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Consumers' Willingness to Pay for Locally Grown Produce: Comparison of New Hampshire and Massachusetts Results

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Abstract

The increasing interest in locally grown produce in the U.S. has resulted in a number of studies examining consumers' willingness to pay for local specialty food. This paper extends the literature to investigate Massachusetts and New Hampshire survey respondents' preferences for locally grown and other attributes of a variety of produce types. Choice experiments are used to discern the relative importance of these produce attributes. Our results show that the average premiums for locally grown green beans, cucumbers and snap peas are respectively 30.74 percent, 67.30 percent, and 32.62 percent above the prices of the non-locally grown counterparts among New Hampshire respondents. In comparison, the average premiums for locally grown green beans, cucumbers and snap peas are respectively 57.66 percent, 17.31 percent (insignificant), and 35.45 percent above the prices of the non-locally grown counterparts among Massachusetts respondents. We also find mixed results on the willingness to pay for the organic feature across different produce. Consumers are willing to pay a price premium for organically grown green beans (about 29.02 percent in New Hampshire and 32.63 percent in Massachusetts), but none for snap peas.

Key Words: Local Agriculture, Willingness to Pay, Choice Experiments

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Introduction

The U.S. has experienced a substantial expansion of the local food system in the last decade. On the production side, the number of farmers markets has increased by 50 percent and Community-Supported-Agriculture (CSA) has increased by roughly 60 percent in the past decade (Lopez and Laughton, 2012). According to the most recent statistics from USDA, the total count of farmers markets reached 8,476 in 2015, a 383% increase from 1,755 in 1994 (USDA, 2015). On the consumption side, the total sales of locally marketed food through direct markets (such as farmers markets, CSAs and agritourism) and intermediate channels (such as grocers, supermarkets, restaurants, schools and other regional distributors) reached $6.1 billion in 2012, compared with $4.8 billion in 2008 (Low et al. 2015; Low and Vogel, 2011).

The increased interest in local agricultural produce could be driven by various factors, such as the freshness of local produce, healthy eating habits, supportive attitudes towards local business, or low carbon emissions associated with a shorter supply chain. Public policies have also been supportive for local agriculture. Through various local branding programs and state-grown promotion programs, state governments play active roles in the local agricultural produce marketing with the aim of increasing farmers' income and stimulating the regional economy.[1]

In this study, we focus on two states in the New England area, New Hampshire and Massachusetts. Given the farmers' volatile profitability in the two states, enhancing local agriculture has been considered to be one of the potential market opportunities to improve the viability of farms and facilitate regional development. Supporters of local agriculture argue that developing local agriculture not only potentially provides economic benefits, but also generates

[1] Onken and Bernard (2011) provide a comprehensive list of the local branding program for 50 U.S. states.

positive externalities in environmental quality, food safety, and social capital accumulation.[2] In fact, New Hampshire has had its own state-sponsored marketing program, New Hampshire's Own, since 2004 (Onken and Bernard, 2010). According to the USDA 2012 agricultural census, about 10.6 percent of the total farm receipts in New Hampshire come from direct market sales, ranking it first in the country. About 30.7 percent of New Hampshire farms report direct market sales, second in the country (USDA, 2014).[3] Similarly, Massachusetts also has its own state-level marketing program, Massachusetts grown… and fresher! According to the USDA 2012 agricultural census, Massachusetts ranks itself 6th in the country with the number of farms offering CSAs.

This paper seeks to understand consumers' preferences for locally grown produce in New Hampshire and Massachusetts and to derive the price premium that consumers are willing to pay for locally grown fresh produce. We conduct choice experiment surveys of New Hampshire and Massachusetts residents and analyze the survey data to explore consumers' preferences using conditional logit and mixed logit models. One advantage of the mixed logit model is to relax the independent irrelevant alternative assumption and allow for preference heterogeneity among consumers. Our results show that consumers are willing to pay a substantial premium for locally grown produce, which indicates great market potential for New Hampshire and Massachusetts farmers. In contrast, we find mixed results on the willingness to pay (WTP) for the organic attribute across different produce in two states.

The remaining of the paper proceeds as follows. Section 2 reviews the literature on the valuation of specialty food products, especially on local features of food. Section 3 details the

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[2] The impact of local agriculture on the economic development is still debatable.

[3] Source of data: Department of Agriculture, Markets & Food, State of New Hampshire. 2014. Weekly Market Bulletin, Vol 93, No.11. Accessed March 15, 2016. http://agriculture.nh.gov/publications-forms/documents/sample-market-bulletin.pdf

design of the choice experiment survey, data collection among the New Hampshire and Massachusetts residents, and the summary statistics of data. Section 4 describes the econometric models employed for the data analysis. Section 5 discusses the results and we offer some concluding remarks in the last section.

Literature Review

There have been numerous studies that focus on the valuation of special attributes of foods, such as local, organic, natural, GMO-free, geographical indication, fair trade, and carbon footprint. A few meta-analyses of those valuation studies are also well documented. For example, Xia and Zeng (2008) conduct a meta-analysis of the valuation of organic food and find that consumers are willing to pay a wide range of premium for the organic feature of food, from 2.3 percent to 509.2 percent. Deselnicu et al. (2013) conduct a meta-analysis of valuation of geographical indication on food products and also report a wide range of WTP for the origin label, from -36.73 percent to 90.60 percent.

For valuation of locally produced features of food, there is also a sizeable literature. Among those studies, various methods are used to obtain consumers' preferences, for example contingent valuation (Loureiro and Hine, 2002; Giraud et al. 2005; Carpio and Isengildina-Massa, 2009), conjoint analysis (Darby et al. 2008; Adalja et al. 2015), and choice experiments (James et al. 2009; Yue and Tong, 2009; Onken et al. 2011; Onozaka and McFadden, 2011).

