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Abstract. This paper uses data collected from hypothetical and non-hypothetical choice-based conjoint survey instruments to estimate willingness to pay for distance-based local food products. The survey was administered to three different groups of respondents: members of a consumer buying club with local and grass-fed market experience, a random sample of Maryland residents, and shoppers at a non-specialty suburban Maryland grocery store. We find that both the random sample of Maryland residents and the grocery store shoppers are willing to pay a premium for local products, but view local and grass-fed production as substitutes. Conversely, members of the consumer buying club are willing to pay significantly less for local than their counterparts, but do not conflate local with other premium attributes, such as grass-fed production.

Keywords. conjoint analysis, field experiment, local, grass-fed, willingness to pay, beef

Recent years have seen a resurgence in the marketing and consumption of local food products (USDA NASS 2009; USDA AMS 2009; Brown and Miller 2008). However, the precise definition and concept of local remains nebulous and consumers are left to project their own perceived attributes onto local products, often projecting positive attributes. In a recent publication, the United States Department of Agriculture [USDA] suggested that consumers choosing local food products are doing so because of perceived freshness, health benefits, environmental sustainability, and support for small farms and the local economy (Martinez et al. 2010). These findings suggest that without a structured definition or certification process in place, the local moniker is vulnerable to misinterpretation by consumers and misuse by unscrupulous producers. Similar to the establishment of organic standards in the U.S., certification of local may serve to assure consumers that local food products meet specific geographic standards, protect price premiums for producers, and increase market efficiency (Lohr 1998). Given the recent increase in focus (USDA's Know Your Farmer, Know Your Food campaign; farm-to-school programs; etc.) and apparent popularity and marketing surrounding local (Jersey Fresh, Maryland's Best, Pride of New York, California Grown, etc.), we undertook this study to quantify the premium on locally produced food products, to determine who is willing to pay for these products, and to investigate whether this distance-based premium is confounded with other desirable process attributes commonly associated with the local label.

To best examine consumer preferences for the local attribute, we chose ground beef as our product of analysis because beef, unlike produce, conveys no obvious notion of "freshness" with distance traveled, and therefore distance conveys more signal and less noise in the measurement of preferences (Dentoni et al. 2009). This issue is akin to the classic omitted variable issue where unobserved "freshness" is typically highly correlated with distance. A

second advantage of ground beef is the limited spectrum of attributes that can vary, notably the leanness and the production method. We focused solely on lean beef, defined as 90 percent lean, and used grass-fed beef production to address variation in production method. By definition, grass-fed operations have non-confined cattle, relatively high land demands per head, and are generally viewed positively in the sense that grass requires less input than grain to grow. Given the fact that consumers often project positive personal notions onto the local attribute which are often also embodied in grass-fed production, we have attempted to use the grass-fed attribute to capture these positive associations, directly isolating the distance component of the local attribute. Additionally, because of the nature of the local label, we narrowed the definition by only referring to distance from producer to consumer.[1]

To estimate willingness to pay [WTP] for ground beef, we collected preference data from a choice-based conjoint analysis survey from multiple populations, including more market experienced shoppers[2] and the general population. To our knowledge, this study is the first to examine the extent to which market information or experience of the food shopper impacts the WTP for distance-based local products. We also examine the relationship between local products and the general population under both hypothetical and non-hypothetical scenarios. We find that more market experienced food shoppers value the distance-based attribute much less than the general public, though both are significantly different from zero, and that the general public is willing to pay a premium for local products in both hypothetical and non-hypothetical preference

[1] In our surveys, we never refer to a product as local, instead we provide participants with information about the miles the product traveled. Any further mention of local in the context of our research refers exclusively to distance traveled.

[2] On average, buying club members have almost three years of experience shopping in grass-fed and local markets. Therefore, throughout the paper, we refer to consumers who have self-selected to be a part of the consumer buying club as market experienced shoppers.

settings. Also, contrary to common perceptions, we find this premium for local products exists across income levels and ages.

Lastly, we address possible substitution and complementarity between the production method and distance attributes in our study (Onozaka and Thilmany McFadden 2011). That is, distance and grass-fed attributes may have overlapping values for consumers, especially in the circumstance where consumers are projecting personal positive notions of local which are embodied in grass-fed production explicitly. For example, because consumers may already associate local production with more "friendly" farming methods, it is likely that the grass-fed attribute may contribute little additional value to a locally-produced product. In this case, grass-fed and local production are substitutes. On the other hand, local production may provide value independent of (or even enhance) the grass-fed attribute for consumers with a different set of beliefs. In either case, any evidence that the local attribute is being confounded with other production attributes by consumers would suggest that the market may benefit from some form of standardization.

Methods for Eliciting Willingness to Pay

In the last decade, a large literature has developed that aims to estimate consumers' WTP for various quality attributes. Most studies tend to use one of three basic methods to elicit WTP: choice-based conjoint analysis [CA], experimental auctions, or hedonic models. CA is widely used in consumer marketing (Green and Srinivasan 1990) and has also become a common tool used by environmental economists to evaluate nonmarket goods. This method typically uses a survey instrument, and the WTP measure is elicited from a hypothetical market scenario. However, the values elicited using stated preference data do not reflect actual market transactions and have thus been met with some skepticism among other economists (Cummings,

Brookshire, and Schulze 1986; Mitchell and Carson 1989; Adamowicz, Louviere, and Williams 1994; and many others).

To address this concern, researchers have devised incentive compatible field experiments where decisions involve real money (List and Gallet 2001; Harrison and List 2004). In these cases, the method for eliciting WTP may involve a non-hypothetical CA or some type of experimental auction. Lastly, the use of hedonic models with revealed preference data (such as consumer scanner data) offers an alternative to real experiments, but this method provides much less control, and the analysis is limited to existing products with available data.

Studies of WTP for Food Attributes

Food products are increasingly differentiated by quality attributes, some of which include environmental considerations, production methods, seed genetics, farm location, and other health-related factors. A considerable literature attempts to estimate consumers' WTP for food that contains genetically modified organisms [GMO]. In fact, Lusk, et al. (2005) identifies 25 separate studies that together provide 57 estimates of consumers' WTP for food containing GMOs. Another set of literature examines consumer preferences for geographic indicators, such as country-of-origin labeling [COOL], and attempts to estimate WTP for COOL (Loureiro and Umberger 2003 and 2005). These studies have generally found significant positive, but small, WTPs for certified U.S. products.

