fresh produce. This study reports significant consumer characteristics that explain relative probability to attend farmers' markets for social interaction, purchasing ready-to-eat food, and buying packaged foods, arts and crafts over

purchasing fresh produce. This study advocates for policies, marketing strategies to increase consumers' visits as well as policies to encourage home-gardening and CSA involvement with primary focus towards females and married individuals.

In second essay, we have posited that most of previous studies about consumer preferences for fresh produce were limited finding consumer characteristics that explain the purchase of organic and local food products. The existing literature therefore seems silent about consumer preferences for fresh produce based on its other various features. Ordered logistic model is employed to analyze consumer preferences for each of eight product features [product variety, quality, and appearance, as well as the pricing, quality attributes (local, organic), freshness, and knowledge about local growers].

The findings from this essay demonstrate that product quality and freshness are extremely importance, and that variety, local, and organic features are very important for the consumers when purchasing fresh produce. Results indicate that consumers who attend farmers' markets frequently value the quality of fresh produce and knowledge about local growers. Increase in the levels of agreement with concern over food safety results in increase in the ordered log-odds of assigning higher importance to product quality, organic produce and product freshness. Higher levels of agreement with concern about health/diet are associated with higher importance to product variety, quality, appearance and freshness. Results also show that agriculture enthusiasts are more likely to buy local and fresh produce items. Individuals with Community Supported Agriculture affinity express high levels of importance to locally grown produce. Finding from this study indicate that WIC participants like product variety, freshness, and organically grown produce. Females show high importance for product quality, appearance, local and

fresher produce than men. Finally, Utahans have more affinity for locally grown fresh produce and knowing local growers than Nevadans.

In the third essay, we base on the conclusion by Howard and Allen, (2010) that differentiation of food products by production practices and origin is prominent in farmers' markets and community supported agriculture programs. From this claim, our curiosity was to know the likelihood of purchasing a specific type of differentiated fresh produce among those consumers who attend farmers' markets in Utah. Unlike Onozaka and Thilmany-McFadden (2011), who were interested in analyzing potential differentiation and interactions among designations of production location and other claims in food markets, this study has assessed stated demands, consumer preferences and WTP for differentiated green peppers, cucumbers, and yellow squash. There are three differentiating product attributes which are based on origin and production practices. These attributes are (i) Conventionally Grown of Unknown Origin (CGUO), (ii) Conventionally Grown Local (CGL) and (iii) Organically Grown of Unknown Origin (OGUO).

To estimate relative probabilities of purchasing either CGL or OGUO type of produce over CGUO produce, a multinomial logistic (MNL) model was employed. To analyze how the characteristics of the categories affect individuals' probability of being in each category, and compute willingness to pay, conditional logistic model was adopted. To estimate stated demand functions and quantify own price elasticities of demand, ordinary least squares model was used. This analysis is applied to fresh produce using three items (green peppers, cucumbers, and yellow squash) as examples. Results demonstrate that the willingness to pay and the probability of purchasing each of the

three products grown conventionally in Utah overweigh that for either organically or conventionally grown of unknown origin. The information about production practices and place of origin increases significantly the likelihood of purchasing these products that are conventionally grown in Utah (local) while it has negative impact on preferences for conventionally grown of unknown origin. The three products are proven to be ordinary goods, and their demands are inelastic.

Overall, there are three main findings for this dissertation. First, most consumers choose to attend farmers' markets primarily because they want to purchase fresh produce. Other primary motivations are social interaction, ready-to-eat foods, and buy arts/crafts and packaged foods. Second, consumer preferences are strong for product variety, freshness, local, organic, and quality as produce features. Third, the willingness to pay and the probability of purchasing each of the three products grown conventionally in Utah overweigh that for either organically or conventionally grown of unknown origin. Green peppers, cucumbers and yellow squash are ordinary goods with inelastic stated demands.

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# APPENDIX

Version 1 of the Survey Used for Data Collection at Farmers' Markets in Utah


**Summer 2011**

The Department of Applied Economics at the Utah State University is conducting a study to evaluate consumer preferences for locally (Utah) produced fresh produce. We are asking for your participation in this study. Your participation is voluntary and you may choose not to answer any of the survey questions. All information collected is confidential and the survey data will be securely stored on the USU campus. Survey questions will address shopping habits and preferences, pricing of certain goods, and demographics. The survey should take approximately 10 minutes to complete.

