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**Consumer Willingness to Pay for Locally Grown Produce Designed to Support  
Local Food Banks and Enhance Locally Grown Producer Markets**

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# **Consumer Willingness to Pay for Locally Grown Products Designed to Support Local Food Banks and Enhance Locally Grown Producer Markets**

## **Abstract**

This study investigates the possibility of using local food banks as a distributor in the local food supply chain. A mixed logit model is used to estimate the price premium consumers are willing to pay at retail outlets for locally grown products, if consumers have knowledge that a portion of the purchase price will be used as a donation to support local food banks. Estimates reveal that average households are willing to pay 11.68% (\$0.17/lb) more for locally grown produce relative to non-locally grown, and 10.75% (\$0.33/lb) more for locally produced animal products. When the locally grown product attribute is combined with a food bank donation the WTP premium increases to 22.33% (\$0.33/lb) for produce and 20.50% (\$0.64/lb) for animal products. Consumers are only willing to pay a small price premium for products that contain the donation attribute but are not locally grown. However, a strong complimentary relationship was found between the *local* and *donation* attribute which suggest consumers have a stronger preference to donate when purchasing locally grown products than when purchasing nonlocal products.

# **Consumer Willingness to Pay for Locally Grown Products Designed to Support Local Food Banks and Enhance Locally Grown Producer Markets**

## **INTRODUCTION**

The sale of agricultural products marketed through “local” marketing channels has dramatically increased in the last two decades. Nationally, the number of local farmers' markets has increased from 1,755 in 1994 to 7,175 in 2011 (USDA, 2011). The number of major food retailers that specifically market local products has also grown rapidly (King et al., 2010). Despite strong consumer demand for their products, smaller farms find it difficult to compete for a share of this growing market. While marketing channel constraints vary by product and setting, local product availability due to seasonality, limitations on available quantity, logistic considerations, and lack of price competitiveness, commonly limit the ability of smaller producers to supply this market (Izumi, 2006; Vogt, 2008). Among these, the relative inefficiency of smaller compared to larger farms in the transportation and distribution of their product is a critical marketing constraint.

King et al. (2010) argue that despite having generally higher per unit costs, local farms can successfully compete if they emphasize their product's unique characteristics or services and/or have access to processing and distribution centers. This study explores the feasibility of an integrated marketing system that links local farmers with local food banks via farmers' markets and other local food retailers. Many food banks have well-established transportation, storage, and processing centers as part of their core mission to provide access to healthy foods to those who cannot afford it. We investigate the possibility of using local food banks as a distributor in the local food supply chain. In exchange for food bank participation, food banks receive capital generated by a price premium placed on locally grown products sold at any retail

market. To be feasible, the system would need to be self-sustaining and provide both the food bank and local farmer the opportunity to enhance their profitability.

As an initial step in the implementation of such a program we estimate the price premium consumers are willing to pay at local farmers' market (and other retail outlets) for locally grown products, if consumers are aware that a portion of the purchase price will be used as a donation to support local food banks. To accomplish this objective we specifically ask three questions: (1) how large are the price premiums consumers are willing to pay for local agricultural products; (2) how large a price premium are consumers willing to donate to food banks through the price paid for agricultural products; and (3) are the local and donation attributes of the food purchase complements or substitutes.

## **LOCAL FOOD DEMAND**

Researchers in many states began investigating the factors that have contributed to increased consumer preference for local foods relative to out-of-state and imported foods starting in the late 1980's.<sup>1</sup> Among the most commonly cited reasons for this preference change are that consumers are looking for fresher food alternatives, have an altruistic desire to support their community, or are supportive of environmentally sustainable practices. This preference is enhanced when the locally grown products are branded as "locally grown" and/or state-certified. This prior research has consistently found that consumer willingness to pay a price premium for locally grown foods varies with the definition of locally grown, and the individual's age, income level, educational attainment, race, and gender.

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<sup>1</sup> Delaware (Lehman, et al. 1998 and Gallons, 1997), Oklahoma (Biermacher, et al. 2007), Missouri (Brown, 2003), Michigan (Cantrell, et al. 2006), South Carolina (Carpio and Isengildina-Massa, 2009), Tennessee (Eastwood, Brooker, Orr, 1987), Kentucky (Futamura, 2007), Louisiana (Hinson, Bruchhaus, 2005), Indiana (Jekanowski, Williams, Schiek, 2000), Colorado (Loureiro, Hine, 2002), Iowa (Pirog, McCann, 2009), Nebraska (Schneider, Francis, 2005), Washington (Selfa, Oazi, 2005); among many others.

What is a *locally grown* product? There are a variety of definitions, but the definition most relevant to this study was coined by the U.S. Congress in the 2008 Food, Conservation, and Energy Act. This definition declares that for an agricultural product to be defined as locally grown, "the total distance that a product can be transported must be less than 400 miles from its origin or within the state in which it is produced". This study defines locally grown to be a product grown in South Carolina, and *non-local* products are those produced *out-of-state*. We recognize that the consumer's surveyed in this study may have a different definition of 'local'. This issue is briefly addressed at the end of the paper.

## **FOOD BANKS AND LOCALLY GROWN FOOD**

Food banks are non-profit organizations created to distribute donated food directly to individuals or to agencies that feed impoverished individual within their area of influence. Food banks provide an important function in their community by targeting a small, low income, subset of the local population. To accomplish their mission, food banks maintain facilities where food is donated, collected, sorted, and then distributed through their supply network to churches, soup kitchens, homeless shelters, government organizations, and schools. These same distribution networks often serve as food collection points during food drives.