For the present product under consideration, grass-fed production is a process trait that may encompass several quality attributes of ground beef. For example, grass-fed cattle are commonly associated with leaner beef (a taste/health quality), but also involve a different production method (pasturing) that may be inherently valuable to consumers. Lusk and Parker (2009) employ a CA design and find positive WTPs for beef with lower fat content and

improved composition of fat, which is consistent with prior hedonic demand analysis of ground beef (Brester et al. 1993; Parcell and Schroeder 2007; Ward, Lusk, and Dutton 2008). Positive WTPs for grass-fed production distinct from fat content have also been measured using hypothetical CA (Abidoye et al. 2011), incentivized CA (Lusk, Fields, and Prevatt 2008), and experimental auctions (Umberger et al. 2002; Umberger, Boxall, and Lacy 2009). Recognizing the importance of leanness in the ground beef market, we control for this confounding effect by holding leanness constant across all of our choice sets.[3]

Much of the literature on WTP for local production is based on hypothetical surveys, but we observe the same trend that consumers have a positive WTP for local food (Loureiro and Hine 2002; Brown 2003). Similar to grass-fed, local production may also span several quality attributes including product freshness, farm size, and actual production location. Darby, et al. (2008) estimates WTP for strawberries differentiated by production location, farm size, and freshness guarantee and finds that consumers' have a positive WTP for local production distinct from other attributes. An important consideration with regard to this product choice is the implied freshness attached to fruit and vegetables that were harvested nearby and thus more likely to have been harvested more recently. Ground beef avoids this critique.

Sampling and Data Collection

Our data are derived from three primary sources as follows:

(1) a survey of participants in a food buying club based in Maryland generating hypothetical conjoint responses (conducted fall of 2011);

[3] Given the consumer backlash to the knowledge of lean finely texture beef [LFTB], a.k.a. "pink slime", that occurred during our study period, our choice of 90/10 beef was fortuitous because both grass-fed and conventional beef can attain this level of leanness without using this additive. All beef in our study was free of LFTB.

(2) a survey of the general population of Maryland generating hypothetical conjoint responses (conducted fall of 2011);
(3) a field experiment in a suburban Maryland grocery store generating non-hypothetical conjoint responses (conducted fall of 2012).

The food buying club represents a set of shoppers with experience purchasing local and grass-fed food products, primarily meat, eggs, and dairy. The club has been in operation since 2004 and has delivery locations across the state of Maryland and expands to new members by word of mouth. Products are ordered via the internet and the orders are fulfilled by one of a handful of farmers in Maryland and southeastern Pennsylvania on a weekly basis. Members of the buying club were approached for participation in the survey via email solicitation using the group's Listserv of the entire buying club which contained approximately 1,200 email addresses. The buying club is an important choice based sample because members have self-selected themselves as interested in local and grass-fed livestock, and have an average of almost three years of experience in this market.

The second sample is comprised of a random selection of Maryland residents over the age of 25 recruited by a web survey company. This sample was targeted to represent a baseline comparison population for the buying club sample. We administered the same survey instrument and conjoint analysis questions to this sample in the same time period as the buying club sample. The third sample is comprised of shoppers of a midsized, regional non-specialty grocery chain in a Baltimore suburb. These shoppers were recruited over a weekend in the fall of 2012. This sample received a shortened version of the survey instrument and a non-hypothetical version of the conjoint choice questions where they received actual ground beef and a coupon off their grocery bill based on their own choices.

Hypothetical Survey

On-line survey questionnaires were administered to the first two groups of respondents. Upon consenting to participate, respondents completed a brief survey of food purchase behavior, followed by a series of four hypothetical ground beef choice experiments, and finally some demographic and socioeconomic questions. In total, 358 buying club members and 327 random Maryland residents completed the survey. Descriptive statistics for the two samples are reported in table 1. As previously stated, the survey contains four ground beef conjoint choice questions. The instructions for the conjoint choice questions ask the respondent to choose between two hypothetical one-pound packages of ground beef that are identical in every way except for the attributes described. That is, two product profiles are presented side-by-side (figure 1) and information is provided on five different attributes: producer (farmer you know, farmer you do not know); distance traveled (100 miles, 400 miles, 1000 or more miles); use of antibiotics and hormones (USDA certified organic; not organic, but no use of antibiotics or hormones; not organic and use of antibiotics and/or hormones); livestock production (pastured zero to three months of the year, pastured three to six months of the year, pastured six or more months); and price ($4.00, $6.00, $8.00). All attribute levels are fully listed in table 2. Respondents were then asked to state which of the two product profiles they would choose, Beef A or Beef B, or if they would not choose either option (Beef C).

To generate the experimental design, sets of product profiles were created using the design efficiency recommendations of Kuhfeld (2009). A total of 162 product profiles (2 producer levels × 3 distance traveled levels × 3 antibiotic/hormone levels × 3 livestock production levels × 3 price levels) were generated. Four blocks with twenty paired product profile comparisons were then created using D-Optimal criteria with one restriction imposed: if

the producer is not known, the price of organic ground beef must always exceed the price of ground beef produced with the use of antibiotics and/or hormones. This restriction was imposed to mimic prices normally observed in retail outlets. Each respondent was randomly assigned to one question from each block of the experimental design, with each respondent completing a total of four hypothetical choice experiments.

Econometric Model

We use a random utility model to determine the WTP for the grass-fed and local attributes in one pound of ground beef. When an individual *i* chooses between *J* choices, suppose the utility of the choice *j* is

$$U_{ij} = \boldsymbol{x}_{ij}'\boldsymbol{\beta} + \varepsilon_{ij}, \quad (1)$$

where $\boldsymbol{x}_{ij}$ is a vector of choice-specific attributes and ε_{ij} is a stochastic component of utility. The vector of coefficients $\boldsymbol{\beta}$ represents the change in utility associated with a unit change in a given attribute. If we observe that an individual chooses alternative *j,* we assume that

$$U_{ij} \geq U_{ik} \quad \text{for all } k \neq j, k \in J.$$

Let Y_i be a random variable indicating the alternative individual *i* chooses. If the *J* error terms for each individual are *iid* with Type 1 EV distribution, we can express the probability that choice *j* is made as

$$\text{Prob}(Y_i = j) = \text{Prob}(U_{ij} \geq U_{ik}) \qquad (2)$$

$$= \frac{\exp(\boldsymbol{x}_{ij}'\boldsymbol{\beta})}{\sum_{j=1}^{J} \exp\left(\boldsymbol{x}_{ij}'\boldsymbol{\beta}\right)},$$

which provides the basis for the conditional logit model (McFadden 1974; Louviere, Hensher, and Swait 2000).