Should you have any pertinent questions or concerns about your rights or a research-related injury as a research subject, you are welcome to contact the Administrator of the Institutional Review Board (IRB) for the protection of human participants at USU at (435) 797-0567 or by email at irb@usu.edu.

**Thank you for your time!**

Interviewer: _____ Location: _____Date:_____

1. Are you the primary food purchaser for your household?
☐ Yes ☐ No

2. Have you attended a farmers' market prior to today?
☐ Yes ☐ No

3. What is your primary motive for attending the farmers' market? (Check only one)
☐ Purchase produce
☐ Purchase packaged foods
☐ Purchase arts/crafts
☐ Social interaction
☐ Events/activities
☐ Concerts/music
☐ Purchase ready-to-eat food (food vendors)

4. Where did you begin your travel to the farmers' market?
☐ Work ☐ Home ☐ Other:_____

5. How many miles did you travel to the farmers' market? _____ miles

6. What method of transit did you use to travel to the farmers' market? (Check only one)
☐ Car
☐ Bicycle
☐ Walking
☐ Bus
☐ Taxi
☐ Train

7. How many visits do you make to farmers' markets on average each summer (4 months)? (Check only one)
☐ 1 visit
☐ 2-3 visits
☐ 4-7 visits
☐ 8-12 visits
☐ More than 12 visits

8. How did you hear about the farmers' market? (Check only one)
☐ Word-of-mouth ☐ Drop by ☐ Newspaper
☐ Radio advertisement ☐ Roadside sign ☐ Internet/E-mail
☐ TV advertisement ☐ Flyer/poster

9. Rank the following products according to most often purchased, with *1* as purchase most often and *11* hardly ever purchase.

| | | |
|---|---|---|
| ____ Fruit | ____ Drinks/Beverages | ____ Arts/Crafts |
| ____ Vegetables | ____ Packaged Products | ____ Spices |
| ____ Dairy | ____ Oils, Jams, Spreads | ____ Breads |
| ____ Meat | ____ Ready to Eat | |

10. Do you attend other farmers' markets?
☐ Yes ☐ No

11. Do you have a favorite vendor?
☐ Yes ☐ No (skip to Q.13)

12. Why is this vendor your favorite? (Check all that apply)

☐ Free samples
☐ Product offering
☐ Friendliness/approachability
☐ Discounts
☐ Product information available
☐ Provides other services outside market (delivery, etc.)
☐ Other: _____

13. On average, how much do you spend per visit at the farmers' market?
_____ dollars per visit

14. How important are the following farmers' market attributes/features?

| Farmers' Market Attributes | Not important | Slightly important | Somewhat important | Very important | Extremely important |
|---|---|---|---|---|---|
| Concerts/Music | 1 | 2 | 3 | 4 | 5 |
| Free parking | 1 | 2 | 3 | 4 | 5 |
| Hours of operation | 1 | 2 | 3 | 4 | 5 |
| Convenient location | 1 | 2 | 3 | 4 | 5 |
| Number of vendors | 1 | 2 | 3 | 4 | 5 |
| Child/Family activities | 1 | 2 | 3 | 4 | 5 |
| Cultural events | 1 | 2 | 3 | 4 | 5 |
| Educational events | 1 | 2 | 3 | 4 | 5 |
| Certified farmers' market | 1 | 2 | 3 | 4 | 5 |
| Product variety | 1 | 2 | 3 | 4 | 5 |
| Food/beverage vendors | 1 | 2 | 3 | 4 | 5 |

15. When making fruit and vegetable purchases, how important are the following product features?

| Product Attributes | Not important | Somewhat important | Important | Very important | Extremely important |
|---|---|---|---|---|---|
| Product variety | 1 | 2 | 3 | 4 | 5 |
| Product quality | 1 | 2 | 3 | 4 | 5 |
| Product value | 1 | 2 | 3 | 4 | 5 |
| Product appearance | 1 | 2 | 3 | 4 | 5 |
| Produced locally(Utah) | 1 | 2 | 3 | 4 | 5 |
| Specialty item | 1 | 2 | 3 | 4 | 5 |
| Product pricing | 1 | 2 | 3 | 4 | 5 |
| Organic production | 1 | 2 | 3 | 4 | 5 |
| Product freshness | 1 | 2 | 3 | 4 | 5 |
| Product taste | 1 | 2 | 3 | 4 | 5 |
| Knowledge of grower/farmer | 1 | 2 | 3 | 4 | 5 |

