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OPEN ACCESS

International Food and Agribusiness Management Review
Volume 20 Issue 3, 2017; DOI: 10.22434/IFAMR2016.0143

Received: 18 August 2016 / Accepted: 11 January 2017

Influence of product type and individuals' perceptions on the geographic boundary for local products

RESEARCH ARTICLE

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Abstract

Over the past couple of decades, consumers have begun to increase purchasing of locally labeled products. However, research has shown their definition of local production is not always accurate and varies by product category. This study investigates consumers' perceptions of the geographic boundary for local fruits/vegetables and ornamental plants. A multinomial logit model is used to assess how consumers' perceptions and perceived characteristics of local product attributes/factors (e.g. freshness, support local community, etc.) influence their understanding of geographic boundaries of local. Results are applicable to producers and retailers in their efforts to obtain portions of the local market. They are also pertinent to policy makers as they determine relevant regulations and definitions of local products.

Keywords: green industry, local labeling, produce
JEL code: Q13

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1. Introduction

During the last decade, growing environmental and social awareness has increased consumers' desire for products that are perceived as environmentally and/or socially responsible. Locally and organically grown products have seen an upsurge in demand given they generally are perceived to convey these characteristics (Campbell *et al.*, 2014; Darby *et al.,* 2008; Essoussi and Zahaf, 2008; Onozaka *et al.,* 2010; Ritson and Oughton, 2007; Yue and Tong, 2009). Particularly, the term 'locally grown' has received a large amount of attention which is demonstrated by every state having some type of marketing program devoted to increasing local sales (Onken and Bernard, 2010). However, many of the state-based local marketing and regulatory efforts have been focused on food-related products. For instance, by 2020 the state of Connecticut aims to have 5% of their total food sales sourced locally (Governor's Council for Agricultural Development, 2011). Similarly, the National Grocers Association (2015) indicates that 'more locally grown foods' is the second most desired improvement among grocery shoppers at 32.1%, behind 'price/cost savings.' In 2012, 7.8% of U.S. farms (163,675 farms) were producing/marketing local foods and U.S. demand for local food was valued at $6.1 billion (Low *et al.*, 2015). Perceived benefits of local foods include less transportation miles, more environmentally friendly, lower carbon footprint, longer shelf life, less greenhouse gas emissions, fresher, more community support (i.e. revenue and jobs), and not being associated with corporate production/marketing entities (Campbell *et al.*, 2014; Darby *et al.*, 2008). Consequently, consumers are often willing to pay premiums for local produce (Darby *et al.*, 2008; Onozaka and McFadden, 2011).

Despite reported preference, perceived benefits, and premiums associated with local foods, little research has focused on the meaning of local when applied to non-food products such as ornamental plants. State promotional programs often do not include ornamental plants within their guidelines even given the economic importance of the green industry (Hodges *et al.*, 2015). Three notable exceptions are the 'Jersey Grown,' 'Texas Superstar' and 'Fresh from Florida' programs. Research has shown that using the state promotional program on ornamental plants increases consumers' willingness-to-pay (Collart *et al.*, 2010) and purchase likelihood (Rihn *et al.*, 2015). Specifically, Collart *et al.* (2010) determined the Texas Superstar program has low consumer awareness but garners a 10% premium compared to unbranded plants. Rihn *et al.* (2015) found consumers were more likely to purchase indoor foliage plants that were promoted using the 'Fresh from Florida' brand. Other studies investigated local origins of plants without using a state specific marketing program or geographical boundaries. Yue *et al.* (2011) and Behe *et al.* (2013) found that consumers prefer local plants to those grown elsewhere. However, consumers' interest in local plants (Behe *et al.*, 2013; Collart *et al.,* 2010; Rihn *et al.*, 2015; Yue *et al.*, 2011) does little to explain how they define local when considering plants and what benefits influence their definitions.

As noted in Feldmann and Hamm's (2015) literature review of local, the influence of product type on consumer perceptions of local needs to be investigated. Notably, the perceived benefits and geographic boundaries associated with local produce versus local plants should be compared. This study attempts to fill some of the gap in the literature. Our overarching objective was to examine whether local produce would have more perceived benefits and a more confined geographic boundary compared to local plants. Specifically, we were interested in the perception that purchasing local supports the local economy. We hypothesize that consumer's view supporting the local economy as a larger factor in purchasing local produce compared to plants given the visibility of local labeling campaigns on produce. Furthermore, we hypothesize that demographics and retail outlet will impact the perception of the geographic boundary for local produce and plants. Following the results of Campbell *et al.* (2013), we expected race, education, gender, and retail shopping environment to contribute to a consumer's boundary of local produce. We expect females to have a state or regional boundary of local since they are potentially more exposed to local products. Higher educated consumers were anticipated to perceive state and 50-100 mile boundaries given increased education may result in more exposure to media. We expected that consumers shopping at supermarkets, grocery stores, and wholesale clubs would have a broader boundary for local produce given these stores might have their own definitions. In comparison, we expect the factors driving the local boundary for plants to be similar in significance and magnitude as those driving the boundary for local produce. Answering the above questions will not only

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assist in clarifying consumers' definitions of local, but can be used by researchers, policy makers and retail firms as they study, educate, legislate and promote local products to the end consumer. The next section discusses literature related to the definition of local, followed by a section on the study's methodology, the empirical results, and a conclusion.