Loureiro and Hine (2002) use the payment card method to obtain consumers' WTP for locally grown potatoes in Colorado State, as well as organic and GMO-free claims. It is shown that the price premium for locally grown potatoes is about 10 percent of the initial price, higher than that of the organic or the GMO-free claim. Giraud et al. (2005) survey the consumers in

New Hampshire, Maine and Vermont on the WTP premium for local specialty food products. Using a dichotomous choice contingent valuation method, the authors find that the three Northern New England states have similar preference patterns. However, there is also some regional variation across the high-end and low-end products. Vermont and New Hampshire consumers are willing to pay a higher premium for high-end products ($20), while Maine consumers are not. Contingent valuation is also used in Carpio and Isengildina-Massa (2009) to measure WTP for locally grown produce and animal products among South Carolina consumers. The authors find that the average price premium is about 27 percent for state-grown produce and is about 23 percent for animal products raised within state boundaries.

Darby et al. (2008) use conjoint analysis to analyze consumer preferences for locally grown produce with an Ohio sample. In accordance with the contingent valuation studies, the authors find that U.S. Midwestern consumers are willing to pay a higher premium for locally grown strawberries than strawberries that are grown non-locally. James et al. (2009) employ choice experiments to study the preference of Pennsylvania consumers for local, organic, and nutrition attributes of applesauce. A multinomial logit model shows a higher WTP for locally produced applesauce over the other attributes. Yue and Tong (2009) use choice experiments to estimate the WTP for local and organic attributes of tomatoes; similar price premiums are found for the two attributes. Onken et al. (2011) conduct choice experiments among Mid-Atlantic consumers to evaluate the consumers' WTP for organic, natural, locally grown, and state marketing programs for strawberry preserves. They conclude that locally produced food is clearly preferred over food promoted by state marketing programs among consumers in Maryland and Pennsylvania.

Onozaka and McFadden (2011) use a national web-based survey to study U.S. consumers' preferences for the local attribute of tomatoes and apples and the interaction effects between local claims and other claims, including organic, fair trade, and carbon footprint. Their results show that U.S. consumers are willing to pay a 9 to 15 percent price premium for locally grown products relative to domestically grown products and a 10 to 32 percent price discount for imported products. The price premium for the locally grown attribute is generally larger than the valuations for production practice claims, except the fair trade claim for apples. Adalja et al. (2015) estimate WTP for locally produced food using both hypothetical and non-hypothetical conjoint analysis and they find typical Maryland residents and supermarket shoppers are willing to pay a premium for local food products. However, the buying-club members who have some local food purchase experience are less willing to pay.

Along the same line of research, there is a body of literature (for example, Bond et al. 2008; Thilmany et al. 2008; Hu et al. 2009) that explicitly compares the valuation of local attributes and organic attributes, and it has been dominantly reported that local attributes are valued more highly than organic. Adams and Salois (2010) review the literature on consumers' WTP for local and organic features of food products. They identify a turning point for the valuation in the late 1990s. The studies before this usually find that the organic feature is more important than the local feature, but studies after the 1990s usually find the reverse. Furthermore, the authors also point out that consumers are often confused about locally produced food and organically produced food. Ostrom (2006) and Berlin et al. (2009) also report that consumers commonly confuse the concepts of local, small scale, and organic.

Consumers' preferences for local specialty food have also been studied outside the U.S. market. Campbell et al. (2010) find the local logo has the largest effect on the purchase decision and increases the WTP for products among Canadian consumers. Gracia et al. (2014) use choice experiments to investigate consumer preferences for the origin and production method claims on eggs in Spain. It is found that consumers are willing to pay a positive premium for both the enhanced production method (e.g. barn, free-range or organic verse caged) and the proximity of production (e.g. local, regional, or national versus overseas). Gracia (2014) uses real choice experiments to mitigate the possible hypothetical bias in the hypothetical experiments with some cash incentive. It is also found that consumers are willing to pay a price premium for locally grown lamb meat in Spain. The price premiums for “local” are 9 percent and 13 percent for two types of lamb meat, respectively.

The most recent relevant study is conducted by Pyburn et al. (2016) that use choice experiments to assess the consumer preferences for locally grown green beans, cucumbers and snap peas in New Hampshire. The conditional logit models show that New Hampshire consumers are willing to pay 34.6 percent, 54.87 percent, and 30.34 percent price premiums for locally grown green beans, cucumbers and snap peas respectively. In this paper, we extend the literature by investigating consumers’ preferences for locally grown fresh produce in both New Hampshire and Massachusetts. We use the same experimental design to compere the consumers’ preferences for locally grown fresh produce across the two states. This study attempts to provide more valuable information for both producers and policy makers in New England area where the interest in local agriculture is rapidly increasing.

Survey Design and Data Summary

Choice experiments are used to identify consumers’ preferences for the locally grown feature of agricultural produce in New Hampshire and Massachusetts. Choice experiments, also referred to as contingent choices, are widely used in non-market valuation to help evaluate the relative importance of components of the public programs and to derive economic values of non-market goods. The basic idea of choice experiments is to ask survey respondents to state their preferences among various choice alternatives. Those choice alternatives are described in terms of a set of attributes (usually a price attribute is included) with different attribute levels. Rational respondents make the tradeoff between different levels of the attributes and choose from the choice alternatives. The economic valuation of certain attributes can be obtained by calculating the marginal rate of substitution between the attribute of interest and the price attribute based on the choice of alternatives. Since the choice scenarios are often created hypothetically and the respondents react to the hypothetical choice alternatives, the choice experiments method is considered a stated preference method, as opposed to revealed preference methods with actual market behavior.

Focus group meetings with New Hampshire farmers and consumers were used to construct the choice experiment's survey instrument. Eight farmers were recruited to participate in the first focus meeting. Information was collected regarding what major concerns when making decisions on crop selection and production methods. The participants were also asked what information about consumer's purchasing habits would be useful. Following the first focus group meeting, 14 New Hampshire residents were screened and invited to attend another focus group meeting prior to the design of choice experiments. We gathered the information regarding consumers' preferences and purchasing habits for local and organic produce through a few qualitative questions. The opinions on the consumers' definition of "local" were also collected and the consensus was "produce cultivated within 50 miles of where it was purchased." All the above information from focus group meetings was used to determine the attributes and levels of attributes in the next step choice experiments design.