For the hypothetical samples, our baseline empirical specification corresponding to equation (1) for the deterministic component of utility for individual *i* and alternative *j* is

$$V_{ij} = \beta_1 KnowFarmer_j + \beta_2 Dist100_j + \beta_3 Dist400_j + \beta_4 Organic_j \qquad (3)$$

$$+ \beta_5 NoHormone_j + \beta_6 Pasture3_j + \beta_7 Pasture6_j + \beta_{cost} Price_j$$

where *KnowFarmer* equals 1 if the ground beef is produced by a farmer you know[4], *Dist100* equals 1 if the distance the ground beef travels from farm to market is 100 miles, *Dist400* equals 1 if the distance the ground beef travels is greater than 100 but less than 400 miles, *Organic* equals 1 if the ground beef is USDA Certified Organic, *NoHormone* equals 1 if the ground beef is not USDA Certified Organic but does not contain antibiotics or hormones, *Pasture3* equals 1 if the cattle from which the ground beef is produced are pastured 3 to 6 months of the year, *Pasture6* equals 1 if the cattle are pastured 6 or more months of the year, and *Price* is the cost for one pound of ground beef. To address the possibility of interactions between the grass-fed and local attributes, we also estimated a model that included an interaction term for these components:

$$V_{ij} = \beta_1 KnowFarmer_j + \beta_2 Dist100_j + \beta_4 Organic_j + \beta_5 NoHormone_j \qquad (4)$$

[4] All values are zero for the attribute variables unless expressly described as non-zero.

$$+ \beta_7 Pasture6_j + \beta_{cost} Price_j + \beta_8 \left(Dist100_j \times Pasture6_j\right).$$

We used a simplified choice experiment for the non-hypothetical sample, and our analogous baseline empirical specification corresponding to equation (1) is

$$V_{ij} = \beta_1 Local_j + \beta_2 Grassfed_j + \beta_{cost} Coupon_j \qquad (5)$$

where *Local* equals 1 if the cattle from which the ground beef is produced are raised within 100 miles, *Grassfed* equals 1 if the cattle are only fed a diet of grass, and *Coupon* is the coupon amount associated with a specific alternative. Similarly, to address potential interactions between the grass-fed and local attributes, we also estimate a companion model with an interaction term:

$$V_{ij} = \beta_1 Local_j + \beta_2 Grassfed_j + \beta_{cost} Coupon_j + \beta_3 (Local_j \times Grassfed_j). \qquad (6)$$

Each of our empirical specifications includes a cost attribute, and its coefficient β_{cost} is interpreted as the marginal utility of income. We calculate the WTP for a particular attribute as the compensating variation for a change in that attribute, which is simply the ratio $\beta_{\text{att}}/\beta_{\text{cost}}$ where β_{att} is the attribute coefficient.

Hypothetical Sample Results

The hypothetical sample participants differ on several demographic margins as shown in table 1. The buying club sample is overwhelmingly female, younger, less wealthy, and slightly more educated; but there is no difference in the midrange income brackets, household size, or households with children. We collect some background information about the knowledge and participation in a likely local food marketplace, a farmer's market, and see that 84.7 percent of the buying club members visit such markets an average of 21 times per year, while the numbers

from the general population sample are 67.3 percent and 13, respectively.[5] We also ask the participants an open-ended question which states: "Within how many miles of where you live would meat, poultry, and dairy products need to be raised to be considered local?". The median and mean responses from the buying club are 100 and 113 miles, respectively, while the median and mean from the general population are 40 and 47 miles, respectively. See figure 2 for the distribution of these responses. It is clear that the buying club responses are more realistic for major metropolitan areas, like Washington, D.C., where sourcing food from within 40 miles would be very difficult. The average length of time participants have been members of the club is 2.83 years. Given the average length of membership and accurate understanding of local agriculture in the Washington metropolitan area, it is evident that the buying club members have considerably more experience and depth of exposure to the local attribute than the general population. Thus, we expect that the buying club members' hypothetical WTPs to be very close to their true valuations, and we are interested in how these individuals are willing to trade off cost for distance and production attributes. Market experience of participants has been shown by List (2003) to be an important predictor eliminating anomalous market actions especially with regard to valuation.

We use a standard conditional logit model as specified in equation (3) to analyze the hypothetical survey data and calculate marginal WTP estimates for the consumer buying club sample, the random sample of Maryland residents, and the pooled sample. Model estimates are presented in table 3 and corresponding WTP estimates are presented in table 4. The baseline product for comparison is one pound of ground beef, raised by an unknown farmer 1000 miles away, with the use of antibiotics and hormones, and pastured zero to three months. For the buying club sample, we estimate a WTP for beef raised within 100 miles of $1.21, which is less

[5] A *t*-test of a difference of the means confirms these differences are statistically significant.

than half the estimate for the general population sample of $2.72. Interestingly, the buying club does not have a significant WTP for beef raised 400 miles away, while the other sample exhibits a large WTP estimate of $2.39. We view this as further confirmation that the buying club has well-formed views on the meaning of local and value of distance as an attribute. On the other hand, the buying club members are willing to pay $2.65 for beef pastured six or more months, nearly twice that of the general population sample at $1.63.

While these results are revealing with regard to direct effects, we wish to disentangle the relationship between the attributes from the responses. Do these attributes act as substitutes or complements? If they are substitutes, this suggests that there is ambiguity among consumers as to what the local attribute entails, leaving the local label vulnerable to exploitation without further structure. If they are complements, this suggests that consumers value the local attribute separate from other commonly associated premium process attributes, and more structure around the local label may provide other benefits. To address this question we estimate the model specified in equation (4) with an interaction term for the attributes pastured six or more months and raised 100 miles away.[6] These model estimates are presented in table 3 with corresponding WTP estimates presented in table 4. In the case of the general population sample, we estimate a WTP for the interaction of -$2.45. This effectively mitigates the value of one of the attributes, implying that they are substitutable to these consumers. Intuitively, this is evidence that consumers view local production and grass-fed production methods as having overlapping benefits (e.g. perhaps some notion of sustainability) and therefore do not view the attributes independent of one another. The interesting comparison is, of course, with the buying club. The

[6] Given the different compositions of the samples, we also explored interactions between attributes and other key demographic variables including gender, income, college education, age, household size, and white. These interaction results produce no obvious departures from the direct results and are available upon request from the authors.

buying club exhibited markedly different behavior with a positive WTP estimate for the interaction of $1.28. For these consumers, the two attributes are complementary which reinforces the notion that these market experienced shoppers are valuing actual distance to the farm without assuming additional production properties.