2. Literature review – defining local

The term local can have diverse connotations depending on place, culture and lifestyle (Carroll and Fahy, 2015). According to the 2008 Food, Conservation, and Energy Act (2008 Farm Act), local or regionally produced food must have travelled less than 400 miles or be sold within the state where it was produced (Martinez *et al.*, 2010). Despite having a governmental issued description, many studies show there is a clear lack of definition of what local food is among consumers and supply chain members (Campbell *et al.,* 2013, 2014; Carroll and Fahy, 2015; Dunne *et al.*, 2011; Martinez *et al.*, 2010; Pearson *et al.*, 2011). However, previous definitions and perceptions of local have consistently been connected to transportation distance(s), other production method attributes, and retail outlets.

Less transportation distance is one of the main attributes associated with local production (Campbell *et al.,* 2013, 2014; Carroll and Fahy, 2015). Given local is defined as decreased transportation distance, many consumers perceive local to be associated with helping the local economy and increased product quality, freshness, and shelf life (Campbell *et al.*, 2014; Darby *et al.*, 2008). However, the definition of distance by consumers and businesses varies greatly due to a variety of factors including product type and availability, connections to local producer/community, population density, and relative geographic size of respondents' location (Carroll and Fahy, 2015; Dunne *et al.*, 2011). Many studies use state and regional boundaries to define origin, but distance tends to be subjective and dependent upon state size. For instance, Carroll *et al.* (2013) found consumers in geographically larger states (i.e. Virginia, Pennsylvania, Maryland) prefer tomatoes promoted as local over those promoted using the state promotional program. Conversely, consumers in smaller states (i.e. New Jersey, Delaware) prefer the state promotional program to local promotions. Darby *et al.* (2008) found consumers do not differentiate between in-state and nearby ('within an undefined sub-state region') origins. But when 'in-state' and 'nearby' are combined (termed local), consumers were willing to pay premiums for local products when compared to those grown in the U.S. or of an unidentified origin. This variance also extends to food retailers who frequently include several states in their definitions of local (Dunne *et al.*, 2011).

Consumers' definitions and perceptions of local are often intermixed with other production methods/characteristics that are perceived as environmentally friendly (Campbell *et al.*, 2013; Onozaka and McFadden, 2011). In a recent study, Campbell *et al.* (2013) investigated consumers' understanding and perceptions of local and organic foods in regard to production characteristics. Local was predominantly defined as decreased transportation miles, whereas organic was defined as food produced without synthetic pesticides. Furthermore, consumers with accurate definitions of local and organic shared a similar demographic profile, while consumers with misguided perceptions did not. Onozaka and McFadden (2011) determined locally grown tomatoes were valued the most by consumers which was heightened when local production was combined with fair trade certification. However, if local production negatively impacted the environment (i.e. carbon-intensive), the products had a much more severe discount than those from other origins suggesting that environmental concerns could be a core component to local products (Onozaka and McFadden, 2011). Adams and Salois (2010) argue that the demand for local products arose due to organic production becoming incorporated and therefore not benefiting the small farmer or local community. Supporting evidence from Lang *et al.* (2014) shows that (in addition to less transportation distance) consumers associate smaller independent growers/manufacturers, family owned and operated, and unique to the region as elements of local.

Retail outlet selection also influences consumers' perceptions of the availability of local products. For instance, most consumers expect farmers market to sell local foods, while natural food stores and local independent supermarkets are ranked equally likely to sell local foods (Lang *et al.*, 2014). Consumers are

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often willing to pay premiums for local products sold at farmers markets (Onken *et al.*, 2011), even though local products at farmers markets are not perceived as being more expensive than products from other origins (Brown, 2003). Shopping at farmers markets has perceived benefits of higher food quality/freshness, safer food, and support for local farmers (Brown, 2003; Conner *et al.*, 2010). Nevertheless, there is very little research on the cumulative interactions of consumers' perceptions of local and how they vary by product type, particularly plants. Notably, there is a lack of information on what local means when applied to plants and the geographic boundary associated with local plants.

3. Methodology

Data was collected via a web-based survey. A total of 1,124 residents of Connecticut completed the survey which equated to a 90% response rate. Connecticut was chosen in order to comply with funding agency requirements. Additionally, Connecticut offers an interesting case given it has a strict definition of local that is heavily geared toward food products, but there is no plant-specific definition. Respondent were obtained from the database of Global Market Insight, Inc. (GMI) and were diverse but representative of Connecticut's population as a whole. Respondents were emailed an invitation to participate in the survey by GMI. Upon agreeing to participate, participants were directed to the online survey. Survey questions included standard socio-demographic questions, as well as questions on perceived benefits of local produce and plants, purchase behavior, and perceptions of geographic boundaries of local produce and ornamental plants.