Based on results from the focus group meetings, three types of fresh produce are considered in this study: green beans, snap peas and cucumbers. To describe the fresh produce to the consumers, five attributes are specified for each in the choice experiments design. Detailed information on the five attributes and associated levels are tabulated in Table 1, Table 2, and Table 3 for all the three products. The first two attributes indicate whether the produce is grown locally or with certified organic practices. The "local" is defined as produce grown within 50 miles of the point of purchase, as agreed by the participants in the focus groups meetings. The appearance of the product is also included as an important factor that affects the purchase decision, since consumers probably use appearance as a quality index. Freshness and quality of the product have been shown as the most important attributes for household consumers (Bond et al. 2008; Brown, 2003). The location of purchase (directly from farmers or indirectly from grocery stores/supermarkets) is also included as a measure of the convenience of purchase for consumers, and some other studies suggest that social interaction in direct farmers market is important in attracting consumers (Hunt, 2007). Finally, price is included to obtain a measure of the WTP for each of the aforementioned attributes.

A simple fractional factorial orthogonal main effects design (FFOMED) is employed to estimate the main effects for each attribute for all products. For each of the four attributes except price, there are two levels (Yes/No), while four different price levels are specified respectively for each of the three products. We randomize the levels of all the attributes to formulate different hypothetical produce choice alternatives, hereafter referred as bundles. A sample choice scenario is given in Table 4. In a choice scenario, consumers are invited to compare and choose from two bundles presented. Following common practice, the “opt-out” option is offered to the consumers to avoid the forced choice if neither of the two bundles is chosen. Each respondent is invited to make two choices for each of the three products. In addition to the comparison of the product bundles, the respondents are asked about their purchase habits for groceries and food items, understanding of local produce, reasons for purchasing local/organic, and their household characteristics.

Given time and budget constraints, an online sample of email addresses was purchased from Qualtrics Survey Research Suite[4]. The owners of the email addresses are New Hampshire and Massachusetts residents who are at least18 years old. Four versions of the survey were created and distributed via Qualtrics. The New Hampshire survey was administered in mid-May, and the data collection was completed by the end of May in 2014. The Massachusetts survey was started from the end of April and completed by the middle of May, 2016. After clearing incomplete responses, no-responses and non-compliers, the New Hampshire sample contains 155 respondents and the Massachusetts sample contains 216 respondents.

Summary statistics of respondent characteristics are presented in Table 5. Among the 155 New Hampshire respondents, 72 percent are female. The mean age is about 47.3 years with a standard deviation of about 16 years, which indicates that this convenient sample has broad coverage of food consumers in the household. The average annual household income is about $52,370. For educational attainment and employment status, we show the percentage of respondents in different categories. For example, about 28.4 percent of the respondents do not have any college education. About 30 percent of the sample work fulltime and 25 percent have retired. The Massachusetts respondents are elder than the New Hampshire respondents on

[4] Qualtrics is a research software company that provides on-line data collection and data analysis services. It has been widely used by researchers in business (for example marketing research), economics, sociology and many other fields.

average, with the mean age at 52.9 years old. The percentage of female is about 59 percent, lower than the New Hampshire sample. The Massachusetts respondents are wealthier on average and the mean of annual household income is about $74,167. The percentage of respondents who get at least some college education and the percentage of respondents who are full-time employed in the Massachusetts sample are higher than the New Hampshire sample.

Econometric Models

Discrete choice models are used to analyze the decision-maker's choice responses among different alternatives. Generally, the utility function of a decision-maker is assumed to contain two components: a deterministic component and a random component. The deterministic component of the utility function is usually assumed to be a linear function of choice attributes, the cost of choice, and possibly individual characteristics (included through the interactions with choice specific constant or other attribute variables)[5]. We use *i* to denote the decision-maker and *j* to denote the choice alternative. Then we have the utility index for the decision-maker *i* with a choice alternative *j* selected,

$$U_{ij} = \beta' x_{ij} + \varepsilon_{ij}$$

The error term is assumed to be randomly distributed. β is a vector of coefficients that are assumed to be constant across individuals and choice alternatives. A rational decision-maker only chooses the alternative that yields the highest utility, therefore the probability that the decision-maker *i* chooses alternative *j* is,

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

[5] However, we do not include the individual characteristics at this stage for the preliminary analysis.

There are different assumptions about the distribution of the random error term which lead to different types of discrete choice models. If we assume the error term follows an i.i.d. type I extreme value distribution, then a conditional logit model results. The conditional logit model is one of the most standard models in the discrete choice models family and has been widely used to analyze discrete choice data since the publication of the seminal paper by McFadden (1974). The probability that the decision-maker *i* chooses alternative *j* is rewritten as,

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

J is the maximum number of choice alternatives for the individual decision-maker. The general log-likelihood function of the choice responses made by decision-makers can be written as,

$$L = \sum_{i=1}^{n} \left[y_{i1} \log(\pi_{i1}) + y_{i2} \log(\pi_{i2}) + ... + y_{iJ} \log(\pi_{iJ}) \right]$$

n is the total number of individual decision-makers. y_{ij} =1 if the alternative *j* is chosen by individual *i*, and y_{ij} =0 otherwise. However, the conditional logit model fails to account for preference heterogeneity among respondents (unless it is related to individual characteristics through interaction terms). Additionally, the irrelevant alternatives are assumed to be independent, which is often referred as IIA assumption.

Mixed logit models relax the IIA assumption by allowing one or more of the parameters in the model to be randomly distributed and correlated with each other (Revelt and Train 1998)[6]. If we assume β to be randomly distributed, the unconditional probability of π_{ij}^* in the log-likelihood function of mixed logit models is derived by integrating over β .

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[6] The random parameters can also be a function of individual characteristics.

$$\pi_{ij}^{*}(\theta) = \int_{\beta} \pi_{ij}(\beta) f(\beta \mid \theta) d\beta$$

where $f(\beta \mid \theta)$ is the density function of β, and θ is the parameter of density function. Since the estimation of parameters in mixed logit models requires the integration over β, there is no closed-form solution to the maximum likelihood function and usually a simulation approach is employed.