To better understand the differences in WTP across samples, we compared the WTP estimates with the consumers' self-reported importance of each attribute from a follow-up question on the survey where we asked respondents to rank how important each attribute was in their decision. The first six rows of data in table 5 display the percentage of "very important", "important", and "not important" responses by sample. It is clear the buying club sample focused heavily on the grass-fed attribute where 86 percent define it as very important. A significant majority, 66 percent, consider the distance to the producer to be important, as well. The general population sample was less conclusive on which attributes influenced their choices with only price garnering a 50 percent share in the "important" category. This begs the question of whether the hypothetical results for the Maryland sample are reflecting true values and provides the motivation for our subsequent non-hypothetical in-store experiment.

In-Store Experiment

While we are comfortable knowing that our buying club sample makes these decisions on a regular basis in a real market setting and, thus, the hypothetical results for that group are likely to reflect their true valuations; we have no assurance that our general population sample has a similar context to inform their decisions in this hypothetical setting. Accordingly, we adapted the hypothetical choice experiment design to use in an in-store experiment. Having estimated significant WTP values for both grass-fed and local beef products from two hypothetical surveys, we sought to validate our results in the field where the experimental subjects are making

tradeoffs between money and quality attributes of ground beef products. To simplify the choice experiment, we only vary two ground beef product attributes: distance traveled and production method. Based on significance of the hypothetical WTP results, we also limited each attribute to two levels: Raised Within 100 Miles vs. Domestic (U.S.), and Grass-fed vs. "consumer's randomly assigned individual notion of production method". While we have no *a priori* reason to suspect bias from our survey samples, especially the buying club group, we wish to validate these hypothetical results with a comparable set of non-hypothetical data. Our research design is rooted from the criticisms of stated preference elicitation mechanisms (Cummings, Brookshire, and Schulze 1986; Mitchell and Carson 1989; Adamowicz, Louviere, and Williams 1994) and their comparisons to revealed preference mechanisms (Carson et al. 1996).

Unlike the studies analyzed by Carson et al. (1996), our collection of the non-hypothetical data utilizes an in-store experiment and resembles the work of Loureiro, McCluskey, and Mittelhammer (2003) and Lusk, Norwood, and Pruitt (2006). There is a rather exhaustive literature regarding field experiments in comparison to lab experiments, but less focus has been given to comparing conjoint choice analysis to a field counterpart.[7] We have the unique opportunity of access to our population of interest, as well as access to the product we wish to study (locally-produced, grass-fed beef), and have a simple decision structure to allow implementation in a field setting. Using the terminology popularized by Harrison and List (2004), our experiment is best viewed as a framed field experiment with the "field" context being implemented in commodity, information set, and task. We differ from a pure natural field experiment only in the fact that our subjects are aware of their participation. Further, the experiment's mechanism could be classified, simply, as a non-hypothetical choice based conjoint

[7] This is most likely due to the types of issues studied by conjoint analysis, some involving exogenous non-market attributes that by nature must be hypothetical.

analysis because even though we control the product attributes, we must value them in randomly generated combinations as they are too numerous for individual treatment isolation.

Design and Implementation

Our method involves approaching grocery store shoppers and presenting them with a rather simple choice involving a product with high familiarity (a pound of ground beef) and money. Not only do we implement the experiment in the grocery store, but we also locate the experiment in the meat section of the store in an attempt to limit our sample to shoppers entering the meat department, thus minimizing non-meat buying consumers in the sample. Finally, unlike Lusk, Norwood, and Pruitt (2006), we do not alter the information set of the consumers using any form of cheap-talk (Cummings and Taylor 1999; Lusk 2003); our participants have their own randomly assigned information sets given to them outside the experiment.

Despite the fact that our survey results suggest little correlation between the grass-fed and local attributes of beef and socioeconomic characteristics of our participants, we intentionally conducted our non-hypothetical, in-store experiment in a conventional grocery store and not a specialty or natural foods store. Were conventional wisdom to hold true, our store selection would *a priori* bias any WTP measures toward zero. For example, the store in which we conducted the experiment had little penetration of organic or local products and carried no grass-fed or local beef products in the meat department. Based on discussions regarding sampling and customer demographics with store management, we conducted the experiment over the course of 10 hours on a non-holiday, non-first or last weekend of the month in the fall of 2012. This choice of day avoids any bias due to atypical holiday-only grocery shoppers or due to the impact of once-monthly (fixed income) shoppers.

The day before the experiment, we had over 300 pounds of grass-fed, locally-produced ground beef delivered to the store in approximately one pound packages, and the morning of the experiment the store butcher produced one pound packages of conventionally-raised ground beef. Both sources of beef were 90 percent lean ground beef to minimize any selection based on leanness. We then labeled the ground beef with one of two labels: grass-fed, raised within 100 miles, or both; and the consumer received the appropriately labeled package depending on the choice made. Participants were not shown the beef packages prior to completing the choice experiments in order to eliminate any visual bias. The choice presented to the consumer is illustrated in figure 3. This figure illustrates a selection between grass-fed and local versus simply grass-fed. See table 6 for a full listing of the attributes. Similar to the experimental design used in the hypothetical conjoint analysis, D-Optimal criteria were again used to generate the different non-hypothetical product profile pairs. The Gift C or "No Beef" coupon value is always 25 cents more than the largest coupon value offered between ground beef choices, Gift A and Gift B, to ensure that participants only choose ground beef because they desire ground beef. In other words, any participant seeking the largest coupon amount will migrate to Gift C. The coupon amounts for Gift A and Gift B varied randomly across values from the set {$0.50, $2.50, $4.50} with one price restriction imposed so as to mimic prices normally observed in retail outlets. That is, grass-fed and local ground beef options are always more expensive than the conventional, domestic ground beef option.

