State and Retail Outlet Impact on Premiums for Locally Grown Berries

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Selected Paper prepared for presentation at the Agricultural & Applied Economics Association's 2014 AAEA Annual Meeting, Minneapolis, MN, July 27-29, 2014.

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Abstract:

Consumption of locally labeled products has increased dramatically over the last decade. As such it is essential to understand what consumers are willing to pay for locally produced products and to understand if differences are present between states. Using berries as a product category given their availability at a wide range of retail outlets, we examine whether consumers' willingness to pay for locally grown berries vary between farmer's markets, farm stands, and grocery stores. Adding to the literature, we also investigate the differences in willingness to pay at these outlets throughout the Northeast. Our results indicate that farmer's markets garner the highest premium followed by farm stands then grocery stores. We also see that locally grown berries at these outlets receive a significantly higher premium than berries grown in the Northeast, U.S. or outside the U.S. Further, we find that there are some states with varying willingness to pay values across retail outlet.

Key Words: Local labeling, Aronia berry, Willingness to pay

JEL Code: Q13

Retailers often use numerous messages to persuade consumers to purchase their products, such as locally or organically grown. With respect to locally grown products, sales reached $4.8 billion in the U.S. during 2008 (Low and Vogel 2011). As local labeling has become mainstream, federal and state regulations defining locally grown have been implemented. Federal regulations define local or regional as a 400 mile or less corridor where the final product is produced and sold or within the state of production (H.R. 6124 2008). However, as noted by Campbell et al. (2014) state regulations are often more specific and generally define local as within state boundaries or slightly into an adjacent state. The purpose of these state led initiatives is to increase demand for state grown products and either increase sales or garner price premiums.

As states, retailers, and producers market products as locally grown, consumers have become more aware of the term. Increased demand for local has led to a plethora of studies examining consumers' willingness to pay (WTP) for locally labeled products, see Darby et al. 2008; Hu, Woods, and Bastin 2009; Yue and Tong 2009; Onozaka and McFadden 2011). These studies have found price premiums for a wide array of products. Recent research has begun examining whether differences exist between WTP at varying retail outlets. Shi, House and Gao (2013) found that WTP for local at a farmer's markets and quality focused store were significantly higher than those at a price-conscious store.

This study builds on previous research in several different ways. First, we examine WTP for a variety of berries on the market, notably a popular new berry, aronia. Second, we not only examine the differences in WTP between locally grown berries at a farmer's market, grocery store and farm stand, but we also but we also compare WTP to for berries grown in the northeast, U.S. and outside the U.S. Differentiating WTP between locally grown product sold at a farmer's

market, farm stand, or grocery store is essential given the need by states to adopt strategies to increase demand at these outlets. Since some producers and consumers are developing regional foobs, there is a further need to understand how a regional label, i.e. grown in the Northeast, would be viewed. As noted by Hu et al. (2012) there is a WTP by some consumers for multi-state labeled products. Finally, we examine whether state differences exist for locally grown berry WTP at farmer's markets, farm stands, and grocery stores. The state effects are not perfect indicators of how state agencies are impacting WTP for locally grown berries, but it does provide an indicator of how Northeastern states are doing with respect to increasing WTP.

Methodology and Data

An online consumer survey was conducted to examine respondents' purchasing behavior of berries. Online surveys offer several advantages including being less expensive, faster, and more accurate data (McCullough 1998; Cobanoglu, Warde, and Moreo 2001; Dillman, Smyth, and Christian, 2009). Respondents with no internet access are generally excluded, however, 81% of the U.S. used the internet in 2012 (World Bank 2013). The survey consisted of three parts. First, respondents were asked to complete a choice based conjoint with four berry products plus a none of the above option. Second, respondents were asked to complete questions about their fresh fruit and berry consumption along with questions relating to their juice consumption. Finally, respondents' were asked demographic questions such as age, gender, state, education, income, number of adults/children in the household, etc.