When the utility function is specified as a linear expression of choice attributes, the welfare measure for a change in the attribute is calculated by the log-sum formula (Bockstael, McConnell, and Strand, 1991).

$$WTP_i = \frac{\ln(\sum_j e^{\beta' x_{ij}^{(2)}}) - \ln(\sum_j e^{\beta' x_{ij}^{(1)}})}{-\beta_p}$$

where $x_{ij}^{(1)}$ and $x_{ij}^{(2)}$ are the two states of choice alternative attributes; β_p is the coefficient of the price attribute. We assume constant marginal utility of income, so the price coefficient is a constant. In mixed logit models, some of the attribute coefficients are randomly distributed, and the mean welfare measure estimate can be obtained by integrating the above WTP formula with respect to β, $\int WTP(\beta) d\beta$. Usually a simulation approach is used to randomly draw from the estimated distribution of β to approximate the multi-dimensional integration.

Holmes and Adamowicz (2003) show a convenient way to calculate the WTP for a binary or two-level attribute by taking the ratio of the interested attribute coefficients and the price coefficient. The individual-specific coefficients of mixed logit models are estimated using the simulation method proposed by Revelt and Train (2000). We calculate the individual-specific WTP for locally grown attribute of fresh produce following the convenient computation proposed by Holmes and Adamowicz (2003).

Estimation and Results

Conditional logit models and mixed logit models with alternative specific constant are estimated for all three products using the choice experiments data that we collected in New Hampshire and Massachusetts. Theoretically, all the coefficients in mixed logit models can be assumed to be random to allow for preference heterogeneity. However, a complete set of the random coefficients might make the maximization of the likelihood function not estimable (Greene 2000). Additionally, allowing the coefficient of the price attribute to be random might generate negative marginal utility of income, which is not feasible to obtain a valid WTP measure for the other attributes (Revelt and Train, 1998). Therefore, in our mixed logit models, the coefficients of local, organic, blemish, and direct purchase from farmers are set to be normally distributed, while the coefficient of price attribute is assumed to be fixed.

Table 6 summarizes the estimated coefficients of the five attributes for green beans, cucumbers and snap peas in conditional logit models across New Hampshire and Massachusetts. Table 7 summarizes the results of the mixed logit models across three products and across the two states. The relaxation of the IIA assumption does not change the results dramatically compared with the conditional logit models.

We find that the coefficients of price attribute are negative in both conditional logit models and mixed logit models for all three products in the two states. This indicates that higher price has a negative impact on the likelihood of the product being chosen by respondents. The coefficients of local attributes are of particular interest in this study. Except for cucumbers in Massachusetts in mixed logit model, across all three products and model specifications, the coefficients of local attribute are positive and statistically significant, which provides strong evidence that consumers positively react to the locally grown feature. This positive relationship is consistent with findings of other studies in the existing literature.

The effect of organic feature on respondents' choice is mixed in both conditional logit and mixed logit models. The organic coefficients are positive and significantly different from zero for green beans, but insignificantly different from zero for snap peas in both New Hampshire and Massachusetts samples, regardless of model specifications. For cucumbers, the coefficients of organic are insignificant among the New Hampshire respondents, but significantly positive among the Massachusetts respondents. This finding seemingly disagrees with the literature on organic product demand that reports numerous motives to purchase organic food, including health concerns, better taste, environmental concerns, animal welfare concerns, and support of the local economy. However, the blurred effect of the organic feature may be explained by the subtle shift of consumer preferences from organic food to local food after the late 1990s (Adams and Salois, 2010) and the misperception of local and organic (Ostrom, 2006; Berlin et al. 2009).

We also find some heterogeneity among the effect of blemish. The coefficients of blemish are insignificant for greens beans in both conditional logit and mixed logit models, but are negative and statistically significant for snap peas. However, while New Hampshire respondents think blemish is important for cucumbers, Massachusetts respondents think the opposite. Interestingly, it seems that direct purchase from farmers does not affect the purchase decisions across all three products, regardless of models specifications and states. The only exception is for snap peas in conditional logit model among Massachusetts respondents, but the effect is merely marginally significant.

We calculate WTP for local and organic attributes following the procedure suggested by Holmes and Adamowicz (2003). Table 8 and Table 9 summarize the WTP measure both in dollar values and as a markup percentage of the average price for each product in both conditional logit and mixed logit models. In mixed logit models, since the coefficients of local and organic attributes are assumed to be random, the WTP estimates are reported as the average price premium. We find mixed logit models and conditional logit models yield similar results in terms of both sign and magnitude (also see Figure 1 - 4 with the bar charts of WTP by percentage). Our discussion focuses on the WTP estimates from mixed logit models considering the superiority of model flexibility[7]. The average premiums for locally grown green beans, cucumbers and snap peas are respectively 30.74 percent, 67.30 percent, and 32.62 percent above the prices of the non-locally grown counterparts among the New Hampshire respondents. In comparison, the average premiums for locally grown green beans, cucumbers and snap peas are respectively 57.66 percent, 17.31 percent, and 35.45 percent above the prices of the non-locally grown counterparts among the Massachusetts respondents. However, the price premium for cucumbers in Massachusetts is not significantly different from zero. We also find that consumers are only willing to pay a price premium for organically grown green beans (about 29.02 percent in New Hampshire and 32.63 percent in Massachusetts), but none for snap peas. Massachusetts respondents are willing to pay a 21.55 percent price premium for organic cucumbers, but New Hampshire respondents are willing to pay none. Through the analysis of WTP estimates, we find that the results are comparable in magnitude for green beans and snap beans across the states of New Hampshire and Massachusetts. However, it seems that the Massachusetts WTP for local attribute is higher than the New Hampshire for green beans and snap peas, but lower for

[7] Most of the standard deviation estimates of attribute coefficients are statistically significant, which suggests that mixed logit models are better than conditional logit models due to the flexibility to account for heterogeneity in preference.

cucumbers. The difference may be explained by the different sample characteristics. For example, the Massachusetts respondents are wealthier, elder, with higher male percentage, higher educational attainment and higher percentage of full-time employment. It may also be attributed to a shift in the preference over time, since the Massachusetts survey was conducted about two years later than the New Hampshire survey. More efforts are needed to explore the state-level variation of WTP estimates for locally grown produce.