16. When purchasing food products, which label is most important? (Check only one)
☐ A product of Utah
☐ A product of the USA
☐ A product from outside of the USA
☐ A product identified as "organic" (regardless of origin)
☐ A product identified as "natural" (regardless of origin)
☐ Other: _____ (please specify)

17. When purchasing food products, which of the following is most important? (Check only one)
☐ The quality of the product
☐ The product origin (place of production)
☐ The product with the lowest price
☐ Other :_____(please specify)

18. Given your income level, tastes, and preferences, please indicate the quantity of each specified food product you would purchase given the price levels indicated in the table below.

| | | | | | | |
|---|---|---|---|---|---|---|
| Green Peppers | Price per/lb | $1.00 | $1.50 | $2.00 | $3.00 | $4.00 |
| | Quantity (lb) | | | | | |
| Cucumbers | Price per/lb | $1.00 | $1.50 | $2.00 | $3.00 | $4.00 |
| | Quantity (lb) | | | | | |
| Apples | Price per/lb | $1.00 | $1.50 | $2.00 | $3.00 | $4.00 |
| | Quantity (lb) | | | | | |
| Yellow Squash | Price per/lb | $1.00 | $1.50 | $2.00 | $3.00 | $4.00 |
| | Quantity (lb) | | | | | |

19. On average, what is your weekly household grocery bill? _____ dollars per week

20. Which outlet do you primarily use for grocery purchases? (Check only one)
☐ Grocery store (Smith's, Winco, etc.)
☐ Bulk store (Sam's Clubs, Costco, etc.)
☐ Multi-purpose store (Wal-Mart, Kmart, etc.)
☐ Specialty store (Whole Foods, Trader Joes, etc.)
☐ Discount store (Savers, etc.)

21. How many miles do you travel to your primary grocery location? _____ miles

22. How many times in the past month have you purchased groceries at your primary grocery location? (Check only one)

☐ 1 visit
☐ 2-3 visits
☐ 4-7 visits
☐ 8-12 visits
☐ More than 12 visits

23. On average, how many meals per week do you consume at home? (Write in)

- Breakfast (1-7):_____
- Lunch (1-7): _____
- Dinner( 1-7):_____

24. Do you participate in the following programs? (Check all that apply)

☐ WIC
☐ Food stamps
☐ Senior nutrition

25. In which of the following activities do you participate or have you participated? (Check all that apply)

☐ Composting
☐ Home gardening
☐ Recycling
☐ Food canning/preserving
☐ Home beer/wine making
☐ 4-H or FFA
☐ Master gardener
☐ Youth groups
☐ CSA program
☐ Earth Day

26. A CSA (Community Supported Agriculture) is a subscription program where consumers purchase a weekly basket of fresh produce from a local farm. Most CSA farmers prefer that subscribers pay for the season up-front, but some farmers will accept weekly or monthly payments. Would you consider subscribing to a local CSA program?

☐ Yes ☐ Need further information _____
☐ No

27. Please answer true or false to the following statements.

| **Statement** | **TRUE** | **FALSE** |
|---|---|---|
| Organic production prohibits the use of synthetic fertilizers | 1 | 2 |
| Organic products must be certified by the USDA or a third party | 1 | 2 |
| Conventional production always includes synthetic fertilizers and pesticides | 1 | 2 |
| Organic products are healthier than conventional products | 1 | 2 |
| Organic producers do not use pesticides on their crops | 1 | 2 |
| Organic products are of better quality and are tastier than conventional products | 1 | 2 |
| Conventional vegetable production leads to environmental degradation | 1 | 2 |
| Organic products include all fresh produce | 1 | 2 |

28. Please specify if you agree or disagree with each of the following statements.

| Statement | Strongly Disagree | Disagree | Unsure | Agree | Strongly Agree |
|---|---|---|---|---|---|
| I am concerned about the safety of my food | 1 | 2 | 3 | 4 | 5 |
| I have little time to prepare meals | 1 | 2 | 3 | 4 | 5 |
| I am concerned about my health/diet | 1 | 2 | 3 | 4 | 5 |
| I buy products with low environmental impact | 1 | 2 | 3 | 4 | 5 |
| I eat out frequently | 1 | 2 | 3 | 4 | 5 |
| Physical activity is an important part of my routine | 1 | 2 | 3 | 4 | 5 |
| Eating out is an event in my family | 1 | 2 | 3 | 4 | 5 |
| Supporting local farmers is important to me | 1 | 2 | 3 | 4 | 5 |
| Agricultural open space is important to me | 1 | 2 | 3 | 4 | 5 |
| I am concerned about the origin of my food | 1 | 2 | 3 | 4 | 5 |
| I am a vegetarian or vegan | 1 | 2 | 3 | 4 | 5 |