Within the survey, the respondents were also randomly assigned to treatment groups where they were presented with varying health and taste information. Treatment one (T1) provided taste information about each of the berries, notably that "Aronia berry which has a

strong astringent (i.e. bitter) flavor." Treatment two (T2) consisted of health information indicating that "Most berries have high levels of antioxidants. According to United States Department of Agriculture studies aronia berries have two to four times the amount of antioxidants as the acai berry, goji berry, wild blueberries, and cranberries." Treatment three (T3) provided both the taste information as well as the health information. Treatment four (T4) was a control whereby no taste or health information was provided. Discussion of the treatment results are not presented in this paper.

Berry Market

Berries were chosen for a number of reasons. First, berry consumption has been rising in the U.S. over the last decade. According to USDA estimates, consumption of fresh raspberries, strawberries, and blueberries have seen continuous growth from 2002-2012. During this period, per capita consumption of raspberries, strawberries, and blueberries has increased by 440%, 67%, and 243%, respectively (USDA 2014). Berries have become one of the leading categories in fresh produce departments with national supermarket sales expected to exceed $5.3 billion annually in 2011 (Cook 2012). As noted in the Wall Street Journal, food companies are seeking out new berry varieties to appeal to increased consumer demand (Chaker 2013). Such berries include elderberry, black currant, goji berry, and bilberry. Given the health benefits of berries, especially new varieties, aronia and other berries have received wide-spread media coverage (see Wall Street Journal article by Chaker 2013). Second, berries can be found throughout farmer's markets, farm stands, and grocery stores from origins all over the world. This allows us to utilize there versatility to better understand WTP at various locations.

Choice Based Conjoint Design

The first step in any choice based conjoint design is to select the attributes (and levels) that are important in making the decision to purchase or not. Consulting with industry experts and previous literature we came up with four attributes: berry variety, price, location, and organic (Table 1). Five berry varieties were selected, including blueberry, blackberry, black currant, aronia and raspberry. Blueberry, blackberry and raspberry were selected given their prevalence in the marketplace. Black currant and aronia were chosen since it is a new berry variety and aronia was chosen given its taste profile and antioxidant content. With respect to prices, we consulted producers and retailers while also examining prices at varying retail outlets. Locations were specifically chosen to test the hypothesis of whether there are differences in WTP for locally labeled berries at farmer's markets, farm stands and grocery stores.

In designing the profiles, we created a fractional factorial design whereby we follow Kuhfeld (2010) and attempt to optimize D-efficiency while keeping in mind the impact of increasing product profile number on respondent fatigue. Using this criterion we generated 15 choice sets with four product profiles and a none of the above option. Before beginning the choice based section of the survey, respondents were asked to select the berry product from the set given that they would purchase, while keeping mind that in a real situation they would have a budget constraint. Respondents were also told that they were purchasing a 6-ounce container of berries and were shown a picture of an empty plastic container so they could visualize the amount of berries they were purchasing. Within each choice set, a different berry product available on the market was presented based on the experimental design specification. The state name associated with the grown in state attribute level was changed to correspond to the state where the respondent lived. For instance, a resident of New York would see "*Farm stand aronia*

berries for $3.99 produced in New York," while a Connecticut resident would see *"Farm stand aronia berries for $3.99 produced in Connecticut."* An example of a choice set is below.

Which fresh berry product would you purchase? Remember, for each product you are purchasing a half-pint (6 ounce) container of berries.

a) *Grocery store raspberries for $5.29 produced in the Northeastern U.S.*
b) *Farm stand aronia berries for $3.99 produced in Connecticut*
c) *Farmers' market black currant berries for $2.89 organically produced in Connecticut*
d) *Grocery store blackberries for $5.99 organically produced in the U.S.*
e) *None of the above choices*

Data

The online survey was administered during October 2013 with 872 invites going out. 807 surveys were returned with 9% of invitees refusing to participate. Of the 807 returned surveys 707 completed all sections. Global Marketing Insite, Inc (GMI) was used as the panel provider. Respondents that were randomly selected through GMI's database were sent an email asking if they would like to participate in the survey and those willing to participate were directed to the survey. The survey was limited to states in the Northeastern U.S. (New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Connecticut, Main and Massachusetts) in order to assess the value of a grown in the Northeast label. The percentage of respondents from each state was restricted to be similar to Northeastern population estimates by state (Table 2).