Conclusions

In this paper, we study New Hampshire and Massachusetts respondents' preferences for locally grown fresh produce. Choice experiments are used to evaluate the relative importance and consumers' valuation of the attributes of three fresh products: green beans, cucumbers, and snap peas. Conditional logit models and mixed logit models are employed to analyze the choice data. Based on the analysis of data, we find that consumers are willing to pay a substantial price premium for locally grown feature in both New Hampshire and Massachusetts samples. Meanwhile, we find mixed results for the valuation of organic attribute of the products. Survey respondents are willing to pay a price premium for organically grown green beans, but not for snap peas in both states. The preferences for locally grown or organically grown cucumbers differ dramatically across the two states. New Hampshire respondents are willing to pay for the local attribute of cucumbers but not for organic, while Massachusetts respondents are willing to pay for organic but not for local.

Based on the findings that consumers are willing to pay a substantial price premium for locally grown fresh produce, regardless of produce types and states, farmers and policy makers may have more confidence to market the locally grown fresh produce. Comparing the premiums for the locally grown and organically grown attributes, it seems that both New Hampshire and Massachusetts consumers think locally grown feature is more important than organically grown feature, which may also have important implications for farmers regarding the growing practice and the farm land use.

References

Adams, D.C. and Salois, M.J., 2010. Local versus organic: A turn in consumer preferences and willingness-to-pay. *Renewable Agriculture and Food Systems*, 25(04), pp.331-341.

Berlin, L., Lockeretz, W. and Bell, R., 2009. Purchasing foods produced on organic, small and local farms: A mixed method analysis of New England consumers. *Renewable Agriculture and Food Systems*, 24(04), pp.267-275.

Bond, C.A., D.D. Thilmany, and J.K. Bond. 2008. "What to Choose? The Value of Label Claims to Fresh Produce Consumers." *Journal of Agricultural and Resource Economics 33(3)*: 402–427.

Brown, C. 2003. "Consumers' Preferences for Locally Produced Food: A Study in Southeastern Missouri." *American Journal of Alternative Agriculture* 18(4): 213–224.

Brown, Cheryl, and Stacy Miller. 2008. "The Impacts of Local Markets: A Review of Research On Farmers Markets and Community Supported Agriculture (CSA)." *American Journal of Agricultural Economics*, 90(5): 1296-1302.

Campbell, B.L., Lesschaeve, I., Bowen, A.J., Onufrey, S.R. and Moskowitz, H., 2010. Purchase drivers of Canadian consumers of local and organic produce. *HortScience*, 45(10), pp.1480-1488.

Carpio, Carlos E., and Olga Isengildina-Massa. 2009. "Consumer Willingness to Pay for Locally Grown Products: The Case of Sourth Carolina." *Agribusiness*, 25(3): 412-426.

Darby, Kim, Marvin T. Batte, Stan Ernst, and Brian Roe. 2008. "Decomposing Local: A Conjoint Analysis of Locally Produced Foods." *American Journal of Agricultural Economics*, 90(2): 476-486.

Department of Agriculture, Markets & Food, State of New Hampshire. 2014. Weekly Market Bulletin, Vol 93, No.11. Accessed March 15, 2016 http://agriculture.nh.gov/publications-forms/documents/sample-market-bulletin.pdf

Deselnicu, O.C., Costanigro, M., Souza-Monteiro, D.M. and McFadden, D.T., 2013. A meta-analysis of geographical indication food valuation studies: What drives the premium for origin-based labels. *Journal of Agricultural and Resource Economics*, 38(2), pp.204-219.

Giraud, K., C. Bond, and J. Bond. 2005. "Consumer Preferences for Locally Made Specialty Food Products across Northern New England." *Agricultural and Resource Economics Review* 34(2): 204–216.

Gracia, A., 2014. Consumers' preferences for a local food product: a real choice experiment. *Empirical Economics*, 47(1), pp.111-128.

Gracia, A., Barreiro-Hurlé, J. and Galán, B.L., 2014. Are local and organic claims complements or substitutes? A consumer preferences study for eggs. *Journal of Agricultural Economics*, 65(1), pp.49-67.

Greene WH, Hensher DA. 2010. Does scale heterogeneity across individuals matter? An empirical assessment of alternative logit models. *Transportation* 37: 413.428.

Hole AR. 2007. Fitting mixed logit models by using maximum simulated likelihood. *Stata Journal* 7: 388-401.

Holmes, Thomas P., and Wiktor L. Adamowicz. 2003. "Attribute-Based Methods." In A Primer on Nonmarket Valuation, edited by Patricia A. Champ, Kevin J. Boyle, and Thomas C. Brown, 171-219. Boston: Kluwer Academic Publishers.

Hu, W., T. Woods, and S. Bastin. 2009. "Consumer Acceptance and Willingness to Pay for Blueberry Products with Nonconventional Attributes." *Journal of Agricultural and Applied Economics* 41(1): 47–60.

Huber, J. and Train, K., 2001. On the similarity of classical and Bayesian estimates of individual mean partworths. *Marketing Letters*, 12(3), pp.259-269.

Hughes, David W., Cheryl Brown, Stacy Miller, and Tom McConnell. 2008. "Evaluating the Economic Impact of Farmers' Markets Using an Opportunity Cost Framework." *Journal of Agricultural and Applied Economics*, 40(1): 253-256.

Hunt, A. 2007. "Consumer Interactions and Influences on Farmers' Market Vendors." *Renewable Agriculture and Food Systems* 22:54–66.

James, Jennifer S., Bradley J. Rickard, and William J. Rossman. 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): 357-370.

Jekanowski, M.D., Williams, D.R., and Schiek,W.A. (2002). Consumers' willingness to purchase locally produced agricultural products: An analysis of an Indiana survey. Agricultural and Resource Economics Review, 29(8), 4353.

Loureiro, M.L., and S. Hine. "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 (December 2002):477-487.

Loureiro, Maria L. and Susan Hine. 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.

