Consumer Demand for Local Food from

Direct-to-Consumer versus Intermediated Marketing Channels

by

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ABSTRACT

Consumers can purchase local food through intermediated marketing channels, such as grocery stores, or through direct-to-consumer marketing channels, for instance, farmers markets. While the number of farms that utilize direct-to-consumer outlets keeps increasing, the direct-to-consumer sales remain lower than intermediated sales. If consumers prefer to purchase local food through intermediated channels, then policies designed to support direct channels may be misguided. Using a variety of experiments, this dissertation investigates consumer preferences for local food and their demand differentiated by marketing channel. In the first essay, I examine the existing literature on consumer preferences for local food by applying meta-regression analysis to a set of eligible research papers. My analysis provides evidence of statistically significant willingness to pay for local food products. Moreover, I find that a methodological approach and study-specific characteristics have a significant influence on the reported estimates for local attribute. By separating the demand for local from the demand for a particular channel, the second essay attempts to disentangle consumers' preferences for marketing channels and the local-attribute in their food purchases. Using an online choice experiment, I find that consumers are willing to pay a premium for local food. However, they are not willing to pay premiums for local food that is sold at farmers markets relative to supermarkets. Therefore, in the third essay I seek to explain the rise in intermediated local by investigating local food shopping behavior. I develop a model of channel-selection in a nested context and apply it to the primary data gathered through an online food diary. I find that, while some consumers enjoy shopping at farmers markets to meet their objectives, such as socialization with farmers, the majority of consumers buy local food from

supermarkets because they offer convenient settings where a variety of products can be bought as one basket. My overall results suggest that, if the goal is to increase the sales of local food, regardless of the channel, then existing supply-chain relationships in the local food channel appear to be performing well.

To My Supportive Family, Loving Husband and Precious Son

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PREFACE

This dissertation is written in a three-essay style. Each essay concerns a different aspect of consumers' channel choice when purchasing local food. Chapters 1 and 5 provide a general introduction and conclusion applicable to all three essays. Chapters 2, 3, and 4 are self-contained and independent from one another in terms of symbols, notations and equations.

CHAPTER 1

INTRODUCTION

Increasing concern over who buys local food, why they buy, and where exercises substantial influence over policy implementation by the U.S. Department of Agriculture (USDA). In fact, federal agricultural policy promotes direct sales of local food due to the widespread belief that doing so provides communities with access to fresh and nutritious foods, supports local farm economies, and reduces the environmental footprint of the food that is grown. As a result, there are several USDA programs that aim to encourage the growth of demand for local food through direct-to-consumer marketing channels, such as farmers markets and roadside stands. However, sales of local food through such direct channels remain lower than sales through intermediated channels, such as supermarkets and other multi-category retailers (Low and Vogel 2011; Thilmany-McFadden 2015; Low et al. 2015; Richards et al. 2017) (Figure 1.1). If higher sales of local food is the objective, and not simply supporting direct markets, then we need to better understand where consumers prefer to purchase local food. Therefore, in this dissertation, I seek to explain the rise of intermediated local food through three, complementary essays.

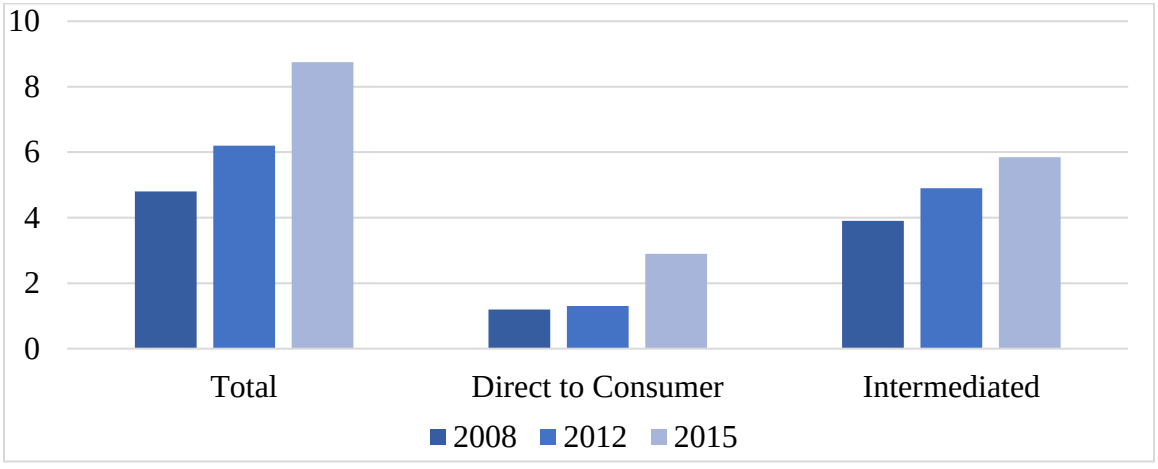


Figure 1.1: US Local Food Sales in $B (Source: Low et al. 2015; NSAC 2016)

Understanding how preferences vary by marketing channel, whether intermediated or direct, is essential because USDA continues to support direct marketing channels as a means of growing the demand for local food (Martinez 2010). For example, the Farmers Market Promotion Program (Agricultural Marketing Service, AMS) offers up to $15 million in grants annually specifically for improvement, development, and expansion of direct marketing channels (2014 Farm Bill, FMPP 2016). Further, the Local Food Promotion Program offers $15 million in grants annually to support local and regional food systems through projects that provide outreach, training, and technical assistance for organizations that aim to launch local business or direct market establishments (LFPP 2018)[1]. These programs and resources, however, assume that consumers are better off purchasing their local food directly from farmers, or that local farmers benefit disproportionately through direct, as opposed to intermediated, food sales.

The empirical evidence on the macroeconomic effect of direct sales of local foods is weak. Brown et al. (2014) and Hughes and Isengildina-Massa (2015), each find that, in general, local food sales appear to have little effect on economic growth patterns or the state economy. Therefore, USDA's support for direct-to-consumer channels as a means of growing the sales of not just local food, but local food distributed in a particular way, to support the farm economy may be misguided. Such targeted support is especially questionable, considering the growing availability of locally-sourced products available through other marketing channels.

[1] USDA has developed various guides and toolkits for aspiring farmers that aim to establish a small or urban farm (Tool Kit 2016; New Farmers 2018; Resources Guide 2018). Also, Farm Service Agency's Farm Loan Program facilitates the development of urban farming and direct channels by providing farmers with an access to additional capital (FSA 2018).

The growing demand for local food provides an impetus for local food supply chains to grow beyond traditional direct channels, and expand into intermediated channels, such as multi-category retailers. Supermarkets are developing fundamentally new methods of sourcing from many, small, local growers, rather than single large distributors, in order to access sufficient supplies of local food to meet consumer demand in a consistent way (Guptill and Wilkins 2002; Dunne et al. 2011). By purchasing local food, supermarkets generate value for local farmers through higher volumes of sales, less costly distribution, and deeper supply-chain integration. This, in turn, enables farmers to retain a share of the food dollar and provides an opportunity to increase scale (Thilmany-McFadden et al. 2015).

Local food products are now readily available at numerous supermarket chains, with Wegmans, Whole Foods, and Walmart being prominent examples (King, Gómez and DiGiacomo 2010). By offering local products, these retailers not only draw consumers away from direct marketing channels, but also attract new consumers who desire access to local food. To date, however, the evidence on the relative value of intermediated local food is largely anecdotal. Therefore, in this dissertation I seek to examine whether consumers prefer to purchase local food through direct channels, such as farmers markets or roadside stands, or intermediated channels like supermarkets or club stores.

We know very little about where consumers prefer to purchase their local food. Much of the literature examines trends in local food, focusing on preferences for the "local" attribute itself (Hu, Woods and Bastin 2009; Onken, Bernard and Pesek 2011; Hu et al. 2012; Willis et al. 2013; Carroll, Bernard and Pesek 2013). Consumers consider "local" to be the highest value-added claim (Loureiro and Hine 2002; James, Rickard and Rossman

2009; Onozaka and Thilmany-McFadden 2011), which reflects their strong preference (Yue and Tong 2009; Costanigro et al. 2011; Carroll, Bernard and Pesek 2013; Meas et al. 2015). However, the degree of preference tends to vary not only over the products, but also across marketing channels. Therefore, I explore the local food movement from three different perspectives, moving from micro- to macro- considerations. I begin by examining the literature and determining the precise value consumers place on local food. Then I explore how channels, through which local food is sold, affect this value. Finally, I investigate the fundamental differences in the nature of the marketing channels that offer local food.

My dissertation consists of three essays. The first essay aims to provide a deeper understanding on how labeling food as "local" affects consumers' willingness-to-pay (WTP), which is a measure of the value of a goods at an individual level (Hanley, Shogren and White 2013). To date, academic literature on consumer demand provides heterogeneous information as to what consumers are actually willing to pay for local. Therefore, the main objective of the first study is to uncover the precise value consumers place on local attribute. In this way, this essay contributes to the broad literature that studies consumers' demand for local food by deriving the "true" WTP.

Given the large number of studies on the preference for local food, I use a meta-regression analysis (MRA) to estimate the WTP for local attribute. MRA is a quantitative method that provides information about relationships of interest by synthesizing results from previous research. Specifically, while examining a range of estimates for the local attribute reported by the studies, MRA takes into account differences across these studies, such as methodological and other study-specific characteristics, to construct a proxy for

the ‘true’ WTP effect. By assembling all the evidence on this topic and utilizing a systematic review methodology, I find that there is a significant mean estimate for local that ranges between $1.70/lb and $2.08/lb. Therefore, producers, growers and stakeholders from the industry can use my results to make informed decisions about local food.

The meta regression analysis also allows me to explain variation in WTP for food labeled as “local” by examining the effects of study-specific characteristics, such as definition used and experimental settings employed, on estimated coefficients. I find that reported estimates vary significantly based on type of experimental methods utilized to empirically measure consumer preferences for “local”. In this way, choice experiments produce higher estimates of WTP compared to other experimental techniques, including auctions and contingent valuation. Therefore, one should be careful when comparing reported WTP for “local” attribute across the literature. On the other hand, I find no significant difference in reported WTP measured by hypothetical and non-hypothetical experiments. This finding contributes to the existing literature that suggests hypothetical studies are a good representation of non-hypothetical settings and provide bias-free estimates of marginal WTP (Carlsson and Martinsson 2001; Lusk and Schroeder 2004; List, Sinha and Taylor 2006; Taylor, Morrison and Boyle 2010). Likewise, my results suggest that random samples of participants yield similar results regardless from where these samples were recruited, i.e. on-line or in-store, which is consistent with prior research (Buhrmester, Kwang and Gosling 2011; Casler, Bickel and Hackett 201; Klein et al. 2014).

My results also indicate that consumers do not seem to favor any specific label that conveys that the food is local. Therefore, governmental agencies should take this into consideration when deciding how to promote local food, as investing in marketing program

labels, such as “Maryland’s Best”, “Jersey Fresh”, or “Arizona Grown”, seems inefficient because they do not have a significant effect on premiums that consumers are willing to pay.

Instead of looking to increase the sales through the use of various labels, farmers should consider extending their product lines to include processed and, hence, value-added local items. By extending their product line, farmers will increase the variety of goods available. This, in turn, may improve their profitability because, according to my results, consumers are willing to pay higher premiums for value-added local products compared to local produce. Moreover, it may present farmers with an opportunity to expand their distribution to intermediated channels, since shelf stable items are highly sought there. However, this decision also depends on whether consumers have a greater preference for buying local products through direct or intermediated channels.

My first essay shows that we have a limited knowledge about consumers’ preferences for where they like to buy local food. We also lack understanding of what affects consumers’ decision to purchase local food through supermarkets as opposed to farmers markets, or other direct channels. Yet, perhaps the most important stylized fact in the demand for local food is the movement away from direct to intermediated marketing channels local food. In the second and third essays of my dissertation, I address this trend through two different empirical models of channel preference.

The second essay investigates consumer preferences for local food from different marketing channels. By separating the demand for “local” as an attribute of the food from the demand for “local” from a particular channel, I am able to disentangle their channel and attribute preferences. In doing so, I investigate how consumer preference and demand

for local food differs across marketing channels, and examine the reasons for the rise of intermediated sales.

I separate the demand for local, as an attribute, from other attributes that researchers typically conflate with local by using an experimental design that accounts for the potential interactions among those attributes, while considering all factors independently. By examining the interaction effects, I reveal fundamental relationships among attributes that consumers seek in purchasing local food, and marketing channels. I demonstrate that, while consumers might think that shopping at direct-to-consumer channels provides some additional intangible benefits, they value whether the food was produced locally more. As a result, they display equal level of support for local farmers who sell their produce at either direct or intermediated channel. Moreover, I find that consumers have a lower preference for local food from urban farms relative to grocery stores, perhaps because they believe they should get a better deal at direct venues, especially since these markets are often inconvenient and remote. Therefore, the fact that the direct sales of local food remain lower than intermediated is less surprising, especially considering the increase in locally-sourced food offered by intermediated marketing channels.

This essay contributes to both the substantive literature on local food and the methodological literature on experimental design. Specifically, I demonstrate that consumer preferences for specific determinants of choice that have inter-related effects on demand can be uncovered through the use of carefully designed experimental methods. By properly assigning preferences to product and point-of-sale attributes, my design effectively disentangles the value of local, as an attribute, separately from the marketing channel at which local food is sold. My results suggest that consumer preferences for local

food differ significantly based on the marketing channels through which it is offered. I explore this finding more in depth in the next essay.

If consumers decide where they are going to buy their food before deciding on what attributes are important, then the choice of distribution channel becomes all-important as a determinant of whether or not they buy local food. For example, consumers might decide to shop at a supermarket because it offers a convenient location with a wide variety of products at an affordable price. With the scope of products offered by modern supermarkets, consumers are able to purchase both local fresh and processed products, non-local food items (national brands), and non-food items, such as household and personal care items. If they purchase local food during a regular visit to their usual supermarket, then they effectively create new demand for local – demand that simply would not exist if local food is offered through direct channels only. Therefore, my third essay demonstrates that one of the main reasons intermediated sales of local food are continuing to increase is because multi-category retailers have an ability to meet consumers' grocery needs, while satisfying consumer' aspiration to contribute to the local economy.

My third essay examines the fundamental tension between the demand for affordability and convenience and the demand for sustainable shopping solutions, high-quality food, and support for local economy in shaping consumers' choice of marketing channel for local food purchases. Specifically, I aim to investigate the observation that, while consumers prefer to attend farmers markets and other direct shopping venues as a means to satisfy niche food demands, when it comes to local food, consumers prefer to purchase it from marketing channels that offer a range of consumer products. In this way, I am able to explain the economic case for the rise in intermediated local food purchases.

I test these motivations by developing an empirical model that considers local food purchases in a nested context. In this model, consumers first choose specific food items they want to buy, and then decide whether to purchase them from a farmers market or a supermarket. With this econometric approach, I offer a more general and comprehensive explanation of how marketing channels characteristics affect consumer preferences and demand for local food.

I apply my model to the data from food-purchase diary collected expressly for the purpose of better understanding the demand for local food. This diary data allows me to evaluate consumer purchasing behavior, while integrating the factors related to food preferences, economic optimization, and attitudes on social issues. I gather the data by creating an online diary style tool that captures discrete choices, of both products and channels, that are driven by attributes of the choice at each level.

My results confirm that the reasons consumers have for buying local food can significantly influence their choice of marketing channel. Diary respondents indicate that the perceived quality and freshness of local products are important to consumers' choice of buying local food at farmers markets. On the other hand, the desire to support the local economy while buying households' favorite products, such as organic local food, in a convenient and affordable manner motivates consumer's decision to shop at intermediated marketing channels. As a result, the attributes conventionally associated with farmers markets become less specific to direct channels.

This essay contributes to both the experimental design literature, and the econometric literature on multi-channel choice. In particular, my empirical model formally tests a number of hypotheses regarding effects that consumer preferences, attitudes and

beliefs about local products have on their actual choice of the marketing channel. I develop these hypotheses through a conceptual model of the local-food purchasing process – a model that captures the core elements of the retailing function of the food-supply chain. My results suggest that intermediated marketing channels appeal to consumers by allowing them to buy local food as a part of their grocery shopping basket, while taking advantage of the convenience offered by supermarkets, and satisfying their desire to support the local economy.

The final chapter offers a summary of my empirical findings and describes their implications. My findings help clarify our understanding of consumer perceptions regarding local food, and disentangle the preference for local from other attributes that are commonly associated with local production. My results also help explain the shift towards intermediated local food sales, and allow to evaluate policies intended to support and promote direct channels as a means of selling local food. Finally, I present suggestions for future work focusing on local food and the inherent differences among the marketing channels, and elaborate on how my results generalize beyond local food.

CHAPTER 2

THE PRICE IS RIGHT!?

A META-REGRESSION ANALYSIS ON WILLINGNESS TO PAY FOR LOCAL

2.1 Introduction

Local food production systems are one of agribusinesses' major innovations in the last decades (Bond, Thilmany, and Bond 2008; Nurse Rainbolt, Onozaka and McFadden 2012). The shift toward local foods became noticeable in the late 1990s, when consumer behavior studies linked to food purchasing began to show that consumers prefer local food (Bruhn et al. 1992; Gallons et al. 1997). Since then, the sector experienced significant growth, which triggered extensive empirical research on consumer behavior related to the "local" attribute of the food (Nurse Rainbolt, Onozaka and McFadden 2012; Feldmann and Hamm 2015). My qualitative synthesis, shown in Figure 2.1, reveals the growth in the body of research that investigates consumers' demand and preferences for local food[2]. Nevertheless, there is still ambiguity regarding consumers' actual willingness to pay (WTP) for the "local" attribute.

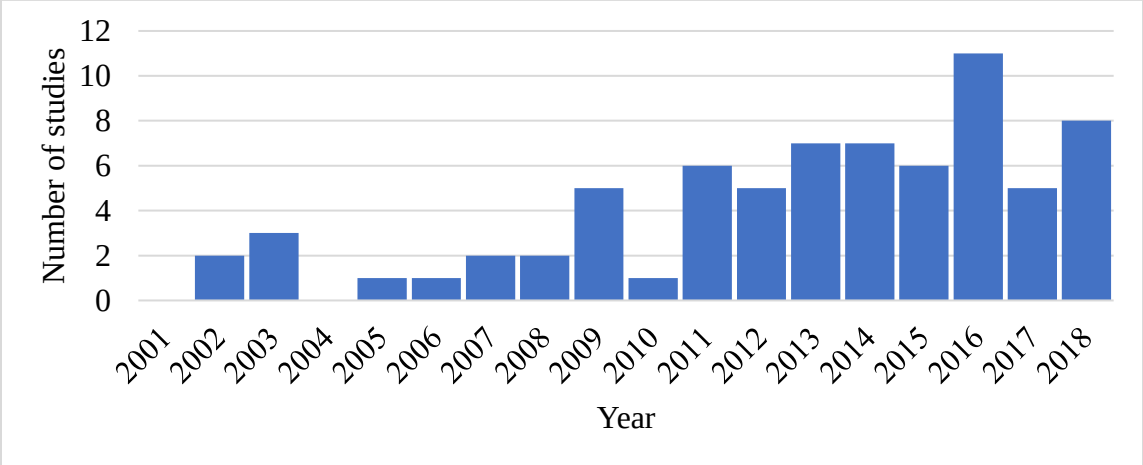


Figure 2.1: Number of Local Food WTP Studies based on qualitative synthesis

[2] Includes 72 studies that have attempted to measure consumers' WTP for "local". Please see Appendix B.

Knowing what consumes are willing to pay for local is important because it provides marketers and policymakers, who seek to promote products as local, with useful information necessary to guide their decisions in developing effective marketing strategies. This, in return, allows growers and producers to capture a proper portion of the consumer surplus as a profit. However, the vast literature on preferences for local food offers heterogeneous information as to what consumers are willing to pay for local. Therefore, the overarching objective of this chapter is to provide a concise synthesis of the research results and to offer a deeper understanding on how labeling food as "local" affects consumers' WTP. Specifically, taking into account study design and methods utilized to empirically measure WTP, including definition used and experimental settings employed, I seek to uncover the precise value consumers place on local attribute.

The definition of local food usually relates to geographic boundaries. For example, the product has to be produced within 100 miles from the point of sale or within a state border (James, Rickard and Rossman 2009) to qualify as "local". However, there is no consensus regarding the appropriate distance local food can travel before being purchased by consumers. For instance, in the U.S. "local" food is not officially defined. The U.S. Department of Agriculture (USDA) states only that a product can be considered local if it is transported for less than 400 miles or within the state in which it was produced (Martinez et al. 2010). Similarly, in European countries local food is understood in various ways because there is no uniform definition or standardized label that exists (Wägeli, Janssen and Hamm 2016; Feldmann and Hamm 2015). Therefore, German consumers, for example, define local as "region of origin", which could be a federal state, such as Bavaria, or a certain radius, such as 50 km (Wägeli, Janssen and Hamm 2016; Hasselbach and Roosen

2015). As a result, research suggests that consumers' understanding of the term "local" varies anywhere between state boundaries and a closer proximity, such as "produced within 50 miles" (Stefani, Romano and Cavicchi 2006; Onozaka, Nurse, and Thilmany-McFadden 2010; Darby et al. 2008; Burnett, Kuethe and Price 2011; Hu et al. 2012). Regardless of the definition, consumers' demand and preference for food characterized as *"local"* is experiencing significant growth (Thilmany, Bond and Bond 2008; Adams and Salois 2010; Grebitus, Lusk and Nayga 2013b; Hughes and Boys 2015).

Consumers places a high value on the "local" attribute compared to other value-added claims. For example, a study among shoppers in a grocery chain store by Costanigro et al. (2011) shows that consumers are willing to pay more for both organic and local attributes of fresh Gala apples. However, the WTP for local turns out to be comparatively higher than the one for organic, $1.18 versus $0.20, respectively. Similarly, conducting face-to-face in-home interviews, Arnoult et al (2007) find evidence that compared to "certified organic" the "produced locally" claim is valued more for strawberries and lamb chops. Also, interviewing supermarket shoppers in Colorado, Loureiro and Hine (2002) reveal that consumers are willing to pay more for local, Colorado grown, fresh potatoes compared to of food certifications, such as organic and GMO-Free alternatives. In addition, surveying residents in Pennsylvania, James et al. (2009) show that consumers have a higher WTP for local applesauce compared to USDA organic, low fat, or 'no sugar added' applesauce. However, examining the literature, I find that there seems to be a difference among consumers' WTP for local depending on the experimental settings employed.

Research on local food uses a variety of labels that convey to consumers that a product is locally produced and sourced, including but not limited to "locally grown" or

"local" labels (Arnoult, Lobb and Tiffin 2007; Onozaka and Mcfadden 2011; Printezis, Grebitus and Printezis 2017; Barlagne et al. 2015), labels with a local brand name (Bosworth et al., 2015), labels signifying that the product is from a certain state/ region/ city (Stefani, Romano and Cavicchi 2006; Meas and Hu, 2014; Grebitus, Roosen and Seitz 2015; Wägeli, Janssen and Hamm 2016), labels specifying the distance the food has traveled (Grebitus, Lusk and Nayga 2013b; Adalja et al. 2015; de-Magistris and Gracia 2016), and labels with a marketing program, such as "Maryland's Best", "Jersey Fresh", "PA Preferred", "Virginia's Finest" "Quality certified Bavaria" (Onken, Bernard and Pesek 2011; Hasselbach and Roosen 2015). Moreover, the literature on WTP for local food has employed a variety of different study designs, for example, focusing on diverse products, such as, fresh produce (Onozaka and Mcfadden 2011; Nganje, Shaw Hughner and Lee 2011; Boys, Willis and Carpio 2014), animal products (Illichmann, and Abdula 2013; Adalja et al. 2015), and processed food items (Hu, Woods and Bastin 2009; Hasselbach and Roosen 2015), as well as regions (Hu et al. 2012; Adalja et al. 2015; Meas et al.2015). In addition, studies on local food utilize different methods to empirically measure WTP, for example, choice experiments (James, Rickard and Rossman 2009; Carroll, Bernard and Pesek 2013; Lopez-Galan et al. 2013), contingent valuation (Isengildina-Massa and Carpio 2009; Burnett, Kuethe and Price 2011; Sanjuán et al. 2012), and auctions (Umberger et al. 2003; Akaichi, Gil and Nayga 2012; Costanigro et al. 2014). Given the vast diversity in methodological characteristics utilized, it is not surprising that there seem to be a variation in reported WTP for "local".

Previous research shows varying premiums for different labels within the studies, for instance, between ground beef that traveled 100 miles [$1.21] and ground beef that

traveled 400 miles [$0] (Adalja et al. 2015); or blackberry jam that carries labels "Produced in Ohio Valley" [$0.42], "From the region" [$0.25], and State Proud logo [$0] (Meas et al. 2015). In addition, previous findings also suggest that there is a difference in premiums for similar labels between studies that use different products: Kentucky-grown Blueberry jam [$2.33] (Hu, Woods and Bastin 2009); Minnesota Grown tomatoes [$0.67] (Yue and Tong 2009); and Arizona Grown carrots [$0.10] (Nganje, Shaw Hughner and Lee 2011). Moreover, research indicates that consumers are willing to pay different premiums for the same products that are characterized by different or similar labels of local, such as, "grown in Ohio" strawberries [$0.45] (Darby at al. 2008) versus "produced locally" strawberries [$1.55] (Arnoult, Lobb and Tiffin 2007); "locally grown" apples [$0.22] (Onozaka and Thilmany-McFadden 2011) versus "locally grown" apples [$1.18] (Costanigro 2011); milk from the "region" [$0.29] (Hasselbach and Roosen 2015) versus milk "from the local region" [$0.69] (Wägeli, Janssen and Hamm 2016); beef from the "local region" [$1.84] (Illichmann, and Abdula 2013) versus beef that "traveled 100 miles" [$2.72] (Adalja et al. 2015).[3] Given the reported differences among premiums, the question what the actual WTP for local is still remains. Therefore, the aim of this chapter is to assemble all the available evidence on this topic across the literature and determine a precise estimate of WTP for "local" attribute.

Given the large number of studies on the demand for local food, I employ a meta-regression analysis (MRA) to determine the WTP for local attribute. MRA is a popular quantitative technique that allows the researcher to synthesize previous research findings,

[3] To ensure comparability of the WTP estimates, all values reported in the studies were converted to $/lb units.

and to control for the effects of study-specific characteristics, such as analyzed product or applied method, on the resulting empirical estimates of WTP (Stanley and Jarrell 1989; Nelson and Kennedy 2009). According to Stanley (2001) MRA is superior to other meta-analysis approaches, such as qualitative literature reviews, that summarize previous economic research. MRA allows me to analyze the distribution of reported WTP estimates and provides a proxy for the "true" WTP for the "local" attribute. Moreover, it is able to evaluate whether publication selection biases, that may emerge due to preference of authors, reviewers and journal editors for statistically significant results, prevail across the underlying literature (Stanley and Jarrell 1989; Stanley 2005). Finally, MRA also enables me to determine how methodological and other study-specific characteristics, such as origin and demographic characteristics of recruited participants, affect WTP for local attribute.

The remainder of the paper is organized as follows. In the next section, I explain the data generation process, and provide a description of the identified variables. This also includes an initial graphical investigation of publication selection bias. In the third section, I present and elaborate on the applied models used to carry out the MRA analysis. The forth section discusses and interprets the results. Finally, the last section offers some conclusions and more general implications, as well as discusses limitations and suggestions for future research.

2.2 Data

When conducting MRA, it is important to follow a clear approach while searching for the relevant literature. Therefore, I follow the "Meta-Analysis of Economic Research Reporting Guidelines" provided by Stanley et al. (2013). I conduct a thorough review of

the scientific literature using the following electronic databases: (i) AgEcon Search, EBSCOhost Electronic Journals Service, JSTOR, ProQuest, PubMed, ScienceDirect, Scopus, Web of Science, Wiley Online Library, and (ii) complementary search in Google Scholar. The search includes studies published in English between January 2000 and June 2018.

To carry out the search, I apply a set of keywords that include "Willingness to Pay", and "Local Food", or "Local", or "Regional", or "State Grown" to ensure that I identify all relevant literature. My search examines titles, abstracts and/or article keywords. Even though other definitions of local food, such as, "state grown" or "regional", are used by the studies, the overarching umbrella term *"local"* is mentioned at least in the abstract of the relevant articles. Therefore, the total count of articles found does not include duplicates produced by using different variations of keywords within the same database.

Figure 2.2 displays the summary of my search results organized using the "Preferred Reporting Items for Systematic Reviews and Meta-Analyses" (PRISMA) template. PRISMA is a popular tool that is used to conduct and report search results (Moher at al. 2009; 2010). As shown by PRISMA, my initial literature identified 149 published papers, including 25 duplicates, such as, same papers yielded by different search engines, earlier versions of papers submitted for conferences, and working papers that have later been published. Out of the remaining 124 articles, 52 are not suitable for the present analysis because they do not include a quantitative measure of WTP for "local." For example, they use qualitative methods to carry out the analysis or do not actually estimate WTP.