The descriptive statistics associated with the sample can be found in Table 2. The average respondent household income was $65,000 while the median household income was

$71,714. The median income for households in the Northeast is about $61,000 (U.S. Census Bureau 2014). The average age of our sample was 55 which is significantly larger than the average U.S. age of 42 reported in the census. Fifty-one percent of the sample was women which is similar to the Northeastern population. Based on age and income our sample was not completely representative of the Northeastern population. However, we can draw some implications from our study keeping the representativeness in mind.

Model

We used a Mixed Logit model (also called Random Parameters Logit) to account for possible correlation between responses from the same respondent. As noted by Train (2003), the utility of choosing a choice within a choice set of *m* options can be formulated as

$$U_{im} = \beta_i' x_{im} + \varepsilon_{im} \qquad (1)$$

where x are observed variables and ε is random term that is i.i.d. extreme value. β is a random vector of unobservable coefficients that represent the i^{th} respondents preferences, which vary over population with density *f*(β). Both z_{im} and ε_{im} define the portion of utility that is stochastic. Decomposing β_i into mean α and deviation μ we see

$$U_{im} = \alpha' \ x_{im} + \mu' \ z_{im} + \varepsilon_{im} \qquad (2)$$

with error components of $z_{im} = x_{im}$ (Train 2003). Furthermore, if z_{im} equals zero then there is no utility correlation amongst alternatives, thereby equating to the standard logit model. Assuming β's are known then we would formulate the probability that is conditional on β_i, such that

$$L_{iv}(\beta_i) = \frac{e^{\beta_i' x_{iv}}}{\sum_m e^{\beta_i' x_{im}}} \qquad (3)$$

However, we do not know β_i so the unconditional choice probability is the integral

$$P_{iv} = \int \left(\frac{e^{\beta_i' x_{iv}}}{\sum_m e^{\beta_i' x_{im}}} \right) f(\beta)\, d\, \beta \qquad (4)$$

which is equivalent to the mixed logit probability (Train 2003). Equation 4 was approximated via simulation.

With respect to our analysis, we regressed respondents' choices on the product attributes. In particular, the independent variables we include in the model are the binary variables, except for price, for each of the attribute levels seen in the choice sets. Price is treated as continuous and enters the model as continuous. It is expected that both state and treatment will impact parameter estimates. Therefore, we create interactions associated with aronia and three treatment groups (not including the control) as well as interactions with each state (except New York) and locally grown sold in farmer's market, farm stand, and grocery store. The control treatment and New York were used as base categories.

WTP was calculated for each attribute without an interaction was calculated as

$$WTP_i = -\left(\frac{\beta_i}{\beta_p}\right) \qquad (5)$$

where β_i is the coefficient for the attribute level of interest and β_p is the coefficient for price (Louviere, Hensher, and Swait 2000). For attribute levels with interactions, WTP was calculated as

$$WTP_k = -\left(\frac{\beta_k + \beta_{(n)(D)}}{\beta_p}\right) \qquad (6)$$

where β is the coefficient for the k^{th} attribute level plus the coefficient value of the n^{th} interaction that corresponds to the k^{th} attribute level times the interacted dummy.

Results and Discussion

Our results provided some interesting insights. First, we see that organic is preferred to non-organic (Table 3). With respect to WTP, organic berries garner a $0.59 per half-pint premium over non-organic (Table 4). This finding is consistent with previous studies that have consistently shown price premiums for organic fruits. Examining the locations we see that berries grown in the U.S. and outside the U.S. are discounted by $0.57 and $0.43 per half-pint compared to the grown in Northeast label. However, the confidence intervals for U.S. and outside the U.S. overlap, implying there is no significant difference in the values. Given the interaction associated with state, the interpretation associated with locally grown sold in a farmer's market, farm stand, or grocery store is more complex so we discuss these results in the next section.