Recently, Community Supported Agriculture (CSA) organizations and individual farmers have become an additional source of food bank donations. CSAs are organizations where consumers purchase a membership or subscription to a particular farm or a cooperative of farms, in return for a box (or other predetermined quantity) of produce on a weekly or monthly schedule throughout the growing season. When a CSA, or a farm, has excess supplies, they often donate

their excess produce to local food banks<sup>2</sup>. Local food banks, in turn, donate the food to citizens within their community to low income residents. However, CSA food donations are not a widespread practice and such donations are usually unsolicited by the food bank.

Traditionally, food banks have not been viewed as potential contributor to local agricultural economic development because they tend to be recipients of food donation policies. However, there are instances where food banks have assisted local farms market their production. Robinson, Carpio, and Hughes (2009) report one such example where a food bank provided benefits to the local agricultural community. Despite its primary mission as an emergency food assistance system, South Carolina's Low-country Food Bank (LCFB) provides delivery, storage, inspection, and disposal services to local farmers to increase the distribution of locally grown produce into local retail markets. The willingness of the LCFB to facilitate the marketing of locally grown produce provides the motivation to investigate the feasibility of establishing an integrated multi-county marketing network in Upstate South Carolina that could potentially benefit both local farmers and participating food banks.

## **DONATION STRATEGIES**

The strategy of marketing products linked with a charity is labeled "cause-related marketing" (Barone, Miyazaki, and Taylor, 2000). Examples are firms selling a product that includes a particular type of donation linked to a non-profit. An early example of cause-related marketing is when American Express issued credit cards that would donate a pre-specified dollar amount towards the restoration of the Statue of Liberty when individuals used their American Express card. The advertising campaign significantly increased card use, and American Express

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<sup>2</sup> Taylor's Fresh Organics CSA, Regional Food Bank of Northeastern New York, Broadway Community Cares, Astoria CSA with Astoria Food Bank, and Helsing Junction Farm and the CSA Food Bank program are examples of such programs in the United States.

subsequently promoted three other charity campaigns tied to their credit cards with great success (Welsh, 1999). The successes of these advertising campaigns clearly show it is possible to link business sales to a charity in need of capital without the corporation making an out-of-pocket donation.

In this proposed program, food banks are not expected to spend their own funds to participate. Instead, food banks function as an intermediary and use their expertise and resources such as marketing networks, transportation system, and storage, to aid locally grown producers. In turn, food banks are compensated for their effort by the price premiums (monetary donations) paid by consumers purchasing locally grown foods. McManus and Bennet (2009) found that consumers are often willing to pay a price premium for products that are related to social causes or public goods.

## **SURVEY MAILING AND DESIGN**

To address our three specific research objectives, two surveys were developed, pretested and distributed to randomly selected Upstate South Carolina households. Each survey was organized into four sections: (1) current consumption of agricultural products, (2) knowledge and opinions about local foods and local food banks, (3) a set of stated choice experiments, and (4) socio-economic demographic characteristics such as respondents' age, gender, highest achieved education level, household zip code, number of years lived in the area, household income, and whether they have worked in either the agricultural or non-profit industries. The two surveys were identical in design except for the choice experiments; one version focused on produce (fruits and vegetables) and the other focused on animal products (meat, poultry, eggs, and dairy). Three thousand surveys of each version were mailed. The first mailing was in June 2012 and included an introductory cover letter and a survey. Two weeks later a reminder card was mailed

to all non-respondents. Finally, two weeks following the reminder card, the cover letter and survey were resent to all remaining non-respondents.

The stated choice experiments were designed to gain information on consumer preferences for local foods and donations to food banks. The choice experiment section began by asking respondents to think about their average trip to the grocery store, farmers market, or other point of purchase for agricultural products. Differing from prior research where participants are given specific products to evaluate, participants were instructed to report their favorite or most commonly purchased agricultural product (dependent on their survey version: fruits/vegetables or animal products), the quantity of their favorite product they normally purchased per trip, and the average price paid per unit. Respondents were then asked to choose between two products (A or B) and a no-choice option (see Figure 1). The two products differed across three attributes: growing location (local versus non-local), price relative to average price paid (five potential prices), and whether or not the product price included an implicit food bank donation. The choice experiments empirically simulate purchasing behavior when the level of specific product attribute differs.

Which would you choose from the options below (check only one) :

☐ Product A      ☐ Product B      ☐ I would not buy either

Attribute	Product A	Product B
Growing location	Out-of-State	Local
Price of Product	Average price	20% more than average
Donation	None	<u>Included</u>

Figure 1. Example Choice Set

Table 1 presents the three product attributes and level of each product attribute considered. SAS software was used to create the experimental design. For each product, the potential level of each of the three attributes is specified to create 8 comparison sets using SAS' D-Optimal criteria. The 8 comparison sets represent a subset of the 190 possible unique product comparisons. The same eight choice sets which each included a no-choice option were presented to each individual. The survey instrument was pretested using a focus group and survey response time ranged from 15 to 20 minutes. The number of choice sets was restricted to eight to keep the survey manageable, understandable, and minimize respondent fatigue. Given the experimental design, each completed survey generated 8 choice experiments (observations).