29. Please indicate which product you are likely to purchase given the differences in production practices, origin (location of production) of the product, and its price.

| | | | | | |
|---|---|---|---|---|---|
| Conventionally grown peaches of unknown origin, $2.49/lb | □ | Conventionally grown peaches from Utah, $2.99/lb | □ | Organically grown peaches of unknown origin, $3.86/lb |
| Conventionally grown tomatoes of unknown origin, $1.99/lb | □ | Conventionally grown tomatoes from Utah, $3.58/lb | □ | Organically grown tomatoes of unknown origin, $2.39/lb |
| Conventionally grown eggplant of unknown origin, $2.99 each | □ | Conventionally grown eggplant from Utah, $2.84 each | □ | Organically grown eggplant of unknown origin, $2.09 each |
| Conventionally grown cucumber of unknown origin, $0.79 each | □ | Conventionally grown cucumber from Utah, $1.58 each | □ | Organically grown cucumber of unknown origin, $1.58 each |
| Conventionally grown green pepper of unknown origin, $2.49/lb | □ | Conventionally grown green pepper from Utah, $2.99/lb | □ | Organically grown green pepper of unknown origin, $2.99/lb |
| Conventionally grown cantaloupe of unknown origin, $0.49/lb | □ | Conventionally grown cantaloupe from Utah, $0.88/lb | □ | Organically grown cantaloupe of unknown origin, $0.47/lb |
| Conventionally grown yellow squash of unknown origin, $1.89/lb | □ | Conventionally grown yellow squash from Utah, $1.89/lb | □ | Organically grown yellow squash of unknown origin, $2.55/lb |

30. Synthetic fertilizers, herbicides, and pesticides are not allowed in the production of organically grown fresh produce. Organic growers generally use compost and manure to improve the soil quality and plant health. They generally pull weeds and use mulch to control weeds and use garlic, oils, and soaps to control pests. Please indicate which product you are likely to purchase given the differences in production practices, origin (location of production) of the product, and its price

| | | | | |
|---|---|---|---|---|
| Conventionally grown peaches of unknown origin, $2.49/lb | □ | Conventionally grown peaches from Utah, $2.99/lb | □ | Organically grown peaches of unknown origin, $3.86/lb |
| Conventionally grown tomatoes of unknown origin, $1.99/lb | □ | Conventionally grown tomatoes from Utah, $3.58/lb | □ | Organically grown tomatoes of unknown origin, $2.39/lb |
| Conventionally grown eggplant of unknown origin, $2.99 each | □ | Conventionally grown eggplant from Utah, $2.84 each | □ | Organically grown eggplant of unknown origin, $2.09 each |
| Conventionally grown cucumber of unknown origin, $0.79 each | □ | Conventionally grown cucumber from Utah, $1.58 each | □ | Organically grown cucumber of unknown origin, $1.58 each |
| Conventionally grown green pepper of unknown origin, $2.49/lb | □ | Conventionally grown green pepper from Utah, $2.99/lb | □ | Organically grown green pepper of unknown origin, $2.99/lb |
| Conventionally grown cantaloupe of unknown origin, $0.49/lb | □ | Conventionally grown cantaloupe from Utah, $0.88/lb | □ | Organically grown cantaloupe of unknown origin, $0.47/lb |
| Conventionally grown yellow squash of unknown origin, $1.89/lb | □ | Conventionally grown yellow squash from Utah, $1.89/lb | □ | Organically grown yellow squash of unknown origin, $2.55/lb |

31. Locally produced foods (within the state) are generally grown in small local farms, are fresher than non-local foods due to the short distance to market, and are more energy efficient than non-local foods as they are not transported large distances. Please indicate which product you are likely to purchase given the differences in production practices, origin (location of production) of the product, and its price.