The experiments were completed via the internet using tablet computers. The typical interaction is as follows:

1. Shopper passes near the meat department of the supermarket.

2. An enumerator asks the participant if they would like to participate in a brief survey and a short experiment in order to receive a coupon and/or a pound of ground beef. The coupon is good the day of the experiment and is subtracted from the total grocery bill.
3. If the shopper agrees, the enumerator leaves them with a tablet computer and simply asks them to follow the on-screen instructions.[8]
4. The shopper answers a few background demographic questions and is then presented with two choice questions in the format of figure 3. One of the questions has an image of a Heads coin in the top margin and the other has a Tails coin.
5. When finished, the shopper flips a coin and that choice is fulfilled.

The complete interaction took between 5 and 10 minutes. We had a total of 279 participants generating 558 observations for the analysis, and no one dropped out after starting the experiment. Table 7 compares the distribution of attributes for the choices presented versus the actual choices made by participants. The sample statistics for the socioeconomic and demographic data are presented in table 8. It is important to note that this sample is slightly older, less educated, and has smaller households than either of our survey samples.

Non-Hypothetical Sample Results

We estimate the same conditional logit model from the previous section using the specification in equation (5) to produce WTP estimates for attributes of ground beef exactly as presented in the hypothetical survey discussion.[9] Results from the conditional logit are presented in table 9 and corresponding WTP estimates are presented in table 10. The calculated WTP

[8] In the case the shopper was uncomfortable with the tablet's interface, the enumerator simply administered the survey and experiment after informed consent was granted.
[9] WTP is not quite correct because participants never paid any money. However, for presentation consistency we use WTP because there should be no distinction between WTP and willingness to accept as the endowment point is neutral.

values are $0.82 and $1.47 for the grass-fed and local attributes, respectively. These are less than the hypothetical survey WTP values for the general public but similar in pattern with the local attribute being valued almost twice as much as the grass-fed attribute. The non-hypothetical results suggest the WTP for each attribute is approximately half what the hypothetical values suggest for the general population sample. Interestingly, the estimated WTP for the local attribute is very close to the hypothetical value estimated for the buying club sample, which further suggests that the buying club results more closely reflect their true valuations. However, the estimated WTP for grass-fed is less than a third of that of the buying club sample, which may suggest that these groups value the attributes in fundamentally different ways.

Similar to the analysis of the hypothetical results, we estimate the model specified in equation (6) to look at the interaction between the grass-fed and local attributes and get a better understanding of how consumers perceive these attributes together. The results and corresponding WTP estimates are also presented in tables 9 and 10, respectively. We estimate a negative and significant WTP of -$1.09 for the interaction of Grass-fed and Raised Within 100 Miles, which is similar in pattern to the hypothetical results for the general population. Once again, this interaction effectively cancels out the value of one of the attributes, and it is consistent with notion that these attributes are interdependent and at least partially substitutable for consumers in this sample. As pointed out earlier, the buying club sample exhibits very different behavior in this regard. Table 11 further breaks down these results using interactions with income and age, and again we see no clear pattern of statistical significance with these interactions, though we see in this sample that the older the participant, the less favorable they viewed the local attribute.

Conclusion

Locally labeled food products are a popular and growing segment of our food choices, as well as a focus of food policy at federal and state levels. Local, as an attribute, is still poorly defined and perhaps even more poorly understood. We have focused this study on isolating one attribute most often associated with "localness", the distance between producer and consumer. Using a unique choice-based sub-sample of local food shoppers, we compare the willingness to pay and the attribute relationship between local and grass-fed ground beef to both hypothetical and non-hypothetical samples of Maryland residents. We find that the market experienced food shoppers value the local attribute less than their counterparts, but the local attribute is not being conflated with other premium attributes. The hypothetical and non-hypothetical samples of Maryland residents also are willing to pay a premium for local, but view local and grass-fed as substitutes, seemingly attributing the premium qualities of the grass-fed operations to the local attribute and potentially over paying for this attribute in isolation. Our results suggest that the local label may require more structure and would potentially benefit all parties involved. From the perspective of a local producer, this structure will help protect the brand and maintain the premium for local products[10]; and from the perspective of the consumer, clearer labeling would prevent expenditures to attain local attributes that are not related to "more desirable" production methods.

Our results suggest several possibilities for future work on this issue. First, our study primarily focused on two groups: a buying club with local and grass-fed market experience and shoppers at a non-specialty suburban grocery store. As specialty grocers and farmers' markets continue to expand and attract more shoppers, we may gain further insight by also examining these groups in broader contexts. Furthermore, in this study, we focus our decomposition of

[10] In the case of organic food, price premiums became more stable after standards were put in place, suggesting that consumers are in greater agreement about what organic means (Oberholtzer, Dimitri, & Greene 2005).

"local" to distance and production method attributes. However, research suggests that consumers associate other attributes with "local" such as farm size, environmental sustainability, and health benefits (Darby et al. 2008, Martinez et al. 2010). Further decomposing "local" based on these attributes will provide a more complete picture of how local labeling affects consumer behavior. It is also possible that consumers behave differently depending on the product involved. In our case, we used non-premium cut of beef (ground beef). It is possible that consumers may value the local and grass-fed attributes very differently for a premium cut such as steak. Similarly, consumers may react differently to fresh foods and processed foods (such as jams and other shelf-stable items). In short, the benefits of local labeling may vary by product. While it is undeniable that the local attribute carries value in all these contexts, it is exceedingly difficult to narrow (identify) exactly how the local nature of the product is valued. This study successfully narrows the spectrum of attributes and identifies rather dramatic interaction effects whereby less market experienced consumers incorrectly value local and premium production as substitutes. Assuming the behavior is not isolated to the ground beef market implies the potential for significant over expenditure on the local label across product categories.