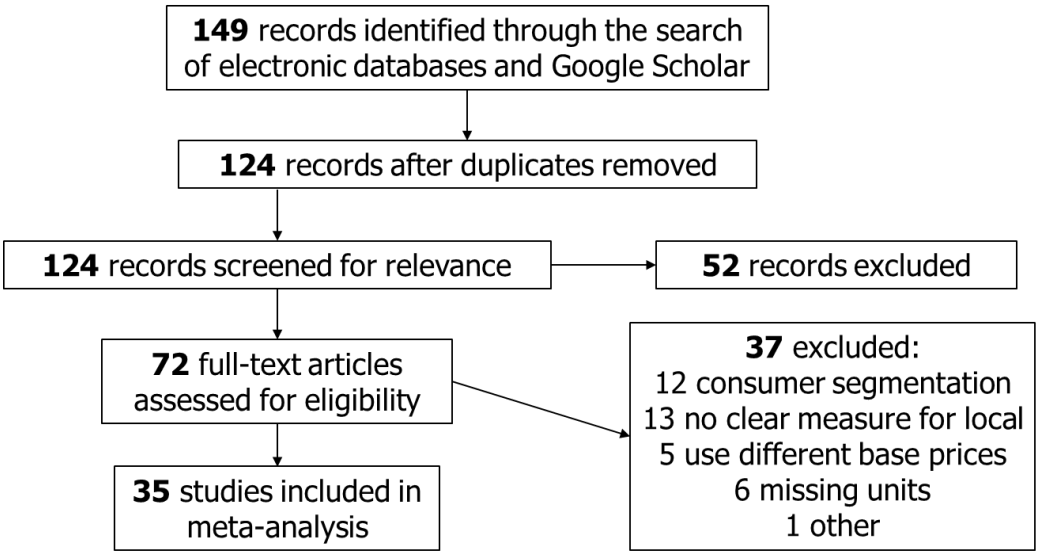


Figure 2.2: Preferred Reporting Items for Systematic Reviews and Meta-Analyses

Because a uniform interpretation of the analyzed measure is of utmost importance for the feasibility of MRA (Oczkowski and Doucouliagos 2014; Hirsch 2017), I assess the remaining 72 studies[4], and identify 35 articles that include a comparable measure(s) of WTP with clearly reported units, such as dollars per pound or dollars per ounce. The remaining 37 studies do not meet the criterion of a uniform interpretation for various reasons. For instance, twelve studies use consumer segmentation techniques or latent class analysis where participants are segmented based on certain variables (e.g., knowledge of organic/local). However, these studies do not provide all information necessary to analyze each consumer segment independently, hence not yielding an individual WTP measure for the local attribute (James, Rickard and Rossman 2009; Akaichi, Gil and Nayga 2012; Tempesta and Vecchiato 2013; Costanigro et al. 2014). I also exclude thirteen studies because they do not provide a clear measure for local (e.g., studies that bundle local with

[4] See Appendix A, Table A, for a list of all these articles and detailed information on why individual articles are excluded.

other attributes, or do not explicitly measure WTP) (e.g., Thilmany, Bond and Bond 2008; Gracia, de Magistris and Nayga 2012). Moreover, I eliminate five studies that use different base prices or only state percentage increase in WTP (e.g., Isengildina-Massa and Carpio 2009; Carroll, Bernard and Pesek 2013). Another six studies do not provide weight units for the product, and instead state use measurements, such as, "loaf of bread" or "box of cereal" (e.g., Batte et al. 2007; Saito and Saito 2013). For these studies, it was not possible to derive a comparable WTP measure. Finally, I exclude one study that was a pilot test with only 27 participants in total.

Table B (please see Appendix B) presents a chronological overview of the 35 articles included in the MRA, providing the year of publication, authors, journal, number of participants, origin, and type of product analyzed[5]. I also include WTP reported in each article. Multiple WTP estimates for a single product indicate that study either utilized more than one sample or applied different definitions of local.

I then categorize the identified papers in order to derive binary variables for the underlying study design characteristics that might potentially affect the WTP estimates (e.g., Hirsch 2017). The derivation of these variables has to be conducted under careful consideration of the trade-off between a reasonable number of categories that will adequately capture the variation in WTP observations, and variables with low explanatory power relating to categories that only occur in a few articles (i.e., variables with a high share of 0-observations). The resulting categories are described below and summarized in Table 2.1.

[5] Note that in my MRA I focus on a broader set of study design characteristics that potentially drive variation in reported WTP estimates, such as, specific product attributes, demographics of the analyzed sample, definition of local used, and experimental method employed (including hypothetical or non-hypothetical).

Table 2.1 Descriptive statistics of WTP Meta-Data

Variable	Definition	Mean	Standard deviation
Dependent variable			
WTP	WTP for the local attribute in $/lb	1.204	1.325
Precision			
Number of participants (n)	Number of participants in the study	621.640	539.285
Study design characteristics			
Year of study[6]	The experiment was conducted after 2011 =1, 0 otherwise	0.372	0.486
Country of study - US	Experiment was conducted in the U.S. =1, 0 otherwise	0.605	0.492
Other countries	Experiment was conducted outside of the U.S. =1, 0 otherwise	0.395	0.492
Animal products	Products used for the study: fish, meat, eggs, or milk =1, 0 otherwise	0.430	0.498
Produce	Products used for the study: fruits, vegetables or nuts =1, 0 otherwise	0.267	0.445
Processed products	Products used for the study: food items that underwent processing =1, 0 otherwise	0.302	0.462
Local def. – state grown	"Local" was defined as grown or produced within the state =1, 0 otherwise	0.244	0.432
Local def. – marketing program	"Local" was defined using a state/region proud logo =1, 0 otherwise	0.255	0.439
Local def. – specific region	"Local" was defined as grown or produced in a specific city, province, or region =1, 0 otherwise	0.360	0.483
Local def. – general	"Local" was defined as locally grown or produced =1, 0 otherwise	0.140	0.349

[6] Three articles did not report the year of study. Therefore, for my analysis, it was assumed to be the year of publication (Clark et al. 2017).

Method – choice experiment	Experiment was carried out using choice experiment method =1, 0 otherwise	0.860	0.349
Method – other	Experiment was carried out using other methods, such as auctions and contingent valuation methods =1, 0 otherwise	0.140	0.349
Hypothetical experiment	Experimental study was hypothetical =1, 0 otherwise	0.802	0.401
Non-hypothetical experiment	Experimental study was non-hypothetical =1, 0 otherwise	0.198	0.401
Participants` origin – shoppers	Participants recruited at the shopping locations =1, 0 otherwise	0.477	0.502
Participants` origin – other	Participants recruited at random or through marketing companies =1, 0 otherwise	0.523	0.502
Number of attributes	Number of attributes used to describe the product	4.128	1.445
Age	Average age of the study participants	46.826	4.340
Gender	Percent of female participants in the study	59.682	10.121
Income	Average income of the study participants in $	50,336.880	18,311.060

2.2.1 Dependent variable

In my MRA I use the WTP estimates reported by the 35 articles as the dependent variable. I converted the WTP values to $/lb in order to keep the currency across studies consistent[7]. It is important to point out that the final number of WTP measures identified (86) is larger than the number of studies included in the MRA (35), since some of the papers report multiple WTP estimates due to multiple products per study, multiple samples, and/or multiple definitions of local used in a single article.

It can be observed that the mean WTP for the local attribute across the included studies is $1.20/lb. Moreover, Table 2.1 reports the mean number of participants based on which the WTP estimate has been generated. This number is an indicator of how precisely the measure of WTP is estimated (Stanley 2005). As will become apparent below, the relationship between reported WTP estimates and their precision can be an important indicator for the presence of publication selection bias (Stanley 2005; Bakucs et al. 2014). Table 2.1 indicates that WTP estimates are, on average, generated based on samples with 622 participants.

2.2.2 Independent variables

Year of study. Concerning underlying study design characteristics, I first identify the year in which the analysis was conducted. This allows me to control for an overtime trend in WTP estimates for local. For example, as local food gains more popularity, the WTP might have increased over time. On the other hand, as local food becomes more mainstream as time passes, WTP may subside. Therefore, I use a dummy variable with value one for

[7] Another way to define the WTP measure is setting it up as an additional percentage that consumers are willing to pay relative to some status quo, base, price. However, only seven of the identified studies present WTP in a way that such premium can be inferred, which is not sufficient to conduct a statistical analysis.

studies conducted post 2011, and zero otherwise. I choose the year 2011 as a threshold because it constitutes the median year of study across the included literature (Dolgopolova and Teuber 2017).

Country of study. Additionally, I include a dummy variable, *Country of study-US*, which captures whether the study was conducted in the US. The "non-US" category includes studies conducted in European countries, such as, Germany, Spain and Italy, and one study conducted in The Commonwealth of Dominica. This country specific variable allows me to identify if the reported WTP differs between the US and other countries.

Type of product. Literature on WTP for local considers various product types, since consumer preference for local food does not only pertain to fresh products but extends to processed and animal products. For example, surveying randomly selected South Carolina households, Willis et al. (2013) find that households have a higher WTP for locally grown produce relative to non-locally grown. Conducting an in-store survey among residents of Kentucky, Hu et al. (2009) find that consumers had a higher WTP for pure blueberry jam, blueberry-lime jam, blueberry yogurt, blueberry dry muffin mix, and blueberry raisinettes with a Kentucky-grown label. Likewise, interviewing consumers in Germany, Wägeli et al. (2016) find that consumers are willing to pay more for fresh milk, pork cutlets and eggs from the local region. The reported WTP, however, may vary significantly among the products analyzed. Therefore, it is necessary to control for the type of product used. I separate the included studies by product type, leading to three categories: (i) animal products, such as, meat, fish, poultry, eggs, and dairy products, (ii) produce, such as, apples, beans, melons, potatoes, strawberries, tomatoes, yams, and (iii) processed food products, such as, blueberry fruit rollups, blueberry raisinettes, jam, and applesauce. The

premium for processed local food can be higher than for unprocessed local food because consumers are willing to pay a higher price premium for value-added shelf-stable products (Ag Marketing 2017). Contrary to this, there might be a discount for processed local food because consumers may only hold trust towards unprocessed foods, i.e., whole products that were produced in the region, something that is more difficult to evaluate for processed foods considering that multiple ingredients are involved.

Definition of local. With regards to the definition of "local", the literature has focused particularly on the following four categories: (i) State Grown; (ii) marketing programs: local brand; Grown Fresh with Care in Delaware, Maryland's Best, Jersey Fresh, PA Preferred, Virginia's Finest, Quality certified Bavaria; (iii) more precise definitions: product of city, province, or region; (iv) any of the following general definitions local/ produced locally/ locally grown/ grown "nearby". The reported WTP might differ across these categories, as some consumers seem to consider state boundaries as a good approximation of local food production (Darby et al. 2008; Burnett, Kuethe and Price 2011), while others prefer a more precise definition of local, such as "produced within 50 miles" (Onozaka, Nurse, and Thilmany-McFadden 2010), or narrower defined geographical boundaries, such as, sub-state regions (Stefani, Romano and Cavicchi 2006; Hu et al. 2012; Meas and Hu 2014).

Method. Several methods have been employed across the literature to carry out the analysis with a focus of research based on choice experiments. As can be observed from Table 2.2, about 85% of identified WTP estimates have been generated using this method. Moreover, another set of studies has focused on a heterogeneous set of methods, such as, auctions and contingent valuations leading to two main method categories: (i) choice experiment, and

(ii) other than choice experiment. Therefore, I control for the variation in WTP based on the methods used. This also allows me to determine if the WTP estimates yielded by conducting choice experiments differ in WTP from the other experimental methods. Similarly, I include a dummy variable that captures whether the experiment was hypothetical. Table 2.1 reveals that 80% of included WTP estimates stem from hypothetical experiments. Since hypothetical studies are often criticized for not being incentive compatible, I examine whether there is a difference in reported WTP. However, since previous studies demonstrated that hypothetical settings can provide a bias free estimate of marginal WTP (Carlsson and Martinsson 2001; Lusk and Schroeder 2004; List, Sinha and Taylor 2006; Taylor, Morrison and Boyle 2010), I expect to find no difference between WTP estimates generated based on hypothetical and non-hypothetical experiments.

Participants' origin. Moreover, for each study, I take into account the place participants were recruited from. This leads to two separate categories: (i) store shoppers, i.e., participants surveyed in person at the place of purchase, and (ii) "other" participants that were recruited through a market research company/online-survey database or through random representative samples (e.g., recruited by mail, phone, or at areas with heavy traffic, such as downtown museums or holiday parades). The WTP reported in the studies that used store shoppers as participants might be lower because those participants are in the shopping environment and, thus, are possibly more price conscious.

Number of attributes. I also control for the number of additional attributes the study used to describe the product, since this might have an effect on the resulting WTP estimate. Consumers' choice satisfaction tends to decrease when complexity of the offered

alternatives increases (Reutskaja and Hogarth 2009; Scheibehenne, Greifeneder and Todd 2010). For example, having alternatives that are described using many different attributes has a significant effect on the ability to make a choice (Arentze et al. 2003; Caussade et al. 2005). One reason for this is an intensity of the cognitive effort necessary to make a choice (Mogilner, Rudnick and Iyengar 2008). Therefore, as the number of attributes increases, the complexity of the experiment might have a negative effect on participants' WTP. On the other hand, if the attribute "local" is more salient among others, the number of attributes used will not affect WTP for local.

Demographics. Finally, I account for demographic characteristics of the surveyed participants that may have an effect on the resulting WTP estimate. Among those are the age (the mean reported by a study), gender (% of females), and income (Loureiro and Hine 2002; Arnoult, Lobb and Tiffin 2007; Illichmann and Abdulai 2013).

2.2.3 Graphical analysis of publication selection bias

Publication selection bias refers to a tendency of having a greater preference for estimation and publishing statistically significant results compared to results that do not reveal statistical significance (Hirsch 2017). Stanley (2005; 2008) shows that the relationship between analyzed estimates and their precision (e.g., standard errors or sample size) can serve as an indicator for publication selection bias. For example, average *t*-statistics around two, which refer to statistical significance approximately at the 5%-level, across the literature of interest are a strong indication for publication selection bias (Hirsch 2017).

I use a scatter diagram of the relationship between estimated effects and their precision, also known as funnel plot. This plot can be used as an initial informal indicator for publication selection bias (Stanley 2005; Stanley and Doucouliagos, 2010). While the

most precise estimates at the top of this plot should be close to the true effect, the less precise ones at the bottom of the plot are more dispersed resembling an inverted funnel shape. Without publication selection bias, estimated effects should vary randomly and symmetrically around the true WTP effect as all imprecise estimates at the bottom of the plot have the same chance of being reported (Havranek and Irsova 2011). In turn, if the plot is over-weighted on either one of the sides, this is considered an indicator for publication selection bias (Stanley 2005).

There are several ways to measure precision of estimated effects, with the most common one being the inverse of the standard error (e.g., Stanley 2005; Oczkowski and Doucouliagos 2014; Zigraiova and Havranek 2016; Hirsch 2017). However, for the WTP effects analyzed in the present case, standard errors are not available as these effects are calculated as a combination of regression coefficients[8], for which the calculation of standard errors is not possible without additional information on the underlying estimation. Nevertheless, the sample size (*n*) and particularly its square root (*sqrt(n)*) can also serve as an adequate precision measure because it is proportional to the inverse of the standard error[9] (Stanley 2005; Bakucs et al. 2014). Moreover, Sterne et al. (2000) and Macaskill et al. (2001) show that in MRA *sqrt(n)* is a superior measure of precision compared to standard errors. While standard errors are estimated values that are affected by random sampling errors, this does not apply to *sqrt(n)* (Stanley 2005).[10]

[8] WTP is estimated by dividing a non-price parameter by the negative value of marginal utility of money (Louviere et al. 2000): $WTP_{local} = -\frac{\beta_{local}}{\beta_{price}}$

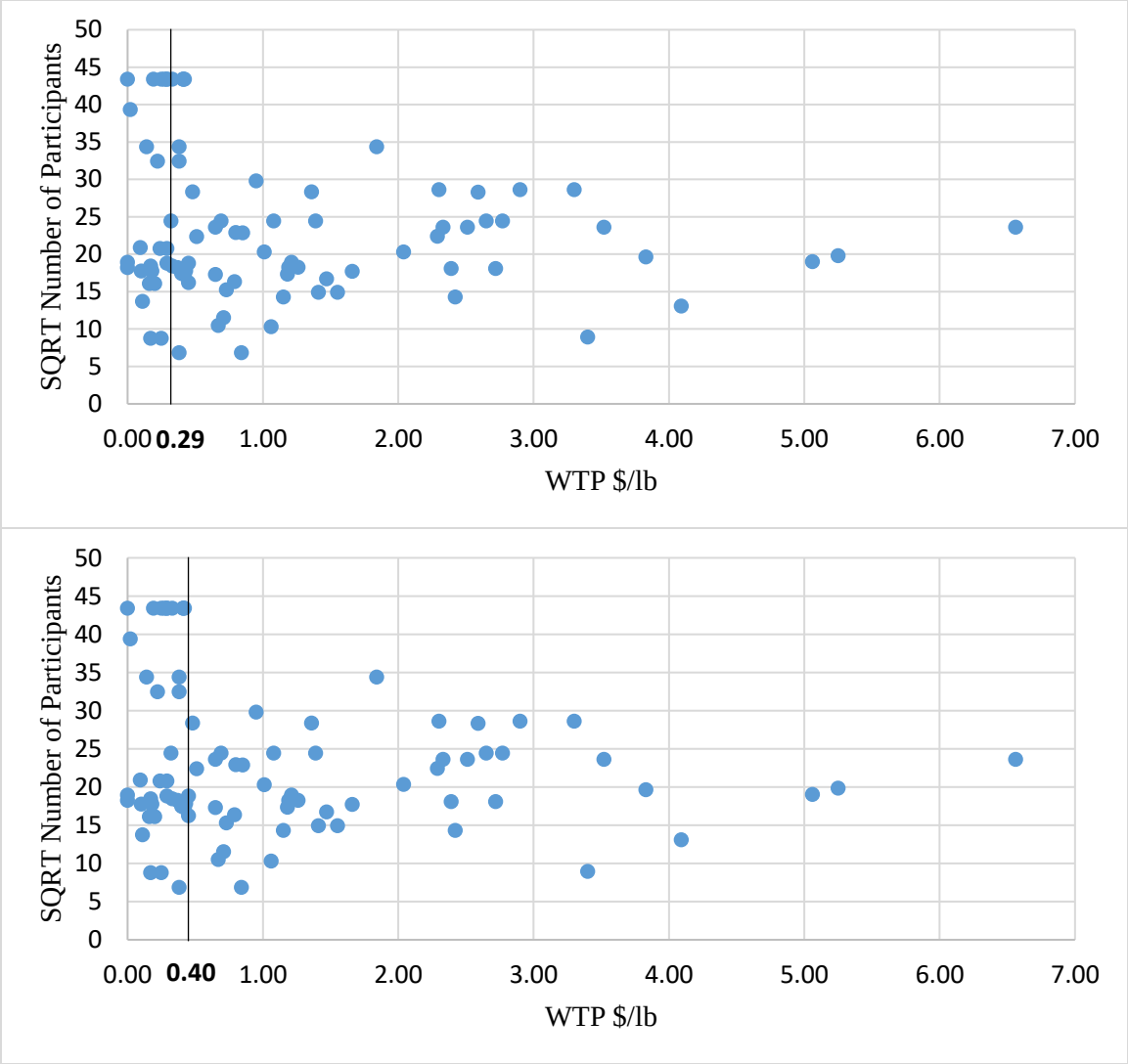
[9] For example, Stanley (2005) finds correlations between (1/SE) and *sqrt(n)* that exceed 0.9.

[10] This is also important for the MRA in this paper, where precision is included as an independent variable to explain the variance in reported WTP estimates. Since (1/SE) is measured with error, its inclusion as

Figure 2.3 displays the funnel plot for the WTP for local food literature. I use the mean of the 10% most precisely estimated WTP effects (measured by *n*) as the measure for the "true" WTP for local food. I do so because as *n* increases standard errors will become smaller, implying that reported WTP approaches the true value if $n \to \infty$ (Stanley 2005). For the WTP for local food literature this value is 0.29, represented by the vertical line in the upper panel of Figure 2.3. As a robustness check I have also calculated the proxy for the true WTP by using the 20% most precisely estimated WTP effects leading to a value of 0.40 (lower panel of Figure 2.3). It can be observed that in both cases the plot is strongly skewed to the right-hand side of the "true" value, indicating publication selection bias towards larger WTP estimates.

Despite the usefulness of funnel plots to provide an initial indication of publication selection bias, their weakness lies in the assumption of a single underlying true effect. However, different countries, participant types, or product types may be characterized by their own distinct true effects (Stanley 2005; Hirsch 2017). The following meta-regression, therefore, provides a more objective test for the asymmetry of WTP estimates that also considers underlying study design characteristics as potential determinants for variation in WTP estimates.

independent variable in a regression analysis will lead to errors-in-variables bias. In contrast, *sqrt(n)*, although highly correlated with (1/SE), is free of estimation error (Stanley 2005).



Note: True value indicated by vertical line is generated by averaging the 10% and 20% most precisely estimated WTP effects

Figure 2.3: Funnel plot for WTP for local food estimates

2.3 Meta-Regression Models

After synthesizing the literature, I use MRA to assess previous research quantitatively. MRA is a powerful tool that provides information about relationships of interest by combining results from various previous studies (Stanley and Jarrell 1989). When summarizing empirical findings of studies, focusing on a similar economic phenomenon, MRA is able to go beyond the estimates that are obtained from individual samples (Nelson and Kennedy 2009). More precisely, MRA uses differences across studies as explanatory

variables in a regression model to explain the effect of interest (Alston et al. 2000). Combining information from independent but similar research, meta-analysis "borrows power" from multiple studies to improve parameter estimates that are obtained from a single study (Erez, Bloom and Wells 1996). This allows me to estimate a proxy for the 'true' WTP effect.

The basic hypothesis of my MRA is that the variation in reported WTP estimates can be explained by the study design characteristics summarized in Table 2.2. Those include the year of study, number of participants and their origin, product type, definition of "local", methodological approach, the number of additional product attributes used in the study, and some key demographics of participants. Therefore, I estimate several specifications of the following MRA model (e.g. Stanley 2005; Stanley 2008):

(1) $$WTP_i = \beta_0 + \beta_1 precision_i + \sum_{k=1}^{K} \beta_k X_{ki} + \varepsilon_i,$$

where WTP_i is the dependent variable which captures the *i*=1, …, 86 identified WTP estimates, X_k is a vector containing *k* variables related to the study design used to estimate the WTP for "local", and ε_i is a classical *i.i.d.* error term.

I start with a simple version of (1) that only includes precision measured by *sqrt(n)* as independent variable:

(2) $$WTP_i = \beta_0 + \beta_1 sqrt(n)_i + \varepsilon_i$$

The estimated constant of (2) ($\hat{\beta}_0$) provides a proxy for the "true" WTP effect. Without publication selection bias, the observed WTP effects should vary randomly around this "true" effect, independently of their precision (*sqrt(n)*) (Stanley 2005; Bakucs et al. 2014). Hence, the *t*-test for $\hat{\beta}_1$, also known as the funnel asymmetry test (FAT), can be

used to detect publication bias. Accordingly, rejection of H_0: $\hat{\beta}_1 = 0$ indicates publication bias (Stanley 2005). The test of H_0: $\hat{\beta}_0 = 0$, also known as precision effect test (PET), serves as an indicator for the presence of a significant WTP for "local" effect after correction for publication bias (Stanley 2005). As a robustness check, I also estimate equation (2) using the number of participants (*n*) as the precision measure.

My final MRA model extends (2) by additionally considering all variables that capture the study design X_k used to estimate the WTP effect:

$$WTP_i = \beta_0 + \beta_1 sqrt(n)_i + \sum_{k=1}^{K} \beta_k X_{li} + \varepsilon_i \quad (3)$$

The econometric estimation of the MRA models specified by (2) and (3) involves two hurdles. First, heterogeneous variances used in WTP estimation might lead to potential heteroscedasticity in the error terms (ε_i),which causes biased standard errors of (2) and (3) (e.g., Stanley 2005; Nelson and Kennedy 2009). Nevertheless, the square root of the number of participants (*sqrt(n)*) is a good indicator for this heteroscedasticity because it is positively related to the estimation precision (Stanley 2005). Therefore, to generate efficient estimates of (2) and (3) with corrected standard errors, I use weighted least squares (WLS) regression with *sqrt(n)* as weights (Hedges and Olkin 1985; Stanley 2005; Oczkowski and Doucouliagos 2014).

A second hurdle evolves from the fact that the 86 collected WTP effects constitute 35 clusters of estimates from the same study. Consequently, intra-cluster error correlations may affect WTP observations, which would result in biased standard error estimates of (2) and (3) (Nelson and Kennedy 2009; Hirsch 2017). Therefore, when estimating (2) and (3), I apply several approaches to mitigate intra-study error dependency: (i) WLS with heteroscedasticity robust standard errors; (ii) WLS with cluster robust standard errors; and

(iii) wild bootstrapped standard errors. WLS with robust standard errors is considered as the base specification, while WLS with cluster robust standard errors is usually considered as the superior approach, to capture the heteroscedasticity in meta-regression data (Stanley and Doucouliagos 2013). Nevertheless, Angrist and Pischke (2008) show that the minimum number of clusters for its application should be 42. As my data only consists of 35 study clusters, I also apply the wild bootstrap specification as a robustness check, which is particularly suited to meta-regression data with a small number of clusters (see Cameron, Gelbach and Miller 2008).

2.4 Results

I present my meta-regression results in Tables 2.2 and 2.3. As described above, I use *sqrt(n)* and *n* as precision measures and apply three different approaches to correct for intra-study error correlations. Table 2.2 presents WLS results for the simple model without additional study design covariates (eq. 2). Columns (3) and (4) display the results for the main specification, WLS with cluster robust standard errors. The significant and negative coefficients of *sqrt(n)* and *n* confirm the presence of publication bias already detected by the funnel plot. This finding is consistent across the remaining methods used to control for intra-study error dependence (robust standard errors in columns (1) and (2) as well as Wild bootstrapped standard errors in columns (5) and (6)).

The most important parameter in my model, however, is the constant. The estimated coefficient of a constant serves as a proxy for the "true" WTP for local, after correcting for publication bias. Therefore, the results in Table 2.2 indicate the presence of a significant WTP for local effect. That is, the constant estimate is significant in all of my models, implying that the weighted average of WTP for local ranges between 1.696 and 2.076.

Table 2.2 PET and FAT analysis

	WLS with robust SEs				WLS with cluster robust SEs				Wild bootstrap cluster robust SEs			
	(1)		(2)		(3)		(4)		(5)		(6)	
	Estimate	St. Error	Estimate	St. Error	Estimate	St. Error	Estimate	St. Error	Estimate	P-values	Estimate	P-value
Constant	2.076***	0.313	1.696***	0.222	2.076***	0.454	1.696***	0.322	2.076***	0.000	1.696***	0.000
sqrt(n)	-0.035***	0.008			-0.035***	0.012			-0.035**	0.020		
n			-0.001***	0.000			-0.001***	0.000			-0.001***	0.002
obs	86		86		86		86		86		86	
F	18.610		27.120		8.470		13.300					
Prob > F	0.000		0.000		0.006		0.001					
R^2	0.083		0.108		0.083		0.108		0.083		0.108	
Adj, R^2	0.072		0.097		0.072		0.097		0.072		0.097	

Note: ***, **, * indicate significance at the 1%, 5%, and 10%-level, respectively. Dependent variable is WTP for local. *sqrt(n)* is used as weight.

Table 2.3 presents the results of the full MRA models that take into account methodological differences across the studies included in my analysis. Model diagnosis shows that all models are overall significant based on the F-test. Table C in the Appendix C reports that none of the variance inflation factors (VIFs) values exceed the critical level of 10, indicating that severe degree of multicollinearity among the set of included explanatory variables is not present. Furthermore, since MRA pools the observations from individual studies, heteroscedasticity can be a feature of my data (e.g. Stanley, 2001; Lagerkvist and Hess, 2011). As stated above, I, therefore, employ a weighted estimation technique to address this potential issue. Nevertheless, to assess the remaining degree of heteroscedasticity after weighting, I calculate Breusch-Pagan (BP) test statistics for the final models. Results show that in none of the cases the null hypothesis of homoscedasticity is rejected ($Chi^2 = 11.32$ $p= 0.660$ $df=14$ for the specification that uses sqrt(n) as a precision measure; $Chi^2 = 11.78$ $p=0.624$ $df=14$ for the specification using the number of participants as precision measure).