Table 1. Choice Experiment Attributes and Levels

Attribute	Level
Growing Location	Local (SC grown) Out-of-State
Product Price	Average price 10% more than average 20% more than average 30% more than average 40% more than average
Donation Aspect	Included donation None (donation not included)

## METHODS

### Theoretical and Empirical Model

Choices made by survey respondents were analyzed using the random utility model (RUM). The utility of each choice depends on the observable product attributes (price premium, donation, and growing location). For individual  $i$  choosing between  $J$  alternatives in choice occasion  $t$ , the utility of choice  $j$  ( $U_{ijt}$ ) is:

$$(1) \quad U_{ijt} = V_{ijt} + \varepsilon_{ijt}$$

where  $i=1,\dots,I$ ,  $j=1,\dots,J$ ,  $t=1,\dots,8$ ,  $V_{ijt}$  is the portion of utility that includes only observed attributes and  $\varepsilon_{ijt}$  captures the effect of the factors not included in  $V_{ijt}$  (e.g., consumers' habits, perceptions, etc.). Assuming the usual linear in parameter utility functional form for the deterministic component of utility, equation (1) can be rewritten as:

$$(2) \quad U_{ijt} = \beta_i' x_{ijt} + \varepsilon_{ijt}$$

where  $\beta_i$  is the  $K \times 1$  vector of utility parameters corresponding to  $K$  choice attributes, with individual-specific parameters, and  $x_{ijt}$  is the  $K \times 1$  vector of the choice attributes of the alternative  $j$  at each choice the individual  $i$  makes. Assuming each  $\varepsilon_{ijt}$  is independently, identically distributed extreme value with the cumulative distribution function,  $F(\varepsilon_{ijt}) = e^{-e^{-\varepsilon_{ijt}}}$ , the probability that consumer  $i$  chooses alternative  $j$  in choice occasion  $t$ , conditional on the coefficient vector  $\beta_i$  is (Revelt and Train 1998) is:

$$(3) \quad P_{ijt}(\beta_i) = \frac{e^{\beta_i' x_{ijt}}}{\sum_j e^{\beta_i' x_{ijt}}}.$$

Since the same consumer makes several choices, we need the probability of each consumer's sequence of observed choices. Let  $h(i,t)$  denote the specific alternative  $j$  that consumer  $i$  selects in choice occasion  $t$ . Conditional on  $\beta_i$ , the probability of consumer  $i$ 's observed sequence of choices over all  $t$  choices is (Train 1998):

$$(4) \quad S_i(\beta_i) = \prod_t P_{ith(i,t)}(\beta_i).$$

The coefficient vector  $\beta_i$  is unobserved for each consumer  $i$  and varies in the population with density  $f(\beta_i|\theta)$  where  $\theta$  are the true parameters of the distribution of  $\beta_i$ . Therefore, the unconditional probability of the observed choice sequence is:

$$(5) \quad P_i(\theta) = \int S_i(\beta_i) f(\beta_i|\theta) d\beta_i.$$

The log-likelihood function is  $LL(\boldsymbol{\theta}) = \sum_n \ln P_i(\boldsymbol{\theta})$ . Because the integral in (5) cannot be calculated analytically, estimation is carried out using simulated maximum likelihood (ML) procedures (Train 1998, Train 2003, and Rigby and Burton 2006). In contrast to the standard conditional logit model, consumer preferences apply to each choice situation and vary across consumers. Moreover, as shown in Train (2003) this version of the logit model, the mixed logit model, allows for correlation of choices for the same consumer. The mixed logit models were estimated using Kenneth Train's Matlab programs available online at <http://elsa.berkeley.edu/~train/software.html>.

With regard to the distribution of the coefficients in  $\boldsymbol{\beta}_i$ , the price coefficient is specified to be fixed. The distribution for the coefficients of all non-price attributes was assumed to be normal because it is difficult to determine a priori how consumers perceive specific attributes. That is the individual  $\boldsymbol{\beta}_i$  coefficients may take on positive or negative values. Given these assumptions, the  $\boldsymbol{\beta}_i$  parameters can be viewed as utility coefficients that can be transformed into willingness to pay (*WTP*) measures for specific attributes (calculated as the negative of the ratio of a specific product attribute coefficient to the price coefficient) which are also normally distributed (Train 1998, Train 2003, and Hensher, Shore and Train 2005).

To make full use of the results derivable from a mixed logit model, in addition to estimating mean *WTP* values, it is also possible to estimate the entire *WTP* distributions. Estimation of the *WTP* distributions is carried out using a conditional distribution approach (Train and Revelt, 1999; Hess, 2007). Using Bayes Rule the density of each  $\boldsymbol{\beta}_i$  conditional on the individual's sequence of choices and the population parameters is given by:

$$(6) \quad h(\boldsymbol{\beta}_i|\boldsymbol{\theta}) = \frac{S_i(\boldsymbol{\beta}_i)f(\boldsymbol{\beta}_i|\boldsymbol{\theta})}{P_i(\boldsymbol{\theta})}.$$

If  $k(\beta_i)$  is a function of  $\beta_i$  (e.g., the *WTP* values for each attribute) then the expected value of  $k(\beta_i)$  is:

$$(7) \quad E(k(\beta_i)|\theta) = \frac{\int k(\beta_i)S_i(\beta_i)f(\beta_i|\theta)d\beta_i}{P_i(\theta)},$$

which can be approximated by:

$$(8) \quad \widehat{k(\beta_i)} = \frac{\sum_r k(\beta_i)S_i(\beta_i^r)}{\sum_r S_i(\beta_i^r)},$$

where  $\beta_i^r$  is the  $r$ -th draw from the population density  $f(\beta_i|\theta)$ . The individual  $\widehat{k(\beta_i)}$  estimated values can then subsequently be used to estimate distributional statistics across respondents (Hess, 2007). The stability of the estimated distributions was verified using various sizes for the number of sample draws. One thousand draws was used in the following analysis.