In order to assess local geographic boundary perceptions, respondents were asked to choose which boundary best corresponded to their view of local. Of the 1,124 respondents that purchased produce, only 648 answered the plant questions given only those indicating they had recently purchased plants were asked to answer the plant questions. The geographic boundary options included my neighborhood/town/city or in a neighboring town/city, within 50-100 miles, Connecticut, Connecticut or a small distance into a neighboring state, Northeastern U.S., East Coast of the U.S., and anywhere in the U.S. These boundaries are similar to those used by Campbell *et al.* (2013) in their assessment of local food. Respondents were also asked to rate (on a 0-100 point scale where 0=not important; 100=very important) how potential benefits of local (i.e. freshness, price, supports the local economy, safe to eat, environmentally friendly, healthy, open space preservation, and preserve farming for future generations) impacted their decision to purchase local produce and plants. The survey instruments for this study were evaluated and approved by the institution's Internal Review Board.

Econometric model

The estimation was conducted using a multinomial logit model (MNL). Participants were presented with j = 1, ...J different geographical definitions of local and they were asked to choose the boundary that they perceived as correct. The MNL model was chosen over the ordered logit model given that the geographical boundaries were not strictly ordered, meaning that some boundaries overlap and cannot be definitively ordered. Further, a deviance test indicated that MNL was an appropriate model compared to ordered logit. Considering a respondent i facing j=1, ..., j definitions of local, the indirect utility function for respondent i, from choosing definition j, is given by the following expression:

$$U_{ij} = X_{ij}\beta + \varepsilon_{ij} \qquad \text{i=1,....,J} \tag{1}$$

where X_{ij} represents the participant's demographic characteristics, different shopping locations, and respondent's beliefs about local products. The respondent will choose the definition that gives him/her the highest utility. As noted by Greene (2003: 721), the probability of choosing choice j can be represented as:

$$Prob(Y_i = j) \mid x_i) = \frac{e^{\beta_j' x_i}}{1+\sum_{k=1}^{J} e^{\beta_k' x_i}} \tag{2}$$

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The marginal effect were then calculated by taking partial derivatives with respect to each explanatory variable. Marginal effects for continuous variables were calculated at the mean while categorical explanatory variable marginal effects were calculated based on a change from zero to one.

4. Data

Table 1 summarizes the sample's socio-demographic variables. Based on the sample characteristics, the sample was 88% Caucasian with an average income of $87,704. The sample's median age was 53 and 63% were female. Given variances are not provided for the Connecticut (CT) Census data estimates, testing whether our sample is statistically different from the CT population cannot be performed. However, our sample appears to over-represent Caucasians (82% CT) and higher income households ($75,000 CT). Our sample also has a higher median age of 53 years (compared to 43 years from CT census). However, the age variable is not directly comparable as the CT census counts persons under 18 years of age while our survey was limited to persons 18 years of age or older. Furthermore, oversampling females is in line with shopping patterns since they are the primary household shoppers (Private Label Manufacturers Association, 2013).

In addition to the socio-demographic questions, respondents were given several geographical distances to define the term local and were asked to select the one that they consider the most appropriate, based on their personal views of local. Table 2 summarizes the different geographical definitions of local used in the survey and the corresponding percentage of people choosing each boundary. The highest percentage of respondents indicated that CT was local (32% for produce and plants, respectively), followed by CT and a small portion of the surrounding states, and then 50-100 miles between production and point-of-sale. Roughly a quarter of respondents selected a broader geographical boundary (i.e. surrounding states or greater) at 27% for produce and 24% for plants. Based on CT law, the correct geographical boundary is produced in CT or within 10 miles of point-of-purchase, which can include a small area in neighboring states (Connecticut General Assembly, 2012).

Finally, given that environmental, moral and health concerns are often important for local food choice, participants indicated the importance of perceived benefits when purchasing locally grown produce and plants (Table 3). One of our main hypothesis was that supporting the local economy would be seen as a larger benefit for produce compared to plants. However, we find no statistical difference between the rating for produce and plants. With respect to the other perceived benefits, freshness was most important, regardless of product type. Consumption characteristics were more important for produce (i.e. safe to eat, healthiness). Conversely, for local plants, supporting the local economy and price were perceived as more important than consumption related traits.

Table 1. Demographic characteristics of the sample.

Number of respondents		1,124
Gender	Male	37%
	Female	63%
Age		53
Average income		$87,704
Ethnicity	Caucasian	88%
	African American	4%
	Hispanic	8%
Primary shopper	Yes	70%

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Table 2. Respondents' boundary of 'local'.[1,2]

Definition	Fruit/vegetable characteristic	Plant characteristic
Produced in:		
1. My neighborhood, town/city, or in a neighboring town/city	6%	7%
2. Within 50-100 miles of point-of-sale	17%	17%
3. Connecticut	32%	33%
4. Connecticut or a small distance into a neighboring state	18%	18%
5. A neighboring state	9%	9%
6. Northeastern U.S.	7%	9%
7. East coast of the U.S.	5%	4%
8. Anywhere in the U.S.	6%	3%***
Total responses[3]	1,124	648

[1] The survey question was 'Which definition below do you feel is an appropriate boundary for fruit/vegetables to be considered locally produced?' For the plant question, plant was substituted for fruit/vegetables. Measurement error could have been introduced if respondents answered in a way that was inconsistent with their perceptions; however, there is no way to accurately measure this error if it exists.