Table 2.3 Meta Regression Results

	WLS with robust SEs				WLS with cluster robust SEs				Wild bootstrap cluster robust SEs			
	(1)		(2)		(3)		(4)		(5)		(6)	
	Estimate	St. Error	Estimate	St. Error	Estimate	St. Error	Estimate	St. Error	Estimate	P-values	Estimate	P-value
Constant	6.179***	2.303	5.173**	2.203	6.179***	2.220	5.173**	2.025	6.179*	0.056	5.173*	0.074
sqrt(n)	-0.065**	0.027			-0.065**	0.031			-0.065*	0.080		
n			-0.002***	0.000			-0.002***	0.001			-0.002***	0.002
Year of study	-0.633*	0.330	-0.814**	0.330	-0.633*	0.359	-0.814**	0.345	-0.633*	0.084	-0.814**	0.030
Country of study - US	0.805**	0.352	0.785**	0.334	0.805**	0.386	0.785**	0.353	0.805	0.146	0.785*	0.088
Animal products	1.056***	0.358	1.025***	0.352	1.056***	0.402	1.025**	0.402	1.056**	0.028	1.025**	0.026
Processed products	1.415***	0.534	1.547***	0.538	1.415**	0.575	1.547***	0.563	1.415*	0.076	1.547*	0.052
Local def. – state grown	0.095	0.403	0.068	0.394	0.095	0.494	0.068	0.475	0.095	0.876	0.068	0.918
Local def. – specific region	-0.042	0.245	0.012	0.230	-0.042	0.229	0.012	0.215	-0.042	0.906	0.012	0.924
Local def. – general	-0.079	0.481	-0.238	0.488	-0.079	0.609	-0.238	0.615	-0.079	0.978	-0.238	0.798
Method – choice experiment	2.139***	0.733	2.007***	0.727	2.139***	0.764	2.007***	0.737	2.139**	0.060	2.007*	0.064
Hypothetical experiment	-0.344	0.434	-0.443	0.421	-0.344	0.463	-0.443	0.430	-0.344	0.484	-0.443	0.308
Participants' origin – shoppers	-0.334	0.374	-0.583	0.383	-0.334	0.414	-0.583	0.410	-0.334	0.538	-0.583	0.246
Number of attributes	-0.257	0.188	-0.131	0.173	-0.257	0.196	-0.131	0.181	-0.257	0.308	-0.131	0.532
Age	-0.064	0.040	-0.052	0.039	-0.064	0.041	-0.052	0.040	-0.064	0.296	-0.052	0.338
Gender	-0.035*	0.019	-0.038**	0.018	-0.035*	0.021	-0.038**	0.019	-0.035	0.182	-0.038*	0.010
Number of obs	69		69		69		69		69		69	
F	3.940		5.030		4.670		6.480					
Prob > F	0.000		0.000		0.000		0.000					
R^2	0.386		0.413		0.386		0.413		0.386		0.413	
Adj, R^2	0.227		0.260		0.227		0.260		0.227		0.260	

Note: ***, **, * indicate significance at the 1%, 5%, and 10%-level, respectively. Dependent variable is WTP for local. *sqrt(n)* is used as weight.

Similar to the simple model (Table 2.2), in my interpretation I focus on the results using WLS with cluster robust standard errors in columns (3) and (4), while the remaining specifications shall serve as robustness tests. The results confirm the presence of publication bias as the coefficients for *sqrt(n)* and *n* remain negative and significant after the inclusion of relevant study design covariates. On the other hand, the estimated constant terms are significant and positive. This indicates that after controlling for publication bias and variation in the WTP due to methodological and other study-specific characteristics, a premium for local attribute remains present. However, one should be careful interpreting the constant parameter because the results suggest that several covariates included in the model have a significant effect. I discuss this in more detail below.

Several covariates related to the study design turn out to be significant. I find that *Year of study* estimate is significant and negative, implying that consumers' WTP for local food has decreased over time, perhaps because it became more widely available as even supermarkets are now increasingly offering locally sourced products (King, Gómez and DiGiacomo 2010). On the other hand, the estimated coefficient of *Country of study-US* is significant and positive, indicating that the studies that were carried out in the US reported a significantly higher WTP for local food than non-US studies. Therefore, researchers, farmers and policymakers should be careful when generalizing the results from different countries.

With regards to the products analyzed, I find a significantly higher WTP for local *Animal products* and *Processed products* compared to local *Produce,* the base group of the estimation. This indicates that the price premium for processed and, hence, value-added

local food products is higher than for unprocessed alternatives, such as produce (Ag Marketing 2017). This finding seems to be consistent with the previous research that considers multiple food items in their studies and reports higher WTP for animal products compared to local produce (Illichmann and Abdulai 2013; Sackett, Shupp and Tonsor 2016). Future studies should take these results into consideration when deciding on the type of a product to utilize for their analysis.

I find no evidence that reported WTP vary depending on the definition of "local" used in the study. This suggests that consumers seem to not differentiate between the various labels used to convey the fact that the product is produced locally. Labels based on a general definition of "local", State Grown labels as well as labels referring to a specific region yield same WTP estimates as labels related to marketing programs (the base category of the regression model). Therefore, if the goal of marketing programs is to increase consumers' WTP, the fact that these labels result in similar WTP as those related to the other definitions indicates that they might lack awareness and support among consumers (Onken and Bernard 2010), maybe due to the fact that they are not widely promoted and explained.

The significant positive *Method – choice experiment* variable indicates that employing choice experiments can lead to higher WTP effects as compared to the application of other experimental techniques, including auctions and contingent valuation. This is in line with Gracia et al. (2012) and Grebitus et al. (2013a) who find that WTP measures from choice experiments and auctions differ. On the other hand, the coefficient of *Hypothetical* is insignificant, suggesting that there is no significant difference between

the reported WTP obtained by conducting hypothetical and non-hypothetical experiments. This finding is consistent with previous research that shows that hypothetical studies are a good representation of non-hypothetical settings and provide bias free estimates of marginal WTP (Carlsson and Martinsson 2001; Lusk and Schroeder 2004; List, Sinha and Taylor 2006; Taylor, Morrison and Boyle 2010).

I also find that the *Number of attributes* used in the study has no effect on WTP for local. Similarly, my results suggest that there is no difference in reported WTP among studies that use store shoppers as opposed to participants recruited through a market research company, online-survey database or through mailing and calling (the base category of the regression model). This implies that samples of randomly recruited participants through various channels, including on-line, yield similar results that use "real" shoppers as participants, which is consistent with prior research (Buhrmester, Kwang and Gosling 2011; Casler, Bickel and Hackett 201; Klein et al. 2014). However, while I also find no evidence that reported WTP estimates vary significantly over *Age*, *Gender* of the study participants has a significant negative effect on the resulting WTP for local, indicating that female consumers might be more price conscious compared to male consumers. The variable income was excluded from the estimation as it is highly correlated with the Country of Study-US variable leading to severe multicollinearity problems.

Finally, to interpret the estimated coefficient of the constant I use model (4) as an example. Setting all categorical variables related to the underlying study design characteristics equal to zero, inserting mean values for the variables *participants (n)* and *Gender*, and adding the constant yields a statistically significant value of 1.89. This

suggests the presence of a significant WTP for local of 1.89 $/lb for the base group (before 2011, non-US, produce, marketing definition of local, no choice experiment or hypothetical, participants recruited outside the shopping locations, and zero additional attributes), after correcting for the publication bias. Starting from this value I can calculate the WTP for each combination of study design attributes. For example, focusing on the US increases this value by 0.79, while considering studies post 2011 leads to a decrease of 0.81.

2.5 Conclusion

The body of research on local food continues to grow, with many articles investigating the premium consumers are willing to pay for local. This literature, however, provides a range of estimates for local attribute that appear to vary significantly based on, for example, the type of "local" labeling employed (Hu, Woods and Bastin 2009; Yue and Tong 2009; Nganje, Shaw Hughner and Lee 2011; Adalja et al. 2015; Meas et al. 2015) or the product category used (Darby at al. 2008; Onozaka and Thilmani-Mcfadden 2011; Costanigro 2011; Hu et al. 2012; Wägeli, Janssen and Hamm 2016). Therefore, the objective of this essay is to determine a precise estimate of the WTP for local attribute. In order to do so, I utilize an MRA analysis, which is a quantitative method used to evaluate the effect of study-specific characteristics on published empirical results. Collecting all relevant evidence on this topic and utilizing a systematic review methodology, I find that there is a significant mean estimate for local attribute that ranges between $1.70/lb and $2.08/lb. As such, this essay contributes to the broad literature that studies consumer demand for local food by deriving the "true" WTP for local.

In addition, I detect publication bias in the literature reviewed as I identify a significant relationship between WTP for "local" estimates and their precision. This suggests that there might be a tendency to select a specific combination of estimates and precision that leads to statistical significance, implying that significant estimates are more likely to be selected for publication. It is important to note that these results also suggest that one should carefully consider the sample size, as, for example, having a small sample may inflate the results.

Using my analysis, I also examine how major methodological characteristics of the studies affect the WTP estimates. For example, my results indicate that the label used by a study to convey the "local" attribute does not affect the reported results. This suggests that consumers do not seem to favor any specific definition of local. Therefore, policymakers and farmers should take my findings into consideration when deciding how to promote local food, as investing in marketing program labels seems inefficient because they do not have a significant effect on consumers' WTP. This might occur due to the lack of awareness of such programs.

My results also indicate that there is no difference in reported WTP measured by hypothetical as opposed to non-hypothetical experiments. On the other hand, utilizing choice experiments seem to result in higher WTP as compared to other experimental technics, including auctions and contingent valuation. While I am not able to draw any conclusions on which experimental method is "better" and can only account for the effects measured based on the study design in terms of WTP, other studies that investigate reliability and validity of various research techniques may explore these findings further.

The results of the assessed studies also vary depending on the country where the study was conducted. Therefore, my finding may assist researchers and policymakers in comparing WTP for "local" attribute reported across different countries or interpreting their own results. Similarly, the WTP differs significantly based on the type of the product that was used. Thus, the results for one category should be applied to another with caution.

This research is not without limitations. First, the number of studies included is limited by means of the search criteria imposed by my research objective. Therefore, it might be beneficial to repeat my analysis in the future, when more research with the appropriate estimates of WTP will appear. Meanwhile, future research on WTP for the local attribute should focus on including all relevant information in the study description, to ensure transparency and allow for in-depth meta-analyses such as mine.

Second, while the increasing number of local food articles over time may suggest a rise in interest in local food, it may also indicate that there have been more food or agricultural economics papers published over the years. Future studies should consider looking at the relative rather than the absolute number of articles published. Third, using the year 2011 as a cutoff point to identify whether there is a change in local food preferences over time may be considered shortsighted. There may be some systematic factors among the studies before and after 2011, other than the timing, that could impact the results. Finally, while the majority of studies used in my MRA utilize some variation of the Random Parameters Logit Model for their estimations, five papers employed another type of estimator. However, given the small number, it is not feasible to control for the type of econometric method used. Also, the type of data collection predetermines the type of

econometric analysis used. Therefore, including both types of variables would likely lead to multicollinearity between variables related to the econometric method and variables related to the type of data collection. Nevertheless, the estimation method applied might have an effect on the final WTP value reported.

Despite these limitations, the results of this study are valuable as they provide useful information about consumers' response to labeling and marketing products as local. My findings can be taken into consideration by future theoretical and empirical research focusing on the WTP for local food. Also, knowing a more precise value that consumers place on local attribute can assist stakeholders from industry, and those involved in policy-making, planning and management, to make better decisions when setting up prices and developing promotional activities.

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CHAPTER 3

MARKETING CHANNELS FOR LOCAL FOOD [11]

3.1 Introduction

The popularity of direct-to-consumer marketing channels, such as, farmers markets, continues to grow (McGarry-Wolf, Spittler, and Ahern 2005; Zepeda 2009; Landis et al. 2010). According to the U.S. Department of Agriculture's (USDA) Agricultural Marketing Service (AMS), the national count of farmers markets tripled between 2000 and 2018 from 2,863 to 8,718 (AMS 2018). Similarly, the number of community-supported agriculture (CSA) venues, one of the most common forms of urban farming where consumers subscribe to the harvest of a certain farm or group of farms by investing in and sharing the risks and benefits of food production, have increased dramatically from 761 in 2001 (Adam 2006) to 7,398 in 2015 (NASS 2016). Yet, direct-to-consumer channels for local food are not the most important in terms of sales volume. U.S. grocery retailers are aggressively seeking out partnerships with local growers and producers to source seasonal, locally grown produce and products made out of local ingredients (Guptill and Wilkins 2002; Dunne et al. 2011)[12]. As a result of these trends, sales of local food rose from $6.1 billion in 2012 to $8.75 billion in 2015, and are projected to reach $20 billion by 2019 (NASS 2016; USDA 2016), with most of the growth occurring through intermediated channels, such as grocery stores and restaurants. Sales through direct-to-consumer channels, such as farmers markets and CSAs, are growing at a much slower rate (Low and Vogel 2011;

[11] With permission from Grebitus C., "Marketing Channels for Local Food". *Ecological Economics*, 152, 161-171., Elsevier, Copyright 2018 (Please see Appendix E).

[12] For example, about 20% of fresh produce sold at Walmart during the summer months is grown in-state and almost 30% of Wegmans' produce sales come from seasonal products sourced from local family farms (King et al. 2010).

Thilmany-McFadden 2015; Low et al. 2015; Richards et al. 2017). In this research, I aim to disentangle consumers' preferences for marketing channels and the "local" attribute in their food purchases.

In 2015, local food sales of the farms that sell only through intermediated marketing channels reached $5.75 billion, while the sales of the farms that only utilize direct-to-consumer channels were $3 billion (NASS 2016). Nevertheless, the USDA AMS continues to support direct-to-consumer channels as a means of growing the demand for not just local food, but local food distributed in a particular way (Martinez 2010; Low et al. 2015). For example, the Farmers Market and Local Foods Promotion Programs (2014 Farm Bill) sets aside up to $30 million in grants annually specifically for improvement, development, and expansion of farmers markets and other direct-to-consumer outlets (FMPP 2016; NSAC 2016). While there may be other goals that drive this policy besides simply growing local food sales, if the positive social impacts from local food are accrued regardless of channel, then we should better understand the relative effectiveness of direct and intermediated channels in growing local food sales.

There is mixed evidence on preferences for local food through different points of sale. For instance, Onken et al. (2011) find that consumers are willing to pay a price premium for strawberry preserves sold at farmers markets relative to conventional supermarkets. However, Carroll et al. (2013) did not find any significant differences between consumers' willingness to pay (WTP) for fresh tomatoes sold at the grocery store or the farmers market. Neither of these studies control entirely for all the factors that may affect preferences for local food offered at different points of sale. In particular, both of these studies include only farmers markets and grocery stores as alternative venues for

local food, and do not consider the growing popularity of other direct-to-consumer locations, such as urban farms. Nor do they take into account attributes of purchasing outlets that can potentially influence the choice, such as, convenience. Finally, they do not isolate consumers' WTP for the local attribute from their WTP for a particular marketing channel. Therefore, whether consumer preferences explain the divergence between direct and intermediated sales of local foods remains an open question.

In this chapter, I attempt to answer this question by conducting an on-line choice experiment that examines consumer behavior in a decision-making context using representative samples of the Phoenix, AZ and Detroit, MI population. The choice experiment setting allows me to separate the demand for local as an attribute from the demand for a particular channel. In doing so, I consider a more complete set of options available to consumers in order to fully characterize what is meant by a direct channel. For example, many metropolitan areas are seeking to re-purpose empty lots within the city as sources of nutrition and new, extensive economic activity (Goldstein 2011; Dieleman 2016). Therefore, understanding the role of commercial urban agriculture outlets is important. Urban agriculture, also known as urban farming, is a practice of production and distribution of food and other products through plant cultivation and animal husbandry within the city limits using vacant lots and parks that are not suitable for housing or construction (Bailkey and Nasrm 1999; Urban Agriculture 2016; USDA 2018). I incorporate this marketing channel in my study by including urban farms as one of the points of sale.

I am also able to control for other factors that are likely to affect consumers' preferences for different outlets. Namely, given that convenience significantly influences

consumers' preference and choice of the shopping location (Kezis et al. 1984; McGarry-Wolf, Spittler, and Ahern 2005; Gumirakiza 2014), I account for accessibility as a potential determinant of where consumers prefer to buy local food. Further, I allow for variation in organic status as local and organic are often conflated, and consumers hold a strong preference for organic produce (Costanigro et al. 2011; Meas et al. 2015). In this way, I am able to separate the demand for organic from the demand for local, and determine whether preferences for organic strengthen or weaken the demand for food sold as locally produced. Finally, while examining all factors independently, my experimental design also allows me to test for potential interaction effects among local, organic and different points of sale. By doing so I am able to reveal the nature of the relationships that exist between these attributes, and determine whether the simultaneous presence of local and organic labels increases or decreases demand for food and whether preference for these labels differs by point of sale.

My findings contribute to both the substantive literature on the local food market and the methodological literature on experimental design. Specifically, I demonstrate how experimental methods can be used to uncover preferences for specific determinants of consumer choice, when these determinants may have multiple, inter-related effects on demand. In this way, my design effectively disentangles the value of local as an attribute, separately from where local food is sold. By properly assigning preferences to product attributes and point-of-sale attributes, I am able to offer valuable insight into the welfare effects of offering food through direct channels and intermediated channels, when the food itself is differentiated along multiple overlapping dimensions.

The remainder of the chapter has the following structure. In the second section, I develop my hypotheses regarding the expected difference in consumer demand for direct-channel and intermediated local food based on concepts from the empirical literature. The following section explains in detail the experiment, and how my design allows me to disentangle the value of local and organic foods. In a fourth section, I describe my empirical model. Section five presents the estimation and results. Finally, I draw some conclusions and implications of my findings in the final section.

3.2 Conceptual Background

Direct marketing channels matter for various reasons. Direct-to-consumer outlets, such as farmers markets or urban farms, provide an opportunity for local farmers to sell the food they grow directly to the customers (Neil 2002; AMS 2017) and create personal relationships with them (Onianwa, Mojica and Wheelock 2006). Direct channels may facilitate the development of farmers' entrepreneurial skills (Feenstra et al. 2003). They may allow farmers to reduce marketing costs, thereby retaining a larger share of the retail price (Low et al. 2015), and receive higher net profits (Anderson 2007). Nevertheless, while the number of local farms utilizing the direct-to-consumer marketing channels continues to grow, direct sales growth is slow (Low et al. 2015). At the same time, sales through intermediated channels are growing rapidly (Richards et al. 2017). Therefore, if the main goal of the governmental policies is to increase the sales of local food, then the support of direct channels may be misguided.

The fact that total direct-to-consumer sales remain lower than intermediated sales raises the questions considered here, namely (1) Do consumers prefer to purchase local food through direct channels, or from intermediated channels, such as, grocery stores? (2)

Are consumers willing to pay a premium for local food sold at direct-to-consumer marketing channels? (3) What affects consumers' preferences for local food purchases? The investigation of these questions is based on core concepts from consumer behavior theory.

The body of research that investigates consumers' demand and WTP for local food shows that consumers are willing to pay more for local produce (Willis et al. 2013; Carroll, Bernard and Pesek 2013) and processed foods (Hu, Woods and Bastin 2009; Onken, Bernard and Pesek 2011; Hu et al. 2012) compared to non-local. Consumers also appear to have a higher WTP for local as a product attribute over other value-added claims, such as, fair trade, GMO-Free, low fat, or 'no sugar added' (Loureiro and Hine 2002; James, Rickard and Rossman 2009; Onozaka and Thilmany-McFadden 2011). In fact, while previous research demonstrates that consumers value the attribute "local", it also suggests that they have a significantly positive WTP for "organic" (Loureiro and Hine 2002; Costanigro et al. 2011; Hu et al. 2012; Meas et al. 2015). If this is the case, then there may be a sub-additive or super-additive relationship[13] between these two attributes. For example, Meas et al. (2015) explore consumer preferences for value-added food labels of processed blackberry jam. They find strong overlapping valuation between organic and local multi- and sub-state regional claims. On the other hand, Onozaka and Thilmany-McFadden (2011) investigate interaction effects among food claims of apples and tomatoes

[13] Two attributes are considered to have a sub-additive (super-additive) relationship when there exists (does not exist) an overlap between their values in the WTP that results in a discounted (higher) total premium compared to the sum of individual WTP for the attributes. This overlap can be determined by examining the sign of the interaction effects between these attributes. While Meas et al. (2015) state that "…the substituting or complement nature between attributes can be conveniently determined through the signs of the interaction terms. Specifically, two attributes are complements if $\beta pq > 0$, and substitutes if $\beta pq < 0$…", I use the terms "sub-additivity" and "super-additivity" for this occurrence in order to avoid confusion with the economic terms substitutes and complements.

and find that local and organic claims do not have a significant interaction, meaning that their values are independent from each other. In addition, conducting a study among Spanish consumers, Gracia et al. (2014) find super-additive relationships between organic and local. Given these mixed results, one objective of this study is to investigate the interaction effects between local and organic food attributes.

Interactions are not limited to credence attributes. Prior research also suggests that there may be an interaction between the marketing channel and local and organic claims. For example, Grebitus et al. (2017) find that "organic" is the most frequent association with urban farming. This suggests that consumers believe that local food sold at urban farms is produced organically. Also, Ellison et al. (2016) find that consumers think tomatoes sold at direct-to-consumer outlets are truly organic. This implies that consumers might have a higher WTP for organic food sold at direct marketing channels. Identifying the true effect of local separate from other attributes requires a design that accounts for these potential interactions, while allowing for evaluation of all factors independently. This study disentangles the value of local from other attributes by testing for possible interaction effects among local, organic and different points of sale.

Even after controlling for attributes that may be associated with local food, point of sale is important in its own right. Conducting a choice-based conjoint experiment at farm markets, farmers markets, and retail grocery stores located in Ohio, Darby et al. (2008) find that grocery and direct market shoppers have a higher WTP for locally grown strawberries over the ones labeled as grown in the U.S. However, the direct market shoppers' WTP was almost twice as high as grocery store shoppers' WTP. This finding suggests that point of sale might have had an effect on the results, indicating that consumers

may be willing to pay more for local food sold through direct-to-consumer marketing channels.

There are also specific point-of-sale characteristics that can affect consumer demand for local products, for example, accessibility. This is a reasonable proposition as convenience is, empirically, one of the most significant drivers of consumers' store choice (Bell and Lattin 1998; Leszczyc, Sinha, and Sahgal 2000; Briesch, Chintagunta, and Fox 2009). In fact, inconvenience and remoteness of the location are the factors that discourage consumers from shopping at the direct venues (Kezis et al. 1984; McGarry-Wolf, Spittler, and Ahern 2005; Gumirakiza et al., 2014). One reason for this is that farmers markets usually offer a limited assortment of products, meaning that consumers will have to shop at multiple locations to satisfy their grocery needs. As a result, a remote location increases consumers' fixed costs of shopping driven by the time and effort involved in reaching farmers markets, which is not consistent with the goal of minimizing shopping costs (Bell et al. 1998; Tang et al. 2001). Therefore, I hypothesize that the demand for convenience means that consumers are willing to pay a premium when purchasing produce from grocery stores compared to direct-to-consumer outlets.

Consumers, however, may prefer direct channels because they get to enjoy some other intangible benefits that direct-to-consumer outlets have to offer. For example, there may be a recreational aspect to buying from a direct channel (McGarry-Wolf, Spittler, and Ahern 2005; Sumner 2010). That is, if consumers simply enjoy community engagements and the aesthetic aspect of going to a farmers market, or a farm, then some of the marginal utility associated with entertainment may be bid into the price of the product. Second, at direct outlets, consumers' ability to interact with food producers may make them feel more

connected to farmers and appreciate the knowledge of where their food is coming from (Zepeda and Leviten-Reid 2004; McGarry-Wolf, Spittler, and Ahern 2005; Landis et al. 2010). In fact, the notion that meeting the person who grew your food is in some sense a guarantee of its integrity has grown into a movement in its own right ("Know your Farmer, Know your Food", USDA 2017). Third, consumers may believe that shopping at a farmers market, or urban farm, will have a more direct impact on the local economy and farmers' welfare (Zepeda 2009; Landis et al. 2010), even though local food sold through an intermediary still generates value for local farmers. I examine each of these motives by allowing consumers to express their preference for point of sale.

Apart from intangible benefits that motivate consumers to purchase products at direct-to-consumer outlets, there are other desirable characteristics related to the products themselves that influence consumer preference, such as taste, quality, value, and price. For example, consumers purchase from farmers markets and urban farms because they provide access to fresh, healthy, higher quality products for a reasonable price (Armstrong 2000; Brown 2002; McGarry-Wolf, Spittler, and Ahern 2005; Landis et al. 2010). However, these characteristics are also the reason why consumers prefer to purchase local food in general (Feldmann and Hamm 2015). Therefore, an increasing availability of local food at grocery stores (Guptill and Wilkins 2002; Dunne et al. 2011) means that these product characteristics become less specific to the direct marketing channels. This suggests that isolating the value of local from the value associated with direct channels might reveal that there is no difference in consumer preferences for where to shop for local food, at direct channels or grocery stores, implying that the demand for local is distinct from the demand for a marketing channel.

I hypothesize that if consumers, whose main goal is to purchase food, value such "intangible" characteristics associated with direct-to-consumer channels more than the product attributes themselves, then their preferences will manifest in a premium for products sold at direct outlets. On the other hand, if consumers place the highest value on whether the food was produced locally, then there will be no difference in preferences between the products offered at the direct channel and grocery store. Furthermore, knowing that consumers believe that direct-to-consumer venues provide a good value for their money (Brown 2003; McGarry-Wolf, Spittler, and Ahern 2005), I might find that they actually expect to pay less at those outlets. That is, they will have a lower WTP for local food sold at the direct channels. I test my hypotheses by conducting the experiment described next.

3.3 Methodological Background

3.3.1 Choice Experiments

To simulate purchase decision making in my study, I use a hypothetical online choice experiment, which is a popular research tool that has been shown to be a good representation of non-hypothetical settings that provide estimates of marginal WTP (Carlsson and Martinsson 2001; Lusk and Schroeder 2004; List, Sinha and Taylor 2006; Taylor, Morrison and Boyle 2010). While conducting a study hypothetically could lead to biased estimates because participants may overestimate their WTP without financial consequences, by comparing hypothetical WTP to actual WTP Murphy et al. (2005) found that the median value of the ratio of hypothetical WTP to actual WTP was only 1.35.

To carry out my experiment, I select a fresh produce item, one pound of fresh tomatoes. I chose this product for two main reasons. First, it is a common and familiar food

item that consumers can buy at grocery stores, farmers markets and urban farms. Tomatoes are the fourth most popular (ERS 2016) and the second most consumed (ERS 2017) fresh vegetable[14] in the US, with a per capita availability of 20.27 pounds in 2017 (Parr, Bond and Minor 2018). Second, local tomatoes are grown successfully in Arizona and Michigan, where the study is conducted, and available to consumers for purchasing (Arizona Harvest Schedule 2016; Michigan: Vegetable Planting Calendar 2017).

3.3.2 Attribute Specification

My choice experiment includes five attributes, namely price, local production, certified organic, point of sale, and travel time (see Table 3.1). The price attribute includes three levels that were established through collecting and analyzing the market prices of fresh tomatoes observed at grocery stores, farmers markets and urban farms at the time of the study. I chose this price range to reflect the low-end, average, and high-end prices of the product.

Table 3.1 Choice Experiment Attributes and Levels for 1lb of Tomatoes

Attributes	Levels		
Price	\$0.99	\$2.99	\$4.99
Convenience	Travel time one-way 5 minutes	Travel time one-way 15 minutes	Travel time one-way 25 minutes
POS	Grocery store	Farmers market	Urban farm
Certified organic	USDA organic	No label	
Local production	Locally grown	No label	

The local production attribute has two levels and includes a "Locally grown" label, as opposed to no label. While it is understood that local food has to be produced within

[14] Even though botanically tomato is a fruit, in 1893 the U.S. Supreme Court ruled it to be considered a vegetable (NIX v. HEDDEN, 149 U.S. 304, 1893).

some specific geographical boundaries around the consumer's residence, the definition of "local food" remains unclear. Therefore, similar to Lim and Hu (2013), I do not provide participants with the definition for "locally grown" or with a specific mileage that the food has traveled. This allows participants to use their own perception regarding what constitutes local food. I define two levels for the certified organic attribute: "USDA Organic," and no label. The point of sale attribute has three levels that reflect different local-food outlets: grocery store, farmers market and urban farm. I provide a definition for what constitutes an urban farm, because focus-group interaction suggested that consumers may not be familiar with the term.