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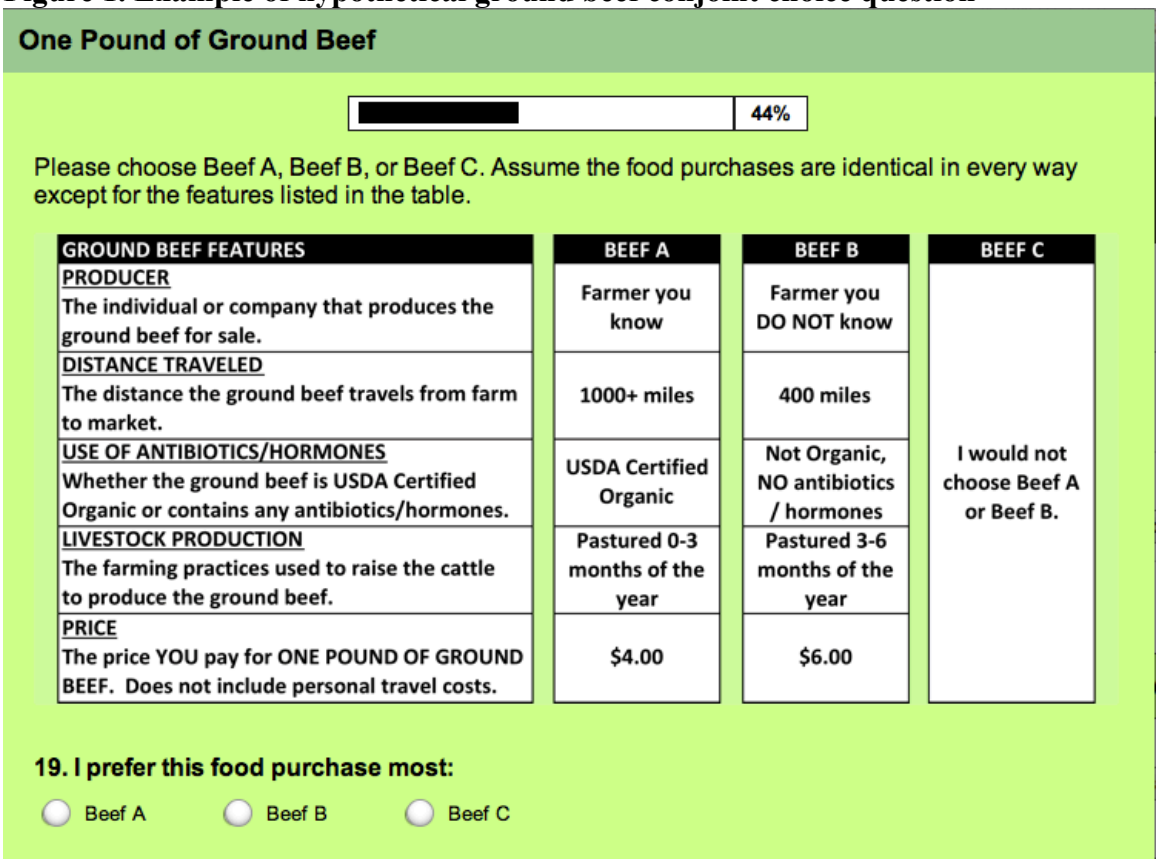
Figures

Figure 1. Example of hypothetical ground beef conjoint choice question



Note: All attributes and attribute levels are fully listed in table 2.

Figure 2. How do respondents define local?

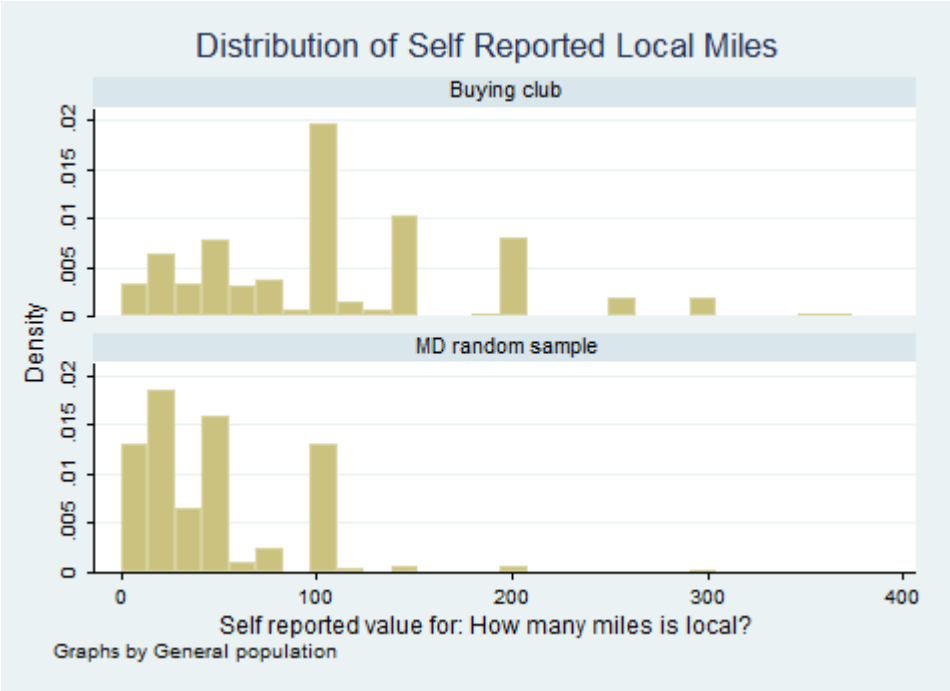
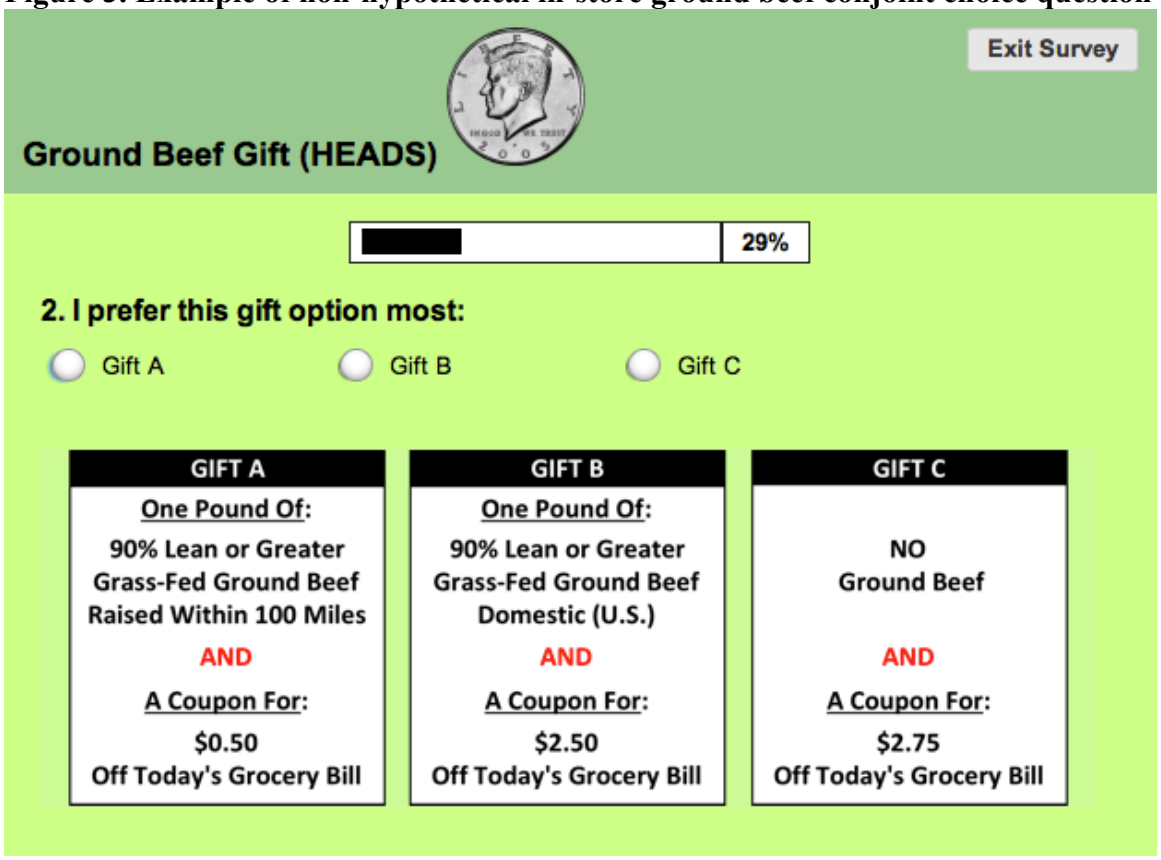