[2] A *t*-test was used to test for significant differences; *** denotes significance at the 0.01 level.

[3] Only individuals who had purchased plants recently (n=648; 58% of the sample) were asked to define the boundary for local plants.

Table 3. Respondents' perceived benefits of 'local' products.[1,2]

Perceived benefits	Fruit/vegetable (mean %)	Plant (mean %)
Freshness	88	83***
Price	74	79***
Supports the local economy	81	80
Safe to eat	84	64***
Environmentally friendly	69	71
Healthy	81	77***
Open space preservation	61	64*
Preserve farming for future generations	74	72

[1] Beliefs were phrased as 'How important are the following characteristics to your decision to purchase locally grown fruits and vegetables (plants)?' with a 0-100 point scale (0=not important; 100=very important).

[2] A *t*-test was used to test for significant differences as significance at the 0.01, 0.05, and 0.1 level are denoted by ***, **, *.

5. Empirical results

In this section the marginal effects of the MNL regression analysis are discussed. The marginal effects demonstrate how the independent variables (e.g. expenditures, perceived benefits, socio-demographics, and retail outlets) influence respondents' geographical boundary of local (as described in Table 2). The relationships and boundaries of local for produce and plants are described separately.

Local fruit and vegetable boundary results

Local produce expenditures influence respondents' geographical boundaries of local. A $1 increase in a respondent's expenditure on local produce decreases the likelihood of defining local as his/her own neighborhood by 0.01% (Table 4). Interestingly, respondents who spent more on local produce were more likely to select East Coast and 'anywhere in the U.S.' as local.

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Table 4. Marginal effects of utility parameters for the boundary of local fruits and vegetables.[1]

Variables	My neighborhood (1)	50-100 miles (2)	Connecticut (3)	Connecticut + portion of neighboring state (4)	Neighboring state (5)	Northeast U.S. (6)	East coast U.S. (7)	Entire U.S. (8)
Total expenditure[2]	-0.0001**	-0.0001	0.0000	0.0000	0.0000	0.0000	0.0000*	0.0001***
	(0.032)	(0.461)	(0.970)	(0.618)	(0.328)	(0.680)	(0.085)	(0.002)
Perceived benefits								
Freshness	-0.0008	-0.0002	0.0006	0.0014	0.0008	0.0005	-0.0017***	-0.0007
	(0.179)	(0.842)	(0.647)	(0.190)	(0.157)	(0.303)	(0.000)	(0.111)
Price	-0.0002	0.0000	0.0004	-0.0007	-0.0002	0.0000	0.0006**	0.0000
	(0.652)	(0.965)	(0.579)	(0.262)	(0.392)	(0.842)	(0.029)	(0.926)
Supports local economy	-0.0006	-0.0013	0.0003	0.0009	0.0006	0.0002	0.0005	-0.0008*
	(0.258)	(0.121)	(0.757)	(0.278)	(0.150)	(0.477)	(0.134)	(0.068)
Healthiness	0.0001	0.0006	-0.0001	-0.0011	-0.0003	0.0002	0.0005	0.0000
	(0.845)	(0.500)	(0.937)	(0.173)	(0.423)	(0.637)	(0.185)	(0.922)
Open space preserving	-0.0003	0.0006	0.0000	-0.0005	-0.0006**	0.0001	-0.0001	0.0008***
	(0.358)	(0.338)	(0.996)	(0.444)	(0.037)	(0.551)	(0.654)	(0.005)
Environ. friendliness	0.0007	0.0000	-0.0015*	-0.0006	0.0007**	0.0003	0.0003	0.0002
	(0.122)	(0.973)	(0.096)	(0.398)	(0.017)	(0.350)	(0.401)	(0.620)
Farm preserving	-0.0004	-0.0009	0.0017*	0.0003	0.0001	-0.0004	-0.0005	0.0001
	(0.383)	(0.232)	(0.084)	(0.682)	(0.773)	(0.136)	(0.174)	(0.721)
Demographics								
Age	-0.0006	0.001	0.0002	0.0003	0.0004	-0.0008**	-0.0012***	0.0007
	(0.278)	(0.320)	(0.880)	(0.760)	(0.438)	(0.035)	(0.006)	(0.115)
Number of children	0.0083	-0.0163	0.0032	0.0151	-0.005	-0.0151*	-0.0042	0.0139***
	(0.239)	(0.339)	(0.868)	(0.301)	(0.498)	(0.063)	(0.599)	(0.004)
Income	0.0002*	-0.0001	0.0004	-0.0004	0.0001	0.0000	0.0001	-0.0003**
	(0.072)	(0.804)	(0.257)	(0.136)	(0.543)	(0.974)	(0.355)	(0.019)
Male	-0.0121	0.0619**	-0.0552	-0.0048	-0.0232*	0.0162	0.013	0.0043
	(0.365)	(0.036)	(0.115)	(0.872)	(0.058)	(0.202)	(0.373)	(0.748)
Caucasian	-0.0215	0.0258	-0.0539	0.0879**	0.0151	0.0013	0.0096	-0.0644*
	(0.415)	(0.577)	(0.368)	(0.044)	(0.434)	(0.948)	(0.625)	(0.063)
African American	0.0623	0.014	-0.112	0.0477	-0.0847***	0.0664	-0.0023	0.0086
	(0.330)	(0.875)	(0.214)	(0.681)	(0.000)	(0.299)	(0.949)	(0.754)
Single family house	-0.0054	-0.0286	0.0159	0.0027	0.0093	0.0103	-0.013	0.0087
	(0.803)	(0.459)	(0.717)	(0.942)	(0.539)	(0.430)	(0.460)	(0.519)
Suburban area	-0.0540***	-0.0537*	0.0604	0.0511*	0.0048	-0.0058	0.0139	-0.0167
	(0.007)	(0.093)	(0.105)	(0.090)	(0.710)	(0.644)	(0.357)	(0.289)
Metropolitan area	-0.0238	-0.0103	0.0031	-0.0077	0.0013	-0.0158	0.0133	0.0399
	(0.148)	(0.837)	(0.964)	(0.892)	(0.958)	(0.331)	(0.694)	(0.189)

