AN EXAMINATION OF THE ECONOMIC VIABILITY OF LOCAL AGRICULTURE IN NORTHERN NEW ENGLAND

Samantha Lynn Werner

University of New Hampshire, Durham

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AN EXAMINATION OF THE ECONOMIC VIABILITY OF LOCAL AGRICULTURE IN
NORTHERN NEW ENGLAND

BY

SAMANTHA LYNN WERNER
B.S. Environmental Science, University of New Hampshire, 2014

THESIS

Submitted to the University of New Hampshire in Partial Fulfillment of the Degree
Requirements of:

Master of Science
in
Natural Resources: Environmental Economics

September, 2017
This thesis/dissertation has been examined and approved in partial fulfillment of the requirements for the degree of Master’s of Science in Natural Resources: Environmental Economics by:

Thesis Director, John M. Halstead, Ph.D.
Professor of Environmental and Resource Economics

Robert A. Robertson, Ph.D.
Associate Professor of Tourism Planning and Development

Nada A. Haddad, UNH Cooperative Extension,
Extension Field Specialist of Food and Agriculture

On June 29th, 2017

Original approval signatures are on file with the University of New Hampshire Graduate School.
DEDICATION

To Susan and William Werner
For all of their love and support
ACKNOWLEDGEMENTS

I would like to thank my advisor, John Halstead, for providing the opportunity to earn my master’s degree while conducting meaningful research. I am grateful for all of his support and guidance over the past two years and for making this experience so enjoyable.

Thank you to my academic master’s committee members, Robert Robertson and Nada Haddad, for their advice along the way. Thanks to Ju-Chin Haung for her expertise in econometric modeling. A special thanks to Scott Lemos for not only assisting in econometric modeling, but also for assisting in data entry, writing, and for his overall willingness to help. Thank you for helping me achieve this accomplishment.

A special thanks to the funds provided by the United States Department of Agriculture—specifically, the American Food Research Initiative (AFRI) which made this research possible. A special thanks to our colleagues from the University of Maine and the University of Vermont, along with the Cooperative Extension members and volunteers from all three participating universities. Thank you to James McConnon, Todd Gabe, Lisa Chase, Richard Kersbergen, Jane Haskell, Casey Hancock, Chyi Lyi Liang, and Lily Harris for their hours spent collecting data and organizing focus groups. Thanks to Dawn Thilmany Mcfadden and Steve Deller for their recommendations on the consumer survey.

Lastly, thank you to my family, Susan, William, Danica, Curtis, Eric, and Will, for all of their love and support!
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ABSTRACT

An Examination of the Economic Viability of Local Agriculture in Northern New England
By
Samantha Lynn Werner
University of New Hampshire, September, 2017

Over the past decade, Northern New Englanders have focused on expanding local agricultural production despite a lack of economic research on regional market dynamics. This thesis follows a two-tiered approach to investigate the consumers and producers of local agriculture in northern New England. The first tier identifies the current constraints and expansion barriers faced by regional local growers using focus group methods. The second tier investigates regional consumers’ purchasing habits, values, and willingness to pay for locally grown fresh produce using a consumer survey and discrete choice analysis techniques.

The qualitative results from producer focus groups (n = 48) suggest that local growers from Maine, Vermont, and New Hampshire would face financial restrictions if they were to expand their farming operations. Additionally, challenges with laborers and consumers hinder current local production efforts in the region. The regional consumer survey results (n = 647) suggest that consumers from Maine, Vermont, and New Hampshire care most about maintaining local farmlands, supporting the local economy, and buying produce that is cultivated without pesticides when choosing to purchase fresh produce. Locally grown produce is seen as superior in its ability to support the local economy, in its freshness, and in its quality; however, local prices are still a top deterrent for those who choose not to purchase locally grown produce. The consumer discrete choice analysis results suggest a weak regional demand for a wide range of local produce options. For example, only local tomatoes and green beans command a price premium from all three states, with percent price premiums ranging from 35-81% and 28-46% for each produce item, respectively. The constraints in supplying local produce are possibly compounded by the consumers’ relatively weak willingness to pay for a variety of local produce options. The combination of both producer and consumer results allow for a better understanding the economic challenges that face local agriculture expansion in the northeast region.
Emerging Product Differentiation in Fresh Produce

In microeconomic theory, fresh produce is often used as the exemplary model for depicting product homogeneity. The definition implies that a fruit or vegetable purchased from one vendor will possess identical qualities as that same produce item purchased elsewhere. In other words, there is no variation in produce attributes across vendors and the consumer is no better-off between the options, such that the two options are viewed as perfect substitutes, *ceteris paribus*. Though fresh produce has often been portrayed as largely non-differentiable and homogenous, recent studies suggest that not all consumers view fresh produce as equal.

Mounting literature suggests that consumers value produce differently, depending on the method and location in which the fruit or vegetable is produced. This is a type of product differentiation best described by hedonic price theory, where the value of a product is derived from a compilation of the good’s own attributes. Following hedonic price theory in regards to fresh produce, organically grown produce has many perceived attributes that are of high value to those concerned with food safety and environmental quality. Locally produced fruits and vegetables are also linked to a variety of social and economic benefits which may be increasing the inherent value of local foods, further perpetuating that product differentiation exists in the fresh produce sector. Though the demand for local and organically grown fruits and vegetables has been shifting, which supports that produce is becoming a more heterogeneous, there are still economic barriers that these products must endure in order to compete with conventionally grown produce. However, if
consumers truly value produce options as a function of their own production methods and location of growth, the purely competitive market structure for produce may be segmented and alter how produce is purchased and produced in the United States. By understanding the market dynamics of local and organic produce, one can better identify the viability and strength of this emerging product heterogeneity.

*Local Agriculture in the U.S.*

Over the past decade, local agriculture has flourished across the United States in both sales and in number of farmers markets. The U.S. Department of Agriculture (USDA) National Farmers Market Directory reported 8,476 registered farmers markets in 2014—a 215% increase from the 2,683 markets registered in 2000 (USDA, 2015). From 2002 to 2005, farmer to consumer sales increased by 50% and local food sales grew from $1 billion to $7 billion from 2005–2012 (USDA, 2013). Local food sales are expected to continue increasing and reach $20 billion by 2020 (USDA, 2016). The increase in demand for local and organic products has been linked to a shift in consumer awareness about food production, heightened by increased media attention focusing on the U.S. agricultural system. During 2006 and 2007 the farming industry was put in the spotlight with the popular publication, *The Omnivore’s Dilemma*, and documentaries, such as Food Inc., which focus the controversial aspects of conventional farming (Adams & Salois, 2010). This resulting increase in social awareness is reflected in the rise of local food sales, but also in how consumers perceive local foods.

Studies support that the average local food consumer tends to perceive local produce as fresher, healthier, and of higher quality when compared to conventionally farmed produce (Yue et al. 2009; Onozaka et al. 2010; Adams & Salois, 2010). These perceptions may stem from how
consumers interpret the term “local”, which consumers associate with food purchased within a 50-100 mile radius from where it is grown (Pyburn et al. 2016). This lower travel time can decrease the risk of food spoilage and appeal to consumers who value food safety and health. (Pyburn et al., 2016; Onozaka et al., 2010). Consumers of local food have been shown to possess similar concerns about food safety to those who purchase organically grown foods (Yue et al., 2009, 2011, Adams & Salois, 2010). Organic food buyers in the U.S., according to a review by Yiridoe et al. (2005), place a high value on food safety and nutritive value. In both cases, studies suggest that consumers are willing to pay higher price premiums for organically and locally grown products over their counterparts to receive the multitude of perceived and real benefits with which they are associated. ¹

Consumers’ Perceptions, Motivations, and Values

Food safety is not the only factor motivating consumers to purchase locally grown products. Social, economic, and environmental benefits are also attributed to purchasing locally produced options. Other than the increased food quality and safety, consumers who purchase local also value helping local farmers, assisting in improving the local economy, and decreasing negative impacts on the environment (Yue, 2009: Adams and Salois, 2010; Onozaka, 2010, Martinez, 2010, Pyburn et al. 2016). Additionally, studies suggest consumers who buy from local community based farm operations or farmers markets often view purchasing locally as a social benefit—boosting a sense of community while obtaining fresh food. The combination of theses attributes allows consumers to perceive they are diminishing a variety of negative externalities,

¹ A full list of references and studies supporting this assertion can be found in the Literature Review in Chapter II.
while simultaneously increasing their own social well-being (Brown et al., 2008; Yue 2009; Adams and Salois, 2010).

The perception that purchasing local foods decreases environmental impacts is heavily linked to substituting away from large-scale agriculture. Since World War II, the U.S. has shifted from away from small-scale local farms towards large-scale agriculture. California is ranked as the top producer of many agricultural products supplied to the U.S., producing one third of the nation’s vegetables and over 400 different agricultural products (USDA, 2015). This suggests that a resident of New England, is often purchasing produce that has traveled over 3,000 miles prior to consumption. Economic theory suggests that large scale agriculture is the most cost-effective method of production, with concepts such as economies of scale and product specialization which promote large-scale monoculture systems. Unfortunately, economic cost-effectiveness has demonstrated to be largely at odds with the environment. Biodiversity loss, soil erosion and top soil loss, along with point-source nitrogen pollution, are all negative externalities associated with large-scale monoculture agricultural systems. Consumers who are concerned with environmental degradation often purchase local and/or organic products, in order to mitigate negative externalities; due to the impression that these products are produced more sustainably. Despite the negative environmental impacts, large-scale agriculture still dominates the United States food market.

With fruit and vegetable production centralized in California, food security may also motivate consumers to purchase locally grown produce. Alterations in California’s regional climate has resulted in lower seasonal snowpack levels and in higher variation in drought severity and duration, which threatens California’s food production. California is enduring a decadal drought which has caused agricultural land to be fallowed, decreasing not only production, but
revenue as well (Howitt, 2014). Production continues despite the drought, due to the groundwater extractions used for crop irrigation. Overall, agricultural water-use comprises of about 80% of total water-use in the state of California. These aquifers are replenished by the melting snowpack in the Sierra Nevada Mountains; however, with current conditions, the rate of replenishment is less than the rate of water extraction (Famiglietti, 2011). The issue of water availability will continue to increase, according to predictive snowpack and snow melting models. Though economic theory supports the cost-effectiveness of large-scale monocultures, the negative externalities inflicted by this system may be contributing to a shift in consumer food perceptions and consequently, decreasing the demand for conventionally grown food.

Economic Benefits of Local Agriculture

Along with decreasing negative externalities, local agriculture also has beneficial economic impacts, which are especially significant to local economies. A community-focused agriculture (CFA) study reports that from 2002-2007, a $1 increase in farm sales led to a $0.22 increase in personal income per county (Brown et al., 2014). The USDA Economic Research Service found that in 2008, for every $1 million in sales, 13 local farming jobs were created which resulted in a total of 61,000 jobs (USDA, 2015). In addition, the Union of Concerned Scientists 2011 report states that an increase in funding for 100-500 farmers markets could create over 13,000 jobs in 5 years (O’Hara, 2011). Local agriculture is also attributed to other community benefits, such as: more research opportunities, elevated agro-tourism, increased interest in sustainable farm management and enhancing social capital; all of which create positive feedbacks in the local economy (Batie et al. 2003; Lyson and Green, 1999). These economic benefits have attracted endorsements from local officials with special interests in creating jobs and increasing income in
their state, county, or region. Enhancing local food systems may be advantageous for political reasons as well as for decreasing the negative externalities posed by large-scale agriculture, further perpetuating the inherent heterogeneity between local and non-locally grown produce.

*Local Agriculture in the Northeast U.S.*

Due to public support and land availability, the Northeast region of the U.S. has been aiming to expand their current local and organic food sector. New England is currently 80% forested but in the mid-19th century 75% of the land was cleared mainly for agricultural purposes (Donahue et al., 2012). The Northeast region is already following a similar trend to that of the national local food movement, with a 1.63% increase in local market shares from 2012-2013 (USDA, 2013). The increase in demand for locally grown produce has also been observed in New Hampshire, where consumers are willing to pay higher premiums for locally grown produce over options such as conventional and organically grown produce (Pyburn et al., 2016). With a growing industry and positively responsive demand, an expansion in local agriculture may be beneficial for the economic growth of the region. Though these factors indicate the perfect niche for local farming in the Northeast, the regional economic viability of local agriculture has been largely unexplored.

In terms of local agricultural production, the New England growers’ willingness and ability to expand current farming operations is not well documented. Clarity is also lacking greatly on constraints faced by farmers of the Northeast region, disallowing for accurate projections of how the local food movement will progress in the future, despite existing potential. In addition, consumer data from northern New Englanders are also lacking including; the overall willingness to pay for local produce, trends or quantifications of the existing consumer based, and overall consumer motivations, perceptions, and values related to purchasing local produce. It is also
important to understand the disconnects between the producers and consumers and start to bridge informational gaps to better facilitate the growth of local agriculture. Without understanding the economic perspectives of both regional consumers and producers of local produce, it is implausible to predict the economic benefits or the feasibility of local agriculture expansion in the Northeast region.

Despite the lack of socioeconomic quantitative and qualitative data, activism and political support for expanding local food production continues in New England (NE). The NE Local Food Visions Plan, a report from Food Solutions NE, pictures at least 50% of the region’s diet to be produced locally by 2060. This vision would require New England to become almost completely self-reliant for vegetables, using five times the current acreage for vegetable production. The NE Local Food Visons Plan also suggests New England could produce half of the regions’ fruits by 2060, which would further increase the acreage dedicated to food production (Donahue et al., 2012). In addition, legislation has been enacted in Maine, Vermont, and New Hampshire which promotes enhancing and expanding local agriculture in order to increase local job opportunities and community income (McCabe and Burke, 2012).

The probability of successfully expanding local agriculture in New England calls for a deeper understanding the regional producer and consumer facets and economic dynamics. Local production data such as, feasibility of expansion, barriers to current and future production, and a comparison of local producer and consumer views, are crucial for understanding the trajectory of local food production in the region. Previous studies conducted across the U.S. have created a foundation for understanding consumers’ willingness to pay for local food; however, willingness to pay studies in NE are limited and fail to investigate price premiums for a variety of different produce options. Additionally, a simultaneous investigation of both consumers and producers of
local agriculture in the region, has yet to be accomplished. There are many benefits to local agriculture, both real and perceived; however, understanding the level of investment expressed by both producers and consumers is vital for determining how local agriculture will progress in the northeast.

Research Questions and Approach

This research aims to better understand the qualitative and quantitative value of local and organic agriculture from the perspective of producers and consumers in northern New England. The research goals of this thesis are as follows:

1. Identify producer constraints to local farming in northern New England (Vermont, Maine, and New Hampshire)
2. Identify factors that impact producer perceptions of expanding local farming practices in northern New England
3. Understand the demand for local and organic produce in northern New England (Vermont, Maine, New Hampshire) by investigating consumer preferences and by generating willingness to pay (WTP) estimates for local fresh produce
4. Compare consumer and producer data for similarities and disconnects related to local and organic agriculture and expansion feasibility

To address these questions, this thesis will take a two-tier approach; the first tier will investigate the local agricultural producer perspectives and the second tier will investigate consumer preferences and willingness to pay for local and organic produce in northern New England. To address the first aspect of the study, focus groups will be conducted with growers from Maine, Vermont, and New Hampshire in order to gather data about local producer perspectives on production expansion and barriers faced during agricultural production. The second tier will consist of a consumer survey influenced by the producer focus groups. The
consumer survey will be sent to the residents of Maine, Vermont, and New Hampshire, and will consist of three major components: Section A, B, and C. Section A will address the participants’ current purchasing habits, general knowledge, and perceptions about local and organic produce. Section B will incorporate an econometric choice experiment, from which willingness to pay estimates can be derived for local and organically grown produce options. Lastly, Section C of the survey will investigate demographic data which will assist in understanding underlying trends of those who purchase local and organic produce in the region. Incorporated throughout the survey will be questions designed directly from the producer focus group results, in order to obtain information that can assist producers in future operational decisions. Combining the producer focus group data and consumer survey data will aid in understanding both the supply and demand for local produce in the Northeast region.

Research Impacts

Through the use of a two tier approach, this research can illuminate the regional supply and demand dynamics of local agriculture in northern New England. The producer focus group portion of the research will aid in highlighting the major production barriers to local agricultural that must be addressed to ensure successful expansion in the Northeast. These results can serve as a guide for policy and decision-making regarding regional local agriculture. Further, the focus groups will allow the growers to express their most pressing questions pertaining to consumer purchasing habits, which in turn will be investigated in the consumer survey. Investigating these specific questions can inform the farmers on subjects they find most valuable for enhancing their enterprise. The incites and views of local producers, which have been largely overlooked, can aid
understanding of what barriers need to be addressed if local agriculture is to successfully compete and progress in the region.

The consumer survey results will be instrumental in understanding how consumers value of local produce in the northeast region. Understanding consumer purchasing motivations and perceptions can inform marketing strategies and techniques to perpetuate the growth of local agriculture. Qualitative input from consumers can also assist in solving the challenges faced by local suppliers by demonstrating how local produce can improve. The willingness to pay estimates will generate dollar price premiums for a variety of different produce options, which can directly help farmers price their produce and indirectly demonstrate trends in the economic viability of this emerging market. By merging both the producer and consumer perceptions about local agriculture, the combined data will demonstrate a holistic view of the local agricultural market in the northeast region and how to overcome the systemic barriers and disconnects that currently exist.

Overview

To preface this study, a literature review is explored in Chapter II, highlighting the foundational studies and methods on which the producer focus groups and consumer surveys will be based. Chapter III describes the detailed methods to be used in addressing the producer and consumer facets of this research. The results of this thesis are described in three following chapters; Chapter IV, Chapter V, and Chapter VI. Chapter IV explores the results of the producer focus groups. The consumer survey results are presented in Chapter V and VI, where Chapter V contains the demographic data and qualitative results and Chapter VI presents the quantitative results, including the consumer willingness to pay estimates. Chapter VII concludes the thesis with a discussion and comparison of the producer and consumer results. Based on the findings presented
in the thesis, this chapter aims to reevaluate the economic implications and future possibilities of local agriculture in northern New England.
CHAPTER II
Literature Review

Literature Review Introduction

In the following chapter, previous published works pertaining to the producers and consumers of local and organic food products will be revisited. The producer literature review consists of studies across the world which aim to better understand the perceptions and constraints faced by local producers; specifically highlighting the various methods used in data collection and analysis. The literature review focusing on local consumers consists of three main components: the findings of the meta-analyses pertaining to consumer preferences and willingness to pay for local and organic food products, a detailed summary of the findings and methods of individual publications which focus on consumers’ willingness to pay for local produce in the United States, and a section highlighting the publications that investigated the willingness to pay for local products in the New England region. By cataloging the methods and findings from both the producer and consumer facets, this literature review will serve as a point of reference and justification for the methods and the analytical framework used in this thesis, as well as a point of comparison for the thesis results.

Producer Literature Review

In order to identify the constraints of local farmers in northern New England, it is important to address the pre-existing literature pertaining to this topic, including the methodologies and motivations behind the studies. To date, little research has been published documenting the
constraints faced by local farmers during seasonal production or on the constraints producers face in the wake of expansion (Griffin and Frongillo 2003; Hunt 2007). Literature that directly addresses producer constraints or perceptions mainly relates to specific programs or methods of direct marketing (eg. perceptions of community supported agriculture (CSA), or barriers when selling in farmers markets).

For example, 18 farmers from Upstate New York were interviewed by Griffen and Frongillo (2003) to understand the motivations, challenges, and views of small scale growers who sell specifically at farmers markets. The interview data were transcribed and analyzed using methods from Tesch (1990) which includes highlighting the key themes and statements reported by each farmer and comparing the results across the participants. The results suggest that the major motivators for farmers to sell at farmers markets are economic and social factors. The major constraints farmers face while selling at farmers markets are: weather, rising prices of various inputs, lack of labor, and financial barriers. The study also found that following consumer trends, competing against larger farms, competing with those who sell at lower prices, and competing with out-of-state farmers, tend to be the main marketing challenges for the farmers who sell at farmers markets. The study also suggested a variety of marketing difficulties were consumer-related, such as issues with consistent consumer volumes and consumer perception barriers.

Stephenson et al. (2008) conducted a study to identify why Oregon farmers markets fail, after noting significantly high mortality rates amongst newly established markets. Fifty of 53 famers markets (94%) were investigated from 2002 to 2005 using different qualitative and quantitative methods, including surveys and focus groups, in order to identify why these markets fail. The study suggests that some failure is due to manager inexperience, small size, low revenues, and low pay. Oberholtzer and Grow (2003) gathered similar information from producer-only
farmers markets in the mid-Atlantic region. One of the study’s goals was to identify the challenges faced by these markets, which they investigated by surveying 43 of the 57 producer-only farmers markets in Pennsylvania, Maryland, and Washington D.C. The predominant constraints were generated from the topics that surfaced most to least often, creating a more accurate and scientific representation of the farmers’ perceptions. According to the study, the topics that are viewed to limit the success of producer-only farmers markets are; space constraints, positive relationships with officials, loss of participating farms, and lack of funding.

Two local food systems (LFS) were explored by Papaoikonomou and Ginies (2003) to understand the social constructs that exist between producers and consumers. Responsible consumption cooperatives in Catalonia, Spain, and producers from CSAs in New York City, were investigated through interviews and focus groups. Though some preliminary producer data were collected, the authors did not compile a list of producer perceptions or constraints from either location. Other studies conducted on CSAs focus on producer barriers based on gender, but do not address general issues or constraints faced by the local producers as a whole (Wells and Gradwell 2001).

The benefits and constraints of alternative food networks in Chiapas, Mexico, was the focus of a publication by Bellante (2016). The study surveyed members of a Tianguis de Comida Sana y Cercana (TCSC) which translates to “The marketplace of healthy and local food”, over the summer seasons of 2011 and 2015. There were 28 surveys completed of the 31 producing families participating at the TCSC. The researchers also conducted 13 interviews with local producers at the TSCS. The transcripts were analyzed by identifying themes amongst the different participants, following methods from Secor (2010). The constraint themes that emerged were price constraints,
limited consumer base, labor requirements, climate change, and lack of Cooperative Extension resources.

Some studies hypothesize the possible constraints that could emerge from alternative food markets or local agriculture, but fail to collect primary data from producers (Allen, P. 1999; Mount, P. 2012). Similarly, studies have created models that hypothesize a region’s ability to meet local caloric needs based on land availability, population, and dietary requirements, but do not consider the local producers’ perceptions in their models (Donahue et al. 2013, Giombolini et al. 2011). Giombolini et al. (2011), does acknowledge that their model does not include the perception or feasibility of expansion from the farmers’ perspective and lists this as one of the study’s limitations.