Figure 3. Example of non-hypothetical in-store ground beef conjoint choice question



Tables

Table 1. Demographic Characteristics of Buying Club and Random Samples

	State[†]	Buying Club	Random Sample
Number of Respondents	–	358	327
Median Household Income	$70,004[††]		
Household Income less than $50,000 (%)		24.8	17.3**
Household Income between $50,000 and $100,000 (%)		36.4	40.9
Household Income between $100,000 and $150,000 (%)		26.5	23.3
Household Income greater than $150,000 (%)		13.3	18.5*
Age	38 (Median)	42.7	47.3***
Female (%)	51.6	85.1	58.5***
Mean Household Size	2.67	3.4	3.2
Households with Children (%)	33.2	58.1	57.7
Bachelor's Degree or Higher (%)	36.9	89.5	82.8***
White (%)	58.6	83.3	78.1*

[†] Source: U.S. Census Bureau, 2011 American Community Survey 1-Year Estimates
[††] Income reported in 2011 inflation-adjusted dollars.
Note: Single asterisk (*), double asterisks (**), triple asterisks (***) denotes that the *t*-test of a difference of the means for the consumer buying club and random sample groups was significant at the 0.10, 0.05, or 0.01 levels, respectively.

Table 2. Ground Beef Attributes in Hypothetical Conjoint Choice Questions

Product Attribute	Levels
Producer	1. Farmer you know 2. Farmer you do not know
Distance Traveled	1. 100 miles 2. 400 miles 3. 1000+ miles
Use of Antibiotics/Hormones	1. USDA Certified Organic 2. Not organic, no antibiotics/hormones 3. Not organic, use of antibiotics/hormones
Livestock Production	1. Pastured 0-3 months of the year 2. Pastured 3-6 months of the year 3. Pastured 6+ months
Price	1. $4.00 2. $6.00 3. $8.00

Table 3. Results from the Conditional Logit Models for the Hypothetical Samples

	Buying Club		Random Sample		Pooled Sample	
Attribute	(3)	(4)	(3)	(4)	(3)	(4)
Farmer you know	0.301***	0.316***	0.268***	0.281***	0.279***	0.298***
	(0.080)	(0.080)	(0.078)	(0.078)	(0.055)	(0.055)
Distance traveled = 100 miles	0.429***	0.296*	0.610***	0.499***	0.509***	0.386***
	(0.104)	(0.118)	(0.098)	(0.110)	(0.071)	(0.079)
Distance traveled = 400 miles	-0.055		0.537***		0.253***	
	(0.099)		(0.098)		(0.070)	
Certified Organic	1.441***	1.495***	1.526***	1.534***	1.451***	1.485***
	(0.107)	(0.108)	(0.121)	(0.120)	(0.082)	(0.081)
Not Organic, No Antibiotics	1.174***	1.222***	0.868***	0.897***	0.990***	1.030***
	(0.103)	(0.106)	(0.119)	(0.117)	(0.080)	(0.080)
Pastured 3-6 months	0.289**		0.316***		0.284***	
	(0.102)		(0.095)		(0.069)	
Pastured 6+ months	0.938***	0.634***	0.366***	0.398***	0.625***	0.487***
	(0.108)	(0.116)	(0.106)	(0.115)	(0.074)	(0.081)
Distance=100mi × Pastured 6mth		0.429*		-0.425		0.035
		(0.206)		(0.222)		(0.149)
Cost	-0.354***	-0.334***	-0.225***	-0.173***	-0.284***	-0.251
	(0.021)	(0.020)	(0.023)	(0.020)	(0.016)	(0.015)
Number of Observations	4,218	4,218	3,843	3,843	8,061	8,061
Number of Clusters	358	358	328	328	686	686
Pseudo R-Squared	0.151	0.150	0.136	0.122	0.123	0.117

Note: Column labels refer to econometric specifications presented in the paper. Single asterisk (*), double asterisks (**), triple asterisks (***) denotes significance at the 0.10, 0.05, or 0.01 levels, respectively. Numbers in parentheses are robust standard errors.