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Table 4. Continued.

Variables	My neighborhood (1)	50-100 miles (2)	Connecticut (3)	Connecticut + portion of neighboring state (4)	Neighboring state (5)	Northeast U.S. (6)	East coast U.S. (7)	Entire U.S. (8)
Education								
Some college	-0.008	-0.0067	-0.0405	0.0588	0.0189	0.0008	0.0062	-0.0295**
	(0.674)	(0.878)	(0.424)	(0.286)	(0.438)	(0.966)	(0.755)	(0.016)
Bachelor degree	-0.0225	-0.0047	-0.1136**	0.1644***	0.0109	0.016	-0.0194	-0.0313**
	(0.232)	(0.915)	(0.024)	(0.005)	(0.636)	(0.448)	(0.255)	(0.020)
Graduate degree	-0.03	0.0564	-0.0998*	0.1165*	-0.0011	0.019	-0.0273*	-0.0336**
	(0.114)	(0.251)	(0.053)	(0.056)	(0.959)	(0.390)	(0.093)	(0.012)
Local retail outlets								
If primary shopper	-0.0182	0.0161	-0.0300	0.0202	-0.0067	0.0037	0.0073	0.0076
	(0.272)	(0.567)	(0.419)	(0.509)	(0.634)	(0.748)	(0.579)	(0.547)
Farms	-0.0293	0.0312	0.0083	0.0664	-0.0306**	-0.0247	-0.0096	-0.0117
	(0.124)	(0.694)	(0.925)	(0.396)	(0.050)	(0.153)	(0.747)	(0.603)
Other locations	0.0907	0.017	-0.1247	-0.1268	-0.0252	0.0486	0.0975	0.0229
	(0.402)	(0.908)	(0.416)	(0.115)	(0.469)	(0.510)	(0.496)	(0.755)
Specialty stores	-0.0469***	0.0012	0.1664	-0.0113	-0.0212	-0.0766***	-0.0104	-0.0012
	(0.000)	(0.988)	(0.100)	(0.877)	(0.312)	(0.000)	(0.703)	(0.968)
Supermarket	-0.0255	0.0304	0.0424	-0.0108	-0.0372**	0.0009	0.0105	-0.0107
	(0.212)	(0.587)	(0.520)	(0.836)	(0.031)	(0.966)	(0.696)	(0.583)
Grocery stores	-0.0208	0.0635	0.0413	-0.022	-0.0350**	-0.0001	-0.0053	-0.0217
	(0.317)	(0.261)	(0.528)	(0.672)	(0.041)	(0.997)	(0.833)	(0.259)
Wholesale clubs	-0.0342*	0.1466	-0.0966	0.0133	-0.0173	-0.013	0.0032	-0.0021
	(0.085)	(0.143)	(0.263)	(0.861)	(0.375)	(0.591)	(0.931)	(0.942)
Number of obs.	1,124	1,124	1,124	1,124	1,124	1,124	1,124	1,124

[1] Number in brackets indicates the coefficient's *P*-value. *, **, and *** denote statistical significance at 10, 5 and 1%, respectively; dependent variables were the various definitions of 'local' for fruits and vegetables as defined in Table 2.

[2] We used the method discussed in Terza *et al.* (2008) to better understand whether expenditure explains boundary or vice versa. Results of the test indicate that expenditure explains boundary; thereby, expenditure was treated as an explanatory variable in the model.