| | | | | |
|---|---|---|---|---|
| Conventionally grown peaches of unknown origin, $2.49/lb | □ | Conventionally grown peaches from Utah, $2.99/lb | □ | Organically grown peaches of unknown origin, $3.86/lb |
| Conventionally grown tomatoes of unknown origin, $1.99/lb | □ | Conventionally grown tomatoes from Utah, $3.58/lb | □ | Organically grown tomatoes of unknown origin, $2.39/lb |
| Conventionally grown eggplant of unknown origin, $2.99 each | □ | Conventionally grown eggplant from Utah, $2.84 each | □ | Organically grown eggplant of unknown origin, $2.09 each |
| Conventionally grown cucumber of unknown origin, $0.79 each | □ | Conventionally grown cucumber from Utah, $1.58 each | □ | Organically grown cucumber of unknown origin, $1.58 each |
| Conventionally grown green pepper of unknown origin, $2.49/lb | □ | Conventionally grown green pepper from Utah, $2.99/lb | □ | Organically grown green pepper of unknown origin, $2.99/lb |
| Conventionally grown cantaloupe of unknown origin, $0.49/lb | □ | Conventionally grown cantaloupe from Utah, $0.88/lb | □ | Organically grown cantaloupe of unknown origin, $0.47/lb |
| Conventionally grown yellow squash of unknown origin, $1.89/lb | □ | Conventionally grown yellow squash from Utah, $1.89/lb | □ | Organically grown yellow squash of unknown origin, $2.55/lb |

32. What is the number of people per age group in your household? (Write in)

| 17 & under | 18-60 | 60+ |
|---|---|---|
| | | |

33. What is your current age? _____ years

34. What is your gender?
☐ Male ☐ Female

35. What is your marital status?
☐ Married ☐ Single

36. What is the zip code of your primary residence? _____

37. What was your 2010 annual household income before taxes?
_____ dollars per year

38. Which of the following categories best represents your completed level of education? (Check only one)
☐ Middle school
☐ High school
☐ Some college
☐ 2-year associate's degree
☐ 4-year college degree
☐ Graduate degree or higher

39. Which of the following best describes your employment status? (Check only one)
☐ Full-time employed
☐ Part-time employed
☐ Unemployed
☐ Homemaker
☐ Retired
☐ Student

40. What is your ethnic background? (Check only one)
☐ African-American
☐ Asian
☐ Hawaiian/Pacific Islander
☐ Caucasian
☐ Middle Eastern
☐ Native American
☐ Hispanic
☐ Prefer not to answer

***We thank you for your participation!***

# CURRICULUM VITAE

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## EDUCATION

### a. Formal education

- Utah State University (USU), Logan, Utah, USA
  - PhD of Economics, 2013
  - Doctoral Dissertation: Assessment of Consumer Motivations to Attend Farmers' Markets, Preferences and Willingness to Pay for Differentiated Fresh Produce: Three Essays.
  - Areas of Specializations: Agricultural economics, agribusiness and econometrics.
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  - Area of Specialization: Regional and community economic development.
- Kigali Institute of Education (KIE), Kigali, Rwanda
  - B.A. 2004
  - Dual Major: Business and economics
  - Minor: Education
  - Memoir: Analysis of factors influencing students' choices of restaurants; a case study of KIE students.

**b. Trainings**

- Leadership Utah training program by Salt Lake Chamber of Commerce. 2013
- Project Management Masters Certification Course offered by the American Project Management (APM). 2012
- Community Leadership by Salt Lake County, Utah. 2011
- Supplemental Instruction (SI) at Utah State University. 2009
- Academic English training at University of Texas at Austin. 2008

**Teaching/academic experience**

**a. Idaho State University**

Adjunct Professor for the Department of Economics. Fall 2012 to Present. Classes taught:

- Econ 2202 Principles of Microeconomics
- Econ 2201 Principles of Macroeconomics
- Econ 1101 Economic issues

**b. Utah State University**

Supplemental Instructor for Department of Political Science; Fall 2009.

**c. Kigali Institute of Education**

Assistant Lecturer for the Department of Economics and Business Studies, 2006 to 2008. Classes taught:

- ECON 2201 Principles of Macroeconomics
- ECON 2220 Mathematics for economists
- BUS 3201 Financial Accounting

- BUS 3202 Cost Accounting
- BUS 1101 Fundamentals of accounting

**d. Other academic experience**

- Graduate Research Assistant, Department of Applied Economics, Utah State University, 2009 to present
- Senior Research for UNICEF/Rwanda under the bilateral agreement between UNICEF and KIE, 2006 to 2008

**Undergraduate student committee service at Kigali Institute of Education**

- Faculty advisor to Students Business Club, 2007 to 2008.
- Faculty advisor/mentor to 32 undergraduate research/memoirs.