The lack of literature considering producers’ perceptions and constraints when creating projections for local agriculture is a key motivation for the first tier of this study. Identifying and documenting producer constraints that hinder expansion efforts along with investigating information that can better assist producers in their local agricultural endeavors, are additional goals of this study. These goals must be addressed when aiming to enhance local agriculture on a regional and national level. This research also aims to report qualitative information in an organized and cardinal manner to facilitate future cross-state comparisons and to inform decision-making when addressing the needs of local producers.

Consumer Literature Review

The preliminary studies investigating consumer preferences and and willingness to pay for organically produced foods date back to the 1970’s. Most of the initial studies investigate qualitative data such as consumer motivations for purchasing organic products. In more recent
years, studies have added quantitative econometric components to generate willingness to pay estimates (Yiridoe et al., 2005). Likewise, early studies investigating the demand for locally grown products were published at about the same time as the majority of the organic studies, some of the earliest dating back to the 1980’s (Adams and Salois, 2010). Similar to the primary organic studies, the local research initiatives mostly investigated qualitative data pertaining to local consumers’ preferences and demographics (Whetherelle et al., 2003; Curry et al., 2002; Padel et al. 2005; Chambers et al., 2007). The empirical qualitative data were collected mainly using consumer surveys, existing census data, or focus groups. The reports drew general qualitative conclusions, which eventually lead to analyzing and reporting using qualitative analysis software. Shortly after, studies emerged with more sophisticated methods of capturing consumer welfare and estimating price premiums for local products.

A large body of literature has been published documenting how consumers perceive local and organic foods and products. A meta-analysis conducted by Yiridoe et al. (2005) analyzes 27 studies with the aim of better understanding the factors that motivate organic food consumers. The meta-analysis supports that food safety, nutritional value, food quality, environmental quality concerns, low pesticide use, and animal welfare, are the top considerations for organic buyers. Similar findings are reported by Adams and Salois (2010) in their meta-analysis, which compares consumer preferences for both organic and local food options. The results support that overlaps exist between the perceptions of local and organic foods, when compared to conventionally produced products. The analysis suggests consumers view organic and local products as environmentally friendly, contributive to a positive impact on the community, support local farmers, and support animal welfare.
Many of the studies investigating consumer preferences for local and organic food also contain a willingness to pay component, though, this is slightly less prevalent in the literature. Yiridoe et al. (2005) investigated 16 organic studies that have a willingness to pay component and found that estimates vary, with price premiums ranging from 5% to 100% for organically produced products. Additionally, a meta-analysis by Xia and Zeng (2008) indicates that the average price premiums consumers are willing to pay for organic products range from 5% to 60%, after reviewing 92 willingness to pay estimates from 33 studies. Of the studies reviewed by Xia and Zeng, 28.3% of the studies suggest that consumers are willing to pay a 5-10% price premium, 19.6% are willing to pay a 10-20% price premium, 16.3% are willing to pay a 20-30% price premium, and 18.5% are willing to pay a 30-60% price premium.

To date, there are a handful of meta-analyses that review the willingness to pay for a product that is locally or regionally produced. Deselnicu, Constanigro, Souza-Monteiro, and Thilmany McFadden (2013) analyzed the findings of 25 studies on relative willingness to pay for Geographical Indications (GI) across different food products. The aggregate findings suggest that price premiums for GIs are highest for grains, fruits, vegetables and agricultural produce with small supply chains, low input processes, and produced with a higher number of producers, such as farmers. On the other hand, GIs with lower price premiums pertain to products such as wine, olive oil, and cheese products with long supply chains and products produced by larger food industries.

Adams and Salois (2010) suggest that consumers are willing to pay a price premium for local and organic food when compared to their non-local and conventional counterparts grown food, but the price premiums vary from study to study. The authors rated the studies that reported statistically significant price premium for local products on a spectrum from “weak” to “strong”.
For example, one study reporting a “moderate” price premium suggests that 43.4% and 52.7% of consumers are willing to pay 5% more for organic and local products, respectively. Another study suggests 72% of consumers are willing to pay a 17% price premium for locally grown products. The “weakest” price premium found in the meta-analysis suggests that only 50% of consumers are willing to pay a premium for local tomatoes. On the other end of the spectrum, one study suggests 42.8% of consumers are willing to pay at least 10% more for a locally produced product.

The meta-analysis by Adams and Salois also addresses the differences in price premiums commanded by locally grown products in comparison to those commanded by organically produced products, to isolate differences between these emerging markets. Adams and Salois report a change in willingness to pay, suggesting consumers are willing to pay higher premiums for locally grown food compared to organically grown food. This finding is based on six studies which indicate a moderate to strong preference for locally produced foods over their organically produced counterparts. For example, one study suggests consumers are willing to pay 32.8% more for the locally produced product over the organically produced alternative.

As Adams and Salois summarized, a shift in consumer demand was captured in studies published in the early 2000’s, suggesting consumers are willing to pay higher premiums for locally grown produce over options such as natural, non-Genetically Modified Organism (GMO) food, and organically produced products (Loureiro and Hine, 2002; Bond, Thilmany, and Keeling-Bond 2008; Costanigro et al., 2011) The studies that compare willingness to pay estimates across different food attributes, mostly follow stated preference methodological frameworks including: choice experiments, conjoint analysis, or contingent valuation.

In Colorado, Loureiro and Hine (2002) investigate residents’ willingness to pay for GMO-free, organic, and local potatoes using a probit payment card method. The survey prompts the
responder to report a percent mark-up they would be willing to pay given that potatoes are either “Colorado grown”, GMO-free, or organically grown. The percent mark-ups were in per pound increments and listed as follows; $0, less than 5 cents, between 5-10 cents, between 11-15 cents, 16-20 cents and more than 20 cents, given that the potatoes had a base price of $1.00/lb. This method, as opposed to a dichotomous choice model, allows for an in-depth analysis of willingness to pay for products based on the perception of their attributes. The data included 437 usable surveys completed by customers shopping at 2,000 supermarkets around the state. The study concludes that, on average, people are willing to pay about a 5% premium for Colorado Grown produce, compared to a 3% and 0.1% mark-up for organic and GMO-free potatoes, respectively. This bounded probit model also demonstrates that the customer’s age, preconception of freshness, and perceived nutritional value, impacts willingness to pay for the three different choice options.

Carpio and Isengildina-Massa (2009) investigate the willingness to pay for products labeled “South Carolina grown” to better understand the percent price premium for this attribute and the sociodemographic characteristics that impact this purchasing decision. The authors use contingent valuation methodology by implementing a dichotomous choice survey to investigate consumers’ preferences for local produce and local animal products. The maximum log-likelihood results suggest that consumers of South Carolina are willing to pay an average price premium of 27% and 23% for local produce and/or local animal products, respectively, as opposed to conventionally produced options. The study also suggests that sociodemographic factors such as age, gender, and income, along with consumer perceptions, such as product quality, local supports of the local economy, and local produce aids local farmers markets, impact local purchasing habits.

Further, James et. al (2009) uses a contingent valuation method to explore the disparities in willingness to pay for various applesauce options in Pennsylvania. The mail survey prompted
residents to compare apple sauces which differed across various attributes, such as nutritional content, fat content, locally grown, and organically grown. The data were analyzed using a multinomial logistical regression. Results suggest that residents are willing to pay more for the locally grown applesauce over organically grown, low sugar, and low fat options. The analysis also considers consumer characteristics when determining their propensity to purchase applesauce products, suggesting that increased knowledgeability about agricultural practices decreases willingness to pay for the locally and organically produced applesauce choices.

A conjoint choice experiment by Darby et al. (2008) concluded that consumers are willing to pay a higher price premium for locally grown strawberries when compared to strawberries grown in other locations across the United States. The experiment took place in 17 different direct and indirect market locations across Ohio, where 530 respondents were intercepted to participate in the study. The participants were given a laptop which presented two identical pictures of strawberries in single-quarts, both accompanied with a caption which listed their hypothetical attributes. The attributes included; produced either in the U.S. or “nearby”, produced either by a corporation or a local farm, the time harvested, and a price ranging from $2.00 to $4.00, increasing in $0.50 increments. Each shopper repeated this choice process for a total of eight responses per individual. Based on the 80 randomized options, the data were in full-factorial experimental form which lends itself to an additive linear utility function which can identify differences in consumer perceptions according to purchasing location. Data were analyzed using a binary probit model and maximum likelihood procedure. The results support that, overall, consumers are willing to pay a price premium for local strawberries. Furthermore, results suggest that the location of the purchase also impacts consumers’ willingness to pay, where people buying in grocery stores are willing to pay a premium of 64 cents, while consumers intercepted at farmers markets are willing to pay a
$1.17 price premium for the locally produced strawberries over their non-locally grown counterparts.

Adalja et al. (2015) investigated the willingness to pay for local food from three individual groups: Maryland residents who participate in a buying club, residents who purchase food from a non-specialty supermarket, and a random sample of Maryland residents. The authors used a conjoint analysis which incorporates a hypothetical survey with product choice sets and a non-hypothetical in-store conjoint questionnaire. After analyzing the data using a conditional logit model, results suggest differences exist between two of the groups; the random sample of residents are willing to pay higher price premiums for local products while the buying club is willing to pay less for locally grown products.

Hu et al. (2009) used an in-store conjoint experiment survey to analyze willingness to pay for three different attributes over a variety of blueberry products. More specifically, the authors investigated consumers’ willingness to pay for sugar free, organic, and local attributes. The study was conducted in Kentucky supermarkets, where consumers were intercepted and asked to participate in the survey. Six conditional logistic and mixed logistic models were conducted for each of the different blueberry products. The results suggest that the Kentucky consumers are willing to pay price premiums for all the of the attributes; however, the magnitude of the premium depends on consumer’s own characteristics. In many of the different blueberry products, the price premium for “Kentucky-grown” is higher than the price premium commanded by organically produced blueberry products.

Constanigro et al. (2011) conducted an in-store field experiment in order to mimic the process of purchasing fresh produce and to collect the most accurate sample of the population when assessing consumers’ willingness to pay for organic and local apples. Data were analyzed
using an alternative-specific conditional logit model, which included three different gift bundles. Participants were given three different “gift” options in exchange for their participation in the study, which consisted of either a pound of Gala apples, distinguished as nonorganic-local, organic non-local, or non-local organic apples with a sum of money. There was also an opt-out option for those who did not wish to purchase apples. The experiment was also accompanied by a questionnaire which captured consumer demographic data. The results of 299 participants suggest that consumers are willing to pay higher premiums for local Gala apples compared to organic options, with price premium estimates of $1.18 per pound and $0.20 dollars per pound, respectively.

Onken, Bernard, and Pesek (2011) conducted a consumer choice experiment to understand consumer preferences and willingness to pay for locally grown strawberry preserves, produced either organically or naturally. The study took place in five Mid-Atlantic states: Delaware, New Jersey, Maryland, Pennsylvania, and Virginia. The study uses choice modeling with 6 different choice sets, 12 outcomes in total. The choice sets included a location attribute (local, non-local), a state promotion attribute, a method of production (natural or organic), method of marketing (farmers market or grocery store), and one of four prices ($2.99, $3.99, $4.99). Data were collected through paper surveys mailed to residents of each state, 1,000 per state. The response rate was 39.6% and data were analyzed using a D-optimal conditional logit model. The results suggest that, in all five states, locally grown and state promoted products command the highest price premiums. The study also suggests that people are willing to pay greater premiums for locally grown preserves purchased from a farmers market compared to those purchased at a grocery store. Organic preserves were also noted to be preferred to naturally produced products; however, the demand for local is much more evident.
Onozaka, Nurse, and Thilmany (2011) conducted a consumer choice experiment to better understand the willingness to pay for different produce attributes on a national level. Data were collected using a web based survey, delivered through a private company which solicited the primary shoppers of the household. The choice experiment used apples and tomatoes as their model produce paired with attributes such as: certified organic, certified fair trade, a measure of carbon emitted from production, locally grown, domestically grown, imported, and per pound unit prices ($1.49,$1.89,$2.29,$2.69,$3.09,$3.49). Consumer choice data were analyzed using the panel mixed logit (PML) estimation, based off of the random utility framework. This study also controlled for consumer perceptions through psychometrics, which investigates the participants’ current views on local and organic products, which was then incorporated into the utility model. Participants were also placed into groups in order to assess differences between alternative methods of purchasing fresh produce, whether it be direct from farmer, from a health store, from a grocery store, etc. The results suggest that willingness to pay is generally greater for tomatoes, for purchases made directly from a producer, and for the locally grown option, respectively. However, the findings also support the magnitude and significance of willingness to pay estimates vary across purchasing methods.

Yue and Tong (2009) used a consumer choice experiment to investigate consumer willingness to pay for organic and locally grown produce in Minnesota. The authors use a hypothetical and non-hypothetical component in this study, the latter of which, has the participant pay for the choice selected in the experiment. Results of the logistic model suggest that the willingness to pay for organic and local products are about the same in magnitude, with about a 60% price premium for both attributes, in comparison to their counterparts. The authors also report
that sociodemographics impact consumers’ decisions when choosing between the two product attributes.

New England Studies

Though there have been a plethora of studies investigating demand for local and organically grown produce across the U.S., few studies have been conducted in New England, specifically. One study published in 2005 by Giraud, Bond, and Bond, focuses on willingness to pay for local specialty items in Maine, Vermont, and New Hampshire. The survey uses a basic binary choice model that offered participants the option of purchasing a locally made specialty product, such as: cookies, salsa, or maple syrup, compared to a non-local option. An opt-out choice was also offered. The two products were first presented to the consumer as of the same quality and price, of either 5 dollars or 20 dollars. A follow-up question prompts those who chose the local option if they would still choose this option given that they would have to pay a price premium. The price premium ranged from one to five dollars. The survey was distributed through standard mail practice, following the Dillman Tailored Design Method (Dillman 2000). This method includes an announcement letter, the survey itself with a dollar bill attached to the cover, a reminder postcard, followed by another paper survey. The survey was sent to 500 New Hampshire residents as a pre-test and had a response rate of 59 percent. After the success of the pilot study, the research initiative expanded to Maine and Vermont with 1000 additional surveys, 500 per state, each of which received response rates greater than 57 percent. The summary statistics describe the respondents as mostly male, attained a higher level of education, and were of the higher income brackets, when compared to the general population. The average survey respondent was also older than the population in each state by about 20 years. Of those who responded, over 90% stated they
had previously purchased local agricultural products and over two-thirds said it was convenient to purchase state grown products. However, those surveyed found local specialty products to be less convenient to purchase, overall. Results show that those who answered the survey overwhelmingly chose to pay for the specialty product over the non-local product, given they were the same price and quality, with 84.6% – 96% and 80.6% - 91.3% of state respondents choosing the local item for the 5-dollar and 20-dollar priced options, respectively. The researchers ran two types of models, a linear and a multiplicative model, to determine willingness to pay price premiums for the local goods. The linear model results suggest a non-significant price premium for the pooled data at the 5-dollar level, contrasting with the multiplicative model, which demonstrates a premium of $1.02, significant at the 5% level for the 5-dollar priced option. When analyzing the 20-dollar specialty good, Vermont and Maine responses were pooled and the New Hampshire data was analyzed by itself in both models. The linear model results support that the Maine and Vermont residents were willing to pay a $2.06 premium for the $20 specialty product and the multiplicative model shows a slightly lower premium of $1.84. The linear model for New Hampshire suggests residents are willing to pay a $1.91 premium for the $20 local product or a $1.71 premium as a result of the multiplicative model. These findings are significant at the 5% level. The paper concludes that local specialty products can be priced slightly higher without losing sales as demonstrated by the willingness to pay estimates.

As a prelude to this thesis, a pilot study was conducted to investigate consumer preferences for local produce in New Hampshire. The study aimed to investigate the willingness to pay for fresh green beans, snap peas, and cucumbers, when associated with a variety attributes. The attributes relate to method of production, region of production, method of distribution, appearance of the produce, and the price of the produce. The survey also investigated pertinent consumer
preference data and consumer demographic data to better understand New Hampshire residents’ values when purchasing fresh produce. The data collection method, however, differs from the methods used in this thesis. The pilot study purchased a panel of participants using the survey company Qualtrics©. This particular electronic method is not a random sample of the New Hampshire population, but a convenience sample. The survey solicited the primary shopper of each household and as a result, the respondents were mostly women (~70%) which is consistent with other studies’ findings (Zepeda, 2009). On average, respondents had a slightly higher educational attainment level, were from households with slightly lower average incomes, and were moderately older than the state population. The overwhelming majority of respondents bought local produce in the last year (> 90%) while only about 60% bought organically grown produce in the last year. According to the respondents, the top reasons for purchasing local foods are: healthy eating (69.6%), overall quality of local produce (71.6%), and supporting local farms (81.1%). The two main motivations for consumers to purchase organic produce related to healthy eating (65.9%) and lower contact with pesticides (57.8%). Additionally, the participants were asked to rank the importance of the following when purchasing any type of fresh produce; that produce is locally grown, organically grown, grown in the country, grown without pesticides, grown to support the local economy, and grown to maintain local farmland. All of these attributes, except for organically grown, were considered important or very important to the consumers.

Results from the conditional logit estimates suggest that the attributes “local” and “price” are the only attributes significant across all three types of produce, significant at the 99% confidence level. The organic attribute is significant for green beans and cucumbers, but not snap peas. Appearance is significant for snap peas and cucumbers but not green beans. Locally grown green beans, snap peas, and cucumbers command a statistically significant price premium of
approximately 35, 30, and 55%, respectively, above market price. Organic green beans and cucumbers demonstrate a significant premium of 32 and 30% compared to market price, along with with a 33 and 39% mark-up for snap peas and cucumbers without blemishes.

As an ancillary component of the pilot study, research was extended to Massachusetts to understand if differences or similarities exist between the two states in residents’ willingness to pay for local produce (Shi, Halstead, and Huang, 2016). A similar convenience sample was conducted with the assistance of the Qualtrics© online survey platform. Price premiums show differences in both magnitude and significance between the two states. For example, the conditional logit results suggest a 58% mark-up for local green beans and a 35% mark-up for local snap peas over their non-local counterparts from the consumers in Massachusetts. Local cucumbers command no significant price premium in Massachusetts, though opposing to New Hampshire where local cucumbers commanded the highest price premium of 55%. Local green beans also command a significantly higher price premium from Massachusetts residents compared to the price premium willing to be paid by New Hampshire residents, with mark-ups of 54% and 35%, respectively. Additionally, results suggest Massachusetts residents are willing to pay a price premium for organically grown green beans (34%) and cucumbers (23.97%) but none for snap peas.

Summary of Consumer Willingness to Pay Literature

In summary, all but one of the studies and meta-analyses reviewed in this thesis indicate consumers are willingness to pay a higher price premium for locally produced products over those which are non-locally produced or organically produced, with price premiums ranging from 5 to 96%. The study by Yue and Tong (2009) suggests that the price premiums commanded by locally
grown produce and organically grown produce are about the same (60%) when compared to their conventionally grown alternatives. Of the studies reviewed, the organic premiums reported range from 5 - 100%.

In addition, locally grown produce commands a higher premium over additional options such as natural, non-GMO, low sugar, and low-fat. A handful of studies also suggest that consumers are willing to pay higher price premiums for produce sold directly from the farmer or at farmers markets when compared to willing to pay estimates derived from local food sold at a grocery store (Onozaka, Nurse, and Thilmany, 2011; Onken, Bernard, and Pesek, 2011, Darby et al. 2008). The studies that included psychometrics, demographic, or sociodemographic elements state that these factors influence the consumers’ willingness to pay for locally grown produce. These studies will inform the methods used in this thesis, as well as serve as a point of reference when interpreting the thesis results.
CHAPTER III
Methods

Methods Introduction

A variety of methods and analytical tools were used in order to evaluate the economic viability of local agriculture in northern New England. A two-tiered analytical framework was implemented to separately investigate the producers and consumers of local agriculture in the northeast region. This chapter describes the methods and analytic tools used in this thesis. First, this chapter describes the methods used to investigate the constraints and viewpoints of local farmers of northern New England, consisting of producer focus groups and qualitative software analysis. This chapter then describes the consumer-focused methods, including the consumer survey used to identify consumer preferences and to generate willingness to pay estimates for local produce in the region. The consumer section is prefaced by a theoretical introduction, describing the previous econometric models and theories commonly used in consumer willingness to pay studies. The econometric model used in the thesis is then described in detail, followed by the method of data acquisition through the use of the consumer survey. The following chapter describes the detailed methods used to answer the thesis research questions, previously described, and gives context for interpreting the results presented in Chapters IV, V, and VI.

Producer Focus Groups

In order to investigate the perspectives of local growers from northern New England, a series of focus groups were conducted during the late winter and early spring of 2015/2016. Focus
Focus groups facilitate face-to-face dialogue, encouraging the expression of unique perspectives from an array of individuals who share a commonality on a particular research topic of interest (Morgan, 1996; Krueger, 1988). Focus groups have a long and diverse history when it comes to research and inquiry, used in a variety of disciplines such as medicine, marketing, and sociology. Though group discussion research has been used since the 1920’s, the creation of focus group work is largely attributed to Robert Merton and his sociological research on "focused interviews” conducted in the 1940’s (Morgan, 1996). Merton highlighted his novel work in a 1987 publication and in the years that followed, focus group guidelines and pedagogy were published by Krueger (1988) and Morgan (1988). These publications have since become the primary texts for focus group research techniques (Morgan, 1996). Inquiry using focus groups allows for a richer and more complex understanding of topics of interest, with deeper explanations that would not be revealed in questionnaire or survey format (Krueger 1988, Kamberelis and Dimitriadis, 2013). In a focus group setting, the interaction between individuals allows for a natural discourse as opposed to a controlled experiment. The flexibility, low costs, and fast results of focus groups are also valuable for various situations such as strategic planning (Krueger, 1988). Like any research method, there are some shortcomings associated with focus groups. Interpretation of any qualitative data is viewed as problematic because data is perceived in a particular way by the researcher conducting the analysis. This is often called, “experimenter’s bias”. Additional criticisms involve the group setting itself— which some argue may not incite unique perspectives, but encourage individuals to agree with others based on social acceptance instead of independent thinking. Focus groups require skilled facilitation such that bias is not introduced during the focus group sessions, adding additional complexities in the data collection process. Despite these
challenges, focus groups offer a rich method for collecting qualitative data and for that reason, focus groups were used in researching the local farmers of northern New England. The focus group method offers the best pathway for categorizing producer perspectives and also in informing the larger consumer survey.

The focus group participants were recruited through pre-existing email and phone lists attained with the assistance of the Cooperative Extension agents from the University of Maine, the University of New Hampshire, and the University of Vermont. The participants were identified as growers and producers who are actively selling fruits and vegetables through direct marketing methods (e.g. farm stand, CSA, farmers markets).