There are several alternative ways to measure convenience, with travel time and travel distance being the most common metrics. Briesch et al. (2009) uses travel distance to measure the effect of convenience on consumers' choice of grocery and non-grocery stores. Hsu et al. (2010) examine grocery shopping behavior among students in a college town using distance from campus to the grocery store as one store attribute. However, perceptions of distance may differ, so Thang and Tan (2003) investigate the effect of consumer perception of accessibility -- defined as a store's convenience measured in travel time, parking, and ease of travel -- on department store preference. Fox et al. (2004) also use travel time as one of the variables to predict household store patronage and expenditures. Therefore, I define convenience in terms of the time in minutes it takes a consumer to travel one-way to the retail outlet, and utilize published data to identify common shopping travel duration patterns among U.S. consumers. For example, according to USDA, the mean distance households have to travel to the nearest primary grocery shopping location is 3.79 miles (Ver Ploeg 2015). Assuming a 45 mile-per-hour speed

limit, the 3.79 miles, on average, implies a travel time of 5.05 minutes. Also, Hamrick and Hopkins (2012) used The Bureau of Labor Statistics' American Time Use Survey data from 2003 to 2007 and found that national average one-way travel time to the grocery shopping outlet is 15 minutes. They also found that, on average, the population with poor access to a grocery shopping venue will have to drive a maximum of 23.23 minutes to reach a store. I set this number as my upper bound for travel time and round it up to 25 minutes to have a balanced design. Therefore, I use a duration of 5, 15 and 25 minutes for a one-way trip to the point of sale as my measure of travel time. Each of these factors form elements of the choice sets in the experimental design described next.

3.3.3 Experimental Design

The experimental design for my study consists of 36 choice sets, which I divide into four blocks to minimize effects of learning or fatigue that can arise in online surveys (Lusk and Norwood 2005; Savage and Waldman 2008). Consequently, each block includes nine choice sets that survey presents in random order. Each choice set has four alternatives and an opt-out option ("None of these").

Similar to Scarpa et al. (2012), I use a two-stage approach to allocate the attribute levels among the choice sets. During the first stage, I generate an orthogonal design for pre-testing purposes. The pre-test survey is administered to an initial group of participants (n = 21). In the second stage, I optimize the design using estimated coefficients from the pre-test as prior values to create a Bayesian efficient design. I use Bayesian efficient design with random priors to account for uncertainty regarding the true parameter prior values that are not known exactly, but only up to an approximation (ChoiceMetrics 2014). In addition, to assess the interaction effects between local, organic, and points of sale, I include five

interaction terms in each stage of the design with specified attribute levels. This allows me to test whether the simultaneous presence of local and organic labels increases or decreases WTP and whether WTP for these labels differs by point of sale. I use the obtained experimental design to carry out my online experiment that follows.

3.3.4 Data Collection

I conducted the Institutional Review Board (IRB) approved online choice experiment in summer 2017. The Arizona State University IRB determined that the protocol is considered exempt pursuant to Federal Regulations 45CFR46 (2) Tests, surveys, interviews, or observation. I recruited a representative sample of the regional population in terms of socio-demographics from Phoenix, AZ and Detroit, MI using the market research company *Qualtrics*. The total number of participants was 1,276, out of which 230 participants were omitted from my analysis because they did not complete the choice experiment. Nevertheless, since I requested n=500 for each city, I received the specified number of completed observations, even slightly more for each city as Qualtrics was not able to close the survey right away after the 500^{th} observation. Therefore, my between-subject design is comprised of n=524 participants from Phoenix, AZ and n=522 participants from Detroit, MI.

I focus on Phoenix, AZ and Detroit, MI because these two major cities are located in very different geographical regions. Consumers in both cities have an access to local food through a variety of marketing channels, such as, farmers markets, urban farms and grocery stores. However, local food is grown seasonally in Detroit, MI while the Phoenix, AZ climate allows for a year round production of fresh local produce (Arizona Harvest Schedule 2016; Michigan: Vegetable Planting Calendar 2017). This enables me to

highlight variation in preferences that might occur among consumers based on geographic and climate differences.

Participants did not have previous information about the goal of the study or the product being used. I randomly assigned one of the four blocks of the choice experiment to each participant. Before participants were introduced to the choice experiment, I asked them to read a cheap talk script (Cummings and Taylor, 1999). Cheap talk lowers hypothetical bias by explaining the importance of making each of the selections as if one was actually facing it in a real-life setting. After the cheap talk script, participants made their choices. Figure 3.1 provides a sample choice set.

A	B	C	D	E
$0.99 Urban Farm Locally grown Travel time one way 15 min.	$2.99 Farmers Market Travel time one way 25 min.	$4.99 Urban Farm USDA Organic Locally grown Travel time one way 25 min.	$4.99 Grocery Store Travel time one way 15 min.	None of these

Figure 3.1: Sample Choice Set for 1 lb of Tomatoes

Apart from the choice experiment, the survey asked participants to answer demographic questions, specifying, among others, their age, gender, and household size. The survey produced an eligible sample of 1,046 participants in total. Table 3.2 presents summary statistics for the basic socio-demographic characteristics of the sample. Half of participants are female. Participants are on average 45 years old with the annual household income of $55,223 (Detroit, MI) and $58,306 (Phoenix, AZ). Using this sample, I am able

to estimate the WTP with an econometric model appropriate for discrete-choices among local food products.

Table 3.2 Sample Characteristics

Characteristics	Phoenix (% unless stated)	Detroit (% unless stated)
Number of observations	524	522
Age in years (mean)	44.7	45.0
Gender (female)	50.0	50.0
Percent primary food shopper	82.0	81.0
Household income (mean in $)	58,306.0	55,223.0
Educational level		
Less than High school	2.3	2.7
High school diploma	15.7	21.7
Some college	42.0	36.6
Bachelor's degree or higher	25.8	26.1
Professional or doctorate degree	14.3	13.0
Race/ethnicity		
White	83.0	75.0
Black or African American	6.0	19.0
Asian	5.0	4.0
American Indian or Alaska native	2.0	3.0
Other	6.0	2.0

3.4 Mixed Logit Model

In my choice experiment, participants make discrete choices among products that vary in attribute levels. In this setting, and assuming preferences are randomly distributed over subjects, a random-utility model is an appropriate econometric approach. In addition to heterogeneous preferences, I also assume that my subject pool reflects a substantial degree of unobserved heterogeneity. I control for the bias that would otherwise arise due to unobserved heterogeneity by applying a random-coefficient, discrete-choice model to the experimental data. Because I assume the distribution of preference heterogeneity is Type I Extreme Value, the specific form of the econometric model is a mixed logit. The

fundamental concept underlying the mixed logit model is that individual utility from any choice is correlated with other choices, according to the attributes embodied in each of the choices. In general, mixed logit models allow for variations in consumer preferences that may arise from random taste differences, unrestricted substitution across product attributes, and correlation in unobserved factors over sequential treatments (Train 2009).

Choice modeling assumes that at a given choice occasion *t* consumer *i* maximizes his or her utility by choosing a product among *j* alternatives with attributes that provide the highest level of utility. This utility consists of a deterministic component V_{ijt}, which includes the specified attributes of the product, and a random component e_{ijt}, which is unobservable to the researcher:

(1) $$U_{ijt} = V_{ijt} + e_{ijt}$$

Under the assumption of a linear utility functional form, the deterministic component can be written as $\beta'_i x_{ijt}$ so the indirect utility function is written:

(2) $$U_{ijt} = \beta'_i x_{ijt} + e_{ijt}$$

where β_i is a vector of structural parameters that are specific to consumer *i* and x_{ijt} is a vector of the observed variables of the alternative *j* faced by consumer *i* at the choice occasion *t*. The choice probability, conditional on the utility parameters β_i that consumer *i* will choose a sequence of choices s_i given the alternatives x_i, is written as

(3) $$P(s_i|x_i, \beta) = \prod_{t=1}^{T} \left[\frac{\exp(\beta'_i x_{is_{it}t})}{\sum_{j=1}^{J} \exp(\beta'_i x_{ijt})} \right]$$

Consequently, the unconditional choice probability in the mixed logit model is obtained by integrating the conditional probability over the joint distribution of β:

(4) $$P(s_i|x_i, \beta) = \int_{\beta} P(s_i|x_i, \beta)\, g(\beta|\theta) d\beta$$

where $g(\beta|\theta)$ is a population distribution, from which individual specific parameters β_i are drawn, and θ is a vector of distribution parameters, such as mean and variance. This choice probability does not have a closed form solution and is approximated through simulation (Brownstone and Train 1999).

In the choice experiment described above, the survey asked participants to make nine choices among tomatoes characterized by the levels of the attributes. I analyze these choices using the indirect utility function specified as follows

(5) $$U_{ijt} = \alpha_i Price_{jt} + \beta_{1i} UF_{jt} + \beta_{2i} FM_{jt} + \beta_{3i} Organic_{jt} + \beta_{4i} Local_{jt} + \beta_{5i} Travel_{jt} + \beta_{6i} UF_{jt} Organic_{jt} + \beta_{7i} UF_{jt} Local_{jt} + \beta_{8i} FM_{jt} Organic_{jt} + \beta_{9i} FM_{jt} Local_{jt} + \beta_{10i} Organic_{jt} Local_{jt} + e_{ijt}$$

where α_i and β_i are the price-response parameter and the attribute valuations, respectively, that vary over consumers *i*; $Price_{jt}$ is the price of the alternative *j* at choice situation *t; UF* and *FM* are dummy variables that take a value of 1 if tomatoes are sold at the urban farm or farmers market, respectively, and zero if tomatoes are sold at the grocery store; *Organic* and *Local* are dummy variables that take a value of 1 if tomatoes are certified organic or produced locally, respectively, and zero otherwise; *Travel* is an alternative-specific convenience attribute of the alternative *j* at the choice occasion *t; UF*Organic*, *UF*Local*, *FM*Organic*, *FM*Local* represent possible interaction terms between the point of sale (urban farm or farmers market) and organic or local production; *Local*Organic* is an interaction term indicating that tomatoes are organically and locally produced, and 0 otherwise; and e_{ijt} is a random error specific to consumer *i.*

Afterwards, using the estimated parameters β from the model, I compute WTP for each of the random parameters *n* by dividing the attribute coefficient by the negative of the price coefficient. I record the results into the matrix, which has one column for each random parameter. The overall WTP that is based on conditional estimates is then calculated by averaging the values in the matrix over all individuals *k* (Greene 2016):

$$(6) \qquad WTP_n = (\sum_{i=1}^{k}(-\frac{\beta_{ni}}{\beta_{pricei}}))/k$$

In order to determine whether the WTP estimate of each attribute is significant, I calculate its variance by following Daly et al. (2012):

$$(7) \qquad var(WTP_n) = \left(\frac{\beta_n}{\beta_0}\right)^2 \left(\frac{\omega_{nn}}{\beta_n^2} + \frac{\omega_{00}}{\beta_0^2} - 2\frac{\omega_{n0}}{\beta_n\beta_0}\right)$$

where β_0 is the price parameter, β_n is the parameter of the attribute, and ω_{nn} and ω_{00} are the variance and ω_{n0} is a covariance for the respective parameter estimates[15]. Further information can be found in Syrengelas et al. (2017).

I estimate three models, one for the Detroit sample, one for the Phoenix sample, and one for the pooled sample to account for city-specific differences that might occur, with alternative sets of random parameters for each of the products. I estimate these mixed models with 500 Halton draws (Revelt and Train 1998) and examined for the stability of the parameters using several different numbers of draws.

[15] The square root of equation (7) is the standard error, which is then used in the t-ratio test to determine the statistical significance of the interaction WTP.

3.5 Empirical Results

3.5.1 Preferences

Table 3.3 presents the results of the mixed logit for Phoenix, Detroit and the overall sample. All models are highly significant based on McFadden's Pseudo R^2 of, on average, 0.36, which is considered excellent (McFadden 1978).

My models include five interaction effects, so the main effects require careful interpretation. Similar to Meas et al. (2015), in my study the variables that are included in the interaction effects[16] are dummy variables that take on a value of 0 or 1.

[16] When two variables are included in the interaction effect ($\beta_A * X_A + \beta_B * X_B + \beta_C * X_A * X_B$, where the last term represents the interaction effect), the main effect of one variable (β_A) is defined as the marginal effect in the absence of the other ($X_B = 0$). On the other hand, the total effect is interpreted based on the sign of the interaction effect term, given that both variables are present simultaneously.

Table 3.3 Mixed Logit Model Estimation Results for Phoenix and Detroit

	Phoenix and Detroit				Phoenix				Detroit			
	Coefficient		SE	z-value	Coefficient		SE	z-value	Coefficient		SE	z-value
Price (M)	-0.723	***	0.014	-52.210	-0.759	***	0.020	-37.110	-0.704	***	0.019	-36.270
Farmers Market (M)	0.019		0.077	0.250	-0.114		0.110	-1.040	0.129		0.108	1.190
Urban Farm (M)	-0.576	***	0.080	-7.220	-0.608	***	0.116	-5.260	-0.549	***	0.111	-4.940
Organic (M)	0.175	**	0.078	2.260	0.101		0.114	0.890	0.269	**	0.111	2.440
Local (M)	0.595	***	0.068	8.740	0.609	***	0.097	6.300	0.594	***	0.098	6.090
Travel time (M)	-0.118	***	0.004	-29.450	-0.121	***	0.006	-19.840	-0.118	***	0.006	-21.100
Local*Organic (M)	0.049		0.074	0.670	0.150		0.107	1.410	-0.037		0.101	-0.360
Farmers Market* Organic (M)	-0.006		0.084	-0.070	0.202	*	0.121	1.660	-0.221	*	0.118	-1.870
Farmers Market* Local (M)	-0.478	***	0.092	-5.210	-0.556	***	0.130	-4.280	-0.454	***	0.134	-3.390
Urban Farm* Organic (M)	0.131		0.086	1.520	0.221	*	0.124	1.780	0.081		0.121	0.670
Urban Farm* Local (M)	-0.191	**	0.082	-2.320	-0.220	*	0.119	-1.850	-0.157		0.116	-1.350
None (M)	-6.347	***	0.204	-31.040	-6.337	***	0.303	-20.920	-6.810	***	0.316	-21.570
Farmers Market (SD)	0.664	***	0.068	9.730	0.553	***	0.111	4.960	0.732	***	0.099	7.370
Urban Farm (SD)	0.766	***	0.068	11.310	0.731	***	0.098	7.440	0.778	***	0.104	7.470
Organic (SD)	1.057	***	0.061	17.400	1.114	***	0.094	11.800	1.107	***	0.079	14.080
Local (SD)	0.365	***	0.107	3.430	0.206		0.189	1.090	0.540	***	0.114	4.750
Travel time (SD)	0.087	***	0.004	23.420	0.095	***	0.006	16.980	0.088	***	0.006	15.750
Local*Organic (SD)	0.776	***	0.092	8.440	0.790	***	0.137	5.780	0.579	***	0.160	3.610
Farmers Market* Organic (SD)	0.117		0.141	0.830	0.203		0.212	0.960	0.127		0.210	0.610
Farmers Market* Local (SD)	0.332	*	0.182	1.830	0.288		0.249	1.150	0.783	***	0.157	4.970
Urban Farm* Organic (SD)	0.011		0.179	0.060	0.083		0.352	0.240	0.023		0.190	0.120
Urban Farm* Local (SD)	0.234	*	0.126	1.860	0.285		0.184	1.550	0.409	***	0.142	2.890
None (SD)	2.977	***	0.175	17.020	3.256	***	0.235	13.870	3.188	***	0.233	13.690
Log-likelihood	-9736.588				-4797.906				-4926.027			
McFadden Pseudo R-squared	0.358				0.368				0.349			
Number of Observations	9414				4716				4698			

Note: ***, **, and * denote statistically significant differences at 1%, 5% and 10%, respectively. SE = Standard Error.

Considering my main empirical models, point of sale is an important determinant of consumers' preferences for local foods. In my models, I use *Grocery Store* as the reference level for point of sale. Therefore, the insignificant mean coefficient for *Farmers Market* across all the models implies that there is no statistically significant difference among consumers' preferences for tomatoes sold at the farmers market compared to tomatoes sold at the grocery store. However, given that the interaction effect between *Farmers Market* and *Local* is significant, the marginal effect of the *Farmers Market* coefficient should be interpreted assuming that there is no simultaneous presence of the attribute *Local*. Thus, the insignificance of the *Farmers Market* coefficient might indicate that consumers do not have a preference for where to shop for non-local tomatoes, at the farmers market or grocery store. On the other hand, a significant and negative interaction effect between *Farmers Market* and *Local* has a discounting effect on the combined main effects of the two attributes, implying that consumers prefer to purchase local tomatoes at grocery stores instead of farmers markets. This finding is somewhat remarkable as it is commonly assumed that farmers markets are the primary source for local products. Further, a significant and negative coefficient for *Urban Farms* indicates that consumers prefer tomatoes sold at a grocery store to the ones sold at an urban farm, while a significant and negative interaction between *Urban Farms* and *Local,* in the case of Phoenix and the overall sample, suggests that consumers prefer local tomatoes sold at the grocery store over tomatoes sold at an urban farm. On the other hand, an insignificant interaction between *Urban Farms* and *Local* in the case of Detroit suggests that the two attributes are independent. This is surprising, as this finding implies that among Detroit consumers the preference for urban farms does not depend on the fact that the food sold there is local.

Attributes related to production methods are also important factors in shaping consumers' preferences for local foods. In my models, the mean coefficients for *Local* are significant with the expected positive signs, suggesting that consumers prefer tomatoes carrying this label. On the other hand, the mean coefficients for *Organic* are significant in the case of Detroit and the overall sample, but insignificant in the case of Phoenix, suggesting that Phoenix consumers do not have a preference for organic tomatoes over non-organic ones. These *Local* and *Organic* estimates, however, are independent across the models, as indicated by the insignificant interaction coefficients, suggesting that there are no conflating effects among these two attributes.

My models, however, demonstrate some evidence of the conflation effects between points of sale and organic production. In the case of Phoenix, a significant and positive interaction effect between *Urban Farms* and *Organic* has an additive effect on the combined main effects of the two attributes, indicating that Phoenix consumers prefer organic tomatoes sold at urban farms to the ones sold at a grocery store. Similarly, Phoenix consumers prefer organic tomatoes sold at farmers markets to the ones sold at a grocery store, as indicated by the significant and positive interaction between *Farmers Market* and *Organic*. However, the opposite is true for Detroit consumers. The significant and negative interaction effect between *Farmers Market* and *Organic* implies that Detroit consumers have a lower preference for organic tomatoes sold at farmers market compared to the ones sold at a grocery store. This finding is supported by an additional model that accounts explicitly for differences between Phoenix and Detroit consumers--see Appendix D--and suggests that Phoenix consumers have a higher preference for organic tomatoes sold at a

farmers market than Detroit consumers. This implies that there might be regional differences in preference for where to buy organic food that future research could take into consideration.

In terms of other utility estimates, as expected, the *Price* coefficients are statistically significant and negative, which means that as price of an alternative increases consumer preference for that alternative decreases, all else constant. *Travel Time* is also significant and negative, indicating that the higher the travel time the less likely consumers will choose that option, all else being equal. This finding is consistent with previous research that suggests that consumers usually strive to minimize travel time to the purchase location (Handy 1992), making a grocery store a more appealing alternative.

Finally, the mixed logit models capture unobserved heterogeneity, or variation in preferences, that are specific to individual variables (Hensher, Rose and Greene 2005). Thus, for example, significant standard deviation estimates for *Urban Farm, Organic*, and *Travel Time* in the models suggest that unobserved heterogeneity is an important feature of my experimental data, and a fixed-coefficient logit would imply substantial bias in several of the estimates. Results in this regard reveal that consumer preferences vary for most of the attributes in that some do prefer, e.g., organic, but this does not necessarily hold for all consumers. Therefore, practitioners need to appeal to their target market.

3.5.2 Willingness-to-Pay

It is well-understood that the coefficient estimates in a logit model are marginal utilities, and are not interpreted in dollar-metric terms. Therefore, in order to provide more meaningful, money-denominated interpretations, I calculate WTP values for each coefficient estimate. These values are displayed in Table 3.4.

Table 3.4 Mean Willingness to Pay Estimates

	Combined Sample		Phoenix		Detroit	
	$/lb		*$/lb*		*$/lb*	
Farmers Market	0.03		-0.13		0.19	
Urban Farm	-0.80	***	-0.80	***	-0.80	***
Organic	0.26	**	0.16		0.36	**
Local	0.83	***	0.80	***	0.85	***
Travel Time	-0.16	***	-0.16	***	-0.17	***
Local*Organic	0.07	***	0.20	***	-0.06	***
Farmers Market* Organic	-0.01	**	0.27	*	-0.32	*
Farmers Market* Local	-0.66		-0.73		-0.64	**
Urban Farm* Organic	0.18	***	0.29	**	0.11	*
Urban Farm* Local	-0.26	**	-0.29	**	-0.22	

Note: ***, **, and * denote statistically significant differences at 1%, 5% and 10%, respectively.

The majority of WTP estimates are consistent among the models with regards to signs and statistical significance, and are of a similar magnitude when compared across the samples. With regards to point of sale, the WTP is significant and negative for *Urban Farm*, but insignificant for *Farmers Market*. This result implies that consumers are willing to pay significantly less for fresh tomatoes sold at an urban farm compared to the ones sold at a grocery store, since the grocery store was used as the reference category for point of sale. This might be the case because consumers may believe that growing, producing and selling produce at urban farms requires less financial input, since, for example, it does not involve profit sharing with a middleman. On the other hand, an insignificant WTP for *Farmers Market* indicates that there is no statistically significant difference among consumers' WTP for tomatoes from farmers markets compared to tomatoes from grocery stores. This indicates that consumers may not display different levels of support for farmers who sell their produce at the farmers market or at the grocery store (Toler et al. 2009). It might also suggest that, while consumers think that shopping at farmers markets provides some

additional intangible benefits as suggested by previous research (Zepeda and Leviten-Reid 2004; Onianwa at al. 2006; Onken, Bernard and Pesek 2011), they still do not consider tomatoes from these venues to be different (Carroll, Bernard and Pesek 2013) and, hence, are not willing to pay a premium.

The results suggest that Detroit consumers have a significant and positive WTP for *Local* and *Organic*, holding all other attributes constant. This implies that consumers are willing to pay significantly more for local or organic tomatoes, which is in agreement with previous research (Loureiro and Hine 2002; Hu, Woods and Bastin 2009; Yue and Tong 2009; Costanigro et al. 2011; Onozaka and Thilmany-McFadden 2011; Carroll, Bernard and Pesek 2013; Meas et al. 2015). Therefore, local growers, producers and retailers should stress and clearly articulate these attributes when promoting their products. However, while Phoenix consumers are also willing to pay significantly more for local tomatoes, they appear to be indifferent between organic and non-organic tomatoes, as suggested by the insignificant coefficient for *Organic*. This implies that there might be state differences in preference for organic food that future research could take into consideration when pulling together a sample from different regions. Nevertheless, the WTP for the local attribute is comparatively higher than the WTP for organic for either of the states, which is consistent with past studies, where local has been shown to be the highest value claim (Loureiro and Hine 2002; Costanigro et al. 2011; Onozaka and McFadden 2011).

The negative WTP for *Travel Time* indicates that as one-way travel time to the grocery outlet increases consumer WTP decreases. This result is consistent with previous findings that consumers highly value convenience of the shopping location (Bell and Lattin 1998; Leszczyc, Sinha, and Sahgal 2000; Briesch, Chintagunta, and Fox 2009). Therefore,

given that remoteness of the direct marketing venues can significantly affect consumers' WTP for products sold at these venues, it needs to be taken into account by urban planners who aim to establish successful farmers markets and urban farms.

Finally, the interaction effects between the variables allow me to determine the nature of the relationships that exists between the values in WTP. Accordingly, in the case of Detroit, results suggest a significant and negative interaction effect between *Local* and *Organic* attributes, indicating that the WTP for local certified organic tomatoes is lower than the sum of WTP associated with local and organic tomatoes. This finding reveals an overlapping valuation of these competing attributes among Detroit consumers. One explanation for this overlap might be that consumers believe that local farmers are less apt to produce a good organic product, or organic producers are less likely to be truly local. Another explanation might be that benefits associated with purchasing organic tomatoes are already present in local ones, and *vice versa* (Gracia et al. 2014). That is, Detroit consumers might believe that local food possesses the qualities of organic production (Naspetti and Bodini 2008; Onozaka, Nurse, and Thilmany-McFadden 2010), such as, being grown without pesticides or not containing genetically modified organisms, as per definition of organic foods according to the USDA (USDA 2016). Similarly, these consumers might think that by buying organic food they support local economy, a factor associated with buying local food (Hughner et al. 2007; Grebitus, Lusk and Nayga 2013). On the other hand, a significant and positive interaction effect between *Local* and *Organic* attributes in the case of Phoenix, implies that Phoenix consumers are willing to pay a premium for locally grown organic tomatoes. Said differently, *Local* and *Organic* have a super-additive effect on utility that is higher than the sum of the utilities derived by organic

and local tomatoes. Therefore, combining organic and locally produced claims may be a successful strategy for Phoenix farmers.

In the case of Detroit, statistically significant WTP for the interaction effect between *Farmers Market* and *Organic* is lower than the sum of WTPs associated with organic tomatoes sold at a farmers market. The same can be said about local tomatoes sold at a farmers market. This implies that organic and local tomatoes might realize an extra discount among Detroit consumers when being sold at farmers markets. One explanation for this occurrence could be that Detroit consumers believe that organic or local produce sold at farmers markets are of a lower quality. Another explanation might be that these consumers believe that produce at farmers markets is more reasonably priced and provides a better value for their money relative to grocery stores (Brown 2002; McGarry-Wolf, Spittler, and Ahern 2005; McCormack et al. 2010), suggesting that they might expect to pay less for organic or local food at this point of sale.

In the case of Phoenix, statistically significant WTP for the interaction effect between *Farmers Market* and *Organic* is higher than the sum of WTPs associated with organic tomatoes sold at a farmers market. This suggests that Phoenix consumers are willing to pay more for organic tomatoes sold at farmers markets. In contrast, the results indicate a significant and negative interaction effect between *Local* and *Urban Farm* attributes, implying a lower WTP for local tomatoes sold at urban farms. One reason for this might be that Phoenix consumers believe that organic produce sold at farmers markets are of a superior quality, while local produce sold at urban farms are of a poor quality. Another reason might be that consumers expect to pay less for local produce at urban farms, believing that local food sold at these venues is more affordable (McGarry-Wolf, Spittler,

and Ahern 2005; McCormack et al. 2010). On the other hand, the WTP for the interaction effect between *Urban Farm* and *Organic* is higher than the sum of WTPs associated with organic tomatoes sold at farmers markets among both Phoenix and Detroit consumers. This suggests that consumers are willing to pay a premium for organic tomatoes sold at urban farms.

My results have important implications for fresh produce growers, retailers and legislators. They demonstrate that consumers do not have a strong preference for the direct-to-consumer outlets compared to grocery stores and are not willing to pay premiums at these venues. In fact, they are willing to pay less at urban farms. Moreover, I find that some consumers appear to have lower preferences and WTP for local products sold at farmers markets and urban farms. This implies that the support of local food sales through the direct-to-consumer venues might not be an optimal strategy. Therefore, policymakers who seek to boost sales of local food or assist local farmers might want to take my findings into consideration.

3.6 Conclusions and Policy Implications

In this research I attempt to disentangle consumers' preferences for the local attribute from their preferences for a marketing channel. Doing so is necessary to evaluate policies that aim to grow local food sales through the support of direct-to-consumer venues. By evaluating the demand for local separately from the demand for a channel, my experimental design allows me to identify consumers' WTP for each target of such policies. Specifically, I determine if consumers are willing to pay a premium for local food per se, and for local

food sold at the grocery store, farmers market or urban farm. In addition, I examine if this premium is affected by the convenience of the point of sale, as well as, by being organically grown.

Results from online choice experiments show that consumers are willing to pay a premium for local food. Moreover, while customers might think that shopping at direct-to-consumer venues provides some additional intangible benefits, they seem to value whether the food was produced locally more, and display an equal level of support for local farmers who sell their produce at different venues. As a result, they do not have a preference for where to buy local produce whether at farmers markets or grocery stores. Furthermore, consumers actually discount local produce sold at urban farms, probably due to the belief that these venues offer a good value for their money. Therefore, the fact that the direct sales of local food remain lower than intermediated is less surprising, especially considering the increasing growth of local food offerings by intermediated marketing channels.

Finally, the results suggest that inconvenience of the point of sale significantly reduces consumer WTP for fresh local food products, in that longer travel time to the venue leads to lower WTP. This means that consumers are willing to pay more when purchasing products from more conveniently located retailing outlets, such as grocery stores, compared to direct-to-consumer outlets that are often times in more remote locations.

This research, however, is not without limitations. First, travel time to the point of sale can be assumed to be a fixed cost of shopping. Fixed costs per item purchased decreases when the number of products consumers purchased during their shopping trip increases. Thus, to control for the variety effect, the metric for convenience, travel time, needs to be divided by the number of items purchased by a consumer at each outlet.