**Professional experience**

- Project Manager for Rwandese Organization of Utah. 2010 to present.
- Project Manager at Rubingo School**.** 2007 to 2008.
- Financial analyst & economist for Employees Credit Union in Rwanda. 2004 to 2006.

**Honors and awards**

- 2012 Golden Key Graduate Scholar Award. 2012.
- Project Service Scholarship Award. American Project Management. 2012.
- Outstanding Community Leadership. Utah Department of Workforce Services. 2012
- Area government most inviting personality award. MASA housing at USU. 2010.
- Fulbright scholarship award. US Department of State's Bureau of Educational and Cultural Affairs. 2008 to 2010.

**Professional affiliations**

- Member of Agricultural & Applied Economics Association (AAEA), 2012.
- Member of Western Agricultural Economics Association (WAEA), 2012.
- Member of Golden Key International Honor Society, 2011 to present.

**Research**

- Analysis of consumer motivations for attending farmers' markets (Selected paper for presentation in the annual meeting of Western Agricultural Economic Association in Park City, Utah. June 2012)
- Assessment of farmers' market consumer preferences for various features of fresh produce (Selected paper for presentation in the annual meeting of Western Agricultural Economic Association in Monterey, California. June 2013)
- Assessment of consumer preferences, willingness to pay, and stated demand for differentiated produce (Dissertation paper)
- Assessment of Tourism Impact on Local Economies in Duchesne and Uintah Counties in Utah using IMPLAN, Fall 2009 (class project)
- IMPLAN analysis of Cache County Development: Tools and Applications, Spring 2009 (class project)
- Comparative Analysis between Child Friendly Schools and Non-child Friendly Schools in Rwanda, (informative report to the UNICEF), 2007
- Piloting an Assessment Methodology for an Integrated School-Based Model of Learning and Delivery of Essential Services for Children in Rwanda and Lesotho as part of Learning Plus Initiative of UNICEF (informative report to the UNICEF), 2007

- Analysis of factors influencing students' choices of restaurants; a case study of KIE students (a memoir as a partial requirement for undergraduate degree at KIE), 2004

**University service**

- USU. Speaker on "Massive willingness to change among Rwandan women." 2011
- Keen State College, New Hampshire. Workshop facilitator and Keynote Speaker on "Healing the world after genocide" Spring 2010
- USU. Initiated an official visit at by the Rwandan Ambassador to the United Nations for International Education week, Fall 2009
- USU and KIE. Initiated academic partnership between the College of Education at USU and KIE. Two professors, one doctorate student from USU and I traveled to Rwanda at KIE in spring of 2010.
- KIE. Elected Chair of Finance Commission for KIE credit union, 2007 to 2008.
- KIE. Elected Chair of Finance Commission for SAKIE (Students' Association of Kigali Institute of Education), 2002 to 2004.
- KIE. Undergraduate program committee, Department of Economics and Business Studies, 2006 to 2008.
- KIE. Coordinator of academic records, Department of Economics and Business Studies, 2006 to 2008.

**Community service**

- Network for Education of the Poor in Rural Rwanda (NEPRR); a USA based nonprofit organization. Co-Founder and Finance Director. December 2011 to present.

- Rwandese Organization of Utah (ROU), Salt Lake City, Utah, USA. Executive Director. 2009 to present.
- Volunteer at Global Village Gifts, Logan, Utah, USA. Sales Representative and Bookkeeper. Used QuickBooks software. 2009 to 2010.
- Parents' Association for Community Development, Burera District, Rwanda. Co-founder and Finance Director. 2005 to 2008.
- SAKIE. Elected Commissioner for Finance. 2001 to 2003.
- Twizamure Association, Burera, Rwanda. Founder and President. 1999 to 2004.
- Janja High School, Students' Representative. 1996 to 1998.

**Computer skills**

- Statistical packages: STATA, SPSS, SAS, R, LINDO, E-views,
- IMPLAN for economic impact analysis,
- Accounting software: Peachtree, QuickBooks,
- Microsoft Office programs: Word, Excel, PowerPoint, Access and
- Can easily learn any other computer programs/software.

**LANGUAGES:** English, French, Kirundi, and Kinyarwanda.