The producer focus group sessions lasted about an hour and a half and varied in the number of participants (n = 4 ~ 14). The focus group sizes were guided by Krueger (1988) to ensure diverse, yet accessible, speaking forums. To further ensure that all opinions were voiced, the focus groups were led by a trained facilitator or professor who guided the discussion and encouraged participants to express an opinion for each of the following questions:

1. What are the main/current obstacles you face when running your operations?
2. What considerations go into deciding what production practices and methods to use?
3. What is the best fresh produce grown for direct marketing?
4. What information about consumers’ fresh produce purchasing habits would be most useful to you?
5. What are the obstacles you would encounter if you decided to expand your operations?

A total of six focus group sessions were conducted with the participation of 50 vegetable and fruit growers from Maine (n = 24), Vermont (n = 12), New Hampshire (n =13), and New York (n = 1), illustrated in Figure 1. The first three sessions were held at the 2015 New England Fruit
and Vegetable Conference in Manchester, New Hampshire, where over a two-day period the focus groups were conducted with a mixture of participants from all participating states (n = 8, 8, 4). The last three focus groups were separated by state and were held at the Unity Maine Food Hub (n = 14), the New Hampshire Farm Bureau in Concord (n = 5), and at the Northeast Organic Farming Association Winter Conference in Vermont (n = 11).

Figure 1. Geographic Distribution of Producer Focus Group Participants. Illustrating the residencies of the producer focus group participants (n = 48). Map generated using the town names provided by the participants.

The use of human subjects was approved by the University of New Hampshire Institutional Review Board for the Protection of Human Subjects in Research (IRB) (Appendix A). In accordance with the IRB, each participant read and signed a document explaining their rights as a participant, the purpose of the study, participant anonymity, and the use and handling of the collected qualitative information. Along with the participant agreement form, focus group attendees were given a short questionnaire to collect their zip code, gender, and information about...
their farming practices not directly investigated during the focus group session, found in Appendix B.

*Producer Focus Groups: Data Analysis*

Electronic and hand-written transcripts were recorded during the six focus group sessions. Researchers were careful to record the discussion verbatim and to note the speaker, in order to preserve the richness of the discussions. The transcripts and questionnaire data provided by each individual were later uploaded into the qualitative software, Atlas.ti®, for analysis. Guided by Friese (2014), the analysis incorporated thematic coding of the salient topics revealed in the transcripts. Each of the participant’s answers were summarized in a concise synopsis, which will hereafter be referred to as a code. Once each question’s responses were coded, the researcher then identified the emerging code themes for each question and categorized the codes into broader groups.

Qualitative analysis software facilitated the generation of a cardinal representation of the voiced comments for each theme, which accurately demonstrates the most frequently mentioned concepts. Measures were taken to avoid reporting a code mentioned by one participant multiple times in a single question, which would inflate the importance to that specific code. Some participants were excluded from the analysis, due to their lack of responses, and therefore failed to adequately represent their views. This resulted in a total of 48 participants used for the analysis.

Convergence, or identification of the dominating themes that emerged for each question, were examined over the course of the research. This included using different sample sizes to identify if new ideas emerged from the additional discussions or if an equilibrium had been reached. We call this novel technique, tracking convergence, and it is best represented by pie
charts, as illustrated in Figure 2. This method not only quantitatively reports emerging themes, but ensures an accurate consensus has been established even as the sample size increases, elevating the overall confidence in the focus group conclusions. The focus groups not only aid in answering the set research questions, but also in influencing the second tier of the research—the consumer survey. With the producers’ input, this research will answer crucial questions, unique to local producers and the northeast region.

Figure 2. Tracking Focus Group Convergence Over Increasing Sample Sizes. Dominating themes of the focus group discussions were analyzed over different points of the sampling period to understand if ideas were changing or if convergence had been reached. When asked what the major constraints are while running farm operations, farmers responded with the same themes as when the sample size more than doubled. (n = 20 to n = 48, for a & b respectively).

Consumer Survey Methods and Design

Introduction to Consumer Methods

The following section describes the methods used to investigate the consumers’ preferences, values, and willingness to pay for local and organic produce in northern New England.
The section is prefaced with background information on willingness to pay theory which introduces the fundamentals of willingness to pay along with the most common methods used for willingness to pay research. This is followed by an explanation of the econometric model used in this thesis, discussing the theory and the techniques used in the analysis phase. This leads to a description of the methods used in deploying the econometric model via a consumer survey. This includes a description of the survey platforms, sampling distribution, sample size, and an in depth description of the survey features. This section marks the conclusion of the methods used in this thesis and will be followed by the results chapters.

Willingness to Pay Theory

Willingness to pay and consumer choice models are based on the fundamentals of consumer theory. First, it is assumed that all individuals aim to maximize their linear utility function through the consumption of composite goods or the use of services. No local satiation is assumed, such that an increase in consumption results in the consumer being better off. The good itself is a function of multiple attributes of varying value to the utility maximizer. Thus, a good’s utility is derived from the compilation of the product’s attributes, which is the basis of hedonic price theory as described by equation 1:

\[
U = \{ f (x, z, P(z)) \},
\]

Where utility, \( U \), is a function of \( x, z, \) and \( P(z) \). Note \( x \) is a 1x\( K \) vector describing a consumer’s personal characteristics that may influence individual preferences for a good’s specific attributes, \( z \) is a vector of the good’s own attributes, and \( P(z) \) is the market price for that specific good. In consumer theory, the consumer will aim to maximize their utility with respect to a budget constraint, \( m \), shown in equation 2,
Max $U = U(z_1, z_2, ..., z_n)$ s.t. $m = \sum P_n z_n$, \hspace{1cm} (2)

Where utility maximization is a function of the different products consumed, $z_n$, subject to the budget constraint, $m$, which is limited to the summation of the corresponding prices and quantities of each good consumed. Graphically, this creates a point of tangency between the budget constraint and the affordable bundle of goods. With the theoretical foundation of consumer theory and utility maximization, consumer welfare and willingness to pay estimates can be derived.

Consumers are also theorized to have a demand schedule which describes the relationship between the prices a consumer is willing to pay for different quantities of any given good, generating a demand curve. In most cases (besides Giffen goods or luxury goods), the demand curve slopes downward for individual and aggregate demand. The inverse demand curve is known as the consumer’s marginal willingness to pay, where the relative equilibrium prices are determined by the quantity of the good demanded. Market prices set below the consumer’s maximum demand schedule price, results in consumer surplus, which is one of the most rudimentary methods of understanding consumer welfare (Goodwin et al. 2015).

A more informative method used to interpret consumer welfare is through willingness to pay measures, stemming from compensating valuation or equivalent valuation. Willingness to pay models the consumers’ maximum utility, which is held constant, as a change in the product’s attributes or price is instituted. The estimation of willingness to pay varies in both data acquisition and in analysis techniques, modeled in Figure 3. One can obtain information on consumer valuation of a product and its corresponding attributes, directly, by studying secondary sales data or through controlled experimentation. This methodology is called revealed preference. Consumer welfare can also be studied through the creation of hypothetical scenarios that mimic marketplace settings. This technique is known as the stated preference method.
Revealed preference is often useful because it uses real data either primarily collected from the population of interest or through the use of secondary market data. However, revealed preference can be problematic for emerging markets which may not have the systems in place to collect extensive sales data. Experiments are beneficial because they replicate the marketplace setting, however, the results can be biased due to the specificity of the questions being investigated (Breidert et al., 2006). Experiments are also often time-intensive and costly.

Stated preference is often used to decrease the costs posed by revealed preference methods while still investigating specific questions and populations of interest. There are two main categories of surveys used in stated preference, direct and indirect. Direct surveys use a straightforward approach which asks the consumer, directly, what they would be willing to pay for a product. This method is often criticized for the bias introduced by consumers, such as protest bids and cognitive bias. The indirect survey method attempts to mitigate this issue by creating specific choice sets for the consumer which prompts the consumer to compare and choose the most preferable “bundle”, rather than generate a willingness to pay estimate themselves. In this thesis,
indirect survey methods will be discussed in more detail, due their prevalence in the related literature.

One use of the indirect survey method is to implement conjoint choice analysis. This type of analysis relates, again, to hedonics where a good is represented by a variety of attribute levels. Each hypothetical product has a profile of attributes which vary across the different choice options. The consumer is presented two options at a time and must choose the most preferred hypothetical product bundle. The choice analysis employs a systematic randomization of the attribute levels and products in order to assess the preference for each attribute of interest, individually. This method is useful for understanding the preferences for a good’s specific attributes, also referred to as part-worth assessment. By including a price attribute level into the product profiles, conjoint analysis can also generate willingness to pay estimates. There are a variety of theoretical linkages from conjoint analysis to willingness to pay, such as the use of reservation prices described by Kohli and Mahajan (1991). After being presented the product profiles, an individual \((i)\) choses the following (equation 3):

\[
U_{it} + U_i(p) \geq U^*_{i} + \varepsilon
\]  

Where \(U_{it}\) is the utility with respect to a good’s \((t)\) attributes, excluding price, and \(U_i(p)\) is the utility contributed by the price of good \(t\). Lastly, \(U^*_{i}\) is the current maximum utility yielded by the consumer’s feasible choice set and \(\varepsilon\) is an arbitrarily small positive number demonstrating the random aspect of utility. Because the consumer weakly prefers good \(t\) to the current utility maximum, the reservation price of good \(t\) is represented by the variable \(p\), also known as the marginal value of good \(t\) over the current most preferred set. This allows for the reservation price to be distributed normally with a known variance and a central tendency. With the probability
density function known, statistical inference and hypothesis testing can be conducted. This method assumes that there is a product that all consumer would accept to reach their max utility level and thus, a price currently paid. Critics, such as Jedidi and Zhang (2002), argue that this assumption leaves no room for expansion or contraction in the market and that the price of the good is always less than the utility attained, which always results in a willingness to pay estimate.

Discrete choice analysis, also called choice-based conjoint analysis, is alike to conjoint analysis in the sense that it allows products to be modeled as compositions of their attributes and allows the consumer to choose between two product profiles. The two methods differ, however, in their construct of consumer utility, where discrete choice analysis aims to estimate the latent utility structure of the consumer. More specifically, in discrete choice analysis the utility for each preferred choice is comprised of two parts, a deterministic aspect and a non-deterministic aspect. The deterministic aspect includes the latent utility, which is a combination of interpersonal heterogeneity and individual preconceived notions about the product profile, while the non-deterministic aspect is categorized as the random fluctuation in consumer preference which cannot be measured, also known as the error term. This lack of knowledge on the latent utility of a consumer leads the choice preference to be modeled as probability, best described by probit or logistic models. Willingness to pay estimates can then be derived using the price attribute and the change in utility resulting from the selection of a particular bundle, also known as the opportunity cost of choosing one attribute over another choice attribute. Revisiting the underlying theory of consumer utility and consumer willingness to pay creates the methodological foundation for accurately investigating consumers’ willingness to pay for local and organic produce in northern New England.
**Econometric Model**

Discrete choice stated-preference models are used to analyze a decision-maker’s choice among various alternatives, where a respondent’s utility is assumed to be a function of both deterministic and stochastic components, following random utility theory. The deterministic component of the utility function is assumed to be a linear function of choice attributes, the price of the choice, and individual-level characteristics. Equation (4) below represents a utility index for decision-maker \( i \) who chooses choice alternative \( j \),

\[
U_{ij} = \beta'x_{ij} + \varepsilon_{ij},
\]

where \( U \) is the utility of individual \( i \) derived from choice \( j \) and \( x_{ij} \) is a vector of observable characteristics that may influence an individual’s preferences towards a good’s specific attributes. The coefficient, \( \beta \), is a vector of coefficients and assumed constant across different choice alternatives, and \( \varepsilon_{ij} \) is a normally distributed error term. The consumer will only choose the bundle that maximizes his or her utility, which can be modeled as a probability of choosing one bundle over another,

\[
\pi_{ij} = \Pr(U_{ij} > U_{ih}), \forall j \neq h
\]

Equation (5) above demonstrates that the consumer \((i)\) will choose bundle \( j \) over bundle \( h \) if the utility derived from bundle \( j \) is greater than that derived from bundle \( h \). Thus, \( \pi_{ij} \) is the probability that the decision-maker, will choose bundle \( j \) over the alternative bundle \( h \).

Following McFadden (1974), the alternative-specific constant (ASC) conditional logit model has become the standard econometric technique for analyzing discrete choice data. Under the assumptions of preference homogeneity and Independence from Irrelevant Alternatives (IIA),
the probability of consumer $i$ choosing bundle $j$ is as follows:

$$
\pi_{ij} = \frac{\exp (\beta^T x_{ij})}{\sum_{m=1}^J \exp (\beta^T x_{im})}
$$

(6)

Where $\pi_{ij}$ describes the probability of individual $i$ choosing bundle $j$ given all other alternative choices, where $x_{ij}$ are alternative-specific regressors. When the utility function in (4) is specified as linear among choice attributes, welfare measures can be calculated using equation (7).

$$
WTP_i = \frac{\ln \left( \sum_{j} e^{\beta x_{ij}^{(2)}} \right) - \ln \left( \sum_{j} e^{\beta x_{ij}^{(1)}} \right)}{-\beta_p}
$$

(7)

Here, $x_{ij}^{(1)}$ and $x_{ij}^{(2)}$ are two states of alternative choice attributes and $\beta_p$, the coefficient on the price attribute, is interpreted as the marginal utility of income and is assumed to be constant for all individuals. This results in a willingness to pay estimate for individual $i$, given the tradeoff between two choice attributes.

**Survey Methods**

To investigate consumer preferences for organically and locally grown produce in northern New England, a discrete choice analysis was implemented through the use of a consumer survey choice experiment. The consumer choice experiment varies four binary produce attributes across six different produce options, to create unique hypothetical product “bundles”. The consumer is to compare the two hypothetical bundles, also known as a choice set, and choose the most preferred bundle. Each bundle has different attribute “levels” which vary in order to identify differences in consumer preferences for each of the attributes investigated. In many cases, the good’s own-price
is an attribute, from which willingness to pay estimates can be derived. The difference between choosing one choice alternative over its binary counterpart can be examined as the opportunity cost or the marginal rate of substitution between options, resulting in a willingness to pay estimate.

A pilot study of the survey was published by Pyburn et al. (2016), where the survey was tested on a convenience sample of New Hampshire residents in 2014. The survey was distributed through the online survey platform Qualtrics®, and consisted of three basic components: an investigation of consumer knowledgeability, perceptions, and current purchasing habits pertaining to local and organic produce; the consumer choice experiment; and collection of sociodemographic data. After successfully conducting the convenience sample, the study site was expanded to Maine and Vermont, along with additional sampling in New Hampshire. Additionally, for this thesis the sampling methods were also altered from a convenience sample to a random sample. The number of produce options investigated in the consumer choice sets was also expanded from three produce options to six produce options.

The revised survey investigates regional consumer preferences for snap peas, green beans, carrots, tomatoes, strawberries, and cucumbers. The additional produce options were chosen as the result of the producer focus group results conducted with local farmers from Maine, Vermont, and New Hampshire in winter/spring of 2015/2016 (n = 48). From these focus groups, producer input was considered to formulate new questions and to identify which produce producers consider to be the “best” for direct marketing (Appendix C). These results were then incorporated as the model produce for the consumer survey choice sets to aid farmers in pricing their produce.

For each of the six produce options, there are four different attribute levels, summarized in Table 1. Specifically, this thesis investigates consumers’ willingness to pay for the following attributes when associated with fresh produce: locally grown, organically grown, blemished or
irregular, and if the produce was purchased directly from producer. Additionally, a non-binary price attribute was also investigated.

Table 1. Choice Experiments Design and Assigned Levels of Attributes

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Actual Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Locally Grown (Y/N)</td>
<td>0,1</td>
</tr>
<tr>
<td>Certified Organically Grown(Y/N)</td>
<td>0,1</td>
</tr>
<tr>
<td>Some Blemishes or other Irregularities (Y/N)</td>
<td>0,1</td>
</tr>
<tr>
<td>Purchased Directly from the Farmer (Y/N)</td>
<td>0,1</td>
</tr>
<tr>
<td>Prices Tomatoes ($)/lb.</td>
<td>1.15, 0.91, 4.49, 1.99</td>
</tr>
<tr>
<td>Price Green Beans ($)/lb.</td>
<td>2.39, 3.99, 3.24, 2.74</td>
</tr>
<tr>
<td>Price Snap Peas ($)/lb.</td>
<td>3.99, 4.99, 4.49, 3.62</td>
</tr>
<tr>
<td>Price Cucumbers ($)/lb.</td>
<td>0.89, 1.43, 2.53, 2.81</td>
</tr>
<tr>
<td>Price Carrots ($)/lb.</td>
<td>1.30, 0.99, 0.70, 1.46</td>
</tr>
<tr>
<td>Price Strawberries ($)/lb.</td>
<td>1.99, 4.24, 6.98, 5.14</td>
</tr>
</tbody>
</table>

The local and organic attributes are clearly defined prior to the start of the choice set section of the survey. More specifically, the local attribute is defined as; produce grown within 50 miles from where it is purchased, informed by the pilot study Pyburn et al. (2016). Similarly, organically grown is defined as; the product meets the USDA federal requirements and is Certified Organic. Organic farming must demonstrate the protection of natural resources, conservation of biodiversity, and use of only approved substances (including pesticides). Conventional is defined as; the product is produced with farming methods that use chemical fertilizers and pesticides. Quality of the produce and freshness have been considered a main concern for local and organic buyers, which is captured by the blemishes attribute (Pyburn et al. 2016; Onozaka et al., 2010; Yue et al., 2009, 2011; Yiridoe et al., 2005). Studies also suggest that there are social benefits provided from purchasing food from farmers markets or from CSAs (Onozaka et. al, 2010; Yue
Thus, by adding the direct farmer-to-consumer sales attribute, one can approximate the monetary value of this social element.

Lastly, the price of the produce is a consideration for all consumers with a budget constraint and is necessary for calculating the willingness to pay estimates. There are four different price levels associated with each produce options. The price levels for each of the produce items were gathered from a variety of different super markets, super centers, health stores, and farmers markets. More specifically, price data for all six produce options were collected from the following websites: Walmart, Whole Foods, Hannaford’s, Stop and Shop, Sam’s Club, and Wegman’s over the summer months of 2016. In addition, in-person price data were collected from local New Hampshire farmers markets and farm stands. Before the distribution of the survey, prices were recalibrated with the current online retail prices to ensure authenticity. All prices used in the survey were within the range of the listed sources at the time of the survey deployment.

The attribute levels and prices were presented to the participant in a fractional factorial orthogonal main effects design (FFOMED). This design systematically randomizes the four price levels with the binary (yes/no) attributes to create unique hypothetical produce bundles. An example of one produce “bundle” comparison is illustrated in Table 2.
Table 2. Consumer Survey Choice Experiment Bundle Example

<table>
<thead>
<tr>
<th>Tomato Bundle A</th>
<th>Tomato Bundle B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-locally grown</td>
<td>Locally grown</td>
</tr>
<tr>
<td>Certified organically grown</td>
<td>Certified organically grown</td>
</tr>
<tr>
<td>Purchased directly from the farmer (e.g. farmers market)</td>
<td>Purchased indirectly from the farmer (e.g. grocery store)</td>
</tr>
<tr>
<td>No blemishes or other irregularities</td>
<td>No blemishes or other irregularities</td>
</tr>
<tr>
<td>$4.49/lb.</td>
<td>$1.15/lb.</td>
</tr>
</tbody>
</table>

- Bundle A
- Bundle B
- Neither (prefer to stay with your current practice)

When faced with a particular choice set, the consumer can either choose Bundle A, Bundle B, or neither, which is an “opt-out” choice. Using an “opt-out” choice is common for this type of experiment, used to mimic the conditions in a marketplace and decrease protest bidding (Ferrini and Scarpa, 2007; Bernard and Bernard, 2010). To minimize survey length, only three of the six produce options were presented in each of the surveys (8 survey versions in total). Each survey version presented two choice sets for each produce option, resulting in 12 bundles (6 choice sets) per survey. If the participant chose the “opt-out” option, there was a follow-up question investigating this choice, shown in Figure 4.

Q28. If you chose the neither option above, what are the reasons? (PLEASE CHECK ALL THAT APPLY)

- I do not believe locally grown produce is genuine. It is hard to certify.
- I’m satisfied with non-locally grown produce.
- It is less productive to grow everything locally.
- Growing produce locally has unpredictable impacts on environment.
- There is less variety if produce is grown locally.
- The comparison is too complex.
- Others ____________________

Figure 4. Follow-Up Question for the Selection of the “Opt-Out” Option of the Consumer Choice Bundles. A justification is provided by the participant when the “neither” choice is selected for the choice set comparison to further decrease protest bidding.

In addition to the bundling preferences information, the survey also gathered information about the consumer’s current purchasing habits and general perceptions about local and organic
produce and demographic data. A full copy of the survey questions from survey Version 1 can be found in Appendix D.

The survey was mailed to 6,000 residents of Maine, Vermont, and New Hampshire following the Dillman Tailored Design Method (2014) in August of 2016. In order to extend the prospective response rate and decrease costs, a mixed-mode method was employed, which allowed the participant to complete the survey either online or via a paper-booklet. The online surveys were generated using the Qualtrics® online survey platform and are identical to that of the paper surveys. Mailing addresses were acquired through the private firm Survey Sampling International©, which allowed for a random sampling distribution. The survey distribution method included three sequential mailings, the first of which was a preliminary mail invitation sent during the second week of August, 2016. This first mailing introduced the research and invited the primary shopper of the household, if at least 18 years of age, to participate in an online survey (Appendix E). The survey also reiterated that the survey-taker had to be a resident of Maine, Vermont, or New Hampshire, to participate. Due to funding restrictions, no incentivization was permitted for this survey. The residents were given instructions to access the Qualtrics® survey using a unique web address, provided in the preliminary mail invitation.

After a week had passed, a second letter was sent to remind the resident to participate in the online survey using their unique web address. A by a third and final letter was sent to those who did not take the online survey (Appendix F). The final mailing also included a paper version of the survey and a prepaid envelope to incentivize completing and returning the survey (Appendix G). Prior to sending the contact letters and the surveys, all were approved by the UNH IRB (Appendix H). The IRB ensured that the survey and letters informed the participants of their rights, of data anonymity, and that the survey was completely voluntary.
After reviewing the submitted online surveys, a total of 253 Qualtrics® surveys were completed. Of which, 245 were deemed usable for the analysis. For cost reasons, 5,520 paper surveys were sent to the remaining addresses that did not complete the online survey. There were 500 paper surveys returned as non-deliverables and a total of 448 surveys were returned from participants. Of the 448 returned surveys, 402 were filled to an acceptable level of completion. In summary, of the 6,000 surveys sent, 647 were returned and filled to an acceptable level of completion, resulting in a 12% response rate.