When considering the correlation between respondents' definitions of local and the perceived benefits of local production, several patterns emerge. Respondents who perceive local as fresher are 0.17% less likely to define local as the East Coast. If respondents perceived local as being more expensive they were more likely to define local as including the East Coast. Not surprisingly, perceptions of local produce helping the local economy reduce the likelihood of respondents' defining local as the entire U.S. by 0.08%. However, if respondents perceive local produce as preserving open space, they are 0.06% less likely to define local as the neighboring state, but 0.08% more likely to define local as the entire U.S. Respondents who perceive local products as environmentally friendly are less likely to define local as just CT but more likely to include neighboring states in their definition of local produce. If farm preservation is a perceived benefit, respondents are 0.17% more likely to select CT as their geographical definition of local.

Regarding the correlation between the boundary of local and respondents' socio-demographic variables, respondents who had a higher income or were less likely to live in a suburb were more likely to define the

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local boundary as one's neighborhood (Table 4). Males and respondents living in non-suburban areas were more likely to view the boundary of local as 50-100 miles from the retail outlet. Respondents with bachelors and graduate degrees were less likely to define the boundary of local as grown within CT. Caucasian, living in a suburb, and highly educated respondents were more likely to perceive CT and a small portion of the neighboring state(s) as the boundary for local. Females and non-African Americans were more likely to view the local boundary as a neighboring state. Younger respondents and respondents with fewer children in the household were more likely to perceive the boundary for local to be the Northeast U.S. Younger respondents and those not having a graduate degree were more likely to view the East Coast of the U.S. as the local boundary. Lower income respondents, those having more children living in the household, being non-Caucasian (compared to the other ethnicity), and not having some college perceived the boundary for local to be the entire U.S.

Respondents' typical shopping locations influenced their probability of selecting the various local geographic boundaries. If respondents primarily shop at specialty stores or wholesale clubs they were less likely to define the boundary of local as 'my neighborhood'. If they purchase their produce from farms, supermarkets or grocery stores, they were less likely to define local as including the neighboring states. Lastly, if they shop at specialty stores, they were 7.66% less likely to define local as 'Northeast U.S.'.

Taking all the results above in aggregate provides some interesting implications. Notably, our hypotheses were accurate for the most part. Caucasian respondents tended to have a smaller boundary for local which correlated with the CT state mandated definition. Females tended to have an increased boundary for local while higher educated respondents had a smaller boundary. However, contrary to our expectation, retail outlet provided little information that can be viewed to provide implications. Based on these results, firms need to examine their clientele to better understand the demographics they serve in order to provide information that educates their respondents with the definitions of local the firm is using.

Local plant definition results

The investigation of local plant definitions showed that expenditures on local plants influence respondents' geographical boundary definitions of local plants. Specifically, a $1 increase reduced the likelihood of defining the boundary of local as their neighborhood by 0.02% but increased the selection of neighboring states by 0.01% (Table 5). Most of the coefficients of expenditure were not significant, except for the neighboring state boundary whereby increased expenditure had a positive effect.

Respondents that define local as preserving farmland were less likely to consider 50-100 miles from the retail outlet as being local. Respondents who perceived price as being an important part of the purchase decision for local produce were more likely to consider grown in CT as the boundary of local plants. Respondents' perceiving supporting the local economy as important to the local purchase decision were less likely to consider CT as the boundary for local. Individuals who perceive local as preserving open space were less likely to believe that local was defined as CT and a portion of the neighboring state(s); however, respondents who viewed local as environmentally friendly, were more likely to have an accurate, as defined by the state of CT, definition that local is CT grown and a portion of a neighboring state(s). If the respondent identified local as being less expensive or supporting the local economy, then s/he was less likely to perceive that neighboring state(s) are local.

Regarding the relationship between respondents' socio-demographics and their definitions of local plants, younger respondents were more likely to define local plants as being grown in 'my neighborhood', while respondents that males and non-metropolitan respondents were more likely to consider 50-100 miles from the retail outlet as the boundary for local. Furthermore, females were more likely to consider grown in CT as the boundary for local. Higher income respondents were more likely to perceive the CT plus a portion of a neighboring state as the boundary. African Americans were less likely to perceive regional (i.e. 'Northeast

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Table 5. Marginal effects of utility parameters on the boundary of local plants.[1]