Low, et al., Trends in U.S. Local and Regional Food Systems: Report to Congress, AP-068, January 2015

McFadden DL. 1974. Conditional logit analysis of qualitative choice behavior. In Frontiers in Econometrics, Zarembka P (ed.). Academic Press: New York.

Onken, K.A., and J.C. Bernard. 2010. "Catching the 'Local' Bug: A Look at State Agricultural Marketing Programs." *Choices* 25(1): 1–7.

Onken, Kathryn A., John C. Bernard, and 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.

Onozaka, Y., G. Nurse, and D. Thilmany-McFadden. 2010. "Local Food Consumers: How Motivations and Perceptions Translate to Buying Behavior." *Choices*, 25(1): 1-6.

Ostrom, M., 2006. Everyday meanings of "local food": Views from home and field. *Community Development*, 37(1), pp.65-78.

Pyburn, M., Puzacke, K., Halstead, J.M. and Huang, J.C., 2016. Sustaining and enhancing local and organic agriculture: assessing consumer issues in New Hampshire. *Agroecology and Sustainable Food Systems*, 40(1), pp.69-95.

Revelt D, Train K. 2000. Customer-specific taste parameters and mixed logit: Households choice of electricity supplier. Working Paper, Department of Economics, University of California, Berkeley.

Schneider, M.L., and C.A. Francis. 2005. "Marketing Locally Produced Foods: Consumer and Farmer Opinions in Washington County, Nebraska." *Renewable Agriculture and Food Systems* 20(4): 252–260.

Thilmany, D., Bond, C.A., and Bond, J.K. (2008). Going local: Exploring consumer behavior and motivations for direct food purchases. *American Journal of Agricultural Economics*, 90(5), 13031309.

Train KE, Weeks M. 2005. Discrete choice models in preference space and willingness-to-pay space. In Application of simulation methods in environmental and resource economics, Scarpa R, Aberini A (eds.). Springer: Dordrecht.

Train KE. 2009. Discrete Choice Methods with Simulation, Second Edition. Cambridge University Press: Cambridge.

United States Department of Agriculture. 2014. "2012 Census of Agriculture: Preliminary Report: U.S. and State Data." Accessed March 15, 2016. http://www.agcensus.usda.gov/Publications/2012/Preliminary_Report/Full_Report.pdf

United States Department of Agriculture. 2015 "Number of U.S. farmers markets has nearly tripled over the last 15 years" Accessed March 15, 2016 http://www.ers.usda.gov/data-products/chart-gallery/detail.aspx?chartId=53464

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

Yue, C. and Tong, C., 2009. Organic or local? Investigating consumer preference for fresh produce using a choice experiment with real economic incentives. *HortScience*, 44(2), pp.366-371.

Table 1: Choice Experiments Design and Assigned Levels of Attributes: Green Beans

Attribute	**Actual Levels**
Locally Grown (Y/N)	0,1
Certified Organically Grown(Y/N)	0,1
Some Blemishes or other Irregularities (Y/N)	0,1
Purchased Directly from the Farmer (Y/N)	0,1
Prices ($)	1.4, 2.0, 2.75, 3.5

Table 2: Choice Experiments Design and Assigned Levels of Attributes: Cucumber

Attribute	**Actual Levels**
Locally Grown (Y/N)	0,1
Certified Organically Grown(Y/N)	0,1
Some Blemishes or other Irregularities (Y/N)	0,1
Purchased Directly from the Farmer (Y/N)	0,1
Prices ($)	0.75, 1.4, 2.5, 3.75

Table 3: Choice Experiments Design and Assigned Levels of Attributes: Snap Peas

Attribute	**Actual Levels**
Locally Grown (Y/N)	0,1
Certified Organically Grown(Y/N)	0,1
Some Blemishes or other Irregularities (Y/N)	0,1
Purchased Directly from the Farmer (Y/N)	0,1
Prices ($)	1.6, 2.7, 4.5, 7.0

Table 4: Sample Hypothetical Bundles of Produce

Green Bean Bundle A	Green Bean Bundle B
Non-Locally Grown	Locally Grown
Certified Organically Grown	Conventionally Grown
$1.40/lb.	$2.00/lb.
Some Blemishes or other Irregularities	No Blemishes or other Irregularities
Purchased Directly from the Farmer (e.g. farmer's market)	Purchased Indirectly from the Farmer (e.g. grocery store)

- ○ Bundle A
- ○ Bundle B
- ○ Neither, Why? ____________________

Table 5: Summary Statistics of Respondent Characteristics

	New Hampshire		Massachusetts	
	Mean	**Standard Deviation**	**Mean**	**Standard Deviation**
Demographic Characteristics				
Female	0.72	0.45	0.59	0.49
Age	47.30	16.07	52.92	14.80
Annual Household Income (in dollars)	52370.13	33801.12	74166.67	30354.09
Education Level				
Did Not Finish High School	1.94%		2.78%	
High School/GED	26.45%		13.89%	
Some College	33.55%		23.15%	
4-yr College Degree	27.1%		32.41%	
Graduate	10.97%		27.78%	
Employment Status				
Full-Time	29.68%		46.30%	
Part-Time	12.9%		12.50%	
Self-Employed	5.81%		6.48%	
Unemployed	23.23%		5.09%	
Retired	24.52%		25.46%	
Student	3.87%		0.93%	
Home care	-		3.24%	
Sample Size	155		216	