Compared to previous literature, a 12% response rate could be considered very low and can cause concern for non-response bias; however, the survey responses accurately reflect the states’ sociodemographic variation. Additionally, low response rates do not necessarily cause bias, according to a recent study by the Pew Research Institute, published in May of 2017. The study suggests that average telephone survey response rates have dropped from 36% to about 9% from 1997 to 2016. However, the low response rates did not necessarily indicate that the responses were biased. The study explains that if the demographics of the sample match that of the larger population, then the population’s perceptions can be accurately represented.

To address the possible non-response bias in the consumer survey, an additional one-question follow-up survey was sent to a sub-sample of the initial mailing list during the Spring of 2017 (n= 489). The survey included a single question asking the resident to pick their top reason for not completing the consumer survey from a list of possible factors (Appendix I). The list of possible options included were: I do not remember getting this survey, I’m not interested in local and organic agriculture, I was distracted by the U.S. presidential election, I did not open the survey, I am sick of surveys, the survey was too long, I was too busy, none of your business, or other. The “other” option was accompanied by a line for a written explanation. The survey was
printed on a postcard, on the back of which was a prepaid business reply stamp. Accompanying the survey was a letter reminding the participant of the initial consumer survey and the directions for answering and submitting the postcard. As a result, 53 postcards were returned as non-deliverables and 53 residents replied, about a 12% response rate. Of those who replied, 15 stated they had taken the survey and 4 stated that the resident either died or had moved, leaving 34 postcards to be used for the analysis. The top responses came from residents who do not remember receiving the initial survey (33%) and, speculatively, threw it away (Appendix J). This was followed by those who were too busy (16%) or indicated “other” (14%). This is closely followed by those who are not interested in local and organic agriculture (12%) and by those who are sick of surveys (9%). The heterogeneity of participants reasons for not answering the survey does not support systematic bias from the non-respondents. In summary, the unsystematic bias and the large number of consumer-survey participants who are interested in local agriculture suggests that the consumer survey results will accurately reflect the views of those interested in local and organic agriculture in northern New England.
CHAPTER IV
Producer Focus Group Results

Introduction to Producer Focus Group Results

This chapter will present the results from the producer focus groups. First, this chapter discusses the general demographics of those who participated in the focus group sessions. The chapter will continue to discuss the results of each of the focus group question investigated, individually, with responses from the collective sample. Then, the producer responses are sorted and presented by state and by producer type. An in depth interpretation of these results will be continued in the discussion section of this thesis, found in Chapter VII.

Producer Focus Demographics

As a result of the producer focus groups, a total of 48 transcripts were used for the analysis. The focus groups sample includes growers from Maine (n=24), Vermont (n=12), New Hampshire (n=13), and New York (n=1). The sample includes 23 male and 24 female participants. Most of the participants grow only vegetables (n = 23) or both, fruits and vegetables, (n = 20) while only 5 solely grow fruit. Of the participants, 27 (56%) claim to be conventional growers and 17 (35%) claim to be organic growers, 1 participant identifies as both, and 3 others do not identify as either. The age of the growers was not prompted to respect the growers’ personal information in a focus group setting; however, age variation was observed in the sessions. The average farm size for the

2 One member did not define their gender.
participants is about 33 acres, ranging from less than 1 acre to over 400 acres. About half of the growers grow on 10 acres or less.

*Producer Operational Constraints*

The major themes that local farmers of northern New England find to be most problematic while running their operations are under the categories of labor and laborers (26%), consumer constraints (16%), managing the business aspect of their farm (14%), and capital constraints (12%), as shown in Figure 5. Constraints related to the topic of labor and laborers mainly relate to finding dependable employees to work for little pay and work only for a short season. Some farmers also expressed difficulties in working with high school or middle school students, due to lack of experience, knowledge, or motivation.

One of the top constraints with consumers is their reluctance to pay price premiums. “They are not willing to pay for what it is worth,” one participant said when referring to consumers resisting to pay for fresh produce. Other issues under the topic of consumers are marketing to new customers, following consumer food trends, encouraging customer frequency and consistency, and understanding general demand. Issues with managing the business aspect of the farming operation are related to keeping accurate records, lacking a business strategy to operate most efficiently, and difficulties with planning and investing. Lastly, these producers find capital to be one of their top constraints, mostly related to lacking the capital to invest in infrastructure and inputs. One participant expressed that they know how to better their farming operation, but lack the finances to move forward.
Figure 5. Operational Constraints of Local Producers. Based on focus group commentary, the most prevalent current constraints for the farmers of northern New England are related to labor and laborers (26%), consumers (16%), managing the business aspect of the operation(14%), and capital (12%).

Practices and Methods

When asked what influences the methods and practices the farmers’ choose to adopt, the farmers find the effectiveness of the practice (16%) and the overall profitability and cost of the practice or method (16%) to be most influential. This is followed by influencers such as the longevity of the practice (13%), the consumer demand for certain practice or method (13%), and
if certain practices or methods are suggested by other outside entities (10%), as shown in Figure 6.

Comments about the overall effectiveness mostly relate to ensuring that the growing method adopted decreases the time spent in the field, maximizes the use of space, or significantly increases crop yields. Considering the overall costs and profitability also influences which methods and practices the farmers use. One participant stated, “you have to make a profit”, which reiterates that when growers are adopting a new technique, if it is not profitable or too costly, it is no longer a viable option.

One of the more unexpected factors that influence the farmers’ decision-making process is the importance of practice longevity. Most of the comments voiced about practice longevity pertain to whether or not the practice aids soil health, decreases negative ecological impacts, or that the practice is overall “sustainable”. The comments are both mindful of what impacts practices have on their own farmland, but also on the surrounding environment. Lastly, consumer desires and information from outside sources, such as that from Cooperative Extension programs or conferences, are the other, less dominant factors which influence which methods the farmers use.
Figure 6. Influential Factors for Operational Methods and Practices. The overall effectiveness (16%) and profitability and costs (16%) of a practice are the most influential to farmers, followed by the longevity of the practice (13%), consumer wants (10%), and influence from outside sources (10%).

**Consumer Information**

This thesis also investigated what information farmers would like to know most about their consumers’ purchasing habits. The top responses pertain to understanding what consumers value (22%), information on consumer awareness and knowledge (16%), and understanding what consumers are willing to pay for local produce (11%), as shown in Figure 7. The comments pertaining to understanding consumer values mostly relate to understanding what produce consumers would like to purchase more of, specifically from local vendors. Another consumer value that farmers want to know more about is consumer food trends, such as how trends become
popular and how to stay updated. One example of a food trend that surprised farmers is the recent surge in demand for kale, which consumers often use in smoothie drinks.

The growers also want to understand how produce price, color, freshness, and other attributes impact a consumer’s purchasing decision. Understanding why the consumers place importance on organically grown food, compared to locally grown food, is also important to the farmers, along with what motivates consumers to purchase local food in general.

Farmers also want to learn and understand more about their consumers’ general awareness and knowledge. This category is composed of growers questions about how consumers prepare and cook fresh foods and how to better educate consumers on incorporating fresh produce in to their diets. Multiple growers want a consumer perspective on whether or not recipe cards help educate their consumers and if the cards encourage expanding and diversifying purchases.

Other questions are more focused on how to send information to consumers, including how to communicate with current patrons, but also reaching new potential buyers. The growers express uncertainty about the impact social media and question the best method for communicating with consumers.

The willingness of consumers to pay price premiums is another topic of interest to the growers. The growers want to know the percent or dollar premium that consumers are willing to pay for a variety of local produce, which can help with pricing products—a concern for multiple producers. Lastly, producers want to learn much more about the quantity consumers are willing to pay for local-organic produce, compared to just locally produced products.
Figure 7. Producer Questions Pertaining to Consumer Purchasing Habits. Consumer values (22%), consumer knowledge and awareness (16%) and consumer willingness to pay (11%), are the topics most mentioned by farmers when asked what they would like to know most about consumers’ fresh produce purchasing habits.

Barriers to Expansion

According to the focus group discussions, farm expansion is most restricted by capital constraints (22%), followed by time (11%), labor (11%), land (10%), and demand (10%), as shown in Figure 8. Expansion requires additional capital for increased inputs, infrastructural changes, taxes, and insurance. Many of the participants who do not work on the farm full-time say they would have to quit their jobs to expand, which makes time another costly constraint. The comments about labor reiterate the concerns mentioned in the current constraints section, previously described. Though forested land is plentiful in New England, the participants express that available land is one of their main expansion constraints. Many of the participants said that obtaining land was extremely expensive and that finding cleared land suitable for growing was an even greater
challenge. Land tenure and leases were also viewed as problematic, one participant even referred to land tenure as “sketchy”. Understanding demand is another issue for producers; the infrequency and fluctuation of demand does not support the need for expansion, from some farmers’ perspective.

![Pie chart showing production barriers for local agricultural expansion]

*Figure 8. Production Barriers for Local Agricultural Expansion. Capital constraints are the most discussed topic when farmers were asked about the barriers of expanding their operations. This is followed by labor (11%) and time (11%), and then by demand (10%) and land (10%).*

**Tri-State Comparison**

Responses were sorted by state and by producer type to identify emerging trends amongst the different groups. As a result, state-level responses indicate there are both differences and similarities in the top responses according to state, shown in Table 3. The data, however, must be interpreted with care due to low sample sizes. The responses from the three states are most similar
in their views of expansion barriers and in what the growers would like to know most about their consumers. Growers from all three states see capital as one of their top constraints if they were to expand their operations. Additionally, responses from all three states indicate that the growers collectively want to know more about consumer values and about topics related to consumer awareness and knowledge, above all other topics.

The responses from each of the states differed, however, in their top operational constraints and in what influences which methods and practices they use. Growers from New Hampshire overwhelmingly see labor and laborers as their major concern. Maine growers also see labor and laborers as a top issue, but also comment heavily on challenges with consumers. Vermont growers are the only participants that views capital as a top constraint. The influential factors that determine which practices and methods the farmers use also differed. Though profitability and costs are important to Maine and Vermont growers, Maine growers are alone in considering the practice longevity as a top influential factor, while Vermont growers are more focused on the overall effectiveness. New Hampshire growers are outliers, not considering profitability or costs, but influenced most by outside sources and consumer wants.
Table 3. Tri-State Comparison of Local Producers Perspectives from of Maine, Vermont, and New Hampshire

<table>
<thead>
<tr>
<th></th>
<th>Maine (n=24)</th>
<th>Vermont (n=12)</th>
<th>New Hampshire (n=13)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumer Constraints</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labor</td>
<td>26%</td>
<td>Capital</td>
<td>36%</td>
</tr>
<tr>
<td>Consumers</td>
<td>21%</td>
<td>Consumers/</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Business</td>
<td>21%*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Aspect</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Determinants of Methods</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>and Practices</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Profitability &amp; Costs</td>
<td>17%</td>
<td>Effectiveness</td>
<td>29%</td>
</tr>
<tr>
<td>Longevity of Practice</td>
<td>17%</td>
<td>Profitability &amp; Costs</td>
<td>23%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information About</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumer Purchasing Habits</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumer Values</td>
<td>18%</td>
<td>Consumer</td>
<td>36%</td>
</tr>
<tr>
<td>Consumer Knowledge &amp;</td>
<td></td>
<td>Values</td>
<td></td>
</tr>
<tr>
<td>Awareness/Consumer Barriers</td>
<td>12%*</td>
<td>Consumer</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Knowledge &amp;</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Awareness</td>
<td>18%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expansion Constraints</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capital</td>
<td>17%</td>
<td>Time</td>
<td>28%</td>
</tr>
<tr>
<td>Know-How</td>
<td>12%</td>
<td>Capital</td>
<td>17%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Land</td>
<td>14%</td>
</tr>
</tbody>
</table>

*Percentages were equal; percent represents both topics individually

* Organic and Conventional

Interesting results stem from the comparison of conventional and organic growers; however, results must be interpreted with care due to the differences in sample sizes (Figure 9). Conventional growers find capital to be the dominating constraint when running their operations, while organic growers, who also find capital to be a top constraint, are more focused on consumer barriers. Conventional growers are most influenced by profitability and costs and the effectiveness of the methods they adopt. Interestingly, organic growers are most influenced by the longevity or sustainability of the practice when deciding their preferred methods, even more so than costs and profitability.
Conventional and organic growers had similar interests in understanding consumer values and consumer awareness and knowledge. When looking to expand, both groups find capital to be a major constraint; however, conventional growers find regulations to be more of an issue than land, labor, demand, and general know-how, which are all equally concerning for organic growers.

Figure 9. Comparison of Local Conventional and Local Organic Producer Perspectives. Differences and similarities are evident between conventional farmers’ and organic farmers’ perspectives (n = 27 and n = 17, respectively). Differences arise in current constraints of running the farming operations and in what the growers are most influenced by when determining which methods and practices to use. The farmers are most similar in their responses to what they would most like to know about their consumers and in their largest constraints to expanding their operations.
Summary of the Producer Focus Group Results

Producer focus groups investigated the perceptions of 48 producer growers in the northern New England in regards to local farming in their region. The top constraints for these producers are labor and laborers (26%) and consumer constraints (16%). The top barriers to expansion are financial restrictions (20%), followed by time (11%), and demand (11%). The results support that there are similarities and differences when comparing the responses from growers by state of residence. There are also similarities and differences between the responses when sorted by producer type. The results from this chapter will be compared to the results from the consumer survey in Chapter VII, to better understand the consumer and producer dynamics.
CHAPTER V
Consumer Survey Qualitative Results

Introduction to the Consumer Survey Qualitative Results

In the following chapter, the qualitative results from the consumer survey will be presented. This chapter will start by describing the demographic data of the consumer survey respondents. This will be followed by the results of the qualitative questions investigated in the survey. The results are organized by topic, starting with; fresh produce purchasing habits and perceptions, organic produce perceptions, local produce purchasing habits and perceptions, organic and local produce purchasing motivations and barriers, and local produce diversification and information outlets. The chapter will close with a summary of the key findings from the consumer survey qualitative results.

Consumer Survey Summary Statistics & Qualitative Results

Despite the low response rate, the consumer survey responses capture the variation in regional demographics, summarized in Table 4. The percent of responses per state accurately reflect the relative state populations. Maine generated 39% of the replies, New Hampshire generated 40%, and Vermont generated 21%, where the true population percentages are 40%, 40%, and 20%, respectively. Of the sample, more than half are female (62%), which is common when soliciting the primary shopper of the household (Zepeda, 2009; Pyburn et al., 2016). The sample is also older than the regional population, with an average age of 58 years. Though New England’s population is older than the rest of the country’s, there is an oversampling of those over 50 years
of age in this sample. This older population is also reflected in the employment status, which shows a bimodal distribution peaking on fully-employed persons and retired persons. As for educational attainment and income, both are oversampled in the higher percentiles. For educational attainment, a relatively low percentage of respondents did not graduate high school (4.03%), followed by persons with a graduate degree (15.78%), high school degree/GED (20.61%), some college education (27.05%), and lastly persons with a 4-year-college degree which has the highest percent of responses (32.53%). This indicates that the respondents in the sample have more formal education in comparison to regional population. The most apparent oversampling is in the income category, where 23% of the sample is comprised of those who have a household income of over $105,000. For comparison, according to the U.S. 2015 Census, the median household income for Maine, Vermont, and New Hampshire is $49,331, $55,176 and $66,779, respectively. On average, the participants have lived at their current residencies for 17 years, with a standard deviation of 14.8 years. The average number of people in the household, including the participants themselves, is about two people and the average number of children under the age of 18 is less than one child per household (S.D. 8 and 6, respectively).
Table 4. Consumer Survey Summary Statistics

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<tbody>
<tr>
<td>Female</td>
<td>67.08%</td>
<td>0.47</td>
<td>59.12%</td>
<td>0.47</td>
<td>59.26%</td>
<td>0.49</td>
<td>62.34%</td>
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<td>Age</td>
<td>58.27</td>
<td>15.17</td>
<td>59.36</td>
<td>14.86</td>
<td>57.49</td>
<td>13.97</td>
<td>58.24</td>
<td>14.62</td>
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<td>Percent of Responses / State</td>
<td>39%</td>
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<td>21%</td>
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<td><strong>Annual Household Income</strong></td>
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<td>Less than $15,000</td>
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<td>7.81%</td>
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<td>6.67%</td>
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<td>$75,000 - $89,999</td>
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<td>14.06%</td>
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<td>$90,000 - $104,999</td>
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<td>7.03%</td>
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<td>$105,000 and over</td>
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<tr>
<td>Did Not Graduate High School</td>
<td>2.50%</td>
<td>2.99%</td>
<td>6.17%</td>
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<td>High School/GED</td>
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<td>17.16%</td>
<td>19.34%</td>
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<td>20.61%</td>
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<tr>
<td>Some College</td>
<td>30.00%</td>
<td>25.37%</td>
<td>25.10%</td>
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<td>4-yr College Degree</td>
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<td>33.58%</td>
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<td>32.53%</td>
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<td>Graduate Degree</td>
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<td>20.90%</td>
<td>17.28%</td>
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<td>Full-Time</td>
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<td>41.91%</td>
<td>48.77%</td>
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<td>Part-Time</td>
<td>9.09%</td>
<td>5.15%</td>
<td>5.74%</td>
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<td>6.87%</td>
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<tr>
<td>Self-Employed</td>
<td>11.98%</td>
<td>8.09%</td>
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<td>Unemployed</td>
<td>5.37%</td>
<td>1.47%</td>
<td>1.23%</td>
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<td>2.88%</td>
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<tr>
<td>Retired</td>
<td>35.54%</td>
<td>41.18%</td>
<td>31.56%</td>
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<tr>
<td>Student</td>
<td>1.65%</td>
<td>1.47%</td>
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<td></td>
<td>0.96%</td>
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<tr>
<td>Home care</td>
<td>0.41%</td>
<td>0.74%</td>
<td>2.46%</td>
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<td>1.28%</td>
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<tr>
<td><strong>Sample size</strong></td>
<td>248</td>
<td>137</td>
<td>258</td>
<td></td>
<td>647*</td>
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</table>

*Note: participants who did not indicate their state are still included in the sample*
Fresh Produce Purchasing Habits and Perceptions

When the participants were asked whether they had purchased local or organic fresh produce over the past year, 96% stated they had purchased local produce and 87% stated they had purchased organic fresh produce (Figure 10). This finding may explain why the response rate was less than 15%, suggesting that those who responded are those interested in local and organic agriculture. Regardless, this finding suggests that the results primarily reflect the opinions of those who currently purchase local and organic fresh produce.

Figure 10. The Percent of Consumers Who Purchase Local and Organic Fresh Produce. The consumer survey respondents were asked if they had purchased organically grown produce in the past year and locally grown produce in the past year (n = 640 and 627, respectively). Local was previously defined as grown within 50 miles of the resident’s home.

Further investigation of those who purchase local and organic produce was conducted through t tests of individual income groups. The t test results in Table 5 suggest that the mean incomes of those who have purchased local produce comparatively to those who have not purchased local fresh produce in the past year are statistically different. This result was also true for organic buyers who demonstrate a statistically different mean income than that of non-organic buyers. Both findings are significant at the 99% level.
Table 5. Local and Organic Purchasing by Income t Test Results

<table>
<thead>
<tr>
<th></th>
<th>Obs.</th>
<th>Mean</th>
<th>Std. Err.</th>
<th>t value</th>
<th>Sig.</th>
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<td>Local</td>
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<tr>
<td>No</td>
<td>22</td>
<td>44995.05</td>
<td>6888.703</td>
<td>-3.3723</td>
<td>0.0026***</td>
</tr>
<tr>
<td>Yes</td>
<td>551</td>
<td>68753.32</td>
<td>1476.073</td>
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<tr>
<td>Organic</td>
<td></td>
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</tr>
<tr>
<td>No</td>
<td>75</td>
<td>47295.55</td>
<td>3492.142</td>
<td>-6.0221</td>
<td>0.0000***</td>
</tr>
<tr>
<td>Yes</td>
<td>505</td>
<td>70264.17</td>
<td>1533.572</td>
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</tr>
</tbody>
</table>

Note: *, **, and *** represent statistical significance at the 90%, 95%, 99% confidence levels, respectively.

The low number of non-local buying participants who participated in the study makes it impossible to use demographic data to describe purchasing habits in a logistic regression. However, logistic tests run on sub-samples of the survey respondents indicate that demographic data such as income level and educational attainment may play a significant role in the probability of purchasing local produce in northern New England (Appendix K). Additional data from those who do not purchase local produce are needed to further clarify these relationships.

When asked how often the participants purchase fresh produce, over half (51%) of the respondents purchase fresh produce on a weekly basis, followed by 32% purchasing fresh produce 2-3 times a week and then by 13% of participants purchasing 2-3 times a month, shown in Figure 11. Two percent of participants purchase fresh produce daily and an additional 2% purchase fresh produce on a monthly basis. Only one respondent claims to never purchase fresh produce.
All participants were asked what percent of their total weekly grocery food budget is spent on fresh produce (Figure 12). On average, 36% of the participants’ weekly budget is spent on fresh produce, with a standard deviation of ±19. The participants were asked a follow-up question asking what percent of the dollars spent on fresh produce are spent on organically grown and locally grown fresh produce. As a result, the respondents state that they spend about 24% and 33% of their produce budget on organic and local fresh produce, respectively (S.D. of ±25 and 24, respectively).

When addressing the weekly expenditures of the survey respondent, the average participant spends 36% of his or her weekly budget on fresh produce. This is twice as much as an average American household, according to the Bureau of Labor Statistics 2013 Consumer Expenditure Survey and a USDA study published 2004 study (Blisard et al. 2004). In addition, the average expenditures are 15 percentage points greater than the average household expenditures found in the NH pilot study (Pyburn et al. 2016). Of the dollars spent on fresh produce, the average

---

Figure 11. Household Frequency of Purchasing Fresh Produce. Northern New England residents were asked how frequently their household purchases fresh produce from a grocery store (n = 638). Fresh produce is defined as fresh fruits and vegetables.
participant spends 33% of those dollars on locally grown fresh produce. On average, those who purchase local produce, purchase on a weekly basis. Using expenditure estimates from the official USDA Food Plans for August 2016 and the results from this survey, a family of two between the ages of 51-70 spends about $30.21 - $58.53 on fresh produce on a weekly basis. Of that, they spend 33% percent of those dollars on local produce, which would indicate $9.97 - $19.31 on local fresh produce, weekly for the average household represented in this survey.