Nevertheless, since my experiment includes only one product at a time, I assume that the number of items purchased is constant across the purchasing venues and equal to one. Future research on this topic, that includes a variety of products in a shopping basket, should take this into account to determine how it impacts consumer preference for local food.

Second, apart from convenience, there are many other features that differentiate stores, farmers markets and urban farms, such as variety of products, speed and quality of service, or atmosphere. However, as the number of attributes and attribute levels increases, the complexity of the choice experiment increases as well. Therefore, I had to limit the number of attributes used in the study. Similarly, I could not include more types of points of sale. In this regard, it must be noted that using the general term "grocery store" might have limited my findings since various types of grocery stores might be perceived differently by the consumers. For example, some consumers might have a stronger preference for local food sold at premium grocery stores such as Whole Foods, as opposed to food sold at stores such as Walmart, and *vice versa*. Also, whether the grocery store is independently-owned might make a difference in consumer preferences for local food. Therefore, future research could consider how these other features of points of sale as well as different types of point of sale affect consumer preferences for local food.

Third, my research is limited to two types of direct-to-consumer marketing channels, farmers markets and urban farms, and does not include other possible locations where consumers can purchase local food, such as farms located outside of the city limits, roadside stands, and food hubs. I also do not consider services that offer local food baskets

or even meal-kits that can be either delivered to consumers' homes or picked up at certain locations. All these various types of direct-to-consumer marketing channels might be of interest for future research.

Finally, one might argue that only researching one product (tomatoes) is too narrow of a focus, despite the fact that tomatoes are a staple produce in the U.S. Therefore, future research could address this by analyzing multiple products, for example, fresh produce, animal products and shelf stable food items, simultaneously and comparing them to each other. Moreover, while inconvenience has a negative effect on the WTP in general, including an interaction between marketing channel and convenience may reveal how travel time to the point of sale affects WTP for a particular channel. Therefore, this concept could also be investigated by future research.

Despite these limitations, it is hoped that this research offers insightful results and provides useful policy implications, since past research demonstrates a gap in understanding differences in local food sales among different marketing channels. My research indicates that support for local channels may be misdirected because consumers appear to prefer to shop for local food through intermediated channels. If the intention of the current policy is to correct a market failure, or the lack of sales at direct-channels, then my findings can be interpreted as suggesting there is no market failure and that the existing system of retailers is adequate to bring local foods to consumers.

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CHAPTER 4

LOCAL FOOD: SUPERMARKETS OR FARMERS MARKETS?

4.1 Introduction

Local food sales continue to grow from $6.1 billion in 2012 to $12 billion in 2014, and are projected to reach $20 billion by 2019 (Low et al. 2015; USDA 2016). However, most of this growth is through intermediated channels, such as supermarkets or restaurants, while sales through direct-to-consumer channels, such as farmers markets or urban farms, have reached a plateau (Low and Vogel 2011; Thilmany-McFadden 2015; Low et al. 2015; Richards et al. 2017). Nevertheless, the U.S. Department of Agriculture's (USDA) Agricultural Marketing Service continues to support direct-to-consumer channels as a means of growing the demand for local food through the use of various programs. For example, the Farmers Market and Local Foods Promotion Programs (2014 Farm Bill) allocates $30 million in grants annually specifically for improvement, development, and expansion of farmers markets and other direct-to-consumer outlets (FMPP 2016; NSAC 2016). If increasing the purchase and consumption of local foods through direct channels is a reasonable public-policy goal (Low et al. 2015), then understanding why is a critical first step in policy design. In this study, I explain why intermediated and direct sales of local foods are likely to differ using a novel household-diary approach.

The line between foods offered by direct and intermediated channels is blurring. Specialty food items, particularly those that promote sustainability and lower environmental impact or have perceived health benefits, used to be available through niche retailers or direct-to-consumer channels only, but are now increasingly offered by supermarkets. For instance, we know that consumers have a strong preference for local

food, whether it is animal product (Sanjuán et al., 2012; Adalja et al., 2015; Li et al., 2015; Hasselbach and Roosen, 2015; Wägeli, Janssen and Hamm 2016), fresh produce (Nganje, Shaw Hughner and Lee 2011; Onozaka and Thilmany-McFadden 2011; Willis et al., 2013; Carroll, Bernard and Pesek 2013; Boys, Willis and Carpio 2014) or processed item (James, Rickard and Rossman 2009; Hu, Woods and Bastin 2009; Onken, Bernard and Pesek 2011; Costanigro et al. 2011; Hu et al. 2012). Consumers perceive local food as more fresh, healthy, and of a higher quality (Armstrong 2000; Onianwa, Mojica, and Wheelock 2006; Landis et al. 2010). Local foods play a key role in the "fresh and healthy" movement, so traditional grocery stores increasingly develop new supply chain connections to offer a wide array of locally-sourced items (Guptill and Wilkins 2002; Dunne et al. 2011). Retailers have co-opted the "fresh and healthy" image usually associated with farmers markets in order to expand sales of perishable foods – foods that typically have the highest margins of any in their stores. As a result, the attributes conventionally associated with farmers markets are now less specific to direct channels.

While local products, in general, are often regarded as healthier, tastier, and more fresh, direct-purchased local foods differ from those purchased in supermarkets. By purchasing food through direct markets as opposed to through intermediated markets, consumers feel more connected to farmers and appreciate the knowledge of where their food is coming from (Zepeda and Leviten-Reid 2004; McGarry-Wolf, Spittler, and Ahern 2005; Hunt, 2007; Landis et al. 2010). Some consumers also regard going to a farmers market as a form of recreational activity (McGarry-Wolf, Spittler, and Ahern 2005). For instance, they might use their discretionary time to visit farmers markets where they not only get to shop, but to eat, socialize and/or attend special events. However, if the intent is

to simply purchase food, perhaps with a particular set of desired attributes, consumers tend to prefer retailers that are convenient, offer a wide selection of products, have competitive prices and can satisfy all their needs at once (Seiders and Tigert, 2000; Fox, Montgomery, and Lodish 2004; Hansen and Solgaard, 2004). Within the broader context of multi-objective shopping experiences, therefore, it is not hard to explain the dominance of intermediated marketing channels in the local-food market (Low et al. 2015). Whereas the analysis in the previous two chapters focused on consumer-preferences for product- and channel-attributes, this chapter examines the role of the retailing function itself. That is, I examine why consumers appear to prefer to purchase local foods through intermediated channels, in spite of the benefits some derive from supporting the local farmers.

Consumers' growing preference for local food (McGarry-Wolf, Spittler, and Ahern 2005; Zepeda 2009; Landis et al. 2010) encouraged multi-category retailers to offer a far greater range of locally-produced foods. Local food products are now readily available at numerous supermarket chains, with Wegmans, Whole Foods, and Walmart being prominent examples (King, Gómez and DiGiacomo 2010). Supermarkets such as these play a significant role in the growth of local food sales as they provide consumers with more convenient access to a wider variety of products. By offering local food, supermarkets not only draw consumers away from direct marketing channels, but also attract new consumers who desire access to local food. Many of these new consumers may be interested in buying local, but do not purchase it simply because they have a limited amount of time available for grocery shopping, and cannot make a special trip to a farmers market.

Indeed, the number of people who have access to relatively inexpensive, convenient local foods through supermarkets is increasing dramatically.

In this chapter, I seek to explain the rise of intermediated local food sales in a more general model of consumer behavior, and supply chain relationships. While the impact of shopping for complementarity goods and the benefits of one-stop-shopping are relatively well-understood (Betancourt and Gautschi 1990; Felker Kaufman 1996; Smith 2004; Richards et al. 2017), recent studies consider other motivations for channel preference. Namely, modern distribution channels blur the line between the pure supply-chain function of the channel, and the value of using the channel as an end in itself. For example, omni-channel retailing provides shoppers with a seamless integrated marketing channel experience and allows them to search and buy products through constant use of different touchpoints (Verhoef, Kannan, and Inman 2015). Assortment integration across channels, such as store, online website, and mailing catalogs, also affects patronage intentions among consumers by altering their perceptions and reference points for variety (Emrich, Paul, and Rudolph 2015). However, while the popularity of mobile channel usage influences consumer behavior across channels (Wang, Malthouse, and Krishnamurthi 2015), it lacks social, physical, and psychological benefits associated with in-store shopping (Lee et al. 2017). In-store interactions are emotionally and socially fulfilling and remain an important part of shopping experience (Baxendale, Macdonald, and Wilson 2015; Lee et al. 2017), which encourages consumers to consider other products (Court et al. 2009; Goodman et al. 2013) and affect immediate or subsequent purchases (Verhoef, Neslin, and Vroomen 2007). Therefore, "physical" stores are still a popular way of shopping, the choice among which is affected by various store and product attributes that have to be taken into account

when considering consumer's preferences for buying local food from direct versus intermediated channels.

I test the relative strength of these concepts using primary data gathered through an online food diary. Food diaries are an increasingly-common way of tracking household food purchases. For example, the FoodAPS data set from the United States Department of Agriculture (USDA) is a food diary that represents a comprehensive effort to gather detailed data on consumers' food purchases, both at home and away from home. However, none provide sufficient detail on the nature of local food purchases to answer the questions I pose here. Consequently, I collect my own data by creating on online diary tool, and implementing it in three states in which consumers are most likely to have exposure to direct-marketing outlets. This data allows me to evaluate consumer purchasing patterns as complex manifestations of food preferences, economic optimization, and attitudes on social issues.

To examine these questions, I develop a model of channel-selection that accounts for not only the common aspects of shopping, but consumers' demands for sustainable shopping solutions, high-quality food, and their sense of contribution to the local community. In this way, I am able to explain the economic case for the rise in intermediated local food purchases. My model considers local food purchases in a nested context, assuming consumers first choose specific food items they want to purchase based on their grocery needs, and then they decide where to buy these items based on their demand for not only food, but convenience, affordability and other features as part of the shopping experience. Attributes of each channel are not observed directly but can be inferred from my data. I control for difference in utility associated with the food itself in a lower level,

or category-demand, stage of the nested model. In the upper, or store-choice, stage of the model I then estimate the marginal effect of each of the other motivations, after controlling for the "food based" motivations from the lower stage. The two stages are connected through the inclusive value (IV) term in the upper stage, which captures the expected value of purchasing items through each channel (Bell and Lattin 1998). With this econometric approach, I offer a more general and comprehensive explanation for the rise of intermediated foods.

My empirical model formally tests a number of hypotheses regarding the relative strength of different motivations for buying local food. I develop these hypotheses through a conceptual model of the local-food purchasing process – a conceptual model that captures the core elements of the retailing function of the food-supply chain. In this way, I contribute to both the substantive literature on direct marketing channels, and the econometric literature on multi-channel choice. Much of the existing empirical literature on local food focuses on consumer preferences for local product (Onozaka and Thilmany-McFadden 2011; Hu et al. 2012; Sanjuán et al., 2012; Willis et al., 2013; Willis and Carpio 2014, Adalja et al., 2015; Li et al., 2015; Hasselbach and Roosen, 2015; Wägeli, Janssen and Hamm 2016). Here I investigate how consumer perceptions, attitudes and demand overall differ according to the marketing channel through which local food is offered, and examine the reasons for the rise of intermediated foods. My theoretical framework shows that intermediated marketing channels attract consumers who are looking to buy local food as a part of their grocery shopping basket, while taking advantage of the convenience offered by supermarkets, and satisfying their desire to support local economy.

The remainder of the chapter is organized as follows. In the next section, I provide a theoretical justification for the hypotheses tested. In the third section I describe the model used to estimate the relationship between consumer store choice for local food and store attributes. The fourth section describes the data used in my empirical application, while the fifth section presents, and interprets, my empirical estimates. A final section offers some conclusions, more general implications for policy efforts directed at promoting local foods, and some suggestions for future research.

4.2 Theoretical Framework

Consumers prefer local food for a variety of reasons. Some perceive local food as fresher, tastier, healthier and of a better quality (Loureiro and Hine 2002; Naspetti and Bodini 2008; Bond, Thilmany, and Bond 2008; Yue and Tong 2009; Zepeda and Deal 2009; Grebitus, Lusk, and Nayga 2013; Feldmann and Hamm 2015). Also, some consumers, even if incorrectly at times, perceive local food as more likely to be organic or possessing characteristics of organic production, such as being GMO-free and/or pesticides-free (Naspetti and Bodini 2008; Adams and Salois 2010; Onozaka, Nurse, and Thilmany-McFadden 2010). Finally, others choose local food because it fulfills their altruistic goals of supporting the local economy, local farmers, and sustainable food practices, in terms of production and transportation (Burchardi, Schröder, and Thiele 2005; Roininen, Arvola, and Lähteenmäki 2006; Brown et al. 2009; Yue and Tong 2009; Bean and Shar 2011; Dunne et al. 2011). I examine the implications of these local-food attributes for consumers' choice of distribution channel.

Consumers can purchase local food through intermediated marketing channels, such as grocery stores, or through direct-to-consumer marketing channels, for instance,

farmers markets. They regard local food, specifically that is sold at direct channels, as more likely to be produced in a way that is good for the environment, since the carbon footprint is, plausibly, smaller for food grown locally (McGarry-Wolf, Spittler, and Ahern 2005, Michalský and Hooda 2015). Transportation miles are the primary consideration with respect to the environmental benefits of local food, as sourcing locally reduces the carbon footprint associated with long distance shipping (Remar, Campbell and DiPietro 2016). However, supermarket supply chains usually use less fuel per unit of product than local food supply chains (King et al. 2010b). Also, consumers who travel 6.7 km (4.2 miles) roundtrip to purchase produce from the local farm shop generate more emission than a large-scale home-delivery mass produce distributor (Coley, Howard, and Winter 2009). Still, transportation represents a relatively small part of greenhouse gas production (DeWeerdt 2009; Avetisyan, Hertel, and Sampson 2014) because over 80% percent of emissions occur during agricultural production and before food leaves the farm (Weber and Matthews 2008). Therefore, it is important to consider greenhouse gas emissions through all life cycle phases: production, transportation, and retailing (Edwards-Jones et al. 2008).

Although consumption of seasonally-grown local produce may have a minimal impact on the environment (Michalský and Hooda 2015), it might not be the case once produce is stored in some way or eaten out of season (Edwards-Jones 2010). Nevertheless, while emphasizing the sustainability of local food does not seem to have a significant effect on attracting new shoppers, some consumers who already shop at direct channels do so because of their concern for the environment – a concern that may be borne of faulty perceptions (Zepeda 2009). Farmers who sell local food usually have relatively small farm,

which makes it easier for them to adopt environmentally beneficial practices (DeWeerdt 2009). Therefore, my first hypothesis is:

H1: Consumers who buy local food because of their concern about the environment will choose to shop at farmers markets.

The demand for sustainable food encompasses not only local but also captures consumers' strong preference for organic food (Loureiro and Hine 2002; Costanigro et al. 2011; Hu et al. 2012; Meas et al. 2014), as its production is commonly associated with methods that are better for the environment and individuals' health (Seyfang 2006, Pirog and Larson, 2007). In fact, prior research finds that "local" and "organic" attributes are often conflated with each other (Meas et al. 2014: Printezis and Grebitus 2018). One reason for this is that consumers might not understand how local food differs from organic, given that there is no official or uniform definition of local food that is currently available (Onken et al. 2011; Meas et al. 2014). Organic food, on the other hand, has to possess a set of specified standards established by USDA's National Organic Program, implemented October 21, 2002, in order to be legally labeled as "certified organic" (USDA 2018). Only farmers that have less than $5,000 in gross organic sales do not need to get certification to market their products as "*organic*" (AMS 2018). In general, third-party certification is an effective way to gain consumer trust in the credence attributes of a product (Roe and Sheldon 2007).

The use of standardized labeling effectively promotes organic food because it reduces confusion among consumers about the organic nature of food products (Batte et al. 2007). However, local food sold at farmers markets is usually not organically certified as it requires an additional financial and time investment from farmers (Veldstra,

Alexander and Marshall 2014). Instead, produce sometimes carries signs that imply organic status, containing phrases such as "…*as organic as can be…*" or "…*following organic practices…*" (Wadyka 2017). Supermarkets, on the other hand, do not display such vague statements and only label food as "organic" when it complies with USDA organic certification. Therefore, consumers might prefer to buy organic locally produced food from supermarkets because it carries a clear label that provides sufficient evidence of the production method. On the other hand, consumers may be persuaded that the imprecise statements are, in fact, true and purchase food from farmers markets anyway.

Consumer reasons for buying local food go beyond their demand for sustainably produced products. For example, they also prefer to buy local food from a farmers market because they believe that shopping through a direct channel will have a greater impact on the growth of local economy and farmers' welfare (Andreatta and Wickliffe 2002; Zepeda 2009; Carpio and Isengildina-Massa 2009; Landis et al. 2010), as more of their dollars will stay in the pockets of local farmers (Anderson 2007). However, while direct channels may provide farmers with the opportunity to retain higher margins on their products, they tend to have lower sales and limited capability for an expansion (Thilmany-McFadden et al. 2015). On the other hand, selling local food through an intermediary enables broader supply chain and higher sales volumes, while still generating value for local farmers (Thilmany-McFadden et al. 2015).

Nevertheless, several studies developed models for examining the impact of local food on the economy (Jablonski, et al. 2016; McFadden, et.al. 2016; Bauman and McFadden 2017; Watson et al. 2017) and some investigate the macroeconomic effect of local food sales. Their findings suggest that local food systems have a weak, if any, effect

on economic growth patterns or state economy (Brown et al. 2014; Deller et al. 2014; Hughes and Isengildina-Massa 2015; Richards et al. 2017). Still, consumers assume that local food sales positively affect economic performance. However, limited sales at farmers markets may not adequately satisfy consumers' intention to support local farmers. Farmers' markets usually operate one day a week and often on a seasonal basis (Dunne et al. 2011). On the other hand, supermarkets are open up to 24 hours a day year-round. In addition, some chain retailers attempt to support the local economy by purchasing directly from local farmers, rather than through middlemen, to ensure equitable share of wealth (Dunne et al. 2011). Therefore, buying local food as a part of the larger basket offered by supermarkets gives consumers the ability to provide the perceived support to the farmers and contribute to the growth of the local economy in a convenient manner, without making a separate trip. Given that retailers continue to add more stock-keeping units of local food to their product selection (King et al. 2010; The Packer 2015), I hypothesize:

H2a: Consumers who believe that purchasing local food at direct channels supports farmers and local economy will choose to shop at farmers market.

H2b: Consumers who want to support farmers and local economy while shopping for local food in a convenient manner will choose to shop at supermarket.

At the same time, consumers who are looking for other desirable, or perceived-to-be-desirable, characteristics of local food, such as taste, quality, and freshness, might be indifferent as to where to purchase it, as these characteristics are related to the products themselves and are less specific to the retailer. In the past, consumers might have had a strong preference for local food purchased from a farmers market because of freshness and quality of local produce available there (McGarry-Wolf, Spittler, and Ahern 2005;

Onianwa, Mojica, and Wheelock 2006). Today, however, supermarkets increasingly focus on sourcing from a wider variety of local producers in order to offer a broad selection of fresh, locally-sourced items (Guptill and Wilkins 2002; Dunne et al. 2011). Multi-category retailers are now capitalizing on the "fresh and healthy" image typically associated with farmers markets in order to expand sales of perishable foods – foods that generally have higher margins than non-perishable, national-branded consumer goods. More generally, supermarkets tend to have a sharper profit motive than farmers who sell directly to use these attributes to compete for business, both with each other, and with farmers markets. Nevertheless, since farmers markets have a reputation for selling produce sometimes only hours after being picked (Andreatta and Wickliffe 2002), consumers perceive farmers' market's produce to be fresher looking, fresher tasting, and of high quality (McGarry-Wolf, Spittler, and Ahern 2005; Pícha, Navrátil and Švec 2018). Therefore, my third hypothesis is:

H3: Consumers who buy local food because it is fresh, healthy and of a higher quality, might prefer to shop at farmers markets.

Apart from motivations for buying local food, consumers' decisions on where to shop for local food depend on retailer's characteristics, such as price, assortment, location, and marketing activity (Arnold et al., 1983; Louviere and Gaeth 1987; Bell and Lattin 1998; Briesch, Chintagunta, and Fox 2009; Richards et al. 2017) that comprise fixed and variable costs of visiting a store (Bell, Ho, and Tang 1998). Fixed costs include attributes that are independent from the items in the shopping list, such as distance traveled between the household and each store. Variable costs, on the other hand, encompass attributes that depend on grocery items to be purchased, such as the average price of the items at each

store (Bell, Ho, and Tang 1998), assortment available at each store (Briesch, Chintagunta, and Fox 2009), and promotions offered. Because consumers compare the total price they expect to pay for alike baskets of products when choosing a store or channel, they not only seek to buy items at the lowest total cost, based on shelf-prices, but also to take advantage of price discounts and coupons that are available (Heilman, Nakamoto, and Rao 2002; Aggarwal and Vaidyanathan, 2003). While the majority of supermarkets offer consumers price reductions and readily accept coupons, farmers markets are usually not able to do so. In general, prices of similar items at farmers markets are, on average, 50% greater than the price of comparable items at supermarkets (Wheeler and Chapman-Novakofski, 2014; Lucan et al. 2015). In addition, by partnering directly with the local producers, supermarkets are able to keep the distribution costs and, as a result, the final price of local products low, making it more appealing to their price sensitive consumers (Guptill and Wilkins 2002). Therefore, the lack of competitive pricing has an adverse effect on consumers' decision to shop at farmers markets. Consequently, my fourth hypothesis maintains:

H4: Consumers who take advantage of promotions will prefer to shop at supermarkets.

Assortment is also an important variable driving store and channel choice as consumers are more likely to find an item that matches their preferences if they have more options to choose from (Fox, Montgomery, and Lodish 2004; Verhoef, Neslin, and Vroomen 2007; Briesch, Chintagunta, and Fox 2009). Because consumers' preferences for product attributes differ, having a large selection of products creates an expectation among consumers that they can find an item that matches their ideal attribute set. Therefore, marketing channels that offer a wider selection of products have a competitive advantage

over others that offer less (Koelemeijer and Oppewal 1999; Bown, Read, and Summers 2003; Oppewal and Koelemeijer 2005).

Sometimes, however, there might be a drawback to such wide assortment as consumers may suffer from choice overload. While a meta-analysis of "choice overload" research found a mean effect size of overabundance of options to be virtually zero, there exists a considerable variance between studies (Scheibehenne, Greifeneder and Todd 2010). Having too many alternatives to choose from may result in adverse consequences, for example, a decrease in the motivation to make a choice (Iyengar and Lepper 2000; Sethi-Iyengar, Huberman, and Jiang 2004; Kuksov and Villas-Boas 2010), a decrease in satisfaction with the chosen alternative (Iyengar and Lepper 2000; Chernev 2003b) or potential disappointment and regret (Schwartz 2000). One reason for this occurrence is that wide selection makes a choice more difficult, since the difference between the alternatives decreases, but the amount of information to process increases (Fasolo et al. 2009).

A broad assortment, on the other hand, does not seem to affect, or even is preferred, by consumers who are familiar with the choice domain (Mogilner, Rudnick and Iyengar 2008), have clear preferences prior to the choice (Chernev 2003a, 2003b), or have a dominant alternative (Dhar 1997; Dhar and Nowlis 1999; Hsee and Leclerc 1998). This is also true for variety-seeking consumers, whose utility increases when they face a large assortment (Kahn and Wansink 2004), and consumers with uncertain future preferences, who prefer to have more flexibility in their choices (Kahn and Lehmann 1991). This "demand for variety" assumes many dimensions in both the behavioral and empirical marketing literatures.

Taking multiple trips to fulfill weekly household needs is not consistent with the consumers' fundamental motivation to minimize shopping costs. Therefore, it is not surprising that the ability to purchase a number of items on each shopping list in one basket is a key motivator to shop for groceries at multi-category retailers (Bell, Ho, and Tang 1998; Bell and Lattin 1998; Smith 2004). For instance, if local food products are preferred, supermarkets allow consumers to purchase local products without making a separate trip. This, in turn, lowers consumers' fixed cost of shopping on a per-item basis by distributing it over a larger number of items purchased during the shopping trip (Bell, Ho, and Tang 1998). For example, consumers can allocate the transportation costs incurred by driving to the retailer over all items purchased during that trip. Spreading fixed costs across all products also reduces average acquisition cost per item (Richards, Hamilton, and Yonezawa 2018). As a result, consumers are able to purchase products they desire in a more economically-efficient way, even those that traditionally were associated with direct venues. In this study, I define fixed costs of shopping in terms of driving time per item purchased. Therefore, my fifth and sixth hypotheses posit:

H5: As the fixed cost of shopping increases, the probability of choosing limited-assortment channels decreases.

H6: Consumers who value their ability to purchase a wide variety of products will prefer to shop at supermarkets.

I test these hypotheses using a nested model of store- and category-choice appropriate for hierarchical structure of the decision process. Consumers do not necessarily purchase local food only to meet basic nutritional requirements in a convenient way. Rather, purchasing patterns are complex manifestations of food preferences, economic

optimization, attitudes on social issues, and simply spending time on activities that give pleasure. Much of the empirical literature on store choice (Bell and Lattin 1998; Briesch, Chintagunta and Fox 2009) models this choice-complexity as a nested decision process. That is, consumers first determine what items they need to purchase during a given week, and then choose the store or channel that provides the maximum utility from purchasing the basket of goods. Therefore, analyzing the data using a nested model helps organize the concepts developed here empirically, and is best suited for testing the complex interactions between the different motivations for channel choice.

Specifically, in the next section I describe a nested logit framework to help explain channel choice, and to test the hypotheses developed here. The advantage of using a discrete choice approach lies in its ability to describes the actual data generating process. For instance, consumers choose one store as their primary, and another (or two) as their secondary stores. The same applies to category level choice. An additional benefit of such model is that it allows me to impute marginal values to latent constructs that capture different attributes of each marketing channel. Because store choice is largely heterogeneous among consumers, a nested logit takes this into consideration when determine the utility consumers obtain from buying local food. In the next section, I describe a nested logit model of store and product choice in more detail.

4.3 Random-Coefficient Nested Logit

I test the hypothesis described above using constructs developed in more detailed in this section. Below, I establish a procedure used to estimate these constructs. The first one is $\boldsymbol{X} = [x_{\mathbf{1}}, x_{\mathbf{2}}, \ldots, x_n]$ which represents a matrix of *n* attributes describing a product purchased at a particular store, and includes product's price, and whether it is local and/or organic.

The second construct is $\boldsymbol{Z} = [z_{\mathbf{1}}, z_{\mathbf{2}}, \ldots, z_m]$ which is a matrix of *m* constructs that represents reasons that motivate consumers to buy local products, such as quality and nutrition, organic production, and support for farmers, economy and environment. I provide the description of my model next followed by the data section that discusses details of each construct, its derivation and components.

The standard discrete choice model, "simple logit", implicitly assumes that a consumer has made a prior choice to visit the store in which the products that she wants are sold. That is, product choice is conditional on a prior, un-modeled store choice decision. However, in this essay this "upper level" decision is also of interest because it is descriptive of the actual decision process taken by households, and is key to the relative market share of each distribution channel. In my model, consumers first choose the specific items from among all others, and then choose the store to visit, farmers market or supermarket. In the context of my study, these two channels offer substantially different assortments of items, so explicitly modeling the category-choice stage is necessary. Because the choice of store or channel is conditional on the relative value of the items it contains, I model both the upper level and lower level choices in a single nested logit model.

The nested logit model is a member of the larger family of Generalized Extreme Value (GEV) models that are commonly used to model more complex substitution scenarios than the simple logit. As is well understood, the simple logit model exhibits independence from irrelevant alternatives (IIA), suggesting a very strict pattern of substitution among products. IIA implies that the ratio of probabilities of two alternatives does not depend upon the utility obtained from a third. It is likely that the IIA assumption is violated if households perceive the channel alternatives as close substitutes. For example,

if consumers perceive some attributes of supermarket and farmers market as similar, then the unobserved factors that affect one channel may also affect another. If there is unobserved correlation among the alternative channels, then the IIA assumption is not suitable. In my case, the IIA property is simply an unrealistic assumption. Therefore, the nested logit model is appropriate not only because it explicitly describes the data-generating process for hierarchical choices, but also because it embodies a convenient relaxation of the IIA property. Traditional nested logit, however, still imposes IIA within each branch of the model. Therefore, I estimate a random coefficient version of the nested logit model, which allows me to retain the hierarchical structure of the original decision process, while incorporating the flexibility of a mixed logit model.