## EMPIRICAL RESULTS

### Choice Experiment Summary

Figure 2 graphically summarizes survey choices to the eight choice experiment questions. Appendix Table A1 reports the attribute settings in the eight choice experiments. As illustrated in Figure 2, no choice is consistently chosen in any experiment. Moreover, the summary findings suggest a preference for local food products over out of state products. For example, in survey question 23 (choice experiment 4), choices A and B both include a donation attribute. Choice A is an out-of-state product priced 10% above average, and choice B is a local product priced 20% above average, and the majority of individuals preferred choice B to choice A. When the choice is between two out-of-state products as in question 22 (choice experiment 3), and the price differential between the two products is small, the majority of the consumers choose the product that includes the donation (choice B).

The last choice experiment (question 27) illustrates that consumers may be conflicted when choosing between local products sold well above average prices that includes a donation, (choice A) versus an out-of-state product also sold well above average price that does not include a donation in the purchase price (choice B). In this situation it is unclear whether the most common individual choice would be choice A or neither product (choice C).

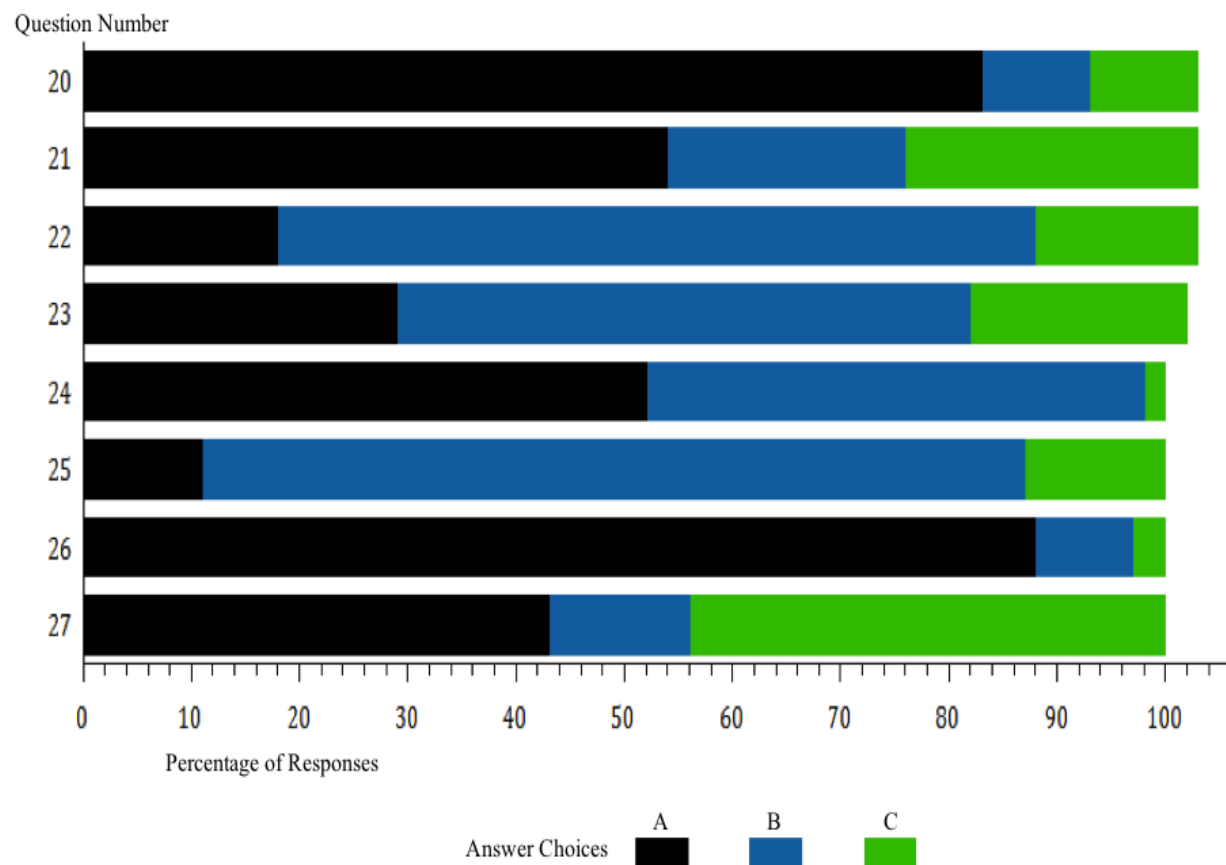


Figure 2. Consumer Percentage Responses to the Eight Choice Experiments

### Descriptive Statistics

Table 2 summarizes the social demographic characteristics for the survey sample compared to population census statistics for South Carolina's Upstate area. The educational attainment of the sample was significantly higher, with 87% of all sampled individuals having

at least some college education compared to 51% in the upstate. The sample was also older and had a higher proportion of white individuals and females than the upstate population but the relative differences were smaller than those related to educational attainment. Finally, sample household size is very close to that of the upstate and the sampled median household income interval contains the median household income in the population.