![Figure 12. Percent of Weekly Grocery Budget Spent on Fresh Produce Options. Consumer survey respondents were asked what percentage of their weekly grocery budget is spent on fresh produce (n = 636). An additional question asked of the dollars spent on fresh produce, what percentage is spent on organic and local fresh produce (n = 629 and 637, respectively). Error bars indicate the standard deviation which are ± 19, 25 and 24, respectively.](image)

Participants were asked in two separate questions how knowledgeable they feel they are about both organically grown fresh produce and locally grown fresh produce, on a scale from 0 to 10 (Figure 13). On this scale, zero indicates no knowledge and ten indicates full knowledge of the growing practice. The participants indicate that they know slightly more about organically grown produce over that of locally grown produce, with average knowledgeabilities of 6.55 and 6.25, respectively. There is also high variation in the amount of knowledge participants believe they
possess, with standard deviations of 2.19 for organically grown produce and 2.20 for locally grown produce.

![Figure 13. Perceived Knowledgeability Pertaining to Local and Organic Produce. Participants were asked to rate their perceived knowledgeability from zero to ten. Here, zero indicates no knowledge and ten indicates full knowledge of the two growing methods, local and organic (n = 638 and 644, respectively). Error bars represent the standard deviation which are ± 2.19 and 2.20 for organically grown produce and locally grown produce, respectively.]

If the consumer claimed to have purchased organic or local produce in the past year, they were asked how frequently they make these purchases, shown in Figure 14. In regards to the frequency of purchasing organically grown fresh produce, the top response by consumers is purchasing once a month, with 32% of responses, followed by on a weekly basis (30%), and then by 2-3 times a month (28%). Those who purchase more frequently, such as 2-3 times a week or on a daily basis, only comprise 10% and 1% of responses, respectively.

For those who purchase locally grown fresh produce, the frequency of purchasing is similar to that of the organic buyers. For the local buyers, however, consumers claim to purchase local produce slightly more frequently, with 35% of respondents purchasing produce 2-3 times a month, followed by on a weekly basis (31%), and then by purchasing once a month (23%). This is followed by 2-3 times a month (10%) and then by on a daily basis (1%).
Participants were asked a series of questions investigating they perceive the importance of different factors when considering to purchase *any* type of fresh produce (Figure 15). More specifically, participants were asked when shopping for fresh produce (fruits and vegetables) how important is it that the produce possess particular characteristics. From a list of produce characteristics, the participants were asked to rank the characteristic on a scale of importance, ranging from not important to very important. The top characteristics that participants deem “very important” are; that the produce supports maintaining local farmland, with 54% of responses, that the produce supports the local economy, with 46% of response, that the produce is grown without pesticides (45% of responses), and that the produce is grown in the United States, with 42% of responses.

Participants state that purchasing produce that is locally grown is mostly important (32%), very important (29%), or somewhat important (28%) when shopping for fresh produce. About 8%
of participants say locally grown is not important when purchasing fresh produce and 2% say they do not consider this attribute when shopping for fresh produce.

Participants find that purchasing produce that is organically grown is somewhat important, with 27% of responses, very important (25% of responses), important (23% of responses), or not important, with 20% of responses. Additionally, 6% state that organic is not considered in their purchasing decision.

When it comes to produce being grown in the United States, 41% of participants say it is very important, 32% say it is important, 15% say it is somewhat important, and 7% say it is not important. Only 4% do not consider this attribute when purchasing fresh produce.

Purchasing produce that is grown without pesticides is deemed very important to 45% of respondents, followed 26% stating it is important, 19% seeing this as somewhat important, and lastly, 7% of participants find this not important. Only 4% do not consider this attribute when purchasing fresh produce. About 46% of participants view supporting the local economy as a very important attribute when considering to purchase fresh produce, followed by 34% view supporting the local economy as important, and 16% view supporting the local economy as somewhat important. About 2% of participants see this attribute as not important while another 2% do not consider this attribute when purchasing fresh produce.

Participants consider maintaining local farmland to be the most important attribute of this analysis, with 54% of participants agreeing that this attribute is very important and 28% agreeing it is important when considering to purchase fresh produce. This is followed by 13% which find this attribute to be somewhat important, 2% find this attribute to be not important, and 2% do not consider this attribute when shopping for fresh produce.
Organic Produce Perceptions

In order to better understand how consumers perceive organically grown produce, participants were asked to compare organically grown fresh produce to fresh produce which is conventionally grown on a variety of characteristics (Figure 16). The comparison investigated the following characteristics: relative freshness, quality (taste), nutritional value, food safety, availability, appearance, produced without chemical pesticides, reduction of potential food-borne illnesses, and reduction of potential long-term health issues. Over half (66%) of the participants find organic to be superior compared to conventionally grown produce when it comes to being

Figure 15. Considerations and Influential Factors When Purchasing Fresh Produce. Indication of factors that are most important to consumers when purchasing fresh produce (n = 630). Percent of respondents on the vertical axis and the statement on the horizontal axis.
produced without chemical pesticides. Almost half of the participants find organically grown produce to be superior to that of conventionally grown produce in reducing long-term health issues and in food safety, (48% and 49%, respectively). In addition, 35% of consumers find organically grown produce to be superior to conventionally grown produce when comparing them on their nutritional value. The only category that the participants find organic to be somewhat inferior to that of conventional is its relative availability, with 46% of participants in agreement that organic is somewhat inferior.

About half of the participants (48%) agree that organically grown fresh produce is superior to that of conventionally grown produce in reducing long-term health issues. An additional 23% of participants view organic as somewhat superior in this comparison. About 13% of participants view organic and conventionally grown produce to be about the same in this category while less than 1% see organic as either inferior or somewhat inferior in this comparison. Lastly, 14% of participants are unsure about this comparison.

When it comes to reducing food-borne illnesses, 28% of respondents find organic to be superior to conventionally grown produce and 19% find organic to be somewhat superior. About 28% of respondents find organic fresh produce to be about the same as conventionally grown produce in this category and 7% find organic to be inferior to conventionally grown produce to some degree (6% somewhat inferior and 1% inferior). Lastly, 19% are unsure about this comparison. When comparing organically grown produce to conventionally grown produce on relative appearance, 43% see both categories as about the same, 24% of participants view organic as somewhat inferior, 20% of participants find organic to be somewhat superior, 9% of participants see organic as being superior, and only 1% find organic to be inferior in this category. Additionally, 3% of respondents are not sure about this comparison.
The most unanimous response result from the pesticides comparison. The dominating response, that organic is superior to that of conventionally grown produce, commands 66% of the responses for this comparison. This is followed by organic is somewhat superior, the two types of produce are about the same, and that organic is somewhat inferior with 15%, 7%, and 2% of responses, respectively. Additionally, 10% of respondents are not sure about this comparison.

When comparing the availability of organic fresh produce to conventionally grown fresh produce, 46% of respondents find organic to be somewhat inferior, followed by 31% of respondents stating that the two produce types are about the same. Only 9% and 5% of respondents find organic to be somewhat superior or superior to conventional, respectively, for this category. In addition, 5% of respondents find organic to be inferior to conventional in terms of produce availability. Lastly, 3% of respondents are not sure about this comparison.

As previously mentioned, 49% of respondents find organically grown fresh produce to be superior compared to conventionally grown produce in the category of food safety. Additionally, 23% of participants and 19% of participants find organic to be either somewhat superior or about the same in this category when compared to conventionally grown produce, respectively. Only 2% of participants find organic to be inferior to some degree in this category while 3% of participants are unsure about this comparison.

The top response for the category comparing the nutritional value of organically grown produce to that of conventionally grown produce is that organic is superior, commanding 35% of the responses. This is followed by organic being about the same as conventional and then followed by organic being somewhat superior to conventional, with 30% and 27% of responses, respectively. Interestingly, less than 1% of respondents find organic to be inferior to any degree in this category, while 8% of participants are unsure how to answer this question.
The quality of organically grown produce is also reported be superior or somewhat superior to that of conventionally grown produce, with 32% and 31% of responses, respectively. About 30% of respondents find the two produce types to be about the same in quality, while only 2% of participants find organic to be inferior in quality to that of conventional produce. Lastly, 4% of respondents are unsure about this comparison.

When it comes to comparing the freshness of organic produce to that of conventional produce, almost half of the consumers (42%) find organic to be about the same as conventionally grown. This is followed by 24% of participants suggesting that organic is somewhat superior and 21% of respondents stating that organic is superior when it comes to freshness. Seven percent of participants find that organic is somewhat inferior to that of conventionally grown and less than one percent found organic to be inferior in this comparison. Lastly, 5% of respondents are not sure about this comparison.
Figure 16. Consumer Comparison of Organically Grown Produce to Conventionally Grown Produce. Consumers were asked to rank the superiority or inferiority of organically grown fresh produce to conventionally grown fresh produce on a variety of attributes (n = 628).
Local Produce Purchasing Habits and Perceptions

To investigate how northern New England residents interpret the meaning of “local”, participants were asked to label a variety of production locations as either local, regional (but not local), or neither (Figure 17). The production locations investigated were: produce grown within a 50, 100, 300, or 500-mile radius from where the participant lives, or grown in the participant’s county, state, or in the Unite States. The results suggest that the participants associate the term “local” with produce grown within a 50-mile radius of their domicile, with 79% of participants in agreement. The term “local” is next most associated with produce grown in the residents’ county, with 42% of participants classify this as local, followed by produce grown within a 100-mile radius of where the resident lives (28%) and then by the produce grown within the residents’ state (26%).

Regional is mostly attributed with produce grown within a 100-mile radius of where the participant lives, with 64% in agreement, followed by produce grown in the participants’ state (61%) and then by produce grown within a 300-mile radius of where the participant lives (53%). Produce that is seen as neither local nor regional is thought of as produce grown anywhere in the United States, with 85% of participants in agreement, followed by produce grown within a 500-mile radius of where the participant lives (73%), and then by produce grown within a 300-mile radius of where the participant lives (42%) and followed by produce grown in the county (33%).
Figure 17. Consumer Classification of “Local” and “Regional” Produce by Location of Production. Consumer survey respondents’ association of different locations of production with the terms “local” and “regional” when classifying fresh produce (n = 626).

Understanding why individuals value purchasing local produce is an ongoing investigation. In order to identify why the participants from northern New England value local produce, a series of statements pertaining to local produce were presented to the participants, which were to be ranked in level of agreement (Figure 18). The statements presented are as follows: locally grown fresh produce has more nutritional value than non-locally grown produce; promoting locally grown fresh produce enhances social interactions and a sense of community; promoting locally grown fresh produce stimulates the local economy; locally grown fresh produce is safer (less risk of food allergy and pesticide exposure); and growing fresh produce locally is less environmentally damaging than non-locally grown produce. These viewpoints were ranked by the level of participant agreement, ranging from strongly disagree to strongly agree.
The most unanimous responses are that, local produce stimulates the local economy with 60% of participants strongly agreeing, and that local produce boosts a sense of community with 47% of participants agreeing with this statement.

When assessing nutritional value, the results suggest that the participants are either neutral or in agreement with the statement that local produce has a higher nutritional value than that of non-local produce, with 31% and 30% in agreement, respectively. Only 19% of participants strongly agree that local produce is more nutritional while only 12% disagree and 2% strongly disagree with this statement. Lastly, 5% answered that they “do not know” about this statement.

When posed with the opinion that locally grown produce enhances social interactions and a sense of community, the majority of the respondents either agree (47%) or strongly agree (43%) with this statement. Only 6% of participants are neutral about this statement, less than 1% disagree, 2% strongly disagree, and 1% are not sure. The perspective that locally grown fresh produce stimulates the local economy contains the highest percent of responses for the “strongly agree” category, with 60% of respondents in strong agreement, followed by 35% of respondents in agreement with this statement. About 3% of participants are neutral about this statement, less than 1% disagree, and 1% strongly disagree. About 1% answered that they are unsure about this statement.

When posed with the opinion that locally grown fresh produce is overall safer, 32% of respondents are neutral with this statement, 27% are in agreement, and 24% of participants are in strong agreement with this statement. Those who disagree or strongly disagree with this statement comprise 8% and 2% of responses, respectively, while 6% “do not know”. When posed with the statement that growing fresh produce locally is less environmentally damaging than non-locally grown produce, most of the participants either agree (33%), strongly agree (28%), or are neutral
(23%) with this statement. The participants that disagree or strongly disagree make up 7% and 2% of the responses, respectively, while the other 7% do not know about this statement.

![Figure 18. Consumer Perceptions of Locally Grown Fresh Produce. Consumers choose level of agreement with statements pertaining to purchasing and consuming local fresh produce (n = 640).](image)

Of those who indicated they had purchased locally grown produce over the past year, they were also asked what percentage of their purchases came from specific vendors, shown in Figure 19. The results suggest that there is high variation in where the participants obtain local fresh produce. On average, about half of local fresh produce (55%) is purchased from supermarkets, with a high standard deviation of about ± 30%. The next most common location for purchasing fresh local produce is directly from the farmer, with participants stating that they purchase about 20% of their fresh produce directly from the producer (S.D. ± 23). The third most frequent place for purchasing local for fresh produce is from farmers markets and health supermarkets, from which participants claim to purchase 15% of their local produce from each of these vendors (S.D. ± 15 and 22, respectively). Also, about 13% of fresh produce comes from home or community gardens, according to these participants (S.D. of ± 20). The additional categories indicate that, on average, participants obtain less than 10% of their fresh local produce from supercenters,
neighbors’ gardens, or from corner or convenience stores with 7%, 4%, and 3% of local produce purchased from these locations, respectively (S.D. 15%, 10%, 11%).

![Figure 19. Percentage of Fresh Local Produce Purchased According to Location. Consumers of local produce indicate the percent of local fresh fruits and vegetables purchased by location (n = 648). Error bars represent the standard deviation for vendor.](image)

The participants who purchase locally grown produce were also asked to rank the local produce according to what they find most preferable to buy from local sources (Figure 20). The participants were to order tomatoes, cucumbers, greens, carrots, snap peas, green beans, and strawberries from 1 to 7, where 1 is the most preferred and 7 is the least preferred produce item to purchase locally. The results suggest that participants most like to purchase tomatoes, strawberries, cucumbers, and greens when produced locally. Less preferable local produce options are green beans, carrots, and lastly, snap peas. Participants were asked to write in any additional produce that they prefer to purchase locally that they did not see on this list. The top responses are corn, apples, and blueberries, which is important for future studies investigating consumer willingness to pay for local produce in the northeast region.
Fig. 20: Ordinal Ranking of Most Preferred Local Produce. Local produce buyers rank the local produce they most like to purchase, from 1 to 7, 1 being the most preferred and 7 being the least preferred. The average rank is reported for each produce option (n = 584).

To further investigate how northern New Englanders view local fresh produce, the participants were asked to compare locally grown produce to non-locally grown produce on a variety of attributes and statements, shown in Fig. 21. The attributes investigated include: freshness, quality (taste), nutritional value, appearance, availability, purchasing supports the local economy, food safety, produced without pesticides, reduction of potential food-borne illnesses, and reduction of potential long-term health issues. Participants were asked to rank the attribute or statement by comparing locally grown food to non-locally grown food. The top categories which participants find local produce to be superior to non-local produce are as follows: purchasing supports the local economy, with 63% of responses, produce freshness (50% of responses), and produce quality, with 40% of responses. Overall, the participants do not find local to be inferior in any of the categories; however, participants find local to be somewhat inferior in its relative availability, with 39% of respondents agreeing local is somewhat inferior in this category.
When asked to rank the freshness of locally grown produce compared to non-locally grown produce, most of the respondents either find local to be superior with 50% of responses, somewhat superior with 34% of responses, or about to same with 12% of responses, compared to non-local produce. Less than 2% find local produce to be inferior or somewhat inferior in this category, while 2% are not sure about this comparison.

When comparing the quality and taste of local produce compared to non-local, the majority of participants find local to be superior, somewhat superior, or about the same with 39%, 37% and 19% of responses, respectively, when compared to the quality of non-local produce. About 1% of participants find local to be somewhat inferior and less than one percent of participants see local as inferior in quality and taste, while 3% are unsure about this comparison. When it comes to nutritional value of local produce compared to non-local produce, 38% participants find local to be about the same, 28% of participants find it as somewhat superior, and 26% find local to be superior to non-locally produced fruits and vegetables. Additionally, 8% of respondents find local to be somewhat inferior in this category, while 3% are unsure about this comparison.

When comparing the appearance of local produce to non-local produce, the majority of participants find the two produce types to be about the same, with 43% of participants in agreement. This is followed by 27% of respondents finding local to be somewhat superior and 18% finding local to be superior to non-local produce in its appearance. About 8% of participants find local to be somewhat inferior in this category while 3% of participants are not sure. Availability of local produce is deemed somewhat inferior to that of non-local produce by 40% of the participants. This is the only category where locally grown produce is seen as more inferior than superior when compared to non-local produce. About 30% view local and non-local as about
the same in availability, 16% find that local is somewhat superior, and 8% of participants find local to be superior. Only 4% find local to be inferior and 3% are unsure about this comparison.

Local is overwhelmingly deemed superior to non-local in its ability to support the local economy, with 63% of responses. This is followed by 27% of respondents who find local to be somewhat superior and 6% of respondents that find local and non-local to be about the same. About 2% of respondents see local as somewhat inferior with and 1% of respondents find local to be inferior. Another 2% of respondents are unsure about this comparison. When locally grown produce is compared to non-locally grown produce in terms of food safety, 38% of respondents view them as about the same, 30% see local as somewhat superior, and 20% find local to be superior in this category. About 2% of the participants find local produce to be inferior or somewhat inferior in this comparison, while 11% of participants are unsure.

Local is seen as superior by 28% of participants, somewhat superior by 26% of participants, or about the same by 26% of participants in its production without pesticides when compared to non-local produce. Additionally, 2% of participants find local to be somewhat inferior and less than 1% find local to be inferior. Lastly, 17% of participants are unsure about this comparison. When comparing the reduction of food-borne illnesses caused by local produce compared to non-local produce, 35% of participants find the two options to be about the same, 29% see local as somewhat superior, and 17% find local to be superior in this category. Less than 2% of participants find local to be somewhat inferior or inferior in this category, while 18% of participants are unsure about this comparison. Participants see the reduction of long-term health issues of local produce compared to non-local produce to be about the same (28%), local as being somewhat superior (27%), or local as superior (24%). Very few, less than 2% of participants, see local as inferior in this category while 19% of participants are unsure about this comparison.
Figure 21. Consumer Comparison of Locally Grown Produce to Non-Locally Grown Produce. Consumer survey participants’ comparison of locally grown fresh fruits and vegetables in relation to non-locally grown fresh produce over a variety of produce attributes (n = 637).

**Organic and Local Produce Purchasing Motivations and Barriers**

Participants who indicated that they had purchased local or organic fresh produce in the past year were asked what their reasons were for making these purchases. In two separate questions, the participants were asked to indicate their reasons for purchasing organic or local produce from list of possible motivations. The lists were generated using the top motivating factors
from previous literature. As a result, the respondents suggest that healthy eating, supporting local farms, and the quality of produce are their top motivations for purchasing both local and organic produce (Figure 22). More specifically, organic buyers find supporting local farms, healthy eating, and the quality of organic produce to be their top motivating factors, with 78%, 71%, and 52% of participants choosing these motivations, respectively. Local buyers are similar in their top motivations with 85% of participants stating that supporting the local farmer is a top consideration, along with quality of produce and healthy eating, with 75% and 74% of participants choosing these as motivating factors, respectively.

Differences are more apparent with the less dominant categories, with organic buyers motivated more by environmental quality concerns (48%) and food safety concerns (42%), but less motivated by sense of community (32%) and knowing their farmers (29%). The local produce purchasers seem to be motivated in the opposite manner, being more motivated by sense of community (50%), followed by environmental quality concerns (41%), knowing the farmer (40%), and lastly, by food safety concerns (36%). Only 6% and 4% of respondents are motivated by reasons not listed when purchasing organic and local produce, respectively.
Figure 22: Consumer Motivations and Rational for Purchasing Local and Organic Produce. Participants indicate if any of the listed attributes are motivating factors for purchasing either organic or locally grown produce (n = 590 and 619, respectively).

Though the majority of respondents who participated in this study were individuals who have purchased local or organic produce in the past year, the survey prompted those who have not purchased organic or local produce to explain their reasoning for not purchasing. The question asks the main reason the participant had not purchased local or organic produce in the past year in two separate questions. The multiple choice options were generated using farmer input along with previous studies’ findings. For both organic and local produce, the top reason for not purchasing is the price of the produce, with 93% of the non-organic buyers and 67% of non-local buyers choosing this as their top deterrent (Figure 23). The barriers to purchasing local produce appear to be more diversified than the barriers for purchasing organic; however, the sample size must be considered when comparing the barriers simultaneously. For example, 12% of local non-buyers find that the hours of operation for farmers markets or farm stands to be the main reason for not buying local produce, followed by 11% not knowing about the local producers in their area, and
lastly by the lack of variety of local produce (7%). Only 3% of local non-buyers state that there are “other” main reasons for deterring them from purchasing local produce.

![Figure 23. Purchasing Barriers for Non-Local and Non-Organic Produce Buyers. Participants who have not purchased fresh organic produce or fresh local produce in the past year indicate the top factors deterring them from making these purchases (n = 121 and 57, respectively). Note persons who indicated they had purchased local and organic produce participated in the question.](image)

**Local Produce Diversification and Information Outlets**

All participants were asked to choose the methods that would entice them to try a new fruit or vegetable from a local source. The list of methods was generated using input from the local farmer focus groups. As a result, 64% of the participants think that trying a new fruit or vegetable would be initiated through taste test stations (Figure 24). This is followed by discounted specials, with 49% of participants in agreement, and recipe cards, with 35% of participants choosing this as a preferred method. Only 27% of respondents said that mixed bags of produce would entice them to try a new fruit or vegetable and 8% said that there is another method that would make them try something new. Of those who chose the “other” option, most recommend better displays of the
new produce, better availability and or accessibility to the new produce, better advertising, and lastly, they are more likely to try a new fruit or vegetable if it is suggested by a friend.

Figure 24 Consumers' Preferred Methods for Trying New Fresh Produce Options. Participants rate the methods that would most likely increase their probability of trying a new fresh local fruit or vegetable which they have not tried in the past (n = 630).

The participants were asked to indicate the best method for receiving information about nearby local vendors. Given a list of options, the participants were to choose any of the options that they view as the best method for receiving information. The question and list of possible answers was generated mainly through the input from the local farmers during the focus group sessions. As a result, the participants indicate that the best method of receiving information about local vendors is through word of mouth, with 61% of respondents in agreement (Figure 25). This is followed closely by road signs, with 59% of participants agreeing this would be a preferred method, then by newspaper ads (47%), and local event calendars (46%). The electronic methods, such as email newsletters, social media (Facebook, Twitter, Instagram, and Snapchat), and town websites are all less popular with only 32%, 27% and 25% of agreeing these are the most preferred methods for receiving information. Lastly, 9% of participants state that there is a different method.
not mentioned that they prefer. Some of the suggested methods defined by the participants are options such as, mailings, magazines, radio, through store advertisements, and through community food festivals.