In my data, consumers make discrete choices among alternative channels that differ in the attributes described in my conceptual model of store, or channel, choice. In this setting, and assuming preferences are randomly distributed over subjects, a random-utility model is an appropriate econometric approach. In addition to heterogeneous preferences, I also assume that our subject pool reflects a substantial degree of observed and unobserved heterogeneity. I control for the former by including demographic measures in our econometric model, and the latter by allowing for the parameters of the choice process to be randomly distributed. Because I assume the distribution of preference heterogeneity is Type I Extreme Value, a random-coefficient nested logit results (Alfnes 2004; Loureiro and Umberger 2007; Barreiro-Hurlé, Colombo, and Cantos-Villar 2008; Richards, Hamilton, and Allender 2016; Andersen 2011).

The main goal of using the nested logit is to estimate the probability of purchasing items from a particular channel. This probability can be expressed as the joint probability

of the conditional probability of choosing items, and the marginal probability of choosing the store.

$$Pr(\mathbf{i}, \mathbf{j}) = Pr(\mathbf{i}|\mathbf{j})Pr(\mathbf{j}) \quad (1)$$

where $Pr(\mathbf{i}|\mathbf{j})$ is the probability of choosing a particular product *i* at the store from the set of all possible products available at that store *j* on a shopping occasion at time *t,* and $Pr(\mathbf{j})$ is the probability of choosing a store *j*. Given that *i* and *j* are arguments of the choice, while the data vary over consumers *h* and shopping occasion *t*, consumer overall utility can be written as:

$$U_{i,ht} = W_{j,ht} + V_{i|j,ht} + \varepsilon_{ijht}, \quad (2)$$

where $W(j)_{ht}$ reflects consumer preferences for a store, $V_{i|j,ht}$ represents consumer preferences for a product purchased at that store, and ε_{ijht} is the unobservable component of the store-and-item choice utility that is GEV-distributed following Train (2003). In this way I assume that utility is separable between the $W(j)_{ht}$ component that depends only on variables that describe store choice, and the $Vi_{|j,ht}$ component that depends on variables that describe item choice within each store. This separation of utility allows the nested logit probability to be decomposed into a product between marginal and conditional probabilities that take a form of two standard logits (1).

4.3.1 Item Choice

Nesting store-and-item choices within a traditional logit-assumption is a well-known approach to modeling store choice (Bucklin and Lattin1992; Bell and Lattin 1998). In this framework, the consumer chooses the option with the highest utility, which in this case consist of two parts, connected by the inclusive-value term. Therefore, based on the

equation (2), I first develop the item choice component of the overall utility, followed by the store choice component below.

The probability that the consumer will choose a particular item depends on its characteristics and the consumers' unique preferences. Consequently, given that a consumer $h = 1, 2, \ldots, H$ has chosen to purchase an item $i \in I$ at a store $j \in J$ during the shopping occasion t, the item-utility is written as:

$$V_{i|j,ht} = \alpha_0 + \beta_h \boldsymbol{X}_{ijt} + \delta \boldsymbol{Y}_{iht}, \quad (3)$$

where α_0 is the fixed effect and the baseline utility, $\boldsymbol{X}_{ijt}$ is a vector of attributes n describing product i offered by store j, such as price (P_{ijt}), and whether the product is local (L_{ijt}) or organic (O_{ijt}); and $\boldsymbol{Y}_{iht}$ is a vector that includes household-level demographic factors such as age (AGE_h) and education level (EDU_h) of the household-head, as well as annual income (INC_h) and the size of the household (HH_h). While there are likely other factors that affect the choice of an item, this set covers those relevant to my hypothesis and fully exhaust those available in my data.

The conditional probability of choosing product i given the choice of store j is given by the binomial logit (Bell and Lattin 1998):

$$Pr(\boldsymbol{i}|\boldsymbol{j}) = \frac{\exp V_{i|j,ht}}{1+\exp V_{i|j,ht}}, \quad (4)$$

where $Pr(\boldsymbol{i}|\boldsymbol{j})$ is the probability of choosing the product i, still conditional on the choice of store j. Note that the binary-logit assumption implies that item purchase decisions are independent across categories as the utility of buying one of the products does not depend on another (Lattin et al. 1997). This is because the items in my data are not substitutes and consumers can choose to buy or not buy from each category. With this utility expression,

I can then estimate the relative attractiveness of a basket of items at each store in the data (Bell and Lattin 1998).

4.3.2 Store Choice

In my model, store choice depends on the attributes of the store, attractiveness of the items at a particular store, and both observable and unobservable characteristics of the consumer, making one store more desirable than another. Estimating a nested logit model allows me to test how latent constructs that capture different attributes of the store and motivations for buying local food influence consumers' decision to shop at a that particular marketing channel. Store attributes also include fixed costs of visiting a store, such as distance traveled to that particular store, that do not depend on the items purchased. On the other hand, variable costs consist of measures of the relative cost of shopping at each store, such as the average price of the items at each store, measured by a price index (Bell, Ho, and Tang 1998), and the relative attractiveness of purchasing a basket of items from each store (Bell and Lattin 1998).

I include all of these components of store choice in the indirect utility for store *j*, written as:

$$W_{j,ht} = \gamma \boldsymbol{S_{jht}} + \theta \boldsymbol{Z_{ht}} + \lambda IV_{jht}, \quad (5)$$

where $\boldsymbol{S_{jht}}$ is a matrix that includes store price index (P_Index_{jht}) that I operationalize as the average weekly price for each category at each store *j*, fixed costs of shopping on a per-item basis specified in terms of driving time distributed over all items purchased during the shopping trip to the store *j* (FCS_{jht}) (Bell, Ho, and Tang 1998), variety (VAR_{jht}) operationalized as a number of different products purchased over the whole sample on a given week at each store *j*; and whether consumers were able to take advantage of price

discounts by using coupons ($Coup_{jht}$); and $\boldsymbol{Z_{ht}}$ is a set of latent constructs that represent reasons that motivate consumers to purchase local product. Therefore, $\boldsymbol{Z}_{ht}$ is a matrix of constructs with *h*t* rows and *m* columns that capture the *m* reasons to purchase local food, such as its quality characteristics (L_Qual_{ht}), being organically produced (L_Org_{ht}); and support for farmers and economy (L_Supp_{ht}). The utility of a store *j* also depends on the "expected attractiveness" of the items purchased at that store, or the inclusive value IV_{jht} In terms of equation (4), the inclusive value is given by the log of the denominator of the category-choice model (Bell and Lattin 1998):

$$IV_{jht} = \frac{1}{\lambda} \log \sum_{i \in I_j} (\exp V_{i|j,ht}), \quad (6)$$

where λ is a store-level scale parameter (Hensher and Greene, 2002; Carrasco and Ortúzar, 2002), that indicates the degree to which retail stores are substitutes for one another. If λ = 1, the nested model reduces to a standard logit model as the GEV distribution turns into a product of independent extreme value terms (Train 2003).

While the basic structure of nested logit model is well understood, it is important to not overlook unobserved heterogeneity in household preferences, which can lead to biased and inconsistent parameter estimates. Therefore, I specify a subset of the estimated parameters to be randomly distributed at the store-choice stage of the model in order to capture unobserved heterogeneity. I specify the model in the most general form:

$$Z_{ht} = Z_{ht0} + Z_{ht1} v_1, \;\; v_1 \sim N(0, \sigma_1), \quad (7)$$

where Z_{ht} reflects the latent construct of reasons to buy local food. By controlling for unobserved heterogeneity at the household-level, any remaining preferences arising through these contacts are identified by my model. With this utility structure, the probability of choosing store *j* is given by

$$Pr(\boldsymbol{j}) = \frac{\exp(\gamma \boldsymbol{S_{jht}} + \theta \boldsymbol{Z_{ht}} + \lambda IV_{jht},)}{\sum_{j \in J} \exp(\gamma \boldsymbol{S_{jht}} + \theta \boldsymbol{Z_{ht}} + \lambda IV_{jht},)} = \frac{\exp W_{j,ht}}{\sum_{j \in J} \exp W_{j,ht}}, \quad (8)$$

where *Pr(**j**)* is the marginal probability of choosing a store *j*.

4.3.3 Likelihood function

Combining the conditional probability of choosing a category, and the marginal probability of choosing a store, the joint probability of store-and-category choice is:

$$Pr(\boldsymbol{i}, \boldsymbol{j}) = Pr(\boldsymbol{i}|\boldsymbol{j}) Pr(\boldsymbol{j}) = \frac{(\exp(V_{i|j,ht})^{1/\lambda})}{\sum_{n=1}^{J} (\sum_{i \in I_j} (1 + \exp V_{i|j,ht})^{1/\lambda})} * \frac{\exp W_{j,ht}}{\sum_{j \in J} \exp W_{j,ht}}. \quad (9)$$

Equation (9) provides a closed-form expression for the choice of each item and store combination that I use to examine my hypotheses regarding the relative strength of different motivations for buying local food. Given the joint probability of store-and-category choice in (8), I estimate my model using maximum likelihood.

The item choice likelihood function is written (Bell and Lattin 1998) as follows:

$$LLF_{i|j} = \sum_h \sum_t \sum_i \mu_{iht} * lnPr(i|j) + (1 - \mu_{iht}) * \ln(1 - \Pr(i|j)), \quad (10)$$

where the conditional probability of choosing product *i* is given in (4). Then the store choice likelihood function is written as

$$LLF_j = \sum_h \sum_t \sum_j \mu_{jht} * lnPr(j), \quad (11)$$

where the marginal probability of choosing a store *j* is provided in (8). Given equations (10) and (11), the join maximum likelihood function of the nested logit is written as sum of item and store choice item likelihood function:

$$L_{i,j} = LLF_{i|j} + LLF_j. \quad (11)$$

While the basic structure of the nested logit model is well understood, it is important to not overlook identification issues that might arise. Not addressing these issues can lead to biased estimates and a significant loss of fit.

4.3.4 Identification

Estimating my model might be problematic due to endogeneity that may lead to inconsistency and an issue with the independence between the variables included in my model and its error. In my case, endogeneity may arise because of the omitted variables bias that violates the exogeneity condition. Essentially, a variable that affects the dependent variable, and is correlated with one or more explanatory variables, is omitted from the regression (Wooldridge 2002, 2006). There are several reasons for this occurrence, such as limited capabilities of researchers to collect all the information necessary.

When modeling consumers' product choices, it is extremely hard to measure and include all attributes of products purchased. For example, to determine prices, the retailer has to consider all product characteristics, including the ones that are not observed. Specifically, the retailer takes into account observed characteristics, unobserved characteristics, and any changes in products' characteristics and valuations (Berto Villas-Boas 2007). In my data, for instance, I have information on products' weight and production methods (e.g. organic, local), but attributes such as quality, taste and nutrition are missing as they were not measured. However, the price of the products purchased likely reflects these unobserved attributes together with observed ones. Ignoring this might result in biased price elasticities, which will indicate the existence of omitted variables that are positively correlated with the demand.

One well-accepted methods to address endogeneity is by using a control function approach (Heckman and Robb 1985; Petrin and Train 2010). This approach removes variation in the unobserved factor that is not independent of the endogenous variable through the inclusion of extra variables in the empirical specification. Specifically, the

control function derives a proxy variable that is conditioned on the part of x_{ij} that depends on ε_{ij}, making the remaining variation in the endogenous variable independent of the error (Petrin and Train 2009). In other words, I first regress the endogenous explanatory variable, price, against exogenous variables and then use the residuals from the estimated regression to create a new variable that is entered into the model alongside the original variables. The exogenous variables used, also known as instrumental variables, separate variation in prices due to exogenous factors from endogenous variation in prices from unobserved product characteristics (Berto Villas-Boas 2007).

Application of instrumental variables is a common technique used in econometric models to overcome an issue of measurement error in explanatory variables (Angrist and Krueger 2001; Angrist and Pischke 2010; Berry and Haile 2014). Given that a valid instrument is uncorrelated with the equation error, but correlated with the exogenous part of measured variable, it offers a consistent estimate even in the presence of measurement error (Angrist and Krueger 2001). However, one must be particularly cautious when choosing an instrument variable avoiding weak or poorly selected instruments that are not independent of the error term or dependent variable other than through the variable of interest.

Valid instruments should be exogeneous to errors in the demand equation but correlated with the retail price paid. Therefore, any variables that shift the demand curve (exogenously) are considered valid instruments for the supply side. My first-stage control function regression uses the income variable available in my diary data together with other variables, such as local weather and population size, to account for any endogenous effects that are unique to each category of products sold at a particular state. I evaluate the

effectiveness of my instruments by conducting an F-test on the first-stage instrumental variables regression. Staiger and Stock (1997) state that the F-test statistic should be greater than 10 to reject the null hypothesis of weak instruments. My resulting F-statistic of 16.59 suggests that my instruments are not weak. Therefore, I use them to estimate the nested logit model using a household-level, panel data set generated from a food-diary experiment. I describe the diary, and summary observations from the data, in the next section.

4.4 Data

4.4.1 Diary survey

The model described above is appropriate for diary-type data as I capture discrete choices, of both products and channels, that are driven by attributes of the choice at each level. Moreover, choice-variation due to preference-heterogeneity among diary respondents and such heterogeneity is a basis of the nested logit model. In this section, I describe my diary data in more detail, and provide some model-free evidence that allows a preliminary investigation into the hypotheses developed above.

My data differs from that previously collected by USDA, or by data syndication firms such as Nielsen or IRI, because it provides detailed information on each product bought, including whether it is organic or local. For example, USDA's National Household Food Acquisition and Purchase Survey (FoodAPS) contains relatively detailed information on consumer purchases, including whether it was purchased for at-home, or away-from-home consumption, but does not include sufficient detail on the provenance of each purchase. Similarly, Nielsen's Homescan database or IRI's scanner data does not include this information either as they focus on consumer purchases from supermarkets or other

commercial outlets, and do not include purchases made through direct marketing channels. Finally, neither of these datasets include information on consumers' motivations for shopping at each particular channel or for buying local food. On the other hand, I collect my diary data expressly for the purpose of better understanding the demand for local food and examining what affects consumers' choice of a particular marketing channel.

While researchers usually collect survey data at one point in time or with time lags over a period of time (e.g. longitudinal study), a diary study allows me to collect the data on a daily basis (Ohly et al. 2010). I use standardized questions and two stages of sampling, where participants first complete an initial survey and then respond to daily survey requests. Therefore, participants complete two surveys, one at the beginning of the diary period that captures time-invariant attributes, and another on a shopping-trip basis that captures data on shopping trips and purchases.

I recruit my participants, who complete the study in exchange for a small payment, using market research company, Qualtrics. The first survey collects participants' demographic information, such as gender, age, ethnicity, marital and employment status as well as educational and income levels. It also asks participants, who indicated that they buy local food, whether they prefer buying local food over national food products, assuming all other characteristics of these products are the same. Moreover, the survey prompts participants to identify on a five-point Likert scale, ranging from 1 - "not important" to 5 - "the most important", how important each of the items are in shaping their beliefs about local food. The list of items includes beliefs on local food that are prominent among consumers (Loureiro and Hine 2002; Burchardi, Schröder, and Thiele 2005; Roininen, Arvola, and Lähteenmäki 2006; Naspetti and Bodini 2008; Bond, Thilmany, and Bond

2008; Brown et al. 2009; Yue and Tong 2009; Zepeda and Deal 2009; Adams and Salois 2010; Onozaka, Nurse, and Thilmany-McFadden 2010; Bean and Shar 2011; Dunne et al. 2011; Grebitus, Lusk, and Nayga 2013; Feldmann and Hamm 2015). The data from this multi-item question is essential for testing my hypothesis as it allows me to not only collect purchasing information, but also the information necessary to infer store-and-choice attributes that serve as constructs for latent-preference measures.

The purpose of the second survey is to collect the data from the participants every time they go shopping over a 4-week study period. Participants receive daily reminders via text-message to complete the survey and have an option to enter the data online or using a mobile application. Qualifying participants receive opt-in language with a unique code at the same time each day that asks if they have shopped that day. If they respond positively, they are sent a link to the survey. Using the survey, respondents indicate how many shopping locations they visited during the day, and then answer questions regarding each specific trip. Participants list all products they purchased on a given trip, including price, brand, size, quantity, whether it is local or organic, as well as information about the shopping trip itself, such as time and distance it took to get to the store, time spent shopping, and whether they were shopping alone. This diary style survey allows me to collect information necessary to investigate each of the hypotheses developed above.

4.4.2 Data summary

I recruited a total of 390 participants, but 246 were omitted from the analysis because they did not complete the second part of survey, leaving a usable sample of 144 households from Colorado (n=40), New Jersey (n=69), and Oregon (n=35). Participants were chosen from these states in order to represent the Eastern, Central and Western parts of the U.S.

Each of these states have active farmers markets that offer consumers a wide variety of products. In addition, these three states promote their locally-grown food through grant programs and by providing funds to various local-food related initiatives (Low et al. 2015).

Table 4.1 offers a summary comparison of the demographic characteristics of my sample relative to each of the state populations. The data in this table shows that the sample is broadly representative of the population in each state (Census 2018), with only gender (Female) being disproportionally higher than the state average in each case. Over-representation of females is perhaps to be expected as my sample includes only the individuals responsible for most of household's grocery purchases, which are predominantly females (PLMA 2013).

Table 4.1 Data Summary. Sample Characteristics

	Oregon Population	Oregon Sample	New Jersey Population	New Jersey Sample	Colorado Population	Colorado Sample
(% unless stated)		n=35		n=69		n=40
Age (mean)	39.1	47	39.5	43.5	36.4	39.2
Gender (female)	50.5	100	51.2	82.6	49.7	90
HH size	2.52	2.6	2.73	2.94	2.56	2.62
Bachelor's degree or higher	31.4	45.7	37.5	66.7	38.7	55
Working full- or part-time	61.9	57.1	65.7	72.5	67.5	67.5
Household income (mean)	$53,270	$68,214	$73,702	$80,434	$62,520	$66,500

My sample has a size typical for a diary-type data (Ohly et al. 2010) and consists of primary grocery shoppers in each household. My empirical results, however, are necessarily conditional on shoppers who exhibit at least a nominal willingness to go to a farmers market (who have shopped at a farmers market during the last 30 days). Focusing on these consumers was necessary because, in order to address my hypothesis, I need purchasing data from both direct and intermediated channels. To the extent that the general

population differs from my sample, my results can only be interpreted as conditional on the revealed willingness to shop through direct channels.

My final sample includes households that completed both parts of the survey and had made purchases in the categories of interest. These households reported an average purchase rate of 22 products across the categories of interest over the 4-week study period. As a result, I was able to collect 2908 observations in beverages, dairy, fruits, meat and vegetables categories. Purchases from the breads, cereal and pasta categories formed the outside option. The categories were chosen based on their popularity, availability in both store types, as well as the number of observations present in the data. Gathering a relatively large number of observations for these categories in not surprising, as they also have high penetration rate in the IRI data (Bronnenberg, Kruger, and Mela 2008). These categories also comprise a wide variety of popular categories usually found in consumer shopping baskets (Supermarket News 2015). They also capture the most common food categories offered at farmers markets, which are vegetables, fruits, meat and dairy (Low and Vogel, 2011; Martinez 2010).

My data captures substantial variation in purchase behavior both within and across stores. Table 4.2 provides a summary of sales, and prices, for each category and reveals several interesting patterns. All prices are converted to *$* per ounce for an easier comparison and consistency. In general, farmers markets' average prices are higher than prices of supermarkets for most categories, which is consistent with prior findings (Wheeler and Chapman-Novakofski, 2014; Lucan et al. 2015).

"Total category sales" represent the percentage of total number of sales within each category that were made at a particular store. For example, out of all vegetable transactions

collected through my diary survey, 16% came from sales at the farmers market, while the rest were done at the supermarket. Not surprisingly, vegetables comprise the largest percentage of sales at farmers markets. In general, percentages of total category sales are much lower at the farmers markets than those of the supermarkets. However, farmers market' total category sales of 7%, on average, are expected since direct-to-consumer sales comprise less than 1% of total agricultural sales (Martinez et al. 2010; USDA 2014).

Notice that supermarkets have a greater number of transaction across all products. The larger percentage of sales through supermarkets might suggest that consumers prefer to shop at supermarkets as they are able to purchase a wide selection of products in convenient settings, which in return reduces their fixed costs of shopping. Moreover, supermarkets may attract consumers because they allow consumers to take advantage of promotions such as the use of coupons. This anecdotal evidence offers preliminary support for some of my hypotheses developed above.

Table 4.2 Data Summary. Category Information

		Farmers Market					Supermarket				
	N	Total Category Sales	Average Price $/Oz	Price St Dev $/Oz	Min Price $/Oz	Max Price $/Oz	Total Category Sales	Average Price $/Oz	Price St Dev $/Oz	Min Price $/Oz	Max Price $/Oz
Vegetables	592	16%	0.193	0.243	0.010	1.310	84%	0.166	0.193	0.010	2.250
Fruits	419	9%	0.145	0.122	0.020	0.500	91%	0.178	0.226	0.010	2.000
Dairy	647	3%	0.374	0.267	0.020	0.900	97%	0.191	0.206	0.010	1.810
Beverage	371	4%	0.313	0.305	0.030	1.000	96%	0.145	0.249	0.002	2.720
Meat	450	2%	0.402	0.302	0.120	1.250	98%	0.293	0.187	0.010	1.990
Bread	242	4%	0.191	0.094	0.010	0.310	96%	0.152	0.090	0.020	0.630
Pasta	95	7%	0.170	0.163	0.010	0.500	93%	0.126	0.087	0.040	0.500
Cereal	92	9%	0.084	0.058	0.010	0.170	91%	0.196	0.164	0.020	1.430

4.4.3 Factor Analysis

Consumer beliefs about local food are not directly observed. Because the relative magnitude of each is fundamentally important to explaining consumers' choice of marketing channels, I use the diary data to infer a set of latent constructs that measure the effects that are expected to be important. As mentioned above, I asked participants a multiple-item question to investigate their beliefs about local food. However, I cannot use these questions directly as they each result in a number of potentially highly-correlated responses. For example, some items aim to measure the same concepts, such as organic production (GMO-free, pesticides free). Therefore, I construct indexes of related items by averaging the Likert scores of the variables.

One way to determine which questions are related is by constructing correlation matrices. Correlation matrices allow to investigate pair-wise relationships between multiple variables at the same time. However, using simple correlation matrices might be difficult, as they rarely produce clear and easy to understand patterns of correlation, especially when the sets of variables are too large to comprehend through visual inspection. Therefore, to avoid my personal judgments when deciding which items can be grouped into each index, I employ exploratory factor analysis (EFA) to overcome these challenges (Fabrigar and Wegener 2011), and use the factors that result to construct indexes used in the formal econometric model.

The purpose of factor analysis is to reduce the dimension of a data set into its most important elements (Smith and Albaum, 2005). Factor analysis is a powerful tool that determines which variables in the item pools are essentially capturing the same underlying construct, and summarizes the relationships among these variables in a small set of

unrelated and independent factors. EFA is the most common form of factor analysis that provides estimates of the strength and direction for each of the variables. These estimates are called loadings that range from -1 to 1 and indicate the relative weight of each variable in the component. The larger the absolute value of the coefficient, the more relevant is the corresponding variable in calculating the factor. Loadings close to 0 indicate that the factor has a weak influence on the variable, while loadings close to -1 or 1 suggest that the factor strongly influences the variable.

In order to simplify and clarify the loading structure and facilitate an interpretation, I utilize the "rotation" strategy that essentially involves the rotation of axes in the initially estimated "unrotated" factor plot in a way that makes the clusters of variables fall as closely as possible to them (Osborne 2015). Specifically, I use varimax rotation that creates a clear pattern of loadings on each factor that is as diverse as possible. The use of varimax creates uncorrelated factors, which is necessary as I want to identify variables to create indexes without inter-correlated components.

Table 3 shows the rotated component matrix with identified factors. The factors generated have a "clean" structure with item loadings above 0.30, no item cross-loadings (items only belong to one factor), and no factors with fewer than three items (Costello and Osborne, 2005). I use a measure of sampling adequacy, the Kaiser-Meyer-Olkin (KMO) test, to test how appropriate my data is for factor analysis. KMO values should be greater than 0.6 to be acceptable. KMO criteria for the estimated factor analysis is 0.86, which according to Kaiser (1974) is considered to be meritorious (very good). I also use Cronbach's α, which is a measure of internal consistency that evaluates whether items that form a factor measure the same general construct. This allows me to quantify the reliability

of each factor. Cronbach's α should be greater than 0.5 for a factor to be included in the analysis (Kim and Mueller, 1978; Hair et al., 1998). In my analysis, the Cronbach's α for each factor is above 0.8, which is considered to be good (Tavakol and Dennick, 2011).

Table 4.3 Factors important in shaping beliefs about local food

KMO: 0.860	Factor 1 Quality	Factor 2 Support	Factor 3 Organic
Cronbach's α	0.833	0.824	0.812
Tastier	**0.812**	0.228	0.012
More nutritious	**0.742**	0.091	0.411
Healthier	**0.648**	0.062	0.525
Higher quality	**0.612**	0.399	0.272
Fresher	**0.586**	0.291	0.225
Supports economy	0.124	**0.929**	0.109
Supports farmers	0.142	**0.914**	0.154
More sustainable	0.351	**0.556**	0.297
Organic	0.148	0.131	**0.851**
GMO-Free	0.164	0.196	**0.849**
Pesticides free	0.263	0.195	**0.708**

Based on my factor analysis, Table 4.3 highlights the values that are large in magnitude and pertain to each factor. I interpret the factors important in shaping beliefs about local food as follows: "tastier" (0.812), "more nutritious' (0.742), "healthier" (0.648), "higher quality" (0.612), and "fresher" (0.586) have large positive loadings on factor 1, so this factor describes consumer perceptions about quality and nutritional value. Questions that address the issues "support economy" (0.929), "support farmers" (0.914) and "more sustainable" (0.556) have large positive loadings on factor 2, so this factor describes the extent of consumer intentions to support farmers, economy and environment through local food purchases. "Organic" (0.851), "GMO-free" (0.849) and "pesticides free" (0.708) have large positive loadings on factor 3, so this factor describes consumer perceptions that local food is either organic or possesses some characteristic of organic

production. All of the loadings are positive, so as one of the variable in a certain factor increases, so do the others.

All three identified factors are relevant to my hypothesis. Therefore, I include these factors as constructs described in my model. I present and interpret the results obtained by applying the nested logit model to the food-diary data in the next section.

4.5 Results

In this section, I present the results obtained from estimating several versions of the nested-logit model of category-and-store choice. My intent is to determine how these choices are affected by consumers' demands for sustainable shopping solutions, high-quality food, and their sense of contribution to the local farmers and economy. I examine the robustness of my main specification, the random-coefficient nested logit, by comparing it to a fixed-coefficient alternative. Following the presentation of results, I discuss their importance, and implications for the local food movement, and food retailing more generally.

I estimate my demand-models over the category-store choice. The first model is a fixed parameter maximum-likelihood model which assumes that all coefficients are fixed over the households. The second model, on the other hand, is a random parameter model that takes into account the unobserved heterogeneity across households and enables random variation in key-variables pertained to beliefs about local food in my store-choice stage of the model. Estimating both fixed and random parameters models allows me to determine whether unobserved heterogeneity is a feature of my diary data and whether applying a fixed-coefficient logit would imply substantial bias for my estimates.

Table 4.4 provides a comparison of the goodness-of-fit estimates obtained by my models. All three statistics, AIC, BIC and log likelihood value, suggest a better fit of the

random coefficient version of the demand model. Moreover, the fact that the standard deviations of the random parameters are all statistically significant also suggests that unobserved heterogeneity is likely to be important. Finally, I formally test the goodness-of-fit using likelihood ratio (LR) test statistic that allows me to compare the fixed and random versions of the model. Given that one degree of freedom implies a critical Chi-square value of 3.841, my calculated LR statistic of 30.540 for the nested category- and store-choice model suggests that unobserved heterogeneity is a statistically important factor driving category choice. Therefore, for the remainder of this chapter I focus my interpretations on the results from the random-parameter model.

Table 4.4 Goodness of Fit Model Comparison

Model	LLF	AIC	BIC
Fixed Coefficients	-12018.4	24102.84	24048.39
Random Coefficients	-12007.6	24089.1	24026.71

Note: In this table, LLF is the log-likelihood function value, AIC is the Akaike Information Criterion, BIC is the Bayesian Information Criterion, and LRI is the likelihood-ratio index.

Table 4.5 presents the estimates of the category choice model. As expected, the marginal utility of income is negative, all else constant. Among the parameter estimates, the coefficient estimates of the item-specific dummy variables are significant and negative for the majority of the categories. In addition, the observed demographic factors such as household's head age and education as well as household size and income significantly influence the intrinsic category preference of households. Moreover, significant and positive estimates of the *Control Function* indicate the presence of the price endogeneity in my model. Therefore, the use of control function approach was necessary to correct for it.