As noted above, we interacted a dummy state variable for each state with locally grown in farmer's market, farm stand, and grocery store. Since New York was left out of the interaction terms, it becomes the base state for our analysis. New York was chosen as the base given it has the largest amount of agricultural production in the Northeast. WTP for locally grown berries sold at a farmer's market in New York can expect to get a $1.31 per half-pint premium for their berries (Table 4). Examining the significance levels of the other states, only Massachusetts has a significantly different WTP than New York. Locally grown berries at a farmer's market in Massachusetts can expect a premium of $0.91 per half-pint of berries. Taking a look at the confidence intervals from the MEL model, there is considerable overlap across all interacted states, implying there is little difference between states (Table 3).

With respect to WTP for local berries at a farm stand New York retailers can expect a $0.72 per half-pint premium. In contrast, New Jersey and Vermont farm stands can expect premiums of $1.17 and $1.86 per half-pint of berries. Further the confidence intervals associated

with the MEL estimates for New Jersey and Vermont do not overlap with the other states indicating these states are different than their Northeastern counterparts. The fact these two states have higher premiums is not surprising. New Jersey has a strong state buy local program while Vermont could be considered a bastion for the local food movement.

Locally grown in grocery stores also receives a price premium, however, it is lower than at farmer's markets and farm stands. Retailers can expect a $0.23 per half-pint premium for locally grown berries sold via a grocery store. This premium is consistent for most of the Northeastern states, except Maine ($0.94), Massachusetts ($0.71), and New Jersey ($0.61) which have higher WTP values than New York.

Conclusions

As retailers and policy makers attempt to increase local expenditures, it is essential to understand consumer preference at varying retail outlets. Our results show that not only are there price premiums for locally grown berries at farmer's markets, farm stands, and grocery stores, but there is some variation between Northeastern states. Notably we find that farmer's market can garner a higher premium than farm stands and grocery stores. However, states like New Jersey and Vermont see higher premiums for berries sold at farm stands and grocery stores than other states. Massachusetts, on the other hand, sees a lower premium at farmer's markets compared to the other states, but can receive a higher premium at the grocery store. With respect to policies and marketing efforts within each Northeastern states have been successful given the higher WTP associated with local berries.

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Table 1. Product Attributes Used in Conjoint Analysis

Product Attributes	Levels
Location	Locally grown at grocery store
	Locally grown at farm stand
	Locally grown at farmer's market
	U.S. grown at grocery store
	Outside of U.S. grown at grocery store
	Northeastern grown at grocery store
Price/6 ounce container	$1.99
	$2.89
	$3.99
	$4.59
	$5.29
	$5.99
Berry variety	Blueberry
	Blackberry
	Aronia berry
	Raspberry
	Black currant
Organic	Yes
	No

Table 2. Demographic Characteristics of Survey Respondents

Variable	Mean
Respondent state	
Connecticut	8%
Maine	4%
Massachusetts	14%
New Hampshire	2%
New Jersey	14%
New York	34%
Pennsylvania	19%
Rhode Island	2%
Vermont	2%
Average household income	$71,714
Average age	55
Female	51%
White/Caucasian	87%
Education	
Less than high school	1%
High school or GRE	23%
Some college	19%
Two year college	12%
Bachelor's degree	29%
Master's degree	12%
Doctorate degree or higher	4%
Number of respondents	707