The most preferred methods for receiving information from local vendors changes when the sample is split by age groups. The two age groups, those younger than 50 years of age and those 50 years of age and older, are similar in their affinity for methods such as; word of mouth (61%, 60%), road signs (57, 59%) local event calendars (47%, 46%), email news letters (33%, 33%), and other methods (9%, 9%). The younger and older age groups differ in their preference for town websites (32%, 23%) and are extremely different in their views of social media and newspaper ads. Those 50 years of age or older favor news paper adds (54%) over social media (18%); however, those younger than 50 years of age find social media to be a highly preferred method (59%) over options such as newspaper adds (27%) for receiving information about their local vendors. Due to the differences in responses, future work will aim to capture an accurate representation of the different age groups of the regional population.
Figure 25. Participants’ Preferred Methods for Receiving Information about Local Vendors According to Age Group. Participants indicate any and all methods which are considered the best for reviving information about local vendors. Results are sorted by the percent of responses by age group, including the entire sample (n=634), those less than 50 years of age (n=148), and those 50 years of age or older (n= 435). Note not all participants reported their age.

Consumer Survey Qualitative Results Summary

The consumer survey sent to the residents of Maine, Vermont, New Hampshire consisted of three sections, one of which investigated qualitative data on consumer preferences, perceptions, values, and habits pertaining to purchasing fresh produce. In summary, when considering to purchase any type of fresh produce, the statements that are deemed “very important” are that the produce maintains local farmlands, that the produce supports the local economy, that the produce is grown without pesticides, and that the produce is grown within the country. Organic produce is seen as superior to conventionally grown produce in its non-use of pesticides, in its food safety, ability to reduce long term health issues, in its nutritional value, and in its quality. When it comes to locally grown produce, consumers mostly attribute the term “local” with produce grown within 50 miles from where it is purchased. Additionally, over half of the local produce purchased was purchased from a grocery store. Participants strongly agree that local produce stimulates the local
economy and agree that it also enhances social interactions and a sense of community. Local is also viewed as superior to conventionally grown produce in its ability to support the local economy, in its freshness, and in its quality. Results suggest that those who purchase organic and local produce are motivated by similar factors, such as the produce supports local farms, for healthy eating and for the quality of the produce. Those who do not buy local and organic produce are deterred from purchasing for similar reasons, mostly due to the price of the produce. Results also suggest local and organic produce is seen as inferior in their relative availability when compared to their counterparts.
CHAPTER VI
Consumer Survey Quantitative Results

Introduction to the Consumer Survey Quantitative Results

Thus far, only the qualitative results of the consumer survey have been presented. In the following chapter, the remaining results of the consumer survey are presented, including the results of the consumer choice experiment. The choice experiment is comprised of alternate-specific constant conditional logit model results and the willingness to pay estimates in both, dollars per pound and percent price premiums. The chapter will end with a summary of the quantitative findings. This chapter concludes the results presented in this thesis and will be discussed in greater detail in Chapter VII.

Choice Experiment Results

As described in Chapter II, an alternative-specific constant (ASC) conditional logit model was estimated for each of the six produce (tomatoes, cucumbers, green bean, snap peas, carrots, strawberries) for the three states (NH, ME, VT), where the choice experiment data were collected. Table 6 summarizes the estimated coefficients of the five attributes (price, organic, local, direct, blemish) for each produce option in the ASC conditional logit models across each state.

Here, results suggest the coefficients on the price attributes, when significant, are negative across the produce options. This price effect is strongest for tomatoes, green beans, strawberries, and carrots, significant across all three states. In terms of preference for growing location, the coefficient on the local attribute is positive and significant for tomatoes and green beans for all
three states, as well as carrots in New Hampshire. This suggests that consumers have a positive propensity to purchase produce that is locally grown. This positive relationship is consistent with findings from the existing literature.
<table>
<thead>
<tr>
<th></th>
<th>Tomato</th>
<th>Cucumber</th>
<th>Carrot</th>
</tr>
</thead>
<tbody>
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<td>NH</td>
<td>ME</td>
<td>VT</td>
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<tr>
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<td>0.695***</td>
<td>0.957***</td>
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<td>0.424*</td>
<td>1.087***</td>
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<td>0.089</td>
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<td>No Blemish</td>
<td>0.366*</td>
<td>0.765***</td>
<td>0.138</td>
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<td>0.181</td>
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<td>-0.146</td>
<td>-0.571*</td>
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<td>0.188</td>
<td>0.203</td>
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<td>0.845*</td>
<td>1.179**</td>
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<td></td>
<td>0.34</td>
<td>0.37</td>
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<td>0.770*</td>
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<td>0.341</td>
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<td>0.456</td>
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<td>98.65</td>
<td>60.79</td>
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<td>Log-lik</td>
<td>-301.367</td>
<td>-248.3</td>
<td>-152.154</td>
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<td># Choices</td>
<td>828</td>
<td>708</td>
<td>438</td>
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<tr>
<td># Respond</td>
<td>138</td>
<td>118</td>
<td>73</td>
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Note: Standard errors in italics. *, **, and *** represent statistical significance at the 90%, 95%, 99% confidence levels respectively, measured by t-statistics.
Table 6 Continued: Table 6: ASC Conditional Logit Results: Propensity to Purchase Produce with a Choice Attribute Over All Other Choice Alternatives

<table>
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<tr>
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<th>Snap Pea</th>
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<th>Strawberry</th>
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<tr>
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<td>NH</td>
<td>ME</td>
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<tr>
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<td></td>
<td>0.157</td>
<td>0.165</td>
<td>0.217</td>
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<td>-0.415*</td>
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<td>0.131</td>
<td>0.113</td>
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<td>No Blemish</td>
<td>0.316*</td>
<td>0.068</td>
<td>0.069</td>
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<td>0.151</td>
<td>0.161</td>
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<td>Direct</td>
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<td>-0.076</td>
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<td>0.157</td>
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<td>0.681*</td>
<td>0.862*</td>
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<td>0.289</td>
<td>0.31</td>
<td>0.385</td>
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<tr>
<td>Bundle B</td>
<td>0.481</td>
<td>0.946**</td>
<td>0.618</td>
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<td>0.311</td>
<td>0.321</td>
<td>0.398</td>
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</table>

| Wald chi2 | 23.12    | 16.31      | 6.85       | 60.14     | 61.57      | 57.5       | 47.42    | 50.27      | 28.36      |
| Log-lik   | -349.18  | -305.5     | -179.54    | -280.052  | -293.56    | -121.67    | -287.77  | -294.348   | -148.93    |
| # Choices | 804      | 702        | 408        | 702       | 732        | 372        | 702      | 726        | 372        |
| # Respond | 134      | 117        | 68         | 117       | 122        | 62         | 117      | 121        | 62         |

Note: Standard errors in italics. *, **, and *** represent statistical significance at the 90%, 95%, 99% confidence levels respectively, measured by t-statistics.
As far as preferences for organically-grown produce, results suggest consumers in all three states have a positive propensity to purchase organically-grown tomatoes and green beans, such that the coefficient on the organic attribute is positive and significant for tomatoes and green beans in New Hampshire, Maine, and Vermont. Among the other produce options, the organic attribute is negative and weakly significant for snap peas in Maine, a finding that is contradictory to other findings on organic product demand.

Consumer preferences for blemishes are less clear than those for the local and organic attributes. Results suggest individuals positively value non-blemished tomatoes in both New Hampshire and Maine as well as for snap peas in New Hampshire, identified by the positive and significant coefficient on the no-blemish attribute. One negative coefficient on the no-blemish attribute is significant, for carrots in Maine, suggesting that these consumers positively value blemished carrots over their non-blemished counterparts.

Finally, results suggest heterogeneity across coefficients for direct-to-consumer produce. Specifically, the coefficient on the direct from producer attribute is negative and significant for tomatoes in New Hampshire and Vermont, as well as green beans in Vermont and strawberries in New Hampshire. This would suggest that consumers have a stronger preference for buying these goods indirectly from the grower, such as in a supermarket or grocery store. On the other hand, the coefficient on the direct attribute is positive for cucumbers in Maine, suggesting consumers prefer to purchase cucumbers directly from the grower.

Willingness to Pay Estimates

Table 7 summarizes the willingness to pay measures calculated using the coefficients from the ASC conditional logit models. These measures can be interpreted as the willingness to pay for the attributes in dollars per pound. Percent price premiums are described in Table 8, where the
percent price premium was calculated with respect to the willingness to pay measure and the average price of the produce option used in the choice experiment. Results suggest individuals are willing to pay a premium of $0.75, $0.98, and $1.74 per pound for locally-grown tomatoes in New Hampshire, Maine, and Vermont, respectively. This represents a mark-up of 35%, 46%, and 82%, respectively, over the average price a consumer faces. A similar result is suggested for green beans, where individuals are willing to pay an additional $1.42 (46%), $1.23 (40%), and $0.85 (28%) per pound for locally grown green beans in New Hampshire, Maine, and Vermont, respectively. Finally, we find that consumers in New Hampshire are willing-to-pay an additional $0.69 per pound for locally grown carrots, a 62% mark-up over the average price.

Table 7: Willingness to Pay Estimates in Dollars per Pound - ASC Conditional Logit Results

<table>
<thead>
<tr>
<th>Attributes</th>
<th>Tomato</th>
<th>Cucumber</th>
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<td></td>
<td>NH</td>
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<tr>
<td>Local</td>
<td>.75**</td>
<td>.98***</td>
<td>1.74***</td>
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<tr>
<td>Organic</td>
<td>1.27***</td>
<td>.60*</td>
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<tr>
<td>Directly Purchased</td>
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<td>-0.21</td>
<td>-1.03*</td>
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<tr>
<td>No Blemish</td>
<td>.55*</td>
<td>1.08***</td>
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Note: WTP measures for a change in attribute level. *, **, and *** represent statistical significance at the 90%, 95%, 99% confidence levels respectively.

Table 7 Continued: Willingness to Pay Estimates in Dollars per Pound - ASC Conditional Logit Results

<table>
<thead>
<tr>
<th>Attributes</th>
<th>Snap Pea</th>
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<td>NH</td>
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<tr>
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<td>0.14</td>
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<tr>
<td>Organic</td>
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<td>Directly Purchased</td>
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<tr>
<td>No Blemish</td>
<td>.76*</td>
<td>0.32</td>
<td>8.23</td>
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Note: WTP measures for a change in attribute level. *, **, and *** represent statistical significance at the 90%, 95%, 99% confidence levels respectively.
In terms of willingness to pay for organic products, results suggest consumers are willing to pay an additional $1.27, $0.6, and $1.74 per pound for tomatoes in New Hampshire, Maine, and Vermont, respectively. This represents a mark-up over average price of 60%, 28%, and 92%, respectively. Furthermore, we find similar trends across all three states in their preferences for organically grown green beans. Specifically, consumers are willing-to-pay an additional $1.21 (39%), $0.92 (30%), and $0.78 (25%) per pound for green beans across New Hampshire, Maine and Vermont, respectively.

<table>
<thead>
<tr>
<th>Attributes</th>
<th>Tomato</th>
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<th>Carrot</th>
</tr>
</thead>
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<td></td>
<td>NH</td>
<td>ME</td>
<td>VT</td>
</tr>
<tr>
<td>Local</td>
<td>35%**</td>
<td>46%***</td>
<td>81%***</td>
</tr>
<tr>
<td>Organic</td>
<td>59%***</td>
<td>28%*</td>
<td>92%***</td>
</tr>
<tr>
<td>Directly Purchased</td>
<td>-35%**</td>
<td>-10%</td>
<td>-48%*</td>
</tr>
<tr>
<td>No Blemish</td>
<td>26%*</td>
<td>51%***</td>
<td>12%</td>
</tr>
</tbody>
</table>

Note: Percent price premiums calculated using WTP estimates and the average produce price from the consumer choice experiment. *, **, and *** represent statistical significance of the WTP estimates at the 90%, 95%, or 99% confidence level, respectively.

Table 8 Continued. ASC Conditional Logit Results – Percent Price Premiums For Choice Attribute Over Binary Counterpart

<table>
<thead>
<tr>
<th>Attributes</th>
<th>Snap Pea</th>
<th>Green Bean</th>
<th>Strawberry</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NH</td>
<td>ME</td>
<td>VT</td>
</tr>
<tr>
<td>Local</td>
<td>16%</td>
<td>3%</td>
<td>-557%</td>
</tr>
<tr>
<td>Organic</td>
<td>-9%</td>
<td>-45%*</td>
<td>288%</td>
</tr>
<tr>
<td>Directly Purchased</td>
<td>0%</td>
<td>23%</td>
<td>-213%</td>
</tr>
<tr>
<td>No Blemish</td>
<td>18%*</td>
<td>7%</td>
<td>193%</td>
</tr>
</tbody>
</table>

Note: Percent price premiums calculated using WTP estimates and the average produce price from the consumer choice experiment. *, **, and *** represent statistical significance of the WTP estimates at the 90%, 95%, or 99% confidence level, respectively.
The results suggest heterogeneity in the consumers’ willingness to pay for produce purchased directly from the grower, varying in coefficient sign across the various produce options. Specifically, we find that consumers in New Hampshire are willing-to-pay $0.75 less per pound for tomatoes that are directly purchased from a grower, representing a mark-down of 35%. Additionally, consumers in New Hampshire are willing-to-pay $1.62 less per pound for strawberries that are directly purchased, a similar mark-down of 35%. Conversely, we find that consumers in Maine are willing to pay an additional $1.82 per pound for cucumbers that are directly purchased, representing a mark-up of 95%. These results could suggest that there may be an additional cost associated with purchasing produce directly from the grower; however, more efforts are needed to explore and understand the variation of willingness to pay estimates for produce that is purchased directly from the producer. In terms of blemishes, consumers in Maine are willing-to-pay an additional $1.08 per pound for tomatoes that are blemish-free, which represents a mark-up over average tomato prices of 51%.

In this discrete choice analysis, participants were also able to “opt-out” of the bundle selection by choosing the “neither” option when comparing Bundle A to Bundle B in any of the choice sets presented. There are a total of 660 choice sets which resulted in participants choosing the “neither” option as their selection. These selections were followed by a justification question asking the participant to choose from a list of possible reasons as to why they chose this “neither” option. This tactic decreases protest bidding and adds additional information qualitative information about the consumer choice experimental design. From the list of reasons for opting-out of the question, almost half of the participants (45%) chose the “other” option, indicating that they were not motivated by reasons listed in the answer bank given in the survey (Figure 26). For example, participants chose “other” over options such as: the comparison is to complex (21%);
they are satisfied with non-locally grown produce (16%); and there is less variety if produce is grown locally (10%).

After investigating the written responses explaining for why the participant chose the “neither” option for any of the choice sets, the top written responses are that the prices in the comparison were too high or too expensive (24%) and that the participant does not like or does not buy the produce option in choice set (23%) (Figure 27). Additionally, some participants indicated they were given a comparison which did not contain a local or organic option, which is always preferable to purchase over conventionally grown produce (20%). Lastly, other participants grew this type of produce in their own garden (15%). Factors such as, participants disliking particular produce or always prefer a particular method of produce production (eg. organic or local), should be considered in future work.

Figure 26. Consumer Survey Choice Set Opt-Out Analysis. Participants were asked to check any of the reasons from a multiple choice list as to why they chose the “neither” option for any of the choice set answers (n=660).
Consumer Survey Quantitative Results Summary

The consumer survey contained three main components, one of which investigated the propensity to purchase produce items possessing specific attributes and the consumers’ willingness to pay for those attributes. The results suggest that there is a positive propensity for consumers to purchase produce items that are locally grown and organically grown. This positive propensity to purchase is most consistent for green beans and tomatoes, where the coefficients are positive and significant across all three states. Results show a relatively weak positive propensity to purchase produce that is non-blemished. Results also suggest a negative propensity to purchase produce that is sold directly from a producer; however, the sign and significance vary across produce items and across states. The willingness to pay estimates suggest a relatively weak willingness to pay for a *variety* of produce options where only tomatoes and green beans are statistically significant for all three states. Consumers are willing to pay a 35-81% price premium for locally grown tomatoes over non-locally grown tomatoes and a 28-46% price premium for...
locally grown green beans over non-locally grown green beans. Similarly, consumers are willing to pay a 28-92% and a 25-39% mark-up for organically grown tomatoes and green beans, respectively, over their conventional counterparts. Results also suggest there is a significant price cut for produce items sold directly from the farmer, in some cases, with premiums as low as -48%. However, in other cases consumers are willing to pay as much as 95% more for produce sold directly from a farmer. Overall, the results indicate extreme heterogeneity across the coefficients, varying in significance and magnitude across the different states, attribute-levels, and produce options under investigation.
Chapter VII
Discussion

Discussion Introduction

The research presented in this thesis aims to investigate the two vital components of local agriculture in northern New England—the producers and the consumers. After presenting the results from both facets, the following chapter will compare the data to discuss the disconnects, knowledge gaps, and possible implications. This chapter will first interpret the producer results and discuss possible solutions to the current constraints and expansion barriers faced by local producers. The next section will address the producer results with the qualitative data from the consumer survey, first by comparing the consumer and producer perceptions of locally grown produce and then comparing the consumer and producer perceptions of organically grown produce. This chapter then specifically addresses the economic viability of local agriculture in northern New England, first by interpreting the producer results and then by addressing the willingness to pay estimates from the consumer survey. The section will end with concluding statements—marking the completion of this thesis.

Discussion of Regional Local Agricultural Production

In order to fully understand the potential for local agriculture in northern New England, the perceptions of producers must be considered. The focus group analysis conducted in this thesis demonstrates the most prevalent constraints in regional farming, the top influencers for determining which practices and methods local growers use during production, the information
most sought by farmers from their consumers, and the predominant barriers to farm expansion. The data supports that labor and laborers are the largest constraints to growing produce in the region, which could be further complicated by minimum wage hikes or other politically tied topics. One possible solution to the laborer challenge is to solicit students interested in the farming industry or a related field. This collaboration would aim to compensate or substitute salaries with on-site education and management skills. Programs between local farms and schools could create a mutually beneficial learning experiences while enhancing local agriculture. This model has been incorporated at the college level in schools such as the University of Massachusetts where students work on a farm for a year while earning college credits. In order to remedy issues with local consumers, additional research or programs should aim to rectify misconceptions and enhance consumer education to decrease consumers’ reluctance to pay premiums and decrease consumer-farmer miscommunications.

Barriers to farm expansion are related to limited capital investments needed for increasing inputs and also for the increases in insurance coverage and taxes that accompany expansion. These factors should be considered when projecting expansion feasibility, but should also be considered if expansion is to be encouraged at the regional level. Expanding education and availability about current loan and grant programs is one way to encourage expansion.

It is also important to understand the perceptions from farmers at a state level. Though there are similarities between all the three northeastern states, differences surface in significant categories pertinent to improving state-level programs and further enhancing local agriculture in the region. This type of qualitative analysis may prove useful for identifying cross state comparisons of programs. For example, only New Hampshire farmers claim to be influenced by outside sources, such as Cooperative Extension, when deciding which methods and practices they
use during their operations. Because of this, New Hampshire’s Cooperative Extension may serve as a model for surrounding states in the region.

The perceptions from both local-organic and local-conventional growers support there are differences in management practices and motivations which further separate these two types of local producers. The organic growers responses’ suggest that they are more concerned with the health of the land compared to that of conventional local growers, which is important to recognize when considering and promoting the sustainability of local farming. Because organic and local foods are sometimes confused by consumers, it is important to understand that there are divergences between these two groups when it comes to considerations of environmental impacts. Systematic interviews, focus groups, or surveys should be administered across different regions in the U.S. to identify similarities and differences from producers across the nation to further understand how local and national policy can aid sustainable local farmers to collectively fortify local agriculture.

*Comparison of Producer and Consumer Qualitative Data*

By addressing the consumers’ willingness to pay for local produce, motivations for purchasing, and local produce perceptions, along side the perceptions of local producers in the New England region, disconnects and unique trends have been revealed. The major barrier for consumers who currently purchase local produce is the general availability of local produce. This is highlighted in both the qualitative results and also in the negative willingness to pay estimates for produce sold directly from farmers. This finding may suggest that collaboration with intermediate markets is needed to enhance the regional economic viability of local produce. If local farmers increase sales to supermarkets or local restaurants, consumers can achieve their main
goals: eating healthy, high-quality produce while supporting their local economy without incurring the cost of an extra trip to the farmers market. By selling to an intermediate market, local producers could also possibly decrease some of their main barriers while simultaneously exposing more prospective consumers to their products and encouraging increased consistency from those who already purchase local produce.

The combination of the state level producer and consumer data demonstrates that there are a variety of differences amongst the three states in both facets. When addressing the tri-state producer constraints and barriers, the states differ in their top responses, while the percent price premiums consumers are willing to pay are also highly dependent on each individual state. This should be taken into consideration when generating plans for New England as a whole, such as broad plans to increase local food production. It should be recognized that there are unique barriers and preferences of both consumers and producers of each state along with separate consumer-producer dynamics. These differences may be alluding to distinctions in social capital and cultural structures that are tied to local agriculture in each state, which will play a role in produce pricing, marketing techniques, and the overall success of state-level local agricultural expansion.

*Organic Produce Perceptions*

The comparison of consumers and producers of organically grown produce has also provided interesting results. From the comparison of the conventional and organic local producers, the results suggest different factors influence the practices and methods used in the two types of production. The organic growers demonstrate that they are motivated more by the longevity of the practice, relating to environmental quality and sustainability, while the conventional growers are more concerned with the practices’ effectiveness and the costs and profits. If states are interested
in progressing local food along with local farm sustainability, organic growers may be more predisposed to take these expenses into account in their farm cost structure. If the sustainable practices are to be encouraged in the Northeast region, perhaps more subsidies should be allocated to the organic farmers who have practice longevity in mind.

From the consumer survey, the results suggest the consumers know more about organic produce comparatively to local produce, even though they purchase less organic produce and less frequently, overall. These consumers suggest that when buying fresh produce it is only “somewhat important” to purchase organic produce; however, when compared to conventionally grown produce, organic is seen as superior in its ability to reduce long term health issues and in its lack of pesticide use. Results also suggest it is “very important” to the survey respondents that their produce is produced without pesticides when considering fresh produce options. In addition, those who purchased organically grown produce are motivated by the idea that it helps local farms.

These combined results suggest that if more local farms were certified organic, the participants would still purchase fresh local produce produce from these farms because it supports their top motivations for purchasing: that it supports local farms, the produce is of high quality, and that it supports healthy eating. This is further supported by the positive willingness to pay estimates for local and organic produce. More organic local farms may generate positive externalities on the environment without losing the current local-buying consumer base.