Table 4.5 Nested Logit Models of Category Choice

	Fixed Coefficients Model				Random Coefficients Model			
	FM		SM		FM		SM	
	Estimate	t-ratio	Estimate	t-ratio	Estimate	t-ratio	Estimate	t-ratio
Veggies	1.926*	3.679	-0.562*	-2.263	1.608*	2.964	-1.237*	-4.257
Fruits	1.625*	3.093	-0.955*	-3.830	-0.663	-1.118	-1.718*	-5.882
Dairy	-1.928*	-2.315	-0.355	-1.433	0.194	0.347	-0.838*	-2.888
Beverage	0.331	0.597	-1.077*	-4.310	-1.488*	-2.239	-1.321*	-4.543
Meat	-3.195*	-2.381	-0.718*	-2.890	-0.921	-1.510	-1.287*	-4.425
Price	-2.084*	-7.788	-2.084*	-7.788	-1.101*	-3.844	-1.101*	-3.844
Local	0.992*	6.033	-0.168*	-2.996	1.218*	7.537	-0.128*	-2.209
Organic	-0.862*	-3.892	-0.022	-0.390	0.533*	2.999	0.156*	2.412
Age	-2.961*	-9.221	0.443*	4.975	-2.467*	-7.145	0.236*	2.221
Income	0.377*	2.369	0.435*	6.530	0.249	1.396	0.296*	4.019
Education	0.611*	2.111	0.011	0.146	-1.268*	-4.463	-0.155*	-2.000
HH size	-1.862*	-9.015	0.177*	3.307	-0.962*	-4.827	0.193*	3.206
Control	2.151*	7.800	2.065*	7.713	1.190*	4.052	1.113*	3.914

Note: A single asterisk indicates significance at 5%.

The results also suggest that attributes related to the production methods - *Local* and *Organic* - are significant drivers of the category choice. Specifically, considering farmers markets, the estimated coefficient for *Local* is significant with the expected positive signs, implying that consumers prefer local products as opposed to non-local products sold at this marketing channel. On the other hand, looking at the supermarkets, a significant and negative coefficient for *Local* indicates that consumers have a lower preference for local products compared to non-local products among the listed categories at this channel. In addition, significant and positive estimates for *Organic* for both stores suggests that consumers in general prefer organic products over non-organic ones.

To provide more meaningful, money-denominated interpretations of the coefficients for *Local* and *Organic*, I calculate willingness to pay (WTP) values for each

of these estimates[17]. The results suggest that farmers market shoppers are willing to pay $1.11 and $0.48 more for local and organic products, respectively, which is consistent with previous research (Hu, Woods and Bastin 2009; Yue and Tong 2009; Costanigro et al. 2011; Onozaka and Thilmany-McFadden 2011; Carroll, Bernard and Pesek 2013; Meas et al. 2015). On the other hand, supermarket shoppers are willing to pay $0.12 less for local as opposed to non-local products, but $0.14 more for organic over non-organic products. One reason for this might be that consumers believe that local products sold at supermarkets are of a poor quality. Another reason might be that consumers expect to pay less for local products at supermarkets, believing that local food sold at these marketing channels is more affordable. They believe that by working directly with local producers, supermarkets should be able to pass savings from economies of scale directly to them. At the same time, there seem to be an inherent preference for organic across the channels with consumers willing to pay more for organic food, which is in agreement with the previous findings (Loureiro and Hine 2002; Costanigro et al. 2011; Hu et al. 2012; Meas et al. 2015).

Estimates of the store choice model are shown in Table 6. A significant and positive estimated coefficient for *Store SM* implies that there is a positive utility associated with supermarkets relative to farmers markets. Therefore, even after controlling for fundamental motivation for choosing supermarkets, such as price, assortment and promotion, consumers still prefer supermarkets over farmers markets. This suggests that there is an inherent preference for supermarkets among consumers due to other factors specific to multi-

[17] WTP is estimated by dividing a non-price parameter by the negative value of marginal utility of income (Louviere et al. 2000): $WTP_{local} = -\frac{\beta_{local}}{\beta_{price}}$

category retailers that are not included in my model, such as "in-store experience" (Hamstra 2017).

Table 4.6 Nested Logit Models of Store Choice

	Fixed Coefficients Model			Random Coefficients Model		
	Estimate	St. Dev.	t-ratio	Estimate	St. Dev.	t-ratio
Store SM	3.429*	0.408	8.413	6.221*	0.694	8.970
Store Price index	-0.541*	0.227	-2.382	-1.723*	0.255	-6.748
Fixed cost of shopping	-0.026	0.060	-0.429	0.011	0.083	0.128
Used coupons	1.212*	0.317	3.828	2.336*	0.412	5.674
Variety	4.763*	0.597	7.972	1.582*	0.758	2.088
Quality	0.767	0.849	0.904	-2.813*	0.957	-2.940
Support	-0.553	0.689	-0.802	2.617*	0.954	2.744
Organic	2.028*	0.506	4.005	3.188*	0.535	5.956
Quality (SD)				0.469*	0.123	3.810
Support (SD)				0.315*	0.116	2.725
Organic (SD)				0.387*	0.122	3.170
λ	0.635*	0.121	5.259	0.553*	0.172	3.214

Note: A single asterisk indicates significance at 5%.

The insignificant coefficient for the fixed cost of shopping is surprising. However, considering that farmers markets usually have remote locations (McGarry-Wolf, Spittler, and Ahern 2005; Gumirakiza 2014), consumers who prefer to shop at farmers markets might be less susceptible to the effects of inconvenience – they intend to shop at a farmers market, regardless of its location. Nevertheless, as expected, the price index has a negative effect on store choice, suggesting that as average weekly price for each category offered at the store increases consumers' preference for that store decreases. On the other hand, the ability to take advantage of price discounts and use coupons has a significant and positive effect on store choice. Therefore, supermarkets appeal to consumers by allowing them to purchase local food at an affordable price while taking advantage of weekly promotions and coupons. In contrast, the fact that products at farmers markets are, on average, more expensive than in supermarkets (Wheeler and Chapman-Novakofski, 2014; Lucan et al.

2015) and that farmers markets are usually not able to accept coupons, might negatively affect consumers' decision to shop at farmers markets.

My results also suggest that variety is a significant and positive determinant of store choice, indicating that marketing channels that carry a wide selection of products are preferred among my sample of consumers. This is consistent with prior research that shows that the variety of products offered by the store and the availability of household's favorite products has a direct link to store choice (Broniarczyk, Hoyer,and McAlister 1998; Govindasamy and Thornsbury 2006; Briesch, Chintagunta and Fox 2009). Given that consumer preference for local food continues to increase (McGarry-Wolf, Spittler, and Ahern 2005; Zepeda 2009; Landis et al. 2010), the availability of local products is an important factor in attracting consumers, and, perhaps more importantly, in building store loyalty. So, it is not surprising that major retail chains are making an effort to cater to their variety seeking consumers by keeping up with direct retailers and sourcing a broad selection of fresh, locally-sourced items (Guptill and Wilkins 2002; Clifford 2010; King, Gómez and DiGiacomo 2010; Dunne et al. 2011).

The store-choice estimates also take into account the relative attractiveness of store alternative discussed in the store-choice stage of the model described above. The estimate of the store level scale parameter in my preferred random-coefficient model is between a range of zero and 1 indicating that the model is consistent with utility maximization for all possible values of the explanatory variables. Also, since λIV_{jht} represents the expected extra utility that consumers receive by choosing a certain store, $\lambda = 0.553$ suggests that consumers do not readily substitute among stores.

My primary interest in the model, however, lies in the estimates that define the extent to which particular reasons for buying local food affect store choice among consumers. Believing that local food is fresher looking, better tasting, and of high quality significantly and negatively affects consumer's decision to shop at a supermarket as opposed to farmers market. This finding is in line with previous research that suggests that the primary reason direct channel shoppers choose to attend farmers markets is the perceived taste, quality, and freshness of local products available there (McGarry-Wolf, Spittler, and Ahern 2005; Pícha, Navrátil and Švec 2018). Even though supermarkets are increasingly partnering with local producers to source a broad selection of fresh, high-quality local products (Guptill and Wilkins 2002; Clifford 2010; King, Gómez and DiGiacomo 2010; Dunne et al. 2011), when it comes to appearance of produce, the majority of consumers prefer it from farmers market versus supermarkets (Onianwa, Mojica, and Wheelock 2006).

In contrast, believing that local is organic positively affects the choice to shop at supermarkets. Perhaps consumers believe that farmers markets are less apt to sell good organic local products, especially because there is no guarantee of how it was produced. Local farmers that sell their products through direct marketing channels often opt not to get the organic certification because of the added costs, such as transition period, operating expenses, certification fees, and paperwork (Veldstra, Alexander and Marshall 2014). While they market their products through face-to-face communication with their customers about their production practices (Veldstra, Alexander and Marshall 2014), consumers prefer products with familiar organic certification logos that they can trust (Janssen and Hamm 2012). Supermarkets, on the other hand, label local food as organic only if it

complies with all the USDA regulations and carries an official certification. This in return allows them to take advantage of standardized labeling that effectively promotes organic food as it reduces confusion among consumers about the organic nature of their food products (Batte et al. 2007).

Likewise, the belief that local food supports environment, farmers and economy positively affect the choice to shop at supermarkets as opposed to farmers market. One reason for this is that farmers markets usually have lower sales volume (Thilmany-McFadden et al. 2015) as they often operate one day a week on a seasonal basis (Dunne et al. 2011), which makes it difficult for this marketing channel to effectively support the local economy. Supermarkets, instead, are conveniently open every day year-round, which generates value for local farmers through higher sales volumes and broader supply chain integration (Thilmany-McFadden et al. 2015). Moreover, consumers might believe that buying local products through intermediated channels reduces their carbon footprint, since supermarket's supply chain usually uses less fuel per unit of product than direct channel supply chains (King et al. 2010b). Therefore, by buying local food through intermediated channels, consumers are able to contribute to the growth of the local economy and reduce their perceived impact on the environment while satisfying their weekly grocery needs.

Finally, the standard deviation of each random coefficient in the store-choice model is highly significant, implying that these coefficients do vary across households, so unobserved heterogeneity is indeed an important consideration. The estimated means and standard deviations of these coefficients provide information on the share of the households store choice of whom is more or less affected by each of the beliefs. The sign of the mean

remains the same within the range of the standard deviation, suggesting that all random coefficients stay within the range of the respective positive or negative significance.

My findings provide an extension to the substantial literature on direct marketing channels, while contributing to the limited literature on multi-channel choice related to local food purchasing. While much of the recent empirical literature focuses on consumer preferences, attitudes and beliefs about local products, I show how these beliefs affect the actual choice of the marketing channel. My results confirm that reasons for buying local food can significantly influence consumers' choice of a marketing channel. They indicate that, while perceived taste, freshness and quality of the produce drives consumers' choice of buying local food at direct markets, the desire to support local farmers and the local economy as well as the proper organic certification positively affects the choice of intermediated channels as a shopping location.

4.6 Conclusion

Consumers are increasingly conscious of who produces their food, where, how, in what conditions, and at what cost. They not only demand products that are safe, healthy and of high quality (Trienekens et al. 2012), but are particularly concerned with the sustainability and environmental impact of their purchases (Lyons et al. 2004, D'Souza, Taghian and Lamb 2006). Although this trend helps explain the rise of the local-food movement, consumers seem to be less concerned about where they purchase their local food as the data on consumption trends reveal a paradox: Consumers want to purchase local food, but are doing so through large, national supermarket chains, and less through small "direct-to-consumer" outlets. In this chapter, I seek to isolate the attributes of the distribution channel as well as the characteristics of local food that may be responsible for this rise in

intermediated local sales. In doing so, I show that consumers' choice of marketing channel is critically dependent on their ability to support the local economy and environment, while purchasing high-quality food.

Consumers perceive many benefits from buying local food. However, there is little research into what drives consumers' preference for purchasing local food through supermarkets as opposed to farmers markets, or other direct channels. Therefore, in this essay I investigate the interaction between point-of-sale attributes and consumers' motivations to determine what influences the demand for local food from intermediated and direct channels.

I find a significant preference for marketing channels that carry a wide variety of products. While farmers markets are known for their selection of locally produced food, their product assortment is usually very limited. On the other hand, multi-category retailers allow their consumers to purchase a wide selection of products as one shopping basket. In addition, they increasingly partner with local producers in order to source a broad variety of local products. Therefore, by providing access to a wide variety of products, including local food, across socio-economic gradients, supermarkets make it available for consumers with limited amount of time and resources.

I also find that consumers' decision of where to buy local food is driven by altruistic motivations, such as support for local farmers and the local economy. Somewhat counter-intuitively, a consumers' desire to support local farmers drives them to purchase from supermarkets, not farmers markets. Farmers markets have relatively limited sales volume and ability to expand, and consumers appear to understand the deeper economics of their actions. Supermarkets, on the other hand, allow local farmers to broaden their supply chain

and increase sales volumes. By selling directly to intermediaries, farmers are able to reduce their distribution costs, so the ultimate effect on their margins may indeed be positive. By working directly with local producers and passing savings from economies of scale directly to their customers, supermarkets appeal to consumers by allowing them to purchase local food at an affordable price while providing perceived support for the local economy and farmers.

Farmers markets, instead, attract consumers who believe in quality and freshness of local food offerings. Even though supermarkets sell a broad selection of fresh locally sourced products, consumers perceive farmers market's produce to be tastier, fresher and of a higher quality, perhaps because direct marketing channels have a reputation of having a shorter farm-to-table cycle. However, believing that local is organic negatively affects the choice to shop at a farmers market. One reason for this might be that farmers that utilize direct marketing channels often choose not to become certified-organic due to the cost and complexity involved. While they promote their products through direct communication with their customers, consumers seem to prefer products with the familiar organic label, which reaffirms the importance of organic certification programs, offered by USDA that provide third-party verification and certification services.

Results from my study offer evidence for a number of managerial and policy implications. For instance, policymakers and governmental agencies in charge of the programs that aim to promote local food may consider my findings to decide whether these programs are misguided. Currently, the USDA provides a range of incentives for direct-marketing of local foods through various programs, such as Farmers Market and Local Foods Promotion Programs. Projects that receive grants under these programs aim to

expand farmers markets, build capacity and create promotional products for farmers markets, and increase sales of local and regional agricultural products through farmers markets. These programs, however, are predicated on the assumption that consumers are better off purchasing their local food directly, or that the producers themselves benefit disproportionately. This research calls these assumptions into question. By obtaining a better insight into the factors that affect consumers' category and store choice decisions, policymakers can better assess the need for stimulating local food sales through direct marketing channels.

My results also have important implications for growers. While USDA is actively promoting the use of direct channels, there appears to be a number of reasons why it would make sense to partner with supermarkets and other multi-category retailers. Driven by demand from their customers, supermarkets are increasingly interested in seeking partnerships with local producers to source local products to their stores. Numerous chains, such as Wegmans, Whole Foods, Walmart, Tesco and Sprouts Farmers Market are a prominent example of these efforts. For instance, Tesco with their "think global, act local" strategy aims to shorten and simplify their complex supply chains by offering a variety of local products. In this way, they strive to satisfy growing customer demand for fresher, locally sourced foods, while cutting food miles and employing sustainable practices. Likewise, Whole Foods strives to maintain strong relationships with local growers to offer an array of seasonal local produce grown within state lines to its consumers. Similarly, Sprouts Farmers Market caters to its consumers by featuring locally grown produce and meats, and providing support to local brands, growers and vendors. Considering the frequency with which consumers shop at supermarkets, and the share of consumers'

category purchases made through formal retail channels, by partnering with store chains like these, local farmers have an opportunity to potentially expand their distribution options, reduce costs, and increase sales volume.

Finally, to maintain the growth of farmers markets, new ways of attracting customers may be necessary. For example, production method labeling, such as "produced locally" and "certified organic", seem to be important to the consumer decision of where to buy local food. Therefore, local farmers should consider adopting labeling strategies for their products, such as acquiring organic certification. Also, given that consumers' beliefs that local food sold at farmers market are of a higher quality, farmers should emphasize the quality and freshness of the products offered through the direct channels in their marketing efforts, such as printed materials, websites and social media, farm events, and other promotional activities. This, in return, might enhance the overall value proposition, positively impact purchasing preferences, attract new shoppers and reinforce the loyalty of the existing repeated customers.

My research is not without limitations. My analysis considers each product category independently and does not take into account the interaction among items in the consumer basket. However, consumers do not usually purchase just one type of food, but rather a basket of, potentially complementary, items. Therefore, consumers' choice of marketing channel might be contingent on their ability to conveniently purchase local foods as part of a larger shopping basket that contains both food and non-food items. Future research might investigate this notion by examining how satisfying consumers' demand for many needs at once – by purchasing multiple products, local and non-local, together as one basket – helps explain the trend toward local-food demand from retail intermediaries.

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CHAPTER 5

CONCLUSION

Despite the volume of research emerging over the past 20 years, there is still ambiguity regarding what motivates consumers to purchase local food from direct versus intermediated marketing channels. Existing empirical studies consider only a limited number of factors that may affect preferences for local food offered at different points of sale (Onken, Bernard and Pesek 2011; Carroll, Bernard and Pesek 2013). In particular, few consider the attributes of marketing channels that potentially influence where consumers purchase local food, such as assortment and convenience. Developing a deeper understanding of channel-choice is critical as store attributes and consumer perceptions about local food sold through different channels affect consumers' choices of where to shop, and ultimately the value growers derive from selling through particular channels. In this dissertation, I provide some insight into this issue by examining what drives consumer preferences for local food and investigating whether consumer preferences are inherently channel-dependent. In this regard, my dissertation represents a more fundamental contribution to the literature in supply chain management and marketing that considers how different channels are able to generate value for upstream producers.

Using experimental methods, my dissertation investigates consumer preferences for local food differentiated by marketing channel. In the first essay, I examine the existing literature on consumer demand for local food by applying meta-regression analysis to the estimates reported by different studies. After correcting for publication bias, my analysis indicates the presence of a significant willingness to pay for local attribute that ranges between $1.70/lb and $2.08/lb. However, the research in this chapter uncovers a distinct

lack of research that examines consumer demand for local food from different marketing channels.

By separating the demand for local from the demand for a particular channel, the second essay allows me to disentangle consumers' preferences for marketing channels and the local-attribute in their food purchases. My experimental design allows me to identify whether consumers are willing to pay a premium for local food itself, and for local food sold at a certain channel. Using a choice experiment, I find that consumers are willing to pay a premium for local food. However, they are not willing to pay premiums for local food that is sold at farmers markets relative to supermarkets. Therefore, the fact that the direct sales of local food remain low is less surprising, especially considering the increase in local food offerings by intermediated marketing channels.

In the third essay, therefore, I seek to explain the rise in intermediated local food sales by investigating local food shopping behavior. Specifically, I develop a model of channel-selection in a nested context and apply it to the primary data gathered through an online food diary. I find that, while some consumers enjoy shopping at farmers markets to meet their objectives, such as to socialize with farmers or to entertain children, the majority of consumers buy local food from supermarkets because they offer convenient settings where a variety of products can be purchased at one time, minimizing the inherent fixed costs of shopping.

This core findings of dissertation offer insights that have wide-ranging managerial and policy implications. First, because I find that consumers prefer to buy local food through intermediated channels, my most important finding challenges the fundamental rationale behind government policies that incentivize the direct sale of local food. While I

do not consider the broader, producer-level implications of selling local food, the fact that direct selling is inherently inefficient implies that there is little reason growers should participate in direct-selling activities, let alone argue for government support. My results suggest that, instead of exclusively focusing on the direct marketing channels to grow the sales for local food, current programs should take advantage of inherent efficiencies of intermediated channels, as these channels play a significant role in shaping the success of local agriculture.

Second, by separating the demand for local, as an attribute, from other related attributes I find that production method labeling, such as "produced locally" and "certified organic", are important to the consumer decision on which product to purchase. Specifically, my results indicate that consumers have a significant preference for local and organic products. However, they prefer products that carry familiar standardized labels, that are known to effectively promote food and to reduce the confusion among consumers. Therefore, local producers should consider adopting labeling strategies for their products, such as acquiring organic certification.

Third, my findings help explain emerging trend in the food retailing sector. For example, the 2017 purchase of Whole Foods by Amazon represented a watershed moment in the maturation of the larger "foodie" movement. While the notion that consumers would take their food seriously, almost without regard to price, seemed quaint in the early 2000s, it is now widely recognized as the most important trend in retail food.

Amazon sells a wide variety of products. However, they cannot provide their customers with reliable access to locally produced food. Therefore, their purchase of Whole Foods chain, known for its reputation of supplying high quality local and organic

products, allows them to cater to their variety seeking consumers who also want to, for example, satisfy their aspiration to contribute to the local economy. The reason why Amazon felt the need to purchase Whole Foods and expand the local food offerings is exactly why supermarkets are so important right now: they realized that consumers want to buy locally sourced food products together with other items.

Indeed, the integration of locally-grown or produced food products into the assortment is now a goal of many forward-thinking retailers, including supermarket chains such as Sprouts Farmers Market, Kroger, and H-E-B, and multinational groceries, such as Walmart and Tesco. For instance, Walmart has more than doubled its offerings of locally soured food between 2010 and 2015. This number, however, keeps growing as consumers demand for greater variety of local products motivates Walmart to work on broadening its assortment by supplying local food from the number of small local producers. This, in return, provides an opportunity for small farmers to expand their distribution operations and to increase profitability. Walmart's commitment to sourcing local food is remarkable given the complexity of developing supply-chain relationships that are, by definition, not scalable across an organization of its size.

Another example of a retailer that takes advantage of local food movement and contributes to the growth of intermediated local sales is H-E-B. H-E-B, a large Texas-based grocery chain, runs yearly contests among Texas food producers to find new, high quality local products to offer at their stores. Eligible products have to be produced, manufactured, grown, or harvested within the state borders. This competition represents a good marketing strategy to promote offerings of locally sourced items, since customers become invested in the products by following their journey to the grocery shelves. As a result, H-E-B not only

able to expand its private-label portfolio of local products, but also to add dozens of Texas food items to their store assortment, attracting customers looking to purchase premium local food at convenient grocery store settings.

These examples highlight my insight that a timely response to consumer demand by the market has led to the rise of intermediate local. Specifically, they demonstrate that, while consumers attend farmers markets or other direct venues for a variety of reasons, when it comes to local food consumers prefer to purchase it from marketing channels that offer a range of favorite household products. Aware of this trend, multi-category retailers put forth effort to meet consumer demand by offering an ever-growing selection of local food.

The existence of government policies to support local food sales suggests that the market is failing in some regard. However, my findings appear to suggest the opposite, namely that existing supply-chain relationships in the local food channels appear to be performing well. As a result, governmental support for direct channels as means of growing local food sales is not only unnecessary, but likely to be fundamentally counter-productive, subsidizing exactly the opposite to what consumers prefer.

Given these results, my next step would be to address the welfare effects of local growers. Direct channels enable farmers to sell their local products directly to customers (Neil 2002; AMS 2017). This, in turn, allows farmers to retain a larger share of the retail price and receive higher net profits (Anderson 2007, Low et al. 2015, Thilmany-McFadden et al. 2015). Yet, intermediated channels remain more important in terms of sales volume of local food (Thilmany-McFadden et al. 2015; Low et al. 2015; NSAC 2016). Therefore, in my future research, I intend to investigate the differences in pass-through rates between

direct and intermediated marketing channels. Given the estimated willingness to pay for local food, I will simulate the welfare effects of selling local food using direct versus intermediated channels. In doing so, I will account for costs associated with utilizing each of these marketing channels, such as setting up a stand at farmers market or offering price discounts at the grocery stores. Imputing farmers welfare will allow me to make more direct statements about rationality of USDA policy that supports direct versus intermediated local food sales.

My research, however, is not without limitations. While producing useful results and implications, my dissertation raises several questions that I intend to address in the future research. First, the sample of studies included in my meta-regression analysis is constrained by the number of studies available that satisfy my search criteria. Therefore, it might be beneficial to repeat my analysis in the future, when more research with the appropriate reported estimates will become available. Meanwhile, new research on preferences for "local" attribute should consider including all relevant information regarding the study design, to ensure transparency and prevent the issue of missing data in meta-analyses such as mine.

Second, my choice experiment in the second essay only considers two types of direct-to-consumer marketing channels, farmers markets and urban farms. However, there are other types of direct channels through which consumers can purchase local food, such as roadside stands and food hubs, as well as local food baskets or even weekly meal-kits that can be delivered straight to consumers. All these various types of direct-to-consumer marketing channels might be of interest for future research. Furthermore, using an umbrella term "grocery store" as a point of sale potentially limits my findings because various types

of grocery stores might be perceived differently by the consumers. For example, consumers might have a stronger demand for local food sold at particular store, for example Whole Foods as opposed to Walmart, and *vice versa*. In addition, whether the grocery store is independently-owned might also significantly influence consumer preferences. Therefore, future research might consider a broader sample of marketing channels at which local food is offered.

With regards to the second essay, one might also argue that only researching one product – tomatoes - is too narrow of a focus, even though tomatoes are a staple produce in the U.S. Therefore, in the future I plan to address this by conducting a choice experiment designed to compare consumer preferences for local food products that differ based on the level of processing, for instance, fresh produce, tomatoes, and processed food item, tomato pasta sauce. In addition, my future research aims to investigate the variation in preferences for local food that might exist not only due to the type of product, but also due to differences in consumer segments that exhibit these preferences. For instance, when it comes to sustainable behavior, young consumers - Generation Y - is a key stakeholder group (Hume, 2010). These young consumers make up a great share of total consumption expenditure in developed countries, such as the U.S. Therefore, in my future work, I intend to examine how their behavior compares to that of the general population.

Finally, in studying consumer choices among marketing channels, my third essay considers each product category purchased independently and does not take into account the interaction among items that consumer chooses to buy as one basket. However, since consumers typically do not purchase just one type of food, but rather a basket of potentially complementary items, their choice of marketing channel might be contingent on their

ability to conveniently purchase local foods as part of a larger shopping basket that contains both food and non-food items. Therefore, in my future research I seek to investigate this notion by examining how satisfying consumers' demand for many needs at once helps explain the trend toward local-food demand from retail intermediaries.

Despite these limitations, I believe that my current research offers insightful and valuable results. First, channel choice in the supply chain and marketing literatures tends to be driven by only marginal differences among the channels. My research, on the other hand, demonstrates that by developing an elaborate experimental design that collects the data necessary, it is possible to consider channels that differ on a larger scale. Through the use of the channel-selection model that accounts for common aspects of shopping as well as specific determinants of store and category choice, I am able to uncover the differences among channels as different as farmers markets and supermarkets. As a result, my findings provide useful information for the upstream producers when they decide which channel to utilize.

Second, my results generalize beyond the local food to other products with credence attributes that differentiate themselves on the basis of production methods. For example, because local food is considered a niche product, my findings are applicable to other unique consumer goods. Once they become available at multi-category retailers, consumers will likely switch to buying them from there due to purchase complementarity – the ability to buy a wide variety of products in one place. Therefore, future studies may utilize my results when investigating the validity of public policies that aim to promote foods that carry credence attributes through the use of a particular marketing channel.