Table 3. Results of Mixed Effect Logit Model

	Coef.	Std. Error	p-value	95% CI-low	95% CI-high
Constant	1.284	0.068	0.000	1.152	1.417
Price	-0.629	0.012	0.000	-0.653	-0.605
Farmers' Market Local	0.821	0.076	0.000	0.672	0.970
Farm Stand Local	0.453	0.082	0.000	0.293	0.613
Grocery Store: Local	0.148	0.088	0.094	-0.025	0.321
Grocery Store: U.S.	-0.359	0.058	0.000	-0.472	-0.245
Grocery Store: Outside U.S.	-0.270	0.065	0.000	-0.397	-0.143
Aronia	-1.684	0.104	0.000	-1.888	-1.479
Raspberry	-0.588	0.045	0.000	-0.677	-0.500
Blackberry	-1.014	0.048	0.000	-1.108	-0.919
Black Currant	-1.660	0.056	0.000	-1.769	-1.550
Organic: Yes	0.372	0.033	0.000	0.308	0.437
Interactions					
Farmer's Market*New Hampshire	-0.233	0.236	0.324	-0.696	0.230
Farmer's Market*New Jersey	0.047	0.117	0.685	-0.182	0.277
Farmer's Market*Pennsylvania	-0.141	0.107	0.189	-0.351	0.069
Farmer's Market*Rhode Island	-0.303	0.236	0.200	-0.766	0.160
Farmer's Market*Vermont	0.435	0.278	0.118	-0.110	0.981
Farmer's Market*Connecticut	-0.170	0.147	0.248	-0.458	0.118
Farmer's Market*Maine	-0.055	0.193	0.776	-0.434	0.324
Farmer's Market*Massachusetts	-0.247	0.125	0.048	-0.491	-0.002
Farmer's Stand*New Hampshire	0.046	0.249	0.852	-0.441	0.534
Farmer's Stand*New Jersey	0.283	0.125	0.023	0.039	0.528
Farmer's Stand*Pennsylvania	0.011	0.115	0.927	-0.215	0.236
Farmer's Stand*Rhode Island	0.249	0.239	0.297	-0.219	0.718
Farmer's Stand*Vermont	0.715	0.291	0.014	0.144	1.285
Farmer's Stand*Connecticut	-0.077	0.158	0.627	-0.387	0.233
Farmer's Stand*Maine	0.160	0.205	0.434	-0.241	0.562
Farmer's Stand*Massachusetts	0.127	0.131	0.331	-0.129	0.383
Grocery Store*New Hampshire	0.044	0.274	0.873	-0.494	0.582
Grocery Store*New Jersey	0.235	0.137	0.087	-0.034	0.504
Grocery Store*Pennsylvania	0.167	0.125	0.180	-0.077	0.412
Grocery Store*Rhode Island	-0.268	0.285	0.347	-0.826	0.291
Grocery Store*Vermont	0.445	0.328	0.175	-0.198	1.088
Grocery Store*Connecticut	0.147	0.169	0.384	-0.184	0.478
Grocery Store*Maine	0.445	0.217	0.040	0.021	0.870
Grocery Store*Massachusetts	0.302	0.141	0.032	0.026	0.577
Aronia Berry*Taste Info.	-0.355	0.148	0.016	-0.646	-0.065
Aronia Berry*Health Info.	0.231	0.135	0.086	-0.033	0.495
Aronia Berry*Taste/Health Info.	-0.136	0.145	0.350	-0.421	0.149
Log likelihood	-12,903				

Wald chi2(38)	4,504		
Prob > chi2	0.000		
ID: var(_cons)	0.271	.218	.337
LR test vs. logistic regression:			
chibar2(01)	326		
Prob>=chibar2	0.000		

Table 4. Willingness to Pay by State and Label Type

	Willingness to Pay / 6 Ounce Container [a]		
State	Famers' Market	Farm Stand	Grocery Store
NY	1.31	0.72	0.23
NH	1.31	0.72	0.23
NJ	1.31	1.17	0.61
PA	1.31	0.72	0.23
RI	1.31	0.72	0.23
VT	1.31	1.86	0.23
CT	1.31	0.72	0.23
ME	1.31	0.72	0.94
MASS	0.91	0.72	0.71

[a] WTP are the same for states that had an interaction that were not significantly different from New York.