What is not explained in the thesis results section, is the additional costs needed to invest in USDA organic certification. Results suggest that these consumers are most consistent in their willingness to pay a price premium for local produce across the different produce options and across the different states; and as long as organic produce is sold locally and can be done so within the price premium range of 25%-81% or about 48% on average, then this may decrease the
negative environmental externalities caused by conventional farming. However, what is hindering prospective buyers to purchase organically grown produce is the price, according to the survey results. The willingness to pay estimates demonstrate that the range of percent price premiums consumers are willing to pay are fairly similar for organically and locally grown produce; with average premiums of 46% and 48%, respectively. The average organic farmer may be pricing above this threshold due to the cost structure imposed by organic standards and certification.

Organic growers appear to be mindful of decreasing the negative externalities imposed on the environment due to farming; however, the cost of organic production may be above what consumers are willing to pay and high prices can generate negative perceptions from non-organic buyers. If local agriculture is to progress in the northeast region, negative externalities from farming practices will have various impacts on the surrounding ecosystems and regional economy. By encouraging and educating growers to use the practices that aim to mitigate soil erosion, decrease nitrogen runoff, and increase farm biodiversity, this can lessen the negative externalities which have been realized from large-scale agriculture. Though local buyers are not primarily motivated by environmental issues, if organic produce is sold locally at a comparable price, those who are currently purchasing local will most likely continue to do so, thus maintaining the number of local sales while adding the benefit of decreasing negative environmental externalities. Additional studies should be conducted to better understand the contingent value of organic practices on the environment. If further research supports a high social benefit resulting from organic agriculture, subsidies may be necessary to compensate the cost of organic produce production. If organic proves to be cost ineffective, other methods for farm sustainability can be

---

3 Assertion based on the producer focus group results which suggests that local-organic growers are influenced by the longevity/sustainability of the growing practices used on their farm.
explored through local Extension agencies, such as helping to help promote agricultural sustainability. This will ensure a healthy evolution of local food production in New England.

Motivations and Economic Viability of Local Produce

Implications of Consumer Purchasing Motivations and Habits

To understand the economic viability of local agriculture in the northeast region of the U.S., both, local supply and demand must be evaluated. When comparing the results from the producers and consumers, strengths and weaknesses are revealed concerning the economic strength of local agriculture. From the producer perspective, there are clear obstacles to current local agricultural production that are hypothesized to hinder any further expansion efforts. Capital, labor, time, land, and, demand, are all problems which stymie expansion efforts. Some of these issues could be mitigated with increased revenues—resolving issues such as capital requirements for increasing production costs and increased wages for additional laborers; however, other barriers are unrelated to profit maximization.

Some producers state that expansion would require too much more of their time or that land is overall hard acquire. With the added labor requirements and complications that accompany expansion, many growers claim that expansion would simply be too much effort. Though geographical models suggest there is ample land to increase local agricultural production, it must be considered that this market, which does not necessarily yield high profits, is violating some basic assumptions about economic suppliers. For example, local farms often do not capitalize on economies of scale and some growers express that they lack a business mindset, indicating that local farming may not follow the basic economic theory of the firm—that all firms aim to be profit maximizers. Instead, there may be other, non-monetary factors, that motivate farmers to grow and
sell local produce, which may explain why farmers are not interested in expansion even if it increases revenues. If medium sized local farms are not willing to expand to meet demand, theory suggests other suppliers will enter the local farming market as producers; however, limited tilled land and difficulties in leasing land may increase entry barriers in addition to the start-up costs that accompany any small enterprise. This could generate high turn-over rates of young farmers who want to attempt local farming. If the demand for local agriculture is truly present, which will be addressed in the next section, then one would expect for suppliers to feel the pull of demand and for suppliers to enter the market. As discussed, this may not be the case due to high barriers to entry and a non-profit maximizing mindset by local growers.

If legislators wish to reap the economic benefits of local agriculture, further measures should be taken to ensure that those who want to expand their production are able to do so. This may include increased land subsidies and grants for those aiming to expand, tax breaks, and special insurance assistance programs aimed to facilitate those increasing local production or starting local farming business. If local agriculture is to grow with demand, it must be considered that the local suppliers do not act as the assumed profit maximizers and their unique perspectives must be considered and accommodated in this new emerging market.

When interpreting the results from the consumer survey it is important to remember that 96% of the respondents stated that they had purchased local produce in the past year. This indicates that the willingness to pay estimates and qualitative results are from the perspective of current buyers. One could expect to see both qualitative and quantitative results demonstrate a positive bias in favor of local produce. For example, the factors considered when purchasing fresh produce seem reflect the motivations of a person who currently purchases local fresh produce, with the factors considered to be “very important” as: maintaining local farm land, supporting the local
economy, grown without pesticides, and that the produce is grown in the U.S. On the contrary, though all of these attributes are common motivators for purchasing locally produced fruits and vegetables, purchasing fresh produce that is grown “locally” is only deemed “important” to these consumers, as opposed to “very important”. This discrepancy could be due to lack of randomization in how the respondents are shown the question, but it could also demonstrate that certain phrasing or word highlighting may influence a consumer’s decision to purchase a local item. Maintaining local farmland commands the most responses in the “very important” category. This topic has not been frequently investigated in previous literature that aims to explain consumer motivations for purchasing local produce. This may indicate that New Englanders’ cultural and economic ties to agriculture are fuel for purchasing locally produced items. Across the different questions, it is clear that these respondents feel that local produce stimulates the local economy and generates a sense of community, tying the top motivations for purchasing local foods in New England to helping the local farmer, helping the local economy, maintaining farmland, along with eating healthy, and purchasing high-quality fresh produce. The fact that consumers find purchasing produce that maintains local farm land to be relatively more important than purchasing produce that is locally grown, indicates a clear pathway in which local food could advertise more effectively in this region by capitalizing on the values of local consumers.

Implications of the Propensity to Purchase and Willingness to Pay Estimates

When analyzing this specific sample, one would expect to see a positive and significant propensity to purchase locally grown produce, possibly across all types of produce, given that the majority of the participants claim to have purchased local produce in the past year. As a result, there is a positive propensity to purchase local produce, consistent across three states, but this
finding is not significant for all of the six produce options investigated. In fact, there are only two types of produce that are significant for the local attribute across all three states—tomatoes and green beans. Overall, the propensity to purchase produce given a particular attribute varies in magnitude, sign, and significance, depending on the individual attribute, state, and, produce option in question.

Significant negative propensities to purchase produce directly from a farmer contradicts findings from previous publications (Darby et al. 2008; Onken, Bernard, and Pesek, 2011; Onozaka, Nurse, and Thilmany, 2011). On average, the northern New Englanders possess a negative significant propensity to purchase directly from farmers, with negative willingness to pay estimates as low as -48%. This suggests there may be a greater inconvenience imposed by farmers markets, where the costs outweigh the benefits received from social interaction. As previously described, consumers are motivated to purchase local produce to support maintaining local farmlands and to support the local economy and farmers, where sense of community is much lower on the list of motivations. This result may indicate that more intermediate market options should be explored to increase local produce sales. This can be explored through local restaurants and by incorporating local foods into grocery stores in the region to decrease this negative propensity to purchase local produce that is sold directly from a grower.

The significant willingness to pay estimates for both local and organically grown produce follow, or are slightly higher than, previous literature from across the United States (Pyburn et al. 2016; Xia and Zeng, 2008; Adams and Salois, 2010; Yiridoe et al., 2005). For organically grown produce, when significant, the results suggest that regional consumers are willing to pay percent price premiums that range from 25% - 92% for over non-organic produce options. The price premiums, when significant for locally grown produce, range from 28% - 81%, over the different
produce options and three states. The average percent price premium for local tomatoes and green beans is 48% above the non-local average price. Likewise, the average percent price premium for organic tomatoes and green beans is 48% above the conventional average price. This does not support a significant price premium for local produce over that of organic as presented in previous literature (Adams and Salois, 2010; Pyburn et al. 2016; Loureiro and Hine, 2002; James et. al, 2009; Hu et al., 2009) Additionally, because of the wide range of price premiums, which vary across produce type and state, this disallows for uniform price premiums to be proscribed for all locally grown and organically grown produce types across the region. In order to aid regional farmers in pricing their products, specific pricing indexes should be generated according to each state and possibly by individual counties. Furthermore, the negative percent price premium indicates that some types of local produce is more profitable when sold at a grocery store.

Overall, the low number of local produce options which yield a significant price premium indicates possible issues with expanding local agriculture in the region. This is especially surprising given the qualitative results which indicate the importance of produce attributes commonly associated with local agriculture. It demonstrates that consumers find maintaining local farmland and aiding the local economy important when considering to purchase their fresh produce, but are still not necessarily willing to pay a price premium when making the final purchasing decision. It is important to understanding that consumers not only have to want to buy local produce and be willing to pay a premium, but they also have to like the variety produce options being sold locally. Results demonstrate a relatively weak consistency in consumer willingness to pay across a variety of produce options, despite a sample that demonstrates interest and a positive perception of locally grown fresh produce.
Concluding Statements

In economic theory, fresh produce is often used as an exemplary model for describing a homogenous product. The idea of product differentiation has been introduced to the produce market, in the form of organically and locally grown produce for which, studies support that consumers are willing to pay price premiums for these product distinctions. In New England, legislators are setting goals to expand local agricultural production in the region with the promise of aiding local economies and possibly decreasing negative externalities caused by large-scale agriculture. However, expansion plans have largely ignored the socioeconomic dynamics of both, the producers and consumers of local agriculture in the region. In order to investigate the economic viability of local agriculture in northern New England, this thesis investigates both the consumer and producer facets in order to inform the current and future prospects of local agriculture in the region.

Results suggest that there are economic complexities stemming from both the producers and consumers in relation to local agriculture expansion. The capital, labor, time, land, and demand required for expansion are the primary barriers to expansion efforts. Many of those who produce locally do not do so as a sole source of income, indicating that even if demand is strong for local produce, the effort, time, and land barriers may not be worth the additional profit gained from farm expansion. As for the consumer investigation, the majority of the respondents indicate that they have purchased local produce in the past year, which is expected to inflate the qualitative and quantitative results in favor of local agriculture. Those who purchase local produce are motivated most by aiding the local economy, healthy eating, and fresh produce, which are also the top motivations for those who purchase organic produce. The respondents also state that maintaining local farmland, aiding the local economy, consuming produce grown without pesticides, and
consuming produce grown within the country are all “very important” when considering to purchase fresh produce. Of those who do purchase local produce, the top motivations for doing so are; that it aids the local farmer, it supports healthy eating, and that it is better quality produce.

Despite the importance of these produce attributes, the propensity to purchase local produce is only significant across all three states, simultaneously, for two of the six produce options investigated—tomatoes and green beans. This was also true when addressing the to the propensity to purchase organically grown produce. For tomatoes and green beans, the percent price premiums range from 28%-81% for the locally grown attribute and 25%-92% for the organically grown attribute with averages of 48% and 48%, respectively. Though these percent price ranges are slightly higher than that of previous literature, they are only significant for two out of the six produce types across all the three states. The willingness to pay a local price premium is dependent on the state and produce option in question, which disallows for average price premiums to accurately represent the consumers’ willingness to pay. Overall, there is a propensity to purchase local produce; however, it is only significant for a few types of produce, indicating a weak willingness to pay for a variety of produce from the residents of Maine, Vermont, and New Hampshire. There is also a negative willingness to pay estimate for purchasing produce directly from the producer, which may indicate a net disutility from purchasing from farmers markets or CSAs, contradictory to previous results.

One solution that may strengthen the economic viability of local agriculture in the region is to increase the availability of local produce sold in intermediate markets such as, food hubs, grocery stores, and in restaurants. This can expose more buyers to a larger produce variety and allow for an expansion of local produce selections which can aid the local producers with a more consistent and a possibly larger revenue stream. Restaurants can also incorporate a larger variety
of fresh produce into full meals that a consumer would not have otherwise purchased alone in a market setting. Despite the motivations of consumers to purchase local produce, the combination of supplier constraints and consumers who are only willing to pay a price premium for a small percent of produce options, indicates a weak economic viability of local agriculture in the region. As the northeast region moves forward with their efforts to expand local agriculture, it is vital to remember basic economic theory; that if two products are seen as close substitutes there is only a small margin in which price differentiations can exist. Until consumers are willing to pay for the additional perceived benefits provided by local agriculture, the majority of fresh produce will continue to be purchased as if it were a homogenous product.
REFERENCES


Friese, S., 2014. Qualitative data analysis with ATLAS. ti. Sage


United States Department of Agriculture: Know Your Farmer, Know Your Food. 2015 United States Department of Agriculture.

United States Department of Agriculture. 2015 “Number of U.S. farmers markets has nearly tripled over the last 15 years” Accessed July 18th 2017.


Xia, W. and Zeng, Y., 2008. Consumer’s willingness to pay for organic food in the perspective of meta-analysis. In international conference on applied economics. ICOAE (pp. 933-943).


University of New Hampshire

Research Integrity Services, Service Building
51 College Road, Durham, NH 03824-3585
Fax: 603-862-3564

26-Feb-2016

Werner, Samantha
Natural Resources, James Hall
216 Ocean Blvd
Seabrook, NH 03874

IRB #: 5944
Study: Local and Organic Agriculture in Northern New England: Assessing Producer and Consumer Constraints and Disconnects
Review Level: Expedited
Approval Expiration Date: 26-Feb-2017

The Institutional Review Board for the Protection of Human Subjects in Research (IRB) has reviewed and approved your request for time extension for this study. Approval for this study expires on the date indicated above. At the end of the approval period you will be asked to submit a report with regard to the involvement of human subjects. If your study is still active, you may apply for extension of IRB approval through this office.

Researchers who conduct studies involving human subjects have responsibilities as outlined in the document, Responsibilities of Directors of Research Studies Involving Human Subjects. This document is available at http://unh.edu/research/irb-application-resources or from me.

If you have questions or concerns about your study or this approval, please feel free to contact me at 603-862-2003 or Julie.simpson@unh.edu. Please refer to the IRB # above in all correspondence related to this study. The IRB wishes you success with your research.

For the IRB,

Julie F. Simpson
Director
New England Regional Agriculture Study: Grower Questionnaire

1. Name of participant ________________________________ Male or Female (circle one)

2. Location of farm (State, Town) ________________________________

3. Which do you primarily grow? Fruits, Vegetables or Both (circle one)

4. Which category does your farm fall under? Conventional Farm or Organic Farm (circle one)

5. What is the size of your farm (in acres)? ________________________________
APPENDIX C-PRODUCER FOCUS GROUP RESULTS ON BEST PRODUCE FOR DIRECT MARKETING

Figure A1. Producer Focus Group Best Produce for Direct Marketing Results. The top produce for direct marketing as a function of frequency of produce mentioned in the growers’ responses. Top produce options, along with produce options from the pilot study were used in the consumer choice sets for willingness to pay estimates.
Northern New England Local and Organic Fruit and Vegetable Survey
Our research team from the University of New Hampshire, the University of Maine, and the University of Vermont, is conducting a survey to gather information on consumer demand for local and organic fresh produce in northern New England. This survey is funded by the United States Department of Agriculture. In order to participate in this survey, you must be at least 18 years old. You also must be the primary shopper for your household. It will take you approximately 25-40 minutes to complete this survey. Survey participation is voluntary, and you will not receive any compensation for participating. There are no potential risks in participating in this study. We seek to maintain the anonymity of all data and records associated with your participation in this research. We will report the data in aggregate, assessing trends in consumer fresh produce preferences. The results may be used in reports, presentations, and publications.

If you have questions about your rights as a research subject, you may contact Dr. Julie Simpson in UNH Research Integrity Services at 603-862-2003 or Julie.Simpson@unh.edu. If you have any questions about this research project or would like more information, you may contact project leader, John Halstead, Professor of Environmental and Resource Economics University of New Hampshire Email: John.Halstead@unh.edu Phone: 603-862-3914

In order to help us with this study, you must be at least 18 years old, the primary shopper for your household and a Maine, Vermont, or New Hampshire resident.

Are you at least 18 years old?
1. ○ Yes
2. ○ No

Are you the primary food shopper for your household?
3. ○ Yes
4. ○ No

Are you a resident of Maine, Vermont, or New Hampshire?
5. ○ Yes, ME
6. ○ Yes, NH
7. ○ Yes, VT
8. ○ No

IF YOU ANSWERED NO TO ANY OF THE QUESTIONS ABOVE, PLEASE STOP THE SURVEY AND MAIL IT BACK. THANK YOU.
Section A: In this section, we are going to ask you some questions about what you know and what you think about fresh produce (fruits and vegetables) production and consumption.

You will often see the term(s):
**Fresh Produce** - Fresh fruits and vegetables only

Q1. How often does your household purchase food from a grocery store?
9 ☐ Never
10 ☐ Once a month or less
11 ☐ 2-3 times a month
12 ☐ Weekly
13 ☐ 2-3 times a week
14 ☐ Daily

Q2. Do you / have you ever grown fruits or vegetables in your own personal garden or in a community garden?
15 ☐ Yes
16 ☐ No

Please use the following definitions for this survey:
**Organic:** The product meets the USDA federal requirements and is Certified Organic. Organic farming must demonstrate the protection of natural resources, conservation of biodiversity, and use of only approved substances (including pesticides).
**Conventional:** The product is produced with farming methods that use chemical fertilizers and pesticides.

Q3. How knowledgeable do you think you are about organically grown fresh produce? (Please circle a number on the 0-10 scale, with 0 being the least and 10 being the most)

0 1 2 3 4 5 6 7 8 9 10
Less Knowledgeable  More Knowledgeable
Q4. Please indicate below how you would compare fresh produce (fruits and vegetables) that is **organically grown** to fresh produce that is **conventionally grown** for the following characteristics. (For example, you find the freshness of organic food is what compared to conventionally grown foods):

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshness</td>
<td>Inferior</td>
<td>Somewhat Inferior</td>
<td>About the Same</td>
<td>Somewhat Superior</td>
<td>Superior</td>
<td>Not Sure</td>
</tr>
<tr>
<td>Quality (taste)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Nutritional Value</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Food Safety</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Availability</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Appearance</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Produced without chemical pesticides</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Reduction of potential food-born illness</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Reduction of potential long-term health issues</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>
Q5. Have you purchased any organically grown fresh produce \textbf{in the past 12 months}? 
17 ☐ Yes 
18 ☐ No 

Q6. If you \underline{have} purchased organically grown food in the past 12 months, how often do you purchase organic fresh produce?

19 ☐ Once a month or less 
20 ☐ 2-3 times a month 
21 ☐ Weekly 
22 ☐ 2-3 times a week 
23 ☐ Daily 
24 ☐ I haven’t purchased organically grown produce

Q7. If you \underline{have} purchased \underline{organically grown} food in the past 12 months, what are your reasons for purchasing organically grown fresh fruits and vegetables? \underline{PLEASE CHECK ALL THAT APPLY.} 
25 ☐ Healthy eating 
26 ☐ Quality of the produce 
27 ☐ Support local farms 
28 ☐ Knowing the farmers 
29 ☐ Sense of community 
30 ☐ Food safety concerns 
31 ☐ Environmental quality concerns 
32 ☐ I haven’t purchased organically grown produce 
33 ☐ Other ______________________

Q8. If you haven’t purchased organically produced foods within the last 12 months, what is the biggest reason that you have not tried \underline{organically grown} fresh fruits and vegetables (\underline{check one})?
Q9. For fresh fruits and vegetables, indicate if you consider the following production locations to be “local”, “regional” (but not local), or “Neither”:

<table>
<thead>
<tr>
<th>Production Location</th>
<th>Local</th>
<th>Regional (but not local)</th>
<th>Neither</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grown within a 50 mile radius of my home</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Grown within a 100 mile radius of my home</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Grown within a 300 mile radius from my home</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Grown within a 500 mile radius from my home</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Grown in my county</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Grown in my state</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Grown in the United States</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

Q10. How knowledgeable do you think you are about locally grown fresh produce? (Please circle your best answer on the 0-10 scale, with 0 being the least and 10 being the most)

0 1 2 3 4 5 6 7 8 9 10
Less Knowledgeable More Knowledgeable
Q11. Please choose the level of agreement for EACH of the following statements about locally grown fresh produce (Here defined as grown within a 50-mile radius of your household).

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
<th>Don't Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Locally grown fresh produce has more nutritional value than non-local produce.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Promoting locally grown fresh produce enhances social interactions and a sense of community.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Promoting locally grown fresh produce stimulates the local economy.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Locally grown fresh produce is safer (less risk of food allergy and pesticide exposure).</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Growing fresh produce locally is less environmentally damaging than non-locally grown produce.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>
Q12. Please indicate below how you would compare fresh produce (fruits and vegetables) that is **locally grown** to fresh produce that is **not locally grown** for the following characteristics:

Example: The freshness of **locally grown** food is what to **non-locally grown** foods?

<table>
<thead>
<tr>
<th>Locally Grown vs Not Locally Grown</th>
<th>Inferior</th>
<th>Somewhat Inferior</th>
<th>About the Same</th>
<th>Somewhat Superior</th>
<th>Superior</th>
<th>Not Sure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshness</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Quality (taste)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Nutritional Value</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Appearance</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Availability</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Supports the local economy</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Food Safety</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Produced without pesticides</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Reduction of potential food-borne illness</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Reduction of potential long-term health issues</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

Q13. When you are shopping for fresh produce (fruits and vegetables), how important is it to you that the produce...
Q14. Do you purchase locally grown foods during the winter months from supermarkets, heated greenhouses, winter farmers markets etc.?
40  ☐ Yes
41  ☐ No

Q15. Have you purchased any locally grown fresh produce in the past 12 months?
42  ☐ Yes
43  ☐ No

Q16. If you have purchased any locally grown fresh produce in the past 12 months, how often is it purchased in your household?
44  ☐ Once a month or less
45  ☐ 2-3 times a month
46  ☐ Weekly
47  ☐ 2-3 times a week
48  ☐ Daily
49  ☐ I have not purchased locally grown fresh produce

Q17. If you have purchased any locally grown fresh produce in the past 12 months, about what percentage of the local food came from the following vendors over the last 12 months (Please write the percentage 0 – 100% on the line provided):

_____ Supermarket (e.g. Market Basket, Shaws)
_____ Supercenter (e.g. Wal-Mart, Target)
_____ Health/Natural Supermarket (e.g. Whole Foods, Fresh Foods)
_____ Farmers Markets
_____ Direct from Producer (e.g. Farm Stand, Community Supported Agriculture (CSA))
_____ Corner/Convenience Store
_____ Home or Community garden
_____ Neighbor’s garden
_____ I have not purchased locally grown produce
Q18. If you have purchased any locally grown fresh produce (fruits or vegetables) in the past 12 months, what are your reasons for purchasing? PLEASE CHECK ALL THAT APPLY.