Variables	My neighborhood (1)	50-100 miles (2)	Connecticut (3)	Connecticut + portion of neighboring state (4)	Neighboring state (5)	Northeast U.S. (6)	East coast U.S. (7)	Entire U.S. (8)
Total expenditure[2]	-0.0002***	0.0000	0.0001	0.0001	0.0001**	0.0000	0.0000	0.0000
	(0.000)	(0.873)	(0.267)	(0.541)	(0.028)	(0.828)	(0.441)	(0.123)
Perceived benefits								
Freshness	-0.0005	-0.0005	0.0008	-0.0004	0.0008	0.0003	-0.0003	-0.0001
	(0.445)	(0.602)	(0.540)	(0.667)	(0.313)	(0.727)	(0.404)	(0.724)
Price	0.0000	-0.0008	0.0025**	-0.0004	-0.0010**	-0.0004	0.0000	0.0001
	(0.937)	(0.329)	(0.035)	(0.576)	(0.026)	(0.558)	(0.950)	(0.703)
Supports local economy	-0.0009	0.0008	-0.0027*	0.0006	0.0013*	0.0004	0.0007*	-0.0003
	(0.128)	(0.415)	(0.051)	(0.581)	(0.072)	(0.565)	(0.099)	(0.241)
Healthiness	0.0005	0.001	-0.0013	0.0003	-0.0001	-0.0003	0.0000	-0.0001
	(0.275)	(0.276)	(0.189)	(0.699)	(0.826)	(0.679)	(0.866)	(0.665)
Open space preserving	0.0005	0.0011	0.0006	-0.0017*	-0.0004	-0.0003	0.0004*	-0.0001
	(0.481)	(0.261)	(0.602)	(0.065)	(0.403)	(0.683)	(0.070)	(0.728)
Environ. friendliness	-0.0009	-0.0004	-0.0017	0.0021*	-0.0003	0.0007	0.0002	0.0003
	(0.104)	(0.639)	(0.208)	(0.057)	(0.658)	(0.277)	(0.560)	(0.247)
Farm preserving	0.0008	-0.0025***	0.0017	0.0011	0.0006	-0.0012	-0.0006	0.0001
	(0.216)	(0.009)	(0.209)	(0.334)	(0.320)	(0.130)	(0.110)	(0.732)
Demographics								
Age	-0.0014**	0.0014	0.0000	0.0015	-0.0003	-0.001	0.0000	-0.0002
	(0.022)	(0.323)	(0.997)	(0.306)	(0.774)	(0.262)	(0.994)	(0.598)
Number of children	-0.0038	-0.0022	-0.0017	0.0056	-0.0047	-0.0095	0.0125*	0.0039
	(0.702)	(0.926)	(0.948)	(0.802)	(0.752)	(0.575)	(0.076)	(0.480)
Income	-0.0001	-0.0004	0.0004	0.0005*	-0.0003	-0.0001	0.0001	-0.0002*
	(0.614)	(0.305)	(0.310)	(0.089)	(0.150)	(0.795)	(0.571)	(0.069)
Male	-0.0015	0.0828**	-0.0813*	0.0452	-0.0364*	0.0014	-0.0104	0.0003
	(0.928)	(0.030)	(0.086)	(0.245)	(0.070)	(0.960)	(0.454)	(0.976)
Caucasian	-0.0214	0.0347	0.0956	0.0337	0.0424	-0.0974	-0.0429	-0.0446
	(0.503)	(0.602)	(0.241)	(0.626)	(0.194)	(0.146)	(0.277)	(0.236)
African American	-0.0084	-0.1067	-0.0607	0.0589	0.2053	-0.0693**	-0.0122	-0.0068
	(0.826)	(0.177)	(0.727)	(0.734)	(0.377)	(0.048)	(0.538)	(0.654)
Single family house	0.009	-0.0152	-0.0621	0.0454	0.0604***	0.0225	-0.0578	-0.0023
	(0.644)	(0.812)	(0.428)	(0.414)	(0.006)	(0.517)	(0.138)	(0.851)
Suburban area	-0.0272	-0.063	0.0523	0.0453	-0.0044	-0.0054	0.0029	-0.0004
	(0.186)	(0.106)	(0.297)	(0.224)	(0.847)	(0.858)	(0.850)	(0.972)
Metropolitan area	-0.0192	-0.0890*	0.0897	-0.0121	0.0278	-0.0015	0.0039	0.0003
	(0.323)	(0.065)	(0.380)	(0.882)	(0.637)	(0.979)	(0.887)	(0.984)

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Table 5. Continued.

Variables	My neighborhood (1)	50-100 miles (2)	Connecticut (3)	Connecticut + portion of neighboring state (4)	Neighboring state (5)	Northeast U.S. (6)	East coast U.S. (7)	Entire U.S. (8)
Education								
Some college	-0.0096	-0.0454	-0.0797	-0.0488	0.0823	0.1100	0.0167	-0.0255***
	(0.682)	(0.387)	(0.300)	(0.398)	(0.248)	(0.261)	(0.617)	(0.006)
Bachelor degree	-0.0017	-0.0535	-0.0952	-0.0299	0.0724	0.1169	0.0059	-0.0147
	(0.947)	(0.310)	(0.222)	(0.632)	(0.310)	(0.236)	(0.832)	(0.166)
Graduate degree	-0.0148	-0.0137	-0.1203	-0.0348	0.0969	0.0920	0.0026	-0.0079
	(0.567)	(0.808)	(0.119)	(0.566)	(0.203)	(0.307)	(0.927)	(0.429)
Local retail outlets								
If primary shopper	0.0448***	-0.0086	-0.0374	0.0492	-0.0569*	-0.0265	0.0228	0.0127
	(0.002)	(0.816)	(0.454)	(0.180)	(0.052)	(0.402)	(0.103)	(0.167)
Home improvement store	-0.0052	0.0146	-0.0949*	0.0044	0.0159	0.0532	-0.0014	0.0134
	(0.776)	(0.762)	(0.085)	(0.929)	(0.618)	(0.232)	(0.941)	(0.456)
Nursery greenhouse	0.0034	-0.0184	-0.0528	0.0464	-0.0096	0.0118	0.0237	-0.0044
	(0.857)	(0.629)	(0.290)	(0.303)	(0.697)	(0.708)	(0.242)	(0.676)
Supermarkets	-0.0049	-0.1297**	0.143	-0.0951	0.0225	0.0326	0.0033	0.0283
	(0.913)	(0.011)	(0.169)	(0.144)	(0.669)	(0.680)	(0.930)	(0.558)
Farms	0.015	0.0164	-0.1798**	0.0397	-0.0064	0.039	0.0033	0.0728
	(0.771)	(0.858)	(0.030)	(0.680)	(0.898)	(0.625)	(0.915)	(0.362)
Wholesale clubs	-0.0317	-0.0285	0.0175	0.0617	-0.0519*	-0.0236	0.0014	0.0551
	(0.151)	(0.666)	(0.851)	(0.484)	(0.075)	(0.659)	(0.959)	(0.299)
Observations	648	648	648	648	648	648	648	648