**Table 2.** Socio-Demographic Characteristics of Survey Respondents versus South Carolina Upstate Region Population

Socio-demographic characteristics	Sample	Upstate Population
Mean age for population 20 years and older	57.0	48.52
Female	63.1%	52.2%
Median household income	\$40,000-\$60,000	\$44,590
Persons per household	2.44	2.53
Some college education	87.2%	51.1%
White	88.7%	77.9%

Note: Upstate population data was obtained from the U.S. Census Bureau 2011 American Community Survey (available at: <http://factfinder2.census.gov>).

### Basic Model Estimation Results

The empirical estimates for two specifications of the basic mixed logit model are reported as Models 1 and 2 in Table 3. Both models exclude the socio-demographic characteristics of the survey respondents. In addition to the product attribute variables of growing location, price and donation, an interaction term between the local and donation attributes (*localxdonation*) was included to explore the complementarity and/or substitutability of these two attributes in the purchasing decision. The variable *asc* (for 'alternative specific constant') is used as a control for

the "neither" option included in each choice experiment. As noted, the price coefficient was assumed to be fixed whereas all the nonprice parameters are assumed to be normally distributed.

Table 3. Basic Mixed Logit Model Results

Variable	Model 1		Model 2	
	Mean	Standard Deviation	Mean	Standard Deviation
<i>price</i>	-6.791*** (0.327)		-5.760*** (0.400)	
<i>asc</i>	-8.855*** (0.407)	1.650*** (0.145)	-7.900*** (0.501)	1.661*** (0.145)
<i>local</i>	0.768*** (0.131)	0.925*** (0.153)	0.619*** (0.157)	0.917*** (0.153)
<i>donation</i>	0.097 (0.095)	0.724*** (0.130)	-0.034 (0.121)	0.735*** (0.130)
<i>local x donation</i>	0.588*** (0.138)	0.934*** (0.145)	0.596*** (0.138)	0.926*** (0.145)
<i>produce x price</i>			-2.415*** (0.611)	
<i>produce x asc</i>			-2.286*** (0.726)	
<i>produce x local</i>			0.336* (0.196)	
<i>produce x donation</i>			0.294* (0.165)	
Number of individuals		340		
Number of observations		2,640		
Log-likelihood (LL)	-2,126.4		-2,116.3	
LL from standard logit model	-2,307.02		-2,298.0	

Notes: *asc*= alternative specific constant for "neither" option, *produce* = fruit/vegetable survey dummy. .

Triple, double and single asterisks (\*) denote two-tail statistical significance at the 1%, 5%, and 10% level, respectively.

In Model 1 the effects of the product attributes on consumer utility are assumed to be identical for both produce (fruits and vegetables) and animal products. To test the validity of this assumption Model 2 was estimated to allow for the interaction of the mean effects of the product attributes and an agricultural produce dummy variable (*produce*).<sup>3</sup> The log-likelihood ratio test was used to compare the restricted model (Model 1) to the unrestricted (Model 2) and the null hypothesis that the restrictions were valid was rejected ( $\chi^2 = 20.2, p < 0.01, df = 4$ ). Focusing on the four estimated interaction parameters, two of the four parameters were significant at the 0.01 level and the other two at the 0.10 level. Hence, there is strong evidence that the effects of product attributes differ by agricultural product type.

Given that the standard deviation parameter associated with each attribute coefficient was significant at the 0.01 level indicates the mixed logit specification provides a significantly better representation of the individual choice decisions than the standard logit model which assumes identical coefficients for all consumers (Hensher and Greene, 2003). Formal log-likelihood ratio tests for all estimated mixed logit models versus the corresponding standard logit models rejected the null hypotheses that the standard deviation coefficients are zero ( $p < 0.01$ ) and strongly support preference heterogeneity in the estimated attribute random parameters.

The negative coefficient for *asc* was expected and reflects the consumer's preference to purchase a product (choosing *either* A or B) are much stronger than to not purchase a product. A consumer's indirect utility is decreased if when given a choice no purchase is made and the consumer decides to keep his dollars in his wallet. As expected, the negative price parameters

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<sup>3</sup>In model 2, all parameters corresponding to interaction terms between the *produce* dummy and attributes are assumed fixed. Estimated models that assumed the coefficients of these interactions were random did not yield statistically significant results. Model 2 also excludes the interaction between the *produce* dummy and the *local x donation* variable since it was also found to be insignificant.

indicate that consumers prefer to purchase cheaper products when all other product attributes are identical. The significant and positive coefficient on the *local* mean parameter indicates that the majority of consumers prefer locally grown products over out-of-state products. Moreover, the effect of *local* attribute is greater for produce than for animal products as captured by the positive value for the produce slope shifter in Model 2.

If for a specific product attribute, the mean coefficient is not significant, the preferences for the attribute are spread with the center at or near zero. This is the case for the *donation* mean coefficient values reported in Models 1 and 2. However in Model 2 where the *produce* dummy interacts with the non-price attributes, the interaction between *produce* and *donation* is significant and indicates a preference for donating when purchasing produce relative to donating when purchasing animal products. The positive and significant interaction between *local* and *donation* implies a complementarity relationship exists between these two product attributes. Hence, consumers have a stronger preference to donate when purchasing locally grown products than when purchasing nonlocal products.

#### *Willingness to Pay Distributions*

Table 4 reports the estimated mean WTP values for the local and donation attributes for both agricultural products. The 95% WTP bound values are also reported. In percentage terms, consumers' mean WTP to pay for a local product that does not contain the donation attribute, minimally differs between produce (fruits and vegetables) and animal products (11.65% versus 10.75%). In contrast, consumers' mean WTP for the donation attribute, in the absence of the local attribute, is over six times larger for produce than animal products (3.69% versus 0.59%). However, a strong complementarity relationship exists between the *donation* and *local* attributes.