50  □ Healthy eating
51  □ Quality of the produce
52  □ Support local farms
53  □ Knowing the farmers
54  □ Sense of community
55  □ Food safety concerns
56  □ Environmental quality concerns
57  □ I have not purchased locally grown produce
58  □ Other ____________________

Q19. Rank the products 1-7 in order of what you would most like to buy locally (1 being most, 7 being least).

____ Tomatoes
____ Cucumber
____ Greens
____ Carrots
____ Snap Peas
____ Green Beans
____ Strawberries

Or check I don’t buy local produce ______

Q19a. If there is produce not listed in Question 19. that you would prefer to purchase locally, please list it here ________________

Q20. Which of the following would most likely increase your likelihood of trying a new fruit or vegetable when buying from a local source? PLEASE CHECK ALL THAT APPLY.

59  □ Recipe cards
60  □ Taste test stations
61  □ Mixed bags or bundles of produce
62  □ Discounted specials
63  □ Other____________________
Q21. If you haven’t bought **local produce** in the past 12 months, what is the **main** reason that you have not tried locally grown fresh fruits and vegetables (Check one)?

- Price
- Farm Stand/Farmers Markets hours of operation
- Variety/Choice of fresh produce
- Do not know about farms/farmers markets in my area (lack of information)
- I have purchased locally grown produce
- Other ____________________

Q22. What are the best ways to supply you with information about local vendors? **(PLEASE CHECK ALL THAT APPLY)**

- Newspaper ads
- Facebook, Twitter, Instagram, Snapchat (or other social media)
- Email newsletter
- Road signs
- Through town websites (either paper or email)
- Local event calendars
- Word of mouth
- Other ____________________

Q23. Please circle approximately what **percentage** of your total weekly grocery food budget is spent on all fresh produce.

0 - 10 - 20 - 30 - 40 - 50 - 60 - 70 - 80 - 90 - 100 %

Q24. Of your dollars spent on fresh produce, please **circle** about what **percentage** of that is spent on the following items:

**Organically** grown fresh produce

0 - 10 - 20 - 30 - 40 - 50 - 60 - 70 - 80 - 90 - 100 %

**Locally** grown fresh produce (fruits and vegetables)

0 - 10 - 20 - 30 - 40 - 50 - 60 - 70 - 80 - 90 - 100 %
Section B: In this section of the survey you will be shown a total of 6 scenarios, each of which will ask you to compare and choose between 2 different bundles of fresh produce characteristics. Each bundle is comprised of a unique set of product characteristics that come together as a package.

Please choose the preferred bundle. If you prefer neither bundle, select neither; and provide an explanation why. Please consider “Locally grown” to mean that the product was grown within 50 miles from where it is purchased.

We will start each produce section by asking what you normally buy followed by the 6 bundle scenarios.

Q25. If and or when purchasing fresh tomatoes, you would generally …. 

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buy locally grown</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Buy organically grown</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Avoid blemishes or irregularities</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Buy directly from the farmer</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

For an average price of $____________ per lb. (If you do not know, write, “I do not know”)
Q26.

<table>
<thead>
<tr>
<th>Tomato Bundle A</th>
<th>Tomato Bundle B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Locally grown</td>
<td>Locally grown</td>
</tr>
<tr>
<td>Certified Organically grown</td>
<td>Conventionally grown</td>
</tr>
<tr>
<td>Purchased directly from the farmer (e.g. farmers market)</td>
<td>Purchased directly from the farmer (e.g. farmers market)</td>
</tr>
<tr>
<td>Some blemishes or other irregularities</td>
<td>No blemishes or other irregularities</td>
</tr>
<tr>
<td>$1.15/lb.</td>
<td>$0.91/lb.</td>
</tr>
</tbody>
</table>

78  ☐ Bundle A  
79  ☐ Bundle B  
80  ☐ Neither (prefer to stay with your current practice)

Q27.

<table>
<thead>
<tr>
<th>Tomato Bundle C</th>
<th>Tomato Bundle D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Locally grown</td>
<td>Non-Locally grown</td>
</tr>
<tr>
<td>Certified Organically grown</td>
<td>Conventionally grown</td>
</tr>
<tr>
<td>Purchased indirectly from the farmer (e.g. grocery store)</td>
<td>Purchased indirectly from the farmer (e.g. grocery store)</td>
</tr>
<tr>
<td>Some blemishes or other irregularities</td>
<td>No blemishes or other irregularities</td>
</tr>
<tr>
<td>$4.49/lb.</td>
<td>$1.99/lb.</td>
</tr>
</tbody>
</table>

81  ☐ Bundle C  
82  ☐ Bundle D  
83  ☐ Neither (prefer to stay with your current practice)

Q28. If you chose the neither option above, what are the reasons? (PLEASE CHECK ALL THAT APPLY)

84  ☐ I do not believe locally grown produce is genuine. It is hard to certify.  
85  ☐ I’m satisfied with non-locally grown produce.  
86  ☐ It is less productive to grow everything locally.  
87  ☐ Growing produce locally has unpredictable impacts on environment.  
88  ☐ There is less variety if produce is grown locally.  
89  ☐ The comparison is too complex.  
90  ☐ Others ____________________

29. If and or when purchasing fresh snap peas, you would generally…. 
<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buy locally grown</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Buy organically grown</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Avoid blemishes or irregularities</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Buy directly from the farmer</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

For an average price of $\underline{\text{__________}}$ per lb. (If you do not know, write, “I do not know”)

Q30.

<table>
<thead>
<tr>
<th>Snap Pea Bundle E</th>
<th>Snap Pea Bundle F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Locally grown</td>
<td>Non-Locally grown</td>
</tr>
<tr>
<td>Conventionally grown</td>
<td>Conventionally grown</td>
</tr>
<tr>
<td>Purchased directly from the farmer (e.g. farmers market)</td>
<td>Purchased indirectly from the farmer (e.g. grocery store)</td>
</tr>
<tr>
<td>Some blemishes or other irregularities</td>
<td>No blemishes or other irregularities</td>
</tr>
<tr>
<td>$3.99/lb.</td>
<td>$4.99/lb.</td>
</tr>
</tbody>
</table>

91  ○ Bundle E
92  ○ Bundle F
93  ○ Neither (prefer to stay with your current practice)

Q31.

<table>
<thead>
<tr>
<th>Snap Pea Bundle G</th>
<th>Snap Pea Bundle H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Locally grown</td>
<td>Locally grown</td>
</tr>
<tr>
<td>Certified Organically grown</td>
<td>Certified Organically grown</td>
</tr>
<tr>
<td>Purchased indirectly from the farmer (e.g. farmers market)</td>
<td>Purchased directly from the farmer (e.g. farmers market)</td>
</tr>
<tr>
<td>Some blemishes or other irregularities</td>
<td>No blemishes or other irregularities</td>
</tr>
<tr>
<td>$4.49/lb.</td>
<td>$3.62/lb.</td>
</tr>
</tbody>
</table>

94  ○ Bundle G
95  ○ Bundle H
96  ○ Neither (prefer to stay with your current practice)
Q32. If you chose the neither option above, what are the reasons? (PLEASE CHECK ALL THAT APPLY)

- [ ] I do not believe locally grown produce is genuine. It is hard to certify.
- [ ] I’m satisfied with non-locally grown produce.
- [ ] It is less productive to grow everything locally.
- [ ] Growing produce locally has unpredictable impacts on environment.
- [ ] There is less variety if produce is grown locally.
- [ ] The comparison is too complex.
- [ ] Others ____________________

Q33. If and or when purchasing fresh carrots, you would generally....

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buy locally grown</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Buy organically grown</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Avoid blemishes or irregularities</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Buy directly from the farmer</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

For an average price of $___________ per lb.
(If you do not know, write, “I do not know”)
Q34.

<table>
<thead>
<tr>
<th>Carrot Bundle I</th>
<th>Carrot Bundle J</th>
</tr>
</thead>
<tbody>
<tr>
<td>Locally grown</td>
<td>Non-Locally grown</td>
</tr>
<tr>
<td>Conventionally grown</td>
<td>Conventionally grown</td>
</tr>
<tr>
<td>Purchased directly from the farmer (e.g. farmers market)</td>
<td>Purchased indirectly from the farmer (e.g. grocery store)</td>
</tr>
<tr>
<td>Some blemishes or other irregularities</td>
<td>Some blemishes or other irregularities</td>
</tr>
<tr>
<td>$1.30/lb.</td>
<td>$0.99/lb.</td>
</tr>
</tbody>
</table>

105  ☐ Bundle I  
106  ☐ Bundle J  
107  ☐ Neither  

Q35.

<table>
<thead>
<tr>
<th>Carrot Bundle K</th>
<th>Carrot Bundle L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Locally grown</td>
<td>Locally grown</td>
</tr>
<tr>
<td>Certified Organically grown</td>
<td>Certified Organically grown</td>
</tr>
<tr>
<td>Purchased directly from the farmer (e.g. farmers market)</td>
<td>Purchased indirectly from the farmer (e.g. grocery store)</td>
</tr>
<tr>
<td>Some blemishes or other irregularities</td>
<td>No blemishes or other irregularities</td>
</tr>
<tr>
<td>$0.70/lb.</td>
<td>$1.46/lb.</td>
</tr>
</tbody>
</table>

108  ☐ Bundle K  
109  ☐ Bundle L  
110  ☐ Neither (prefer to stay with your current practice)  

Q36. If you chose the neither option above, what are the reasons? (CHECK ALL THAT APPLY)

111  ☐ I do not believe locally grown produce is genuine. It is hard to certify.  
112  ☐ I’m satisfied with non-locally grown produce.  
113  ☐ It is less productive to grow everything locally.  
114  ☐ Growing produce locally has unpredictable impacts on environment.  
115  ☐ There is less variety if produce is grown locally.  
116  ☐ The comparison is too complex.  
117  ☐ Others ____________________
Section C: This is the last section- almost done!
In this section, we are going to ask some basic respondent information to assist our analysis.

Q37. You are
   - Male
   - Female

Q38. In what year were you born (in YYYY format)? ___________

Q39. What is the highest level of education you have completed?
   - Did not graduate high school
   - High school graduate/GED
   - Some college education
   - 4-year college degree
   - Graduate degree

Q40. Including yourself, how many individuals live in your household?___________
   How many people living in your household are under 18? _______

Q41. What is your zip code?_______________

Q42. Which of the following best describes your current employment situation?
   - Employed full time
   - Employed part time
   - Self-employed
   - Unemployed
   - Retired
   - Student
   - Home care

Q43. What was the total income of your household (before taxes) last year?
   - Less than $15,000
   - $15,000 - $29,999
   - $30,000 - $44,999
   - $45,000 - $59,999
   - $60,000 - $74,999
   - $75,000 - $89,999
   - $90,000 - $104,999
   - $105,000 and over
Q44. Are you aware of the SNAP program?
   Yes  No

Q45. Are you a participant in the SNAP program?
   Yes  No

Q46. How many years have you lived at your current location? _________ Years
August 10, 2016

Dear «First_name» «Last_name»,

It is summer in New England, which means fresh corn, juicy tomatoes, and bright strawberries. Across our region, local and organic food has become a topic of discussion for activist groups and legislators alike, however, we want to know your unique perspective.

I am writing to ask you for your help in our research to improve our understanding of residents’ views on local and organic produce in northern New England. The best way to do this is by asking people in the region to share their thoughts and opinions with us. Please complete the survey even if you don’t buy local or organic foods; we want to understand all points of view!

To participate in the study, you must be the primary grocery shopper for your household, at least 18 years or older, and be a resident of Maine, Vermont, or New Hampshire. Your responses are voluntary and you will remain anonymous. Non-respondents will receive two additional reminders from our research team.

To access the survey, enter the address into your Internet browser’s address bar.

Your unique survey link:

Your names are not on our mailing list and your answers will never be associated with your mailing address. If you have any questions about the survey, please contact Professor John Halstead by phone 603-862-3914 at or by email at John.Halstead@unh.edu

By taking a few moments, you will be adding greatly to our understanding of local agriculture and its future. This research will help local farmers, agricultural groups, and the State Departments of Agriculture make informed decisions in the future. I hope you enjoy completing the survey and I look forward to receiving your responses.

Many Thanks,

John M. Halstead, Ph.D.  
Professor of Environmental & and Resource Economics  
University of New Hampshire  
Durham, NH 03824

James C. McConnon, Ph.D.  
Extension Specialist & Professor of Economics  
University of Maine  
Orono, ME 04469

Lisa Chase, Ph.D.  
Extension Professor  
University of Vermont  
Brattleboro, VT 05301
APPENDIX F- CONSUMER SURVEY SECOND CONTACT LETTER

August 10, 2016

Dear «First_name» «Last_name»,

Last week, we mailed you a letter asking for your help with a study asking for your thoughts on local and organic fruits and vegetables.

If you or someone has already completed the survey, please accept our sincere thanks. If not, and you are the primary shopper for your household, at least 18 years of age, and a resident of Maine, Vermont, or New Hampshire, please complete the survey as soon as possible. Please complete the survey even if you do not buy local or organic foods! We are especially grateful for your help with this important study.

To access the survey, enter the web address into your Internet browser’s address bar.

Your unique survey web address: «URLID»

If you have any questions about the survey, please contact Professor John Halstead by phone (603)-862-3914 or by email John.Halstead@unh.edu.

Many Thanks,

[Signatures]

Professor of Environmental & and Resource Economics
University of New Hampshire
Durham, NH 03824

Extension Specialist & Professor of Economics
University of Maine
Orono, ME 04469

Extension Professor
University of Vermont
Brattleboro, VT 05301
APPENDIX G- CONSUMER SURVEY FINAL CONTACT LETTER

September 10, 2016

«First_name» «Last_name»,
«Address» «Address_2_»
«City», «State» «Zip»

Dear «First_name» «Last_name»,

In recent weeks, our research team has asked you to let us know what you think about local and organic produce. As we compile our results, we are still hoping you complete your survey.

Some people have asked us if they could complete a paper survey instead of using the internet. The answer is yes, and we are enclosing a paper survey in hopes that it makes it easier for you to respond. You can help us by filling out the questionnaire and returning it in the stamped envelope.

Many legislators and activists in our region have big plans for local and organic agriculture, but we want to know your opinion. We plan for this study to contribute to the larger conversation and help local farmers, agricultural groups, and the State Departments of Agriculture plan for the future.

This is the last contact we will be sending you about this survey as we are bringing this phase of our project to a close. If you have any questions about this survey, please contact Professor John Halstead by phone 603-862-3914 or by email John.Halstead@unh.edu.

Many thanks for considering our request.

Respectfully,

[Signatures]

Professor of Environmental & Extension Specialist & Professor of and Resource Economics Economics
University of New Hampshire University of Maine
Durham, NH 03824 Orono, ME 04469

Extension Professor
University of Vermont
Brattleboro, VT 05301
APPENDIX H – IRB CONSUMER SURVEY APPROVAL LETTER

University of New Hampshire
Research Integrity Services, Service Building
51 College Road, Durham, NH 03824-3585
Fax: 603-862-3564

19-Jul-2016

Werner, Samantha
Natural Resources, James Hall
216 Ocean Blvd
Seabrook, NH 03874

IRB #: 5944
Study: Local and Organic Agriculture in Northern New England: Assessing Producer and Consumer Constraints and Disconnects
Approval Expiration Date: 26-Feb-2017
Modification Approval Date: 18-Jul-2016
Modification: Increasing Demographics of Survey

The Institutional Review Board for the Protection of Human Subjects in Research (IRB) has reviewed and approved your modification to this study, as indicated above. Further changes in your study must be submitted to the IRB for review and approval prior to implementation.

Approval for this protocol expires on the date indicated above. At the end of the approval period you will be asked to submit a report with regard to the involvement of human subjects in this study. If your study is still active, you may request an extension of IRB approval.

Researchers who conduct studies involving human subjects have responsibilities as outlined in the document, Responsibilities of Directors of Research Studies Involving Human Subjects. This document is available at http://unh.edu/research/irb-application-resources or from me.

If you have questions or concerns about your study or this approval, please feel free to contact me at 603-862-2003 or Julie.simpson@unh.edu. Please refer to the IRB # above in all correspondence related to this study. The IRB wishes you success with your research.

For the IRB,

Julie F. Simpson
Director
Dear New England Resident,

Back in October, we sent you a survey about local and organic agriculture.

What was your top reason for not responding?
(Please check one and mail back, free of charge)

- I do not remember getting this survey
- I’m not interested in local and organic agriculture
- I was distracted by the U.S. presidential election
- I did not open the survey
- I am sick of surveys!
- The survey was too long
- I was too busy
- None of your business
- Other _____________________
APPENDIX J- CONSUMER SURVEY NON-RESPONDER EXAMINATION RESULTS

Figure A2. Investigation of Non-Response Residents (n = 34).
# Appendix K – Logistic Model Results: Probability of Purchasing Local Produce in Relation to Demographic Data

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Description</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>Dummy variable for female or male</td>
<td>1 = female 0 = male</td>
</tr>
<tr>
<td>Age</td>
<td>Age of respondent in years</td>
<td>Continuous</td>
</tr>
<tr>
<td>State</td>
<td>Dummy variable for State of residence</td>
<td>2 = VT 3 = NH  otherwise = ME</td>
</tr>
<tr>
<td>Emp</td>
<td>Range of employment levels (Appendix D)</td>
<td>Discrete</td>
</tr>
<tr>
<td>Educ</td>
<td>Range of education levels (Appendix D)</td>
<td>Discrete</td>
</tr>
<tr>
<td>Inc</td>
<td>Range of income levels (Appendix D)</td>
<td>Discrete</td>
</tr>
<tr>
<td>Yrshh</td>
<td>Years resident lived at current location</td>
<td>Continuous</td>
</tr>
<tr>
<td>People</td>
<td>Number of people living in the household</td>
<td>Continuous</td>
</tr>
<tr>
<td>Young</td>
<td>Number of children living in the household</td>
<td>Continuous</td>
</tr>
</tbody>
</table>

#Observations = 24 non-local buyers and 50 randomized local buyers per iteration

| Iteration 1 | dy/dx     | Std. Err. | z    | P>|z| |
|-------------|-----------|-----------|------|------|
| Female      | 0.1974756 | 0.095094  | 2.08 | 0.038*** |
| State       |           |           |      |      |
| 2           | -0.005845 | 0.0945084 | -0.06| 0.951 |
| 3           | 0.3213336 | 0.0920822 | 3.49 | 0.000*** |
| Age         | 0.0139465 | 0.0029119 | 4.79 | 0.000*** |
| Educ        |           |           |      |      |
| 121         | 0.4957138 | 0.1057217 | 4.69 | 0.000*** |
| 122         | 0.6196348 | 0.0879704 | 7.04 | 0.000*** |
| 123         | 0.597384  | 0.1085685 | 5.5  | 0.000*** |
| Ppl         | 0.138967  | 0.0532216 | 2.61 | 0.009*** |
| Young       | -0.2981144| 0.1297847 | -2.3 | 0.022** |
| Emp         |           |           |      |      |
| 125         | 0.3138884 | 0.1002902 | 3.13 | 0.002*** |
| 127         | 0.3029907 | 0.101856  | 2.97 | 0.003*** |
| 128         | 0.2407996 | 0.1281383 | 1.88 | 0.06*  |
| Inc         |           |           |      |      |
| 131         | 0.0045606 | 0.1017822 | 0.04 | 0.964 |
| 133         | -0.2884533 | 0.1000429 | -2.88| 0.004*** |
| 134         | -0.0395784 | 0.2132342 | -0.19| 0.853 |
| 135         | 0.0919997 | 0.113075  | 0.81 | 0.416 |
| 136         | 0.2356001 | 0.1645198 | 1.43 | 0.152 |
| 137         | .         | --        | --   |      |
| 138         | -0.1550458| 0.1590438 | -0.97| 0.33  |
| Iteration 2 | dy/dx   | Std. Err. | z     | P>|z| |
|------------|---------|-----------|-------|-----|
| Female     | 0.1357058 | 0.1804024 | 0.75  | 0.452 |
| State      | 0.0408748 | 0.1627428 | 0.25  | 0.802 |
| Age        | 0.0088725 | 0.0081362 | 1.09  | 0.275 |
| Educ       | 0.121     | 0.0114753 | 0.121 | 0.952 |
| Ppl        | -0.0671994 | 0.1375563 | -0.49 | 0.625 |
| Young      | 0.1132658 | 0.1421244 | 0.8   | 0.425 |
| Emp        | 0.3594432 | 0.2534605 | 1.42  | 0.156 |
| Inc        | -0.4337222 | 0.2170135 | -2    | 0.046** |
| Yrshh      | 0.0017211 | 0.007024  | 0.25  | 0.806 |

Note: *, **, and *** represent statistical significance at the 90%, 95%, 99% confidence levels respectively.
<table>
<thead>
<tr>
<th>Iteration 3</th>
<th>dy/dx</th>
<th>Std. Err.</th>
<th>z</th>
<th>P&gt;z</th>
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<tr>
<td>Female</td>
<td>0.4083392</td>
<td>0.1169627</td>
<td>3.49</td>
<td>0.000***</td>
</tr>
<tr>
<td>State</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>2</td>
<td>0.0061457</td>
<td>0.1250268</td>
<td>0.05</td>
<td>0.961</td>
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<tr>
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<td>0.163892</td>
<td>-1.01</td>
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<tr>
<td>Age</td>
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<td>0.0072782</td>
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<td>0.025**</td>
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<tr>
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<td></td>
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<tr>
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<td>0.0716619</td>
<td>4.81</td>
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<tr>
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<td>0.0509992</td>
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<td>0.000***</td>
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<tr>
<td>123</td>
<td>0.6723228</td>
<td>0.0465736</td>
<td>14.44</td>
<td>0.000***</td>
</tr>
<tr>
<td>Ppl</td>
<td>0.1599962</td>
<td>0.0778197</td>
<td>2.06</td>
<td>0.04**</td>
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<tr>
<td>Young</td>
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<td>-2.05</td>
<td>0.04**</td>
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<tr>
<td>Emp</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>125</td>
<td>-0.0432813</td>
<td>0.0652734</td>
<td>-0.66</td>
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<tr>
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</tr>
<tr>
<td>128</td>
<td>-0.2969625</td>
<td>0.0903266</td>
<td>-3.29</td>
<td>0.001***</td>
</tr>
<tr>
<td>Inc</td>
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<td></td>
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<tr>
<td>132</td>
<td>-0.0080141</td>
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<tr>
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<tr>
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<tr>
<td>136</td>
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<tr>
<td>137</td>
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<tr>
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<td>0.1460136</td>
<td>-2.34</td>
<td>0.019**</td>
</tr>
<tr>
<td>Yrshh</td>
<td>0.0043391</td>
<td>0.0032105</td>
<td>1.35</td>
<td>0.177</td>
</tr>
</tbody>
</table>

Note: *, **, and *** represent statistical significance at the 90%, 95%, 99% confidence levels respectively.