[1] Number in brackets indicates the coefficient's *P*-value. *, **, and *** denote statistical significance at 10, 5 and 1%, respectively; dependent variables were the various definitions of 'local' for plants as defined in Table 2.

[2] We used the method discussed in Terza *et al.* (2008) to better understand whether expenditure explains boundary or vice versa. Results of the test indicate that expenditure explains boundary; thereby, expenditure was treated as an explanatory variable in the model.

U.S.') as a local boundary for plants. Finally, lower income respondents were more likely to perceive 'entire U.S.' as a geographic boundary for local plants.

Shopping behavior also influenced respondents' definitions of local plants. If the respondent was the household's primary shopper, (s)he was 4.48% more likely to define local as his/her neighborhood but 5.69% less likely to define local as 'including neighboring states'. Supermarket shoppers were 12.97% less likely to define local as 50-100 miles, while home improvement store and farm shoppers were less likely to perceive CT plants as local.

Implications from the plant results are that the factors driving the boundary for local plants do not seem to be the same as factors for local produce. As with produce, female respondents were more likely to choose a larger boundary (i.e. state). However, we could find little pattern for race or education. As with produce, the retail outlet some significance, but provided little information that could guide industry stakeholders. Based on these findings it appears that there are differences in what drives a respondent's perception of local

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produce and plants. Firms (and policy makers) need to be aware of this fact and make decisions understanding that a one size fits all (for produce and plants) strategy that targets specific demographics may not work.

6. Conclusions

Our results provide insights into respondent perceptions of local in terms of geographical distances. Most respondents indicated that the boundary for local products are those grown in CT or CT and a portion of the surrounding states. This is not surprising when one considers the United States Department of Agriculture (USDA) definition of local (i.e. less than 400 miles or within the state of production) and the size of CT (roughly 70 miles wide and 110 miles long) which easily falls within the USDA definition of local. Future studies could address similar questions in states that exceed the USDA's definition of local to test the robustness of the results.

With respect to benefits, we find the perceived boundary for local produce and plants is similar. However, the degree by which respondents view certain benefits as important to their purchasing of local produce and plants vary. Given this difference between produce and plants, laws seemingly meant for food are being applied by consumers to non-food products. Further, there were several similarities in respondents' perceptions of local products, regardless of product type (i.e. produce, plants). Notably, in the empirical results respondents who used broader geographical areas to define local perceived local production as a means of preserving open space. However, although respondents rated preserving open space positively, they did not rate this benefit nearly as highly as other perceived benefits (e.g. freshness, supporting the local economy, etc.) There is an opportunity in future studies to assess respondent tradeoffs of perceived benefits of local and how those benefits influence purchasing behavior and willingness-to-pay. Additionally, a closer investigation of the relationships between perceived benefits of local production and the consistency of those perceptions across product categories could help explain this finding.

Results of this study are relevant for researchers, policy makers and retail firms. Results provide researchers with more information about the relationship between respondent perceptions and their definitions of local production. This information can be used in future studies on local production, labeling and marketing. From the policy maker's perspective, the results can help decision makers implement programs that provide support for the purchase of locally grown products. Our findings result in a better understanding of respondents' perceptions of locally grown products and can be used by policy makers to refine laws/regulations to insure local production aligns with respondent expectations. Results of this study will also provide businesses with critical information about why/how respondents are responding to local labeling. Notably, it allows retailers to understand the respondent trade-offs between local products so they can address respondent needs more appropriately.

Acknowledgements

'Funding has been provided by the Specialty Crop Block Grant Program of the Agricultural Marketing Service, U.S. Department of Agriculture, awarded and administered by the Connecticut Department of Agriculture'. Dr. Hoke's contribution to this paper is a result of his efforts and resources during his time as a Ph.D. student at the University of Connecticut.'

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