Relative to a product having only the local attribute, the mean WTP premium for both products nearly doubles when a product possesses both the local and donation attributes.

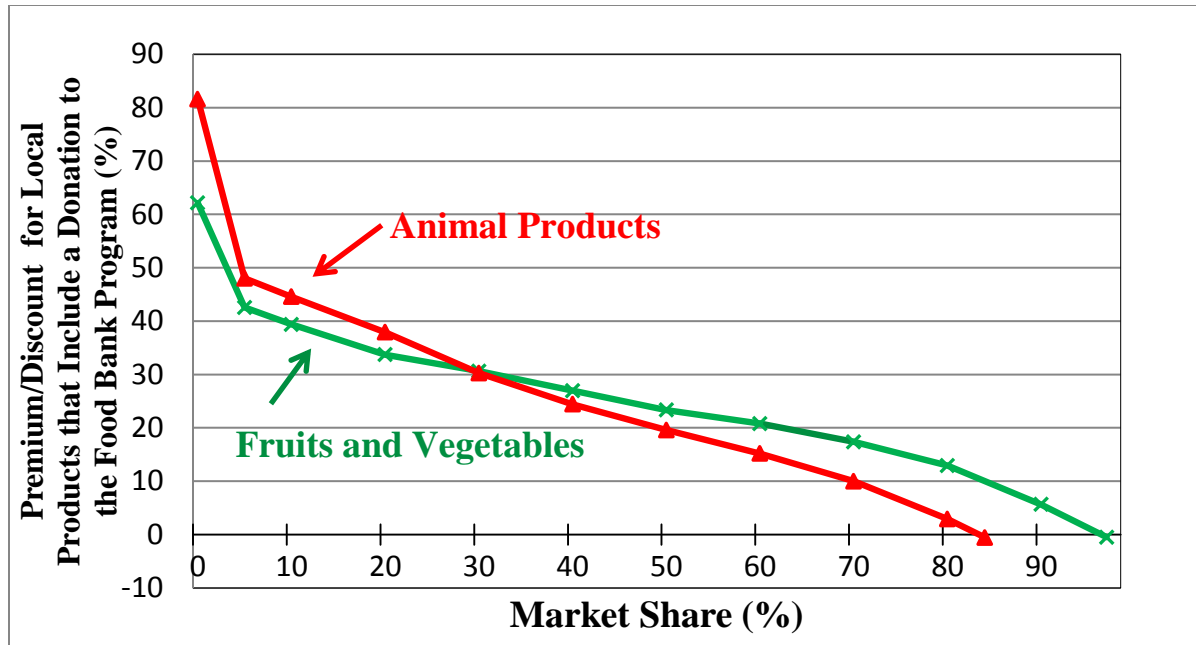
Table 4. Estimated Willingness to Pay Distributions for Product Attributes (%)

Fruits and Vegetables			Animal Products		
Local no Donation	Donation not Local	Local + Donation	Local no Donation	Donation not Local	Local + Donation
11.68 [1.23,21.04]	3.69 [-6.27,12.86]	22.33 [-1.00,45.69]	10.75 [-4.08 ,24.02]	0.59 [-14.00;13.14]	20.50 [-12.37,53.91]

Note: Bracketed values represent the 95% numerical bound values of the distributions.

Using the reported average price of \$1.47/lb for the most commonly bought produce products and \$3.11/lb for the most commonly purchased animal products, the mean WTP premium values for locally grown with donation correspond to per pound values of \$0.33 and \$0.64 for produce and animal products, respectively. In comparison, the mean WTP percentage premiums for local products without donation included correspond to per pound values of \$0.17 and \$0.33for produce and animal products, respectively.

Figure 3 presents the simulated demand equations for both local products with a donation attribute using the estimated WTP distributions. Points on the simulated demand curves represent the proportion of the population (i.e., market share) willing to pay various price premiums (Louviere, Hensher and Swait, 2000). Comparing the demand curves for animal products versus produce reveals that a greater proportion of consumers are willing to pay a positive premium for local fruits and vegetables with a donation (97%) than for local animal products with a donation (84%). Figure 3 also shows that the market share for animal products drops more rapidly as the percent premium increases than for produce, most likely due the greater actual dollar cost of a given percentage premium on animal products than produce .



**Figure 3.** WTP Price Premiums for Locally Grown Products that Support Local Food Banks

#### *The effect of Consumer Sociodemographic Characteristics*

The estimates in reported in Table 3 indicate that the attribute parameters vary greatly within the population. However, the basic specification did not consider observed customer characteristics. Table 5 presents a model that factors in the possible interaction between main attribute effects of the *local* and *donation* variables with the socio-demographic variables. Many alternative interaction combinations between socio-demographic variables and the two main product attributes were examined. Nonlinear effects for the age variable using quadratic effects were also investigated but we found no evidence of a nonlinear effect of this variable. The following patterns were consistent across all model specifications: (1) consumers with higher income are more willing to pay for local products and to donate to the food bank program; (2) females have a higher willingness to pay for local products; (3) older individuals are less willing to pay for local products and products that include a donation to the food banks.