Table 6: Alternative Specific Constant Conditional Logit Results

	Green Beans		Cucumbers		Snap Peas	
	NH	MA	NH	MA	NH	MA
Local	0.588***	1.236***	0.689***	0.201*	0.567***	0.670***
	(0.146)	(0.154)	(0.163)	(0.118)	(0.172)	(0.155)
Organic	0.484***	0.770***	0.161	0.305***	0.105	0.188
	(0.148)	(0.153)	(0.161)	(0.118)	(0.175)	(0.158)
Price	-0.693***	-0.947***	-0.534***	-0.606***	-0.468***	-0.549***
	(0.118)	(0.144)	(0.105)	(0.0706)	(0.0661)	(0.0633)
Blemish	-0.209	-0.0912	-0.386**	-0.0406	-0.627***	-0.414***
	(0.148)	(0.142)	(0.152)	(0.117)	(0.175)	(0.153)
Direct	0.0824	-0.143	-0.0923	0.0378	0.0867	0.293*
	(0.145)	(0.146)	(0.158)	(0.117)	(0.179)	(0.156)
Bundle A	2.907***	2.902***	2.578***	3.178***	2.921***	3.114***
	(0.381)	(0.333)	(0.271)	(0.261)	(0.326)	(0.254)
Bundle B	2.454***	2.727***	2.061***	2.724***	2.627***	2.842***
	(0.366)	(0.371)	(0.294)	(0.270)	(0.356)	(0.293)
Wald chi2	47.91	81.91	42.01	75.39	67.84	94.31
Log-lik	-244.4323	-314.8897	-257.8430	-322.247	-243.1319	-321.9387
# Choices	930	1296	930	1296	927	1296
# Respondents	155	216	155	216	154	216

Note: Values in the parentheses are standard errors. *****, ******, and ******* represent statistical significance at the 90%, 95%, 99% confidence levels respectively, measured by t-statistics.

Table 7: Alternative Specific Constant Mixed Logit Results

	Green Beans		**Cucumbers**		**Snap Peas**	
	NH	MA	NH	MA	NH	MA
Local	1.023**	1.903***	1.378***	0.612	2.236**	1.179***
	(0.417)	(0.397)	(0.480)	(0.442)	(1.134)	(0.289)
Organic	0.966**	1.077***	0.113	0.762**	-0.599	0.383
	(0.424)	(0.297)	(0.296)	(0.386)	(0.850)	(0.292)
Price	-1.380***	-1.368***	-0.975***	-1.684***	-1.736**	-0.842***
	(0.350)	(0.274)	(0.256)	(0.456)	(0.729)	(0.124)
Blemish	-0.561	-0.125	-1.138**	-0.608	-2.584**	-0.681***
	(0.362)	(0.236)	(0.494)	(0.441)	(1.305)	(0.253)
Direct	0.217	-0.268	-0.190	0.402	0.587	0.355
	(0.342)	(0.230)	(0.300)	(0.390)	(0.739)	(0.277)
Bundle A	4.950***	3.890***	4.202***	6.729***	9.815**	4.188***
	(1.144)	(0.669)	(0.828)	(1.634)	(3.965)	(0.510)
Bundle B	4.111***	3.654***	2.921***	5.199***	7.980**	3.616***
	(0.953)	(0.689)	(0.658)	(1.221)	(3.193)	(0.479)
Std. Dev.						
Local	2.790***	1.566***	2.156**	3.486***	4.262**	0.0259
	(0.955)	(0.530)	(0.954)	(1.197)	(2.007)	(0.723)
Organic	1.955**	1.418***	1.210*	2.027**	4.753**	1.608***
	(0.773)	(0.491)	(0.722)	(0.852)	(2.421)	(0.454)
Blemish	1.755**	1.217**	3.054***	2.227**	3.603**	-0.120
	(0.868)	(0.593)	(0.894)	(0.871)	(1.645)	(1.663)
Direct	0.771	0.209	-0.303	2.409**	4.026**	2.283***
	(0.718)	(1.265)	(0.591)	(0.953)	(1.885)	(0.501)
LR chi2	20.94	13.38	30.42	25.50	33.97	28.76
Log-lik	-233.9622	-308.1993	-242.6337	-309.4949	-226.1471	-307.5598
# Choices	930	1296	930	1296	927	1296
# Respondents	155	216	155	216	154	216

Note: Values in the parentheses are standard errors. *****, ******, and ******* represent statistical significance at the 90%, 95%, 99% confidence levels respectively, measured by t-statistics.

Table 8: WTP Estimates in Dollars per Pound - ASC Conditional Logit

Attributes	**Green Beans**		**Cucumbers**		**Snap Peas**	
	NH	MA	NH	MA	NH	MA
Local	0.848*** (35.16%)	1.305*** (54.10%)	1.290*** (61.45%)	0.332* (15.79%)	1.212*** (30.68%)	1.220*** (30.90%)
Organic	0.699*** (28.96%)	0.813*** (33.70%)	0.301 (14.35%)	0.503*** (23.97%)	0.224 (5.66%)	0.342 (8.67%)
Blemish	-0.301 (-12.48%)	-0.096 (-3.99%)	-0.732** (-34.41%)	0.062 (-3.19%)	-1.341*** (-33.94%)	-0.754*** (-19.09%)
Directly Purchased (Farmers' Market)	0.119 (4.93%)	-0.151 (-6.26%)	-0.173 (-8.23%)	-0.067 (2.97%)	0.185 (4.70%)	0.534* (13.51%)

Note: WTP measures for a change in attribute level. *, **, and *** represent statistical significance at the 90%, 95%, 99% confidence levels respectively. Values in parentheses represent the markup percentage for the premium of each attribute using the average price level for each product as the base.

Table 9: WTP Estimates in Dollars per Pound - ASC Mixed Logit

Attributes	**Green Beans**		**Cucumbers**		**Snap Peas**	
	NH	MA	NH	MA	NH	MA
Local	0.742** (30.74%)	1.391*** (57.66%)	1.413*** (67.30%)	0.363 (17.31%)	1.288** (32.62%)	1.400*** (35.45%)
Organic	0.700** (29.02%)	0.787*** (32.63%)	0.116 (5.54%)	0.452** (21.55%)	-0.345 (-8.74%)	0.455 (11.52%)
Blemish	-0.407 (-16.87%)	-0.091 (-3.79%)	-1.167** (-55.58%)	-0.361 (-17.19%)	-1.489** (-37.69%)	-0.809*** (-20.48%)
Directly Purchased (Farmers' Market)	0.157 (6.52%)	-0.196 (-8.12%)	-0.195 (-9.29%)	0.239 (11.37%)	0.338 (8.56%)	0.422 (10.67%)

Note: WTP measures for a change in attribute level. *, **, and *** represent statistical significance at the 90%, 95%, 99% confidence levels respectively. Values in parentheses represent the markup percentage for the premium of each attribute using the average price level for each product as the base.