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APPENDIX A

LIST OF FULL-TEXT ARTICLES ASSEST FOR ELIGIBILITY

Table A
List of Full-Text Articles Assest for Eligibility

Study	Author	Year	Title	Journal Full Name	Volume page	Country of Research	Date of Study	Included in MRA	Reason for Exclusion
1	Loureiro, M. L., & Hine, S.	2002	Discovering niche markets: A comparison of consumer willingness to pay for local (Colorado grown), organic, and GMO-free products	Journal of Agricultural and Applied Economics	34(3), 477-487	US	2000	Yes	
2	Skuras, D., & Vakrou, A.	2002	Consumers' willingness to pay for origin labelled wine: A Greek case study	British Food Journal	104(11), 898-912	Greece	1998	No	4
3	Alfnes, F., & Rickertsen, K.	2003	European consumers' willingness to pay for U.S. beef in experimental auction markets	American Journal of Agricultural Economics	85(2), 396-405	Norway	1999	Yes	
4	Loureiro, M. L., & Umberger, W. J.	2003	Estimating consumer willingness to pay for country-of-origin labeling	Journal of Agricultural and Resource Economics	28(2), 287-301	US	2002	No	2
5	Umberger W. J., Dillon M. Feuz, Chris R. Calkins, & Bethany M. Sitz	2003	Country-of-Origin Labeling of Beef Products: U.S. Consumers' Perceptions	Journal of Food Distribution Research	34(3), 103-116	US	2002	No	2
6	Giraud, K. L., Bond, C. A., & Bond, J. J.	2005	Consumer preferences for locally made specialty food products across northern new England.	Agricultural and Resource Economics Review	34(2), 204	US	2002-2003	No	4

7	Stefani, G., Romano, D., & Cavicchi, A.	2006	Consumer expectations, liking and willingness to pay for specialty foods: Do sensory characteristics tell the whole story?	Food Quality and Preference	17(1), 53-62	Italy		Yes	
8	Arnoult, M., Lobb, A., & Tiffin, R.	2007	The UK Consumer's Attitudes to, and Willingness to Pay for, imported Foods	Contributed Paper prepared for presentation at the 105th EAAE Seminar: International Marketing & International Trade of Quality Food Products, Bologna, Italy, March	(pp. 8-10)	UK	2005	Yes	
9	Batte, M. T., Hooker, N. H., Haab, T. C., & Beaverson, J.	2007	Putting their money where their mouths are: Consumer willingness to pay for multi-ingredient, processed organic food products	Food Policy	32(2), 145-159	US	2003-2004	No	4
10	Darby, K., Batte, M. T., Ernst, S., & Roe, B.	2008	Decomposing local: a conjoint analysis of locally produced foods	American Journal of Agricultural Economics	90(2), 476-486	US	2005-2006	Yes	

11	Thilmany, D., Bond, C. A., & Bond, J. K.	2008	Going local: Exploring consumer behavior and motivations for direct food purchases	American Journal of Agricultural Economics	90(5), 1303-1309	US	2006	Yes	
12	Hu, W., Woods, T., & Bastin, S.	2009	Consumer acceptance and willingness to pay for blueberry products with nonconventional attributes	Journal of Agricultural and Applied Economics	41(01), 47-60	US	2007	Yes	
13	James, J. S., Rickard, B. J., & Rossman, W.	2009	Product differentiation and market segmentation in applesauce: Using a choice experiment to assess the value of organic, local, and nutrition attributes	Agricultural and Resource Economics Review	38(3), 357	US	2005	No	1
14	Isengildina-Massa, O., & Carpio, C. E.	2009	Consumer willingness to pay for locally grown products: The case of South Carolina	Agribusiness	25(3), 412-426	US	2007	No	3
15	Thilmany, D. D., Smith, A. R., & Umberger, W. J.	2009	Does altruism play a role in determining U.S. consumer preferences and willingness to pay for natural and regionally produced beef?	Agribusiness	25(2), 268-285	US	2004	No	2
16	Yue, C., & Tong, C.	2009	Organic or local? Investigating consumer preference for fresh produce using a choice experiment with real economic incentives	HortScience	44(2), 366-371	US	2008	Yes	

17	Wang, Q., Sun, J., & Parsons, R.	2010	Consumer preferences and willingness to pay for locally grown organic apples: Evidence from a conjoint study	HortScience	45(3), 376-381	US	2003	No	1
18	Adams, D. C., & Adams, A. E.	2011	De-placing local at the farmers' market: Consumer conceptions of local foods	Journal of Rural Social Sciences	26(2), 74	US	2005	No	2
19	Burnett, P., Kuethe, T. H., & Price, C.	2011	Consumer preference for locally grown produce: An analysis of willingness-to-pay and geographic scale	Journal of agriculture, food systems, and community development	2(1), 269-78	US	2010	No	1
20	Costanigro, M., McFadden, D. T., Kroll, S., & Nurse, G.	2011	An in-store valuation of local and organic apples: the role of social desirability	Agribusiness	27(4), 465-477	US	2009	Yes	
21	Nganje, W. E., Shaw Hughner, R., & Lee	2011	State-branded programs and consumer preference for locally grown produce	Agricultural and Resource Economics Review	40(1), 20	US		Yes	
22	Onken, K. A., Bernard, J. C., & John D Pesek Jr.	2011	Comparing willingness to pay for organic, natural, locally grown, and state marketing program promoted foods in the mid-Atlantic region	Agricultural and Resource Economics Review	40 (1), 33–47	US	2009	No	3

23	Onozaka, Y., & Mcfadden, D. T.	2011	Does local labeling complement or compete with other sustainable labels? A conjoint analysis of direct and joint values for fresh produce claim	American Journal of Agricultural Economics	93(3), 689-702	US	2008	Yes	
24	Akaichi, F., Gil, J. M., & Nayga, R. M.	2012	Assessing the market potential for a local food product	British Food Journal	114(1), 19-39	Spain		No	1
25	Gracia, A., de Magistris, T., & Nayga, R. M.	2012	Importance of social influence in consumers' willingness to pay for local food: Are there gender differences?	Agribusiness	28(3), 361-371	Spain	2009	No	2
26	Hu, W., Batte, M. T., Woods, T., & Ernst, S.	2012	Consumer preferences for local production and other value-added label claims for a processed food product	European Review of Agricultural Economics	39(3), 489-510	US	2008	Yes	
27	Roosen, J., Köttl, B., & Hasselbach, J.	2012	Can local be the new organic? Food choice motives and willingness to pay	In Selected paper for presentation at the American Agricultural Economics Association Food Environment symposium	(pp. 30-31)	Germany	2012	No	5

28	Sanjuán, A. I., Resano, H., Zeballos, G., Sans, P., Panella-Riera, N., Campo, M. M. & Santolaria, P.	2012	Consumers' willingness to pay for beef direct sales. A regional comparison across the Pyrenees	Appetite	58(3), 1118	Two Spanish and two French regions located on both sides of the Pyrenees	2010-2011	Yes	
29	Carroll, K. A., Bernard, J. C., & John D Pesek Jr.	2013	Consumer preferences for tomatoes: The influence of local, organic, and state program promotions by purchasing venue	Journal of Agricultural and Resource Economics	38(3), 379	US	2009	No	3
30	Grebitus, C., Lusk, J. L., & Nayga Jr, R. M.	2013	Effect of distance of transportation on willingness to pay for food	Ecological Economics	88, 67-75	Germany	2009	Yes	
31	Illichmann, R., & Abdulai, A.	2013	Analysis of consumer preferences and willingness-to-pay for organic food products in Germany	In Contributed paper prepared for presentation at Gewisola conference	September 25–27, 2013	Germany	2010	Yes	
32	Lim, K. H., & Hu, W.	2013	How local is local? Consumer preference for steaks with different food mile implications	In 2013 Annual Meeting	Feb (pp. 2-5)	Canada	2013	No	3

33	Lopez-Galan, B., Gracia, A., & Barreiro-Hurle, J.	2013	What comes first, origin or production method? An investigation into the relative importance of different attributes in the demand for eggs	Spanish Journal of Agricultural Research	11(2), 305-315	Spain	2009	Yes	
34	Saito, H., & Saito, Y.	2013	Motivations for local food demand by Japanese consumers: A conjoint analysis with Reference-Point effects	Agribusiness	29(2), 147-161	Japan	2010	No	4
35	Tempesta, T., & Vecchiato, D.	2013	An analysis of the territorial factors affecting milk purchase in Italy	Food Quality and Preference	27(1), 35	Italy	2009-2010	No	1
36	Boys, K. A., Willis, D. B.,& Carpio, C. E.	2014	Consumer willingness to pay for organic and locally grown produce on Dominica: Insights into the potential for an "Organic island"	Environment, Development and Sustainability	16(3), 595-617	The Commonwealth of Dominica	2009	Yes	
37	Costanigro, M., Kroll, S., Thilmany, D., & Bunning, M.	2014	Is it love for local/organic or hate for conventional? asymmetric effects of information and taste on label preferences in an experimental auction	Food Quality and Preference	31, 94	US		No	1
38	Gedikoglu, H., & Parcellb, J. L.	2014	Variation of Consumer Preferences Between Domestic and Imported Food: The Case of Artisan Cheese	Journal of Food Distribution Research	45(2), 174	US	2010	No	1

39	Gracia, A., Barreiro-Hurlé, J., & Galán, B. L.	2014	Are local and organic claims complements or substitutes? A consumer preferences study for eggs	Journal of Agricultural Economics	65(1), 49-67	Spain	2009	No	1
40	Gracia, A.	2014	Consumers' preferences for a local food product: A real choice experiment	Empirical Economics	47(1), 111-128	Spain	2009	Yes	
41	de-Magistris, T., & Gracia, A.	2014	Do consumers care about organic and distance labels? an empirical analysis in Spain	International Journal of Consumer Studies	38(6), 660-669	Spain	2011	Yes	
42	Meas, T., & Hu, W.	2014	Consumers' willingness to pay for seafood attributes: A multi-species and multi-state comparison	In Proceedings of the Southern Agricultural Economics Association Annual Meeting	Dallas, TX, USA (pp. 1-4).	US	2012	Yes	
43	Adalja, A., Hanson, J., Towe, C., & Tselepidakis, E.	2015	An examination of consumer willingness to pay for local products	Agricultural and Resource Economics Review	44, 253-274	US	2011	Yes	
44	Barlagne, C., Bazoche, P., Thomas, A., Ozier-Lafontaine, H., Causeret, F., & Blazy, J.	2015	Promoting local foods in small island states: The role of information policies	Food Policy	57, 62-72	Guadeloupe		No	2

45	Bosworth, R. C., Bailey, D., & Curtis, K. R.	2015	Consumer willingness to pay for local designations: Brand effects and heterogeneity at the retail level	Journal of Food Products Marketing	21(3), 274-292	US	2012	Yes	
46	Fiamohe, R., Nakelse, T., Diagne, A., & Seck, P. A.	2015	Assessing the effect of consumer purchasing criteria for types of rice in togo: A choice modeling approach	Agribusiness	31(3), 433-452	Togo	2010	No	2
47	Hasselbach, J. L., & Roosen, J.	2015	Consumer heterogeneity in the willingness to pay for local and organic food	Journal of Food Products Marketing	21(6), 608-625	Germany	2012	Yes	
48	Meas, T., Hu, W., Batte, M. T., Woods, T. A., & Ernst, S.	2015	Substitutes or complements? consumer preference for local and organic food attributes	American Journal of Agricultural Economics	97(4), 1044-1071	US	2008	Yes	
49	Wägeli, S., Janssen, M., & Hamm, U.	2016	Organic consumers' preferences and willingness-to-pay for locally produced animal products	International Journal of Consumer Studies		Germany	2013	Yes	
50	Cosmina, M., Gallenti, G., Marangon, F., & Troiano, S.	2016	Attitudes towards honey among Italian consumers: a choice experiment approach	Appetite	99, 52-58	Italy	2014	No	1
51	Hempel, C., & Hamm, U.	2016	How important is local food to organic-minded consumers?	Appetite	96, 309-318	Germany		No	1

52	de-Magistris, T., & Gracia, A.	2016	Consumers' willingness-to-pay for sustainable food products: The case of organically and locally grown almonds in Spain	Journal of Cleaner Production		Spain	2011	No	1
53	Adu-Gyamfi, A., Omer, R. I., Bartlett, J. R., Tackie, D. N. O., & Perry, B. J.	2016	Assessing Florida Consumer Attitudes and Beliefs about Locally or Regionally Produced Livestock and Products	Professional Agricultural Workers Journal	4(1), 11	US	2013-2015	No	2
54	Bruno, C. C., & Campbell, B. L.	2016	"Students' willingness to pay for more local, organic, non-GMO and general food options	Journal of Food Distribution Research	47(3), 32-48	US	2014	No	3
55	Dobbs, L. M., Jensen, K. L., Leffew, M. B., English, B. C., Lambert, D. M., & Clark, C. D.	2016	Consumer Willingness to Pay for Tennessee Beef	Journal of Food Distribution Research	47(2), 38-61	US	2013	Yes	
56	Remar, D., Campbell, J., & DiPietro, R. B.	2016	The impact of local food marketing on purchase decision and willingness to pay in a foodservice setting	Journal of Foodservice Business Research	19(1), 89-108	US		No	2
57	Sackett, H., Shupp, R., & Tonsor, G.	2016	Differentiating" sustainable" from" organic" and" local" food choices: does information about certification criteria help consumers?	International Journal of Food and Agricultural Economics	4(3), 17	US	2010	Yes	

58	Etoa, J. M. A., Ndindeng, S. A., Owusu, E. S., Woin, N., Bindzi, B., & Demont, M	2016	Consumer valuation of an improved rice parboiling technology: Experimental evidence from Cameroon	African Journal of Agricultural and Resource Economics Volume	11(1), 8-21	Cameroon	2012	No	2
59	Willis, D. B., Carpio, C. E., & Boys, K. A.	2016	Supporting local food system development through food price premium donations: a policy proposal	journal of Agricultural and Applied Economics	48(2), 192-217	US	41061	340	
60	Ay, J. S., Chakir, R., & Marette, S	2017	Distance Decay in the Willingness to Pay for Wine: Disentangling Local and Organic Attributes	Environmental and Resource Economics	68(4), 997-1019	France	2013	No	2
61	Bazzani, C., Caputo, V., Nayga Jr, R. M., & Canavari, M.	2017	Revisiting consumers' valuation for local versus organic food using a non-hypothetical choice experiment: Does personality matter?	Food Quality and Preference	62, 144-154	Italy	2014	80	
62	Berg, N., & Preston, K. L.	2017	Willingness to pay for local food?: Consumer preferences and shopping behavior at Otago Farmers Market	Transportation Research Part A: Policy and Practice	103, 343-361	New Zealand	2015	No	2
63	Mugera, A., Burton, M., & Downsborough, E.	2017	Consumer preference and willingness to pay for a local label attribute in Western Australian fresh and processed food products	Journal of Food Products Marketing	23(4), 452-472	Australia	2012	Yes	

64	Gumirakiza, J. D., Curtis, K. R., & Bosworth, R.	2017	Consumer preferences and willingness to pay for bundled fresh produce claims at Farmers' Markets	Journal of food products marketing	23(1), 61-79	US	2011	Yes	
65	Brayden, W. C., Noblet, C. L., Evans, K. S., & Rickard, L.	2018	Consumer preferences for seafood attributes of wild-harvested and farm-raised products	Aquaculture Economics & Management	1-21	US	2016	No	4
66	Byrd, E. S., Widmar, N. J. O., & Wilcox, M. D.	2018	Are Consumers Willing to Pay for Local Chicken Breasts and Pork Chops?	Journal of Food Products Marketing	24(2), 235-248	US		Yes	
67	Everett, C., Jensen, K., Boyer, C., & Hughes, D	2018	Consumers' willingness to pay for local muscadine wine	International Journal of Wine Business Research	30(1), 58-73	US	2015	No	3
68	Heng, Y., & Peterson, H. H.	2018	Interaction Effects among Labeled Attributes for Eggs in the United States	Journal of International Food & Agribusiness Marketing,	30(3), 236-250	US	2014	No	1
69	Kumpulainen, T., Vainio, A., Sandell, M., & Hopia, A.	2018	The effect of gender, age and product type on the origin induced food product experience among young consumers in Finland	Appetite	123, 101-107	Finland		No	2
70	Li, X., Jensen, K. L., Lambert, D. M., & Clark, C. D	2018	Consequentiality Beliefs And Consumer Valuation Of Extrinsic Attributes In Beef	Journal of Agricultural and Applied Economics	50(1), 1-26	US	2012	Yes	

71	Merritt, M. G., Delong, K. L., Griffith, A. P., & Jensen, K. L.	2018	Consumer Willingness to Pay for Tennessee Certified Beef	Journal of Agricultural and Applied Economics	50(2), 233-254	US	2016	Yes
72	Printezis I. and Grebitus C.	2018	Marketing Channels for Local Food	Ecological Economics	152, 161-171	US	2017	Yes

Note: Reasons for exclusion: 1. Consumer segmentation; 2. No clear measurement for local; 3. Missing units; 4. Uses different base prices; 5. Other (no sample size, very small sample size)

APPENDIX B

STUDIES INCLUDED IN META-EFRESSION ANALYSIS

Table B
Studies included in Meta-Regression Analysis

Year	Authors	Journal	Country of research	Total number of participants	Type of product	WTP $/lb
2002	Loureiro, Hine	Journal of Agricultural and Applied Economics	US	437	Potatoes	$0.93
2003	Alfnes, Rickertsen	American Journal of Agricultural Economics	Norway	106	Beef	$1.06
2006	Stefani et al.	Food Quality and Preference	Italy	77	Spelt	$0.17
2007	Arnoult et al.	International Marketing and International Trade of Quality Food Products	UK	222	Lamb chops	$1.41
					Strawberries	$1.55
2008	Darby et al..	American Journal of Agricultural Economics	US	530	Strawberries	$0.45; $0.79
2008	Thilmany et al.	American Journal of Agricultural Economics	US	1,549	Melons	$0.021
2009	Hu et al.	Journal of Agricultural and Applied Economics	US	557	Pure blueberry jam	$2.33
					Blueberry-lime jam	$3.52
					Blueberry yogurt	$0.65
					Blueberry dry muffin mix	$2.51
					Blueberry raisinettes	$6.56
2009	Yue, Tong	HortScience	US	343	Tomatoes	$0.67

						$0.73
2011	Costanigro et al.	Agribusiness	US	300	Apples	$1.18
2011	Nganje et al.	Agricultural and Resource Economics Review	US	315	Spinach	$0.18
					Carrots	$0.10
2011	Onozaka, Mcfadden	American Journal of Agricultural Economics	US	1,052	Apples	$0.22
					Tomatoes	$0.38
2012	Hu et al.	European Review of Agricultural Economics	US	1,884	Blackberry jam	$0.29; $0.33; $0.41; $0.29; $0.19
2012	Sanjuán et al.	Appetite	Spanish regions, French regions	1,219	Beef	$0.42; $0.65; $0.43; $0.40
2013	Gebitus et al.	Ecological Economics	Germany	47	Apple	$0.38
					Wine	$0.84
2013	Illichmann, Abdulai	German Gewisola conference	Germany	1,182	Apples	$0.14
					Milk	$0.38
					Beef	$1.84
2013	Lopez-Galan et al.	Spanish Journal of Agricultural Research	Spain	803	Eggs	$1.36; $0.48

2014	Boys et al.	Environment, Development and Sustainability	Commonwealth of Dominica	188	Produce	$0.11
2014	Gracia	Empirical Economics	Spain	133	Lamb meat	$0.71
2014	de-Magistris, Gracia	International Journal of Consumer Studies	Spain	171	Untoasted almonds	$4.09
2014	Meas, Hu	Southern Agricultural Economics Association Annual Meeting	US	778	Tilapia	$3.83; $5.25
2015	Adalja et al.	Agricultural and Resource Economics Review	US	685	Ground beef	$1.21; $0; $2.72; $2.39; $1.47
2015	Bosworth et al.	Journal of Food Products Marketing	US	259	Ice cream	$0.20 $0.16
2015	Hasselbach, Roosen	Journal of Food Products Marketing	Germany	720	Bread Beer Milk	$0.45; $0.29 $0; $0.37 $0.24; $0.29
2015	Meas et al.	American Journal of Agricultural Economics	US	1,883	Blackberry jam	$0; $0.25; $0.41; $0.27; $0.42

2016	Wägeli et al.	International Journal of Consumer Studies	Germany	597	Milk	$0.69; $0.32
					Pork cutlets	$2.77; $2.65
					Eggs	$1.39; $1.08
2016	Dobbs et al.	Journal of Food Distribution Research	US	676	Boneless ribeye steak	$5.06
					Ground beef	$1.66
2016	Sackett et al.	International Journal of Food and Agricultural Economics	US	1002	Apple	$0.51
					Steak	$2.29
2016	Willis et al.	Journal of Agricultural and Applied Economics	US	340	Produce	$0.17
					Animal product	$0.33
2017	Bazzani et al.	Food Quality and Preference	Italy	80	Applesauce	$3.40
2017	Mugera et al.	Journal of Food Products Marketing	Australia	333	Fruit yogurt	$1.19
					Skinless chicken breast	$1.26
2017	Gumirakiza et al.	Journal of food products marketing	US	819	Peaches	$2.30
					Yellow squash	$3.30
					Eggplant	$2.90
2018	Byrd et al.	Journal of Food Products Marketing	US	825	Pork chops	$2.04
					Chicken breast	$1.01

2018	Li et al.	Journal of Agricultural and Applied Economics	US	1688	Steak Beef	$2.59
					Ground beef	$0.95
2018	Merritt et al.	Journal of Agricultural and Applied Economics	US	408	Beef steak	$2.42
					Ground beef	$1.15
2018	Printezis, Gebitus	Ecological Economics	US	1046	Tomatoes	$0.80; $0.85

Note: WTP represents the price premium that consumers are willing to pay for the "local" attribute compared to conventionally grown, unlabeled origin food.

APPENDIX C

VARIANCE INFLATION FACTORS

Table C
Variance Inflation factors

Variable	VIF	VIF
sqrt(n)	5.73	-
n	-	7.19
Year of study	1.84	1.95
Country of study – US	1.94	1.94
Animal products	2.17	2.17
Processed products	2.80	2.86
Local def. – state grown	1.90	1.90
Local def. – specific region	2.62	2.65
Local def. – general	2.40	2.46
Method – choice experiment	1.94	1.92
Hypothetical experiment	2.37	2.18
Participants' origin – shoppers	1.98	2.23
Number of attributes	4.20	4.73
Age	1.31	1.35
Gender	2.31	2.13
Mean VIF	2.54	2.69

APPENDIX D

MODEL ESTIMATION ACCOUNTING FOR CITY-SPECIFIC EFFECTS

Table D
Mixed Logit Model Estimation accounting for City-Specific Effects

	Coefficient		SE	z-value
Price (M)	-0.720	***	0.014	-52.360
Farmers Market (M)	0.139		0.102	1.360
Urban Farm (M)	-0.574	***	0.107	-5.380
Organic (M)	0.220	**	0.106	2.080
Local (M)	0.578	***	0.093	6.220
Travel time (M)	-0.111	***	0.005	-21.090
Local*Organic (M)	-0.025		0.100	-0.250
Farmers Market* Organic (M)	-0.190	*	0.114	-1.660
Farmers Market* Local (M)	-0.427	***	0.128	-3.340
Urban Farm* Organic (M)	0.096		0.118	0.810
Urban Farm* Local (M)	-0.157		0.112	-1.410
Phoenix*Farmers Market (M)	-0.226		0.144	-1.570
Phoenix*Urban Farm (M)	-0.017		0.153	-0.110
Phoenix*Organic (M)	-0.131		0.149	-0.880
Phoenix* Local (M)	0.009		0.131	0.070
Phoenix*Travel time (M)	-0.007		0.007	-0.940
Phoenix*Local*Organic (M)	0.158		0.145	1.090
Phoenix*Farmers Market* Organic (M)	0.360	**	0.162	2.220
Phoenix*Farmers Market* Local (M)	-0.169		0.181	-0.930
Phoenix* Urban Farm* Organic (M)	0.108		0.167	0.650
Phoenix*Urban Farm* Local (M)	-0.054		0.161	-0.330
None (M)	-6.392	***	0.196	-32.650
Farmers Market (SD)	0.559	***	0.088	6.320
Urban Farm (SD)	0.697	***	0.072	9.680
Organic (SD)	1.015	***	0.061	16.530
Local (SD)	0.377	***	0.106	3.560
Travel time (SD)	0.086	***	0.004	22.040
Local*Organic (SD)	0.568	***	0.104	5.440
Farmers Market* Organic (SD)	0.026		0.154	0.170
Farmers Market* Local (SD)	0.518	***	0.126	4.110
Urban Farm* Organic (SD)	0.034		0.161	0.210
Urban Farm* Local (SD)	0.154		0.129	1.190
Phoenix*Farmers Market (SD)	0.333	**	0.152	2.200
Phoenix*Urban Farm (SD)	0.425	***	0.128	3.310
Phoenix*Organic (SD)	0.209	*	0.126	1.660
Phoenix*Local (SD)	0.185		0.139	1.330
Phoenix*Travel time (SD)	0.022	*	0.013	1.740
Phoenix*Local*Organic (SD)	0.653	***	0.119	5.490
Phoenix*Farmers Market* Organic (SD)	0.197		0.137	1.440
Phoenix*Farmers Market* Local (SD)	0.129		0.170	0.760
Phoenix*Urban Farm* Organic (SD)	0.117		0.239	0.490
Phoenix*Urban Farm* Local (SD)	0.092		0.134	0.690
None (SD)	2.934	***	0.147	19.980
Log-likelihood	-9734.005			
McFadden Pseudo R-squared	0.358			
Number of Observations	914			

Note: ***, **, and * denote statistically significant differences at 1%, 5% and 10%, respectively. SE = Standard Error.

APPENDIX E

PERMISSION LETTER

ASU W. P. Carey School of Business
Arizona State University

To:

Iryna Printezis

September 18, 2018

Dear Iryna Printezis,

I am writing to grant you permission to use the article, where I am a co-author, in your dissertation. The reference to the article is below.

Printezis, Iryna, and Carola Grebitus. "Marketing Channels for Local Food." *Ecological Economics* 152 (2018): 161-171.

Title of article: _____ Marketing Channels for Local Food _____
Author of article: ___ Printezis Iryna & Grebitus Carola _____
Periodical Title: ____ *Ecological Economics*_____
Volume: __152___ Date: __October 2018_____ Pages: ____161-171_____

This request grants permission to Iryna Printezis to include the content of the above-mentioned article to her dissertation, here at the Arizona State University. With this permission, the article can be included into dissertation, whether in full or in part, and submitted to the university's repository in either print or electronic form.

If you have any questions, please feel free to contact me at Carola.Grebitus@asu.edu.

Sincerely,

Dr. Carola Grebitus

Ass. Prof. Food Industry Management
Morrison School of Agribusiness
Arizona State University | W. P. Carey School of Business

Morrison School of Agribusiness
7231 E. Sonoran Arroyo Mall, Santan Hall, Suite #230, Mesa, AZ 85212
p: 480-727-1586 **f:** 480-727-1961 **email:** wpcarey.Morrison@asu.edu **web:** www.wpcarey.asu.edu

ASU W. P. Carey School of Business
Arizona State University

To:
Iryna Printezis

September 18, 2018

Dear Iryna Printezis,

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Printezis, Iryna, and Carola Grebitus. "Marketing Channels for Local Food." *Ecological Economics* 152 (2018): 161-171.

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Author of article: ___ Printezis Iryna & Grebitus Carola _____
Periodical Title: ____ Ecological Economics_____
Volume: __152___ Date: __October 2018_____ Pages: ____161-171_____

This request grants permission to Iryna Printezis to include the content of the above-mentioned article to her dissertation, here at the Arizona State University. With this permission, the article can be included into dissertation, whether in full or in part, and submitted to the university's repository in either print or electronic form.
If you have any questions, please feel free to contact me at Carola.Grebitus@asu.edu.

Sincerely,
Dr. Carola Grebitus
Ass. Prof. Food Industry Management
Morrison School of Agribusiness
Arizona State University | W. P. Carey School of Business

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APPENDIX F

IRB APPROVAL LETTER

ASU Knowledge Enterprise Development

EXEMPTION GRANTED

Carola Grebitus
Agribusiness, Morrison School of
480/727-4098
Carola.Grebitus@asu.edu

Dear Carola Grebitus:

On 7/12/2017 the ASU IRB reviewed the following protocol:

Type of Review:	Initial Study
Title:	Consumer behavior towards community gardens—the role of food security
Investigator:	Carola Grebitus
IRB ID:	STUDY00006512
Funding:	Name: USDA: National Institute of Food and Agriculture (NIFA), Grant Office ID: TKS0220, Funding Source ID: FP00001496; Name: National Science Foundation (NSF), Grant Office ID: TKS0220, Funding Source ID: NSF 13-607
Grant Title:	TKS0220; TKS0220;
Grant ID:	TKS0220; TKS0220;
Documents Reviewed:	• Proposal, Category: Sponsor Attachment; • consent, Category: Consent Form; • Protocol, Category: IRB Protocol; • Survey, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • Proposal, Category: Sponsor Attachment;

The IRB determined that the protocol is considered exempt pursuant to Federal Regulations 45CFR46 (2) Tests, surveys, interviews, or observation on 7/12/2017.

In conducting this protocol you are required to follow the requirements listed in the INVESTIGATOR MANUAL (HRP-103).

Knowledge Enterprise Development

EXEMPTION GRANTED

Timothy Richards
Agribusiness, Morrison School of
480/727-1488
trichards@asu.edu

Dear Timothy Richards:

On 2/11/2016 the ASU IRB reviewed the following protocol:

Type of Review:	Initial Study
Title:	Local Foods: Overcoming Constraints to Growth
Investigator:	Timothy Richards
IRB ID:	STUDY00003783
Funding:	Name: USDA: National Institute of Food and Agriculture (NIFA), Grant Office ID: Not assigned yet, Funding Source ID: 2015-07543
Grant Title:	Not assigned yet;
Grant ID:	Not assigned yet;
Documents Reviewed:	• Richards_Local_Foods_Recruit_Script.pdf, Category: Recruitment Materials; • Local Foods Cover Letter, Category: Consent Form; • Sample Questions, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • Local Foods Protocol, Category: IRB Protocol; • AFRI_Local_Food_Project_Description.pdf, Category: Sponsor Attachment;

The IRB determined that the protocol is considered exempt pursuant to Federal Regulations 45CFR46 (2) Tests, surveys, interviews, or observation on 2/11/2016.

In conducting this protocol you are required to follow the requirements listed in the INVESTIGATOR MANUAL (HRP-103).

Sincerely,

Susan Metosky