Table 5. Mixed Logit Model with Sociodemographic Variables

Variable	Mean Coefficient		Standard Deviation	
			Coefficient	
	Parameter	Standard	Parameter	Standard
	Estimate	Error	Estimate	Error
price	-5.763***	0.400		
asc	-7.879***	0.500	1.626***	0.142
local	1.579**	0.711	0.723***	0.175
donation	0.706	0.597	0.621***	0.145
local x donation	0.594***	0.141	1.055***	0.138
produce x price	-2.412***	0.611		
produce x asc	-2.291***	0.726		
produce x local	0.231	0.192		
produce x donation	0.221*	0.163		
income \$40K-\$80k x local	0.609***	0.223		
income >80K x local	0.845***	0.273		
female x local	0.515***	0.192		
age x local	-0.018***	0.007		
white x local	-0.124	0.296		
members x local	-0.278***	0.082		
education x local	0.051	0.282		
income \$40K-\$80k x donation	0.144	0.190		
income >80K x donation	0.275	0.228		
female x donation	-0.081	0.164		
age x donation	-0.020***	0.006		
white x donation	0.049	0.252		
members x donation	-0.070	0.069		
education x donation	0.400*	0.244		
Number of individuals		340		
Number of observations		2,640		
Log-likelihood (LL)		-2,092.10		
LL from standard logit model		-2,262.24		
Notes: asc= alternative specific constant for “neither” option, produce = fruit/vegetable survey dummy.				
Triple, double, and single asterisks (*) denote two-tail statistical significance at the 1%, 5%, and 10% level, respectively.				

The estimated parameters presented in Table 5 can be aggregated to estimate the impacts that the socio-demographic factors have on the mean *WTP* functions for products that contain both the local and donation attributes. It is important to recall that the estimated parameters reported in Table 5 capture their effects on the indirect utility function and must be rescaled to capture their impact on the *WTP* price premiums. The estimated coefficients that affect each *WTP* function for (locally grown animal products with a donation or locally grown produce products with a donation) must be carefully aggregated by the appropriate product type and then normalized on the appropriate price coefficients (animal or produce). For example the intercept for the animal products *WTP* function with both attributes is calculated as the negative of the sum of the local, donation, and local\*donation parameters divided by the price parameter ( $-\frac{1.579 + 0.706 + 0.594}{-5.763} = 0.4996$ ). In comparison, the intercept for the produce *WTP* function with both attributes is calculated as the negative of the sum of the local, donation, local\*donation, produce\*local and produce\*donation parameters divided by the sum of the price parameter and the produce\*price parameter ( $-\frac{1.579 + 0.706 + 0.594 + 0.231 + 0.221}{-5.763 - 2.412} = 0.4075$ ). For households earning from \$40K to \$80K annually, the effect on willingness to pay a price premium for animal products with the combined local and donation product attributes, relative to a household making less than \$40K, is calculated as the negative of the sum of the parameters for income \$40K-\$80K\*local and income \$40K-\$80K\*donation, divided price parameter ( $-\frac{0.609 + 0.144}{-5.763} = 0.1307$ ). The *WTP* calculation for produce is identical except the denominator is the sum of price and price\*produce parameters.

Doing the appropriate parameter aggregation and price normalization for all other estimated parameter generates two mean *WTP* functions. Equation 9 is the derived *WTP*

function for animal products having both the local and donation attributes, and Equation 10 is the WTP function for produce products having both attributes.

$$(9) WTP_{Anim.Prod.(local+donation)} = 0.4996 + 0.1307 \text{ income\$40K-}\$80K + 0.1943 \text{ income}>\$80K \\ + 0.0753 \text{ female} - 0.0066 \text{ age} - 0.0130 \text{ white} - 0.0604 \text{ members} \\ + 0.0783 \text{ education},$$

and a similar mean WTP function for produce that is local and includes a donation:

$$(10) WTP_{Produce(local+donation)} = 0.4075 + 0.0921 \text{ income\$40K-}\$80K + 0.1370 \text{ income}>\$80K \\ + 0.0531 \text{ female} - 0.0046 \text{ age} - 0.0092 \text{ white} - 0.0426 \text{ members} \\ + 0.0552 \text{ education}.$$

The interpretation of the parameters in the derived WTP functions is identical to the estimated parameters in a standard linear regression model. The marginal effects for the continuous variables represent the change in the WTP for local products whose price include a donation to the food bank program given a one unit change in the variable. Thus, each additional year of age decreases willingness to pay premium by 0.66% for animal products and 0.46% for produce. Household size is a significant driver of consumer willingness to pay a premium for local products that support local food banks. Each additional household member is estimated to decrease the willingness to pay premium by 6.0% for animal products that are local and include a donation to the food bank, and by 4.3% for produce that is local and include a donation.

The marginal effects of the dummy explanatory variables are interpreted relative to the dummy variables excluded from the model (a non-white male consumer without any college education, who is member of a household that makes less than \$40K per year). The results suggest that gender, education, and income have a strong impact on WTP for both products possessing the local and donation attributes.

Relative to male consumers, females are willing to pay an additional 5.3% premium for produce that is local and include a donation, and an additional 7.5% premium for animal products that are local and include the donation. Consumers with some college education are willing to pay an additional 7.8% for animal products and 5.5% for produce if these products are local and include a donation to the food bank programs.

Finally, consumers with household income above \$40K are willing to pay higher prices for local products that also support local food banks relative to individuals that have incomes below \$40K. Relative to consumers with a household income below \$40K, consumers with household income between \$40K and \$80K are willing to pay 13.1% more for local animal products that support local food banks and 9.2% more for local produce with a donation. Consumers with household income above \$80K are willing to pay 19.4% more for local animal products with donation and 13.7% more for local produce that also includes a donation for the food banks. No economic significant difference in premiums was detected between white and nonwhite consumers for products that are both local and include a donation to the food banks.