Figure 1: WTP by Percentage for Attributes (ASC Conditional Logit-NH)

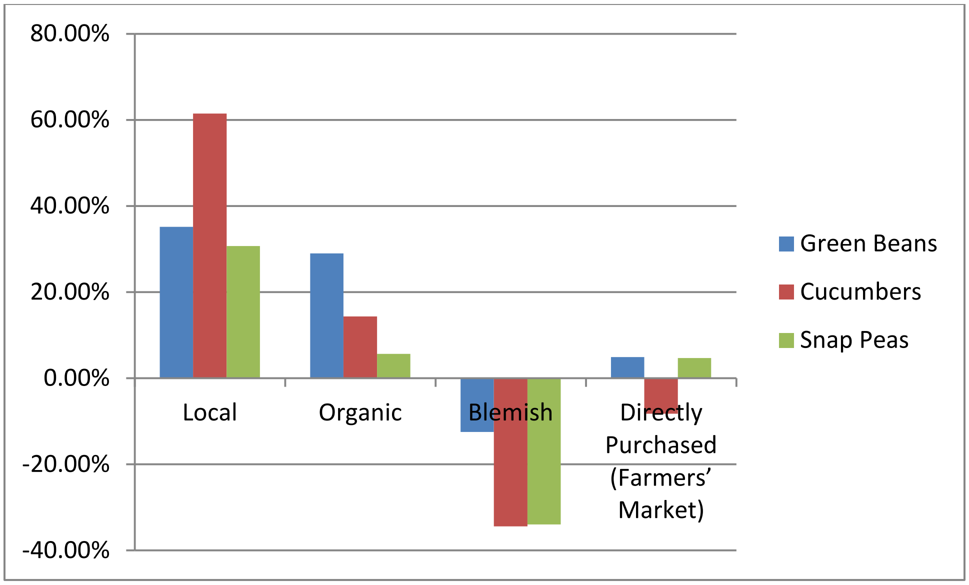

Figure 2: WTP by Percentage for Attributes (ASC Conditional Logit-MA)

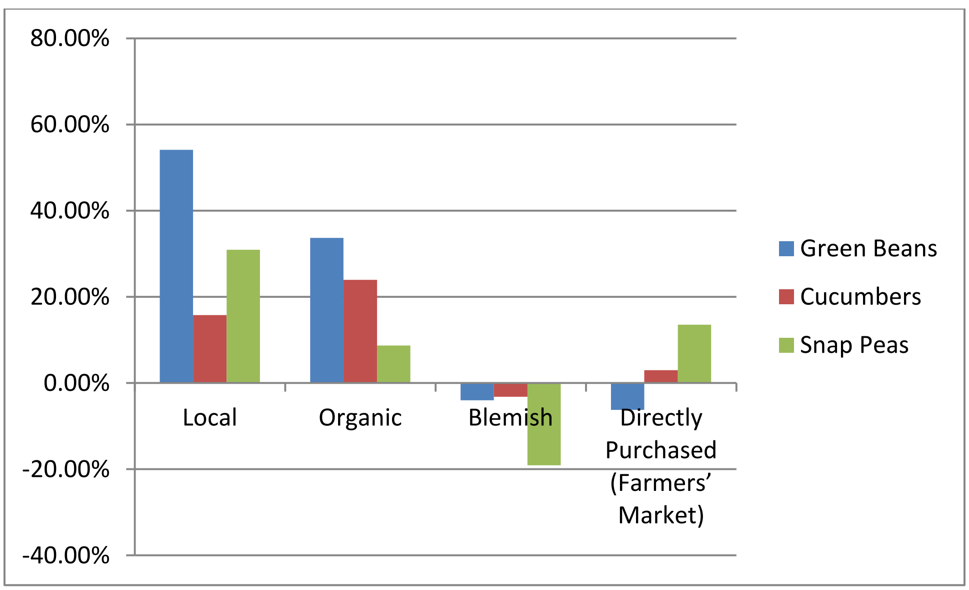

Figure 3: WTP by Percentage for Attributes (ASC Mixed Logit-NH)

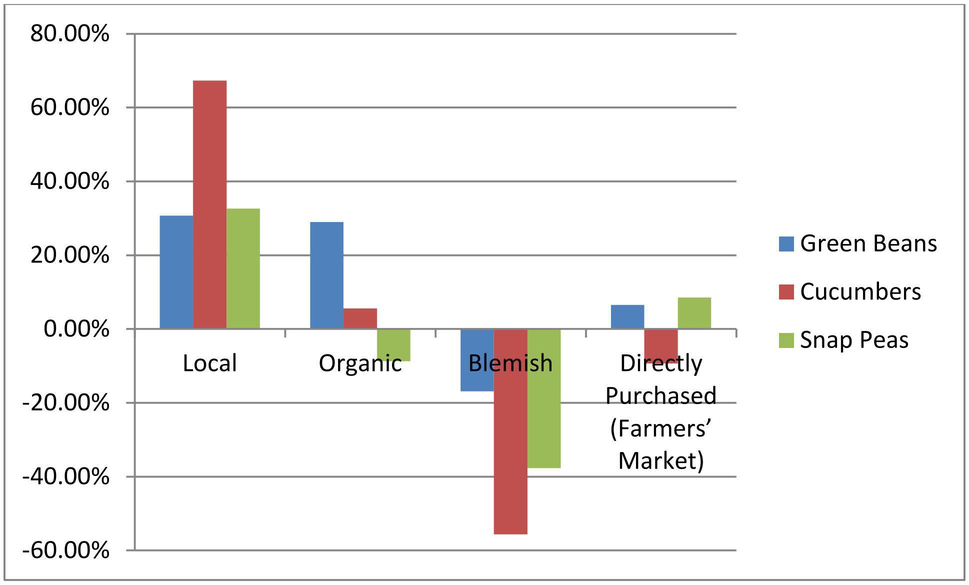

Figure 4: WTP by Percentage for Attributes (ASC Mixed Logit-MA)