### **Donation Preference**

In addition to estimating consumer willingness to pay for local products with and without a food bank donation, a secondary research objective was to determine the type of donation program consumers most preferred. Although the donation type could have been incorporated as another product attribute in the choice experiments, a focus group analysis revealed that adding the type of donation to the choice experiment created unnecessary complexity to the experiment description and decreased respondent understanding of the choice experiments. Hence, an additional question was included at the end of the survey to address this issue. Figure 4 replicates

survey question 30, the question used to gather information on donation preference for the type of donation, when the donation attribute is included in the product price.

**Question 30:**

Please read the explanation of two types of donations that could support a system linking local food banks to local farms. In both cases, donations are *included in the sale price* and the buyer knows that they are making a donation.

A. **Known proportion** - a percent of the total purchase of local food is donated to a local food bank, this percentage is explicitly told to the buyer

B. **Blind (built-in donation)**- a price x% more than the average price is charged and that x% is donated. The x% is unknown to the customer when purchasing

☐ I prefer A      ☐ I prefer B      ☐ Undecided

Figure 4. Survey Question on Donation Preference

The known donation amount was overwhelmingly the most popular survey response with 82.4% of respondents preferring it over the blind donation (3.9%) or undecided (13.7%). These answers highlight consumers' need for information to make accurate decisions about their locally grown purchases and donation amounts. Consumers may feel 'better' about their locally grown purchase when knowing how much they are donating.

## CONCLUSIONS

Demand for locally grown food has significantly increased the last few decades. By combining this consumer preference for locally grown foods with a food bank donation, it may be possible to redefine how consumers donate to food banks that jointly help low income members of their local community plus support local farmers. Attribute based methods are used to estimate how much consumers are willing to pay for the locally grown attribute and the

donation attribute above their average expenditures on produce and animal products, and how socio-demographic characteristics influence consumer choices and WTP. A mixed logit model was used to analyze consumer responses to a choice experiment presented to a random sample of households in the upstate South Carolina region.

Estimates reveal that average households are willing to pay 11.68% (\$0.17/lb) more for locally grown produce relative to non-locally grown, and 10.75% (\$0.33/lb) more for locally produced animal products non-locally produced. When the locally grown product attribute is combined with a food bank donation the WTP premium increases to 22.33% (\$0.33) for produce and 20.50% (\$0.64) for animal products. Results reveal that consumers are willing to pay only a small price premium for products that contain the donation attribute but are not locally grown. Consumers are willing to pay only 3.69% (\$0.05/lb) more for produce when the purchase price includes a food bank donation but the product is non-locally grown and only 0.59% (\$0.02/lb) more for non-locally raised animal products when purchase price includes a food bank donation. However, a strong complimentary relationship was found between the *local* and *donation* attribute which suggest consumers have a stronger preference to donate when purchasing locally grown products than when purchasing nonlocal products. As anticipated, WTP for both locally grown products and the magnitude of the donation increases with income. WTP price premiums for food products that included both the locally grown attribute and the donation attribute also increased with educational level and were higher for women than men. WTP decreased with age, household size, and if the responded was white.

Prior studies have found some linkages between local food systems and community economic development. When local supply chains are utilized, a greater share of all wage and proprietor income is retained locally. Moreover, this research has shown that consumers of

locally grown products are willing to pay an additional price premium if the price implicitly includes a donation to a local food bank. Thus, it may be possible to use the donation as a carrot to get non-profit food system intermediaries (for example food banks) to work with small, local, farmers to sustain and expand the operations of small farmers and, in turn, stimulate local economies.

## **FUTURE RESEARCH**

This research focused on South Carolina's Upstate, but a broader research agenda could include the entire state or multiple states. The basis of this study can be extended to any state or region because all areas have farmers markets, local farm products, and food banks. Regions can be defined in terms of a specific mile radius from either the primary point of sale or the growing location. This would provide a means to change the definition of "local" to include not just the state the consumer is buying the product from but to suit local circumstances, preferences, and /or understanding. The feasibility of this system depends on the participation of food retailers and consumers willingness to donate to local food banks in their area. For example, many farmers from North Carolina may travel to farmers markets in South Carolina and therefore could participate in the program because they consider "over the border" to be "local."

The survey methodology asked survey responders an open-ended question of what their favorite/most commonly purchased agricultural product is. This created some unusable surveys because the responders provided either an ambivalent answer or no answer. In several cases vegetarians and vegans received the animal product survey and were unable to respond to what their favorite animal product is. Future research could explore using a close ended format by giving responders either one product (i.e., a tomato or chicken breast) or a choice between several products.

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## Appendix

Table A1. Attributes Associated with Each Question and Choice

Attributes per Choice per Question		
Question	Choice A	Choice B
20	Out-of-State Average Price No Donation	Out-of-State 30% more than average Included Donation
21	Local 30% more than average Included Donation	Out-of-State 20% more than average Included Donation
22	Out-of-State 10% more than average No Donation	Out-of-State Average Price Included Donation
23	Out-of-State 10% more than average Included Donation	Local 20% more than average Included Donation
24	Local 10% more than average Included Donation	Local Average Price No Donation
25	Out-of-State 40% more than average No Donation	Local 10% more than average No Donation
26	Local Average price Included Donation	Local 40% more than average No Donation
27	Local 40% more than average Included Donation	Out-of-State 30% more than average No Donation

Note: Survey questions 20 through 27 respectively correspond to choice sets 1 through 8.