Table 4. Willingness-to-Pay Estimates for the Hypothetical Sample ($/lb. of beef)

	Buying Club		Random Sample		Pooled Sample	
Attribute	(3)	(4)	(3)	(4)	(3)	(4)
Farmer you know	0.85	0.95	1.19	1.62	0.98	1.19
	[0.39, 1.29]	[0.46, 1.40]	[0.49, 1.85]	[0.73, 2.49]	[0.59, 1.35]	[0.76, 1.61]
Distance traveled = 100 miles	1.21	0.89	2.72	2.88	1.79	1.54
	[0.68, 1.73]	[0.22, 1.50]	[1.88, 3.58]	[1.63, 4.17]	[1.34, 2.23]	[0.95, 2.11]
Distance traveled = 400 miles	-0.15		2.39		0.89	
	[-0.72, 0.39]		[1.53, 3.29]		[0.42, 1.34]	
Certified Organic	4.07	4.47	6.79	8.84	5.11	5.92
	[3.53, 4.68]	[3.92, 5.06]	[5.58, 8.42]	[7.35, 10.93]	[4.55, 5.75]	[5.33, 6.58]
Not Organic, No Antibiotics	3.32	3.66	3.86	5.17	3.49	4.11
	[2.77, 3.89]	[3.10, 4.31]	[2.94, 4.87]	[4.09, 6.65]	[2.99, 4.00]	[3.58, 4.74]
Pastured 3-6 months	0.82		1.41		1.00	
	[0.27, 1.38]		[0.59, 2.29]		[0.54, 1.48]	
Pastured 6+ months	2.65	1.90	1.63	2.29	2.20	1.94
	[2.13, 3.21]	[1.23, 2.54]	[0.76, 2.54]	[0.99, 3.67]	[1.74, 2.71]	[1.32, 2.55]
Distance=100mi × Pastured 6mth		1.28		-2.45		0.14
		[0.12, 2.64]		[-5.03, 0.02]		[-0.98, 1.36]

Note: Column labels refer to econometric specifications presented in the paper. Figures are estimates of compensating variation for each of the attributes. Numbers in brackets are 95% confidence intervals calculated using Krinsky–Robb bootstrapping method.

Table 5. Self-Reported Importance of Attribute in Choices Made

What influenced your choice?

	Production Method	Distance	Price
Buying Club Sample			
Very Important	**86%**	22%	11%
Important	13%	**66%**	**58%**
Not Important	1%	13%	31%
Random Sample			
Very Important	32%	14%	**50%**
Important	**47%**	44%	37%
Not Important	21%	42%	12%
Grocery Store Sample			
Very Important	37%	22%	36%
Important	**42%**	**45%**	39%
Not Important	11%	33%	25%

Table 6. Ground Beef Attributes in Hypothetical Conjoint Choice Questions

Product Attribute	Levels
Livestock Production	1. Grass-fed 2. –
Distance Traveled	1. Raised Within 100 Miles 2. Domestic (U.S)
Price (Coupon Value)	1. $0.50 2. $2.50 3. $4.50

Table 7. Attribute Distribution for In-Store Experiment for the Overall Choices

Attribute	% of Presented Choices	% of Choices Made
Grass-fed	37.87	38.71
Local	37.34	41.39
Grass-fed and Local	18.34	20.97
Not Grass-fed and Not Local	18.99	20.43
No Beef Included	33.33	25.09

Note: By design, 33.33 percent of choices have no beef attached (Gift C).

Table 8. Demographic Characteristics of In-Store Sample

	State[†]	In Store Sample	Random Sample
Number of Respondents	–	279	327
Median Household Income	$70,004[††]		
Household Income less than $50,000 (%)		21.9	17.3
Household Income between $50,000 and $100,000 (%)		40.1	40.9
Household Income between $100,000 and $150,000 (%)		18.2	23.3
Household Income greater than $150,000 (%)		19.8	18.5
Age	38 (median)	56.0[‡]	47.3***
Female (%)	51.6	58.8	58.5
Mean Household Size	2.67	2.7	3.2***
Bachelor's Degree or Higher (%)	36.9	74.5	82.8***
White (%)	58.6	74.8	78.1

[†] Source: U.S. Census Bureau, 2007-2011 American Community Survey 5-Year Estimates
[††] Income reported in 2011 inflation-adjusted dollars.
[‡] Approximations using midpoint of interval from in store sample.
Note: Single asterisk (*), double asterisks (**), triple asterisks (***) denotes that the *t*--test of a difference of the means for the in-store sample and hypothetical random sample groups was significant at the 0.10, 0.05, or 0.01 levels, respectively.

Table 9. Results from the Conditional Logit Model for the Non-Hypothetical Sample

	In-Store Sample	
Variable	(5)	(6)
Grass-fed	0.377***	0.614***
	(0.124)	(0.163)
Local	0.675***	0.911***
	(0.121)	(0.170)
Coupon Value	0.459***	0.486***
	(0.053)	(0.055)
Grass-fed × Local		-0.531**
		(0.237)
Number of Observations	1674	1674
Number of Clusters	279	279
Psuedo R-Squared	0.0846	0.0901

Note: Column labels refer to econometric specifications presented in the paper. Single asterisk (*), double asterisks (**), triple asterisks (***) denotes significance at the 0.10, 0.05, or 0.01 levels, respectively. Numbers in parentheses are robust standard errors.

Table 10. Willingness-to-Pay Estimates for the Non-Hypothetical Sample ($/lb. of beef)

	In-Store Sample	
Attribute	(5)	(6)
Grass-fed	0.82	1.26
	[1.34, 0.26]	[1.86, 0.60]
Local	1.47	1.87
	[2.05, 1.00]	[2.49, 1.25]
Grass-fed × Local		-1.09
		[-0.12, -1.95]

Note: Column labels refer to econometric specifications presented in the paper. Figures are estimates of compensating variation for each of the attributes. Numbers in brackets are 95% confidence intervals calculated using Krinsky–Robb bootstrapping method.

Table 11. Results from the Conditional Logit Model for the Non-Hypothetical Sample with Demographic Interactions

Variable	Income	Age	Income and Age
Grass-fed	0.377*	0.724	0.693
	(0.303)	(0.161)	(0.602)
Local	0.675	1.662***	1.323**
	(0.286)	(0.001)	(0.582)
Coupon Value	0.459***	0.456***	0.442***
	(0.055)	(0.000)	(0.055)
Grass-fed × Income	-0.002		-0.002
	(0.003)		(0.003)
Local × Income	0.003		0.003
	(0.003)		(0.003)
Grass-fed × Age		-0.007	-0.003
		(0.009)	(0.010)
Local × Age		-0.019**	-0.017*
		(0.009)	(0.010)
Number of Observations	1482	1662	1476
Number of Clusters	247	277	246
Psuedo-R Squared	0.0846	0.089	0.087

Note: Column labels refer to interactions included in the econometric specifications. Single asterisk (*), double asterisks (**), triple asterisks (***) denotes significance at the 0.10, 0.05, or 0.01 levels, respectively. Numbers in parentheses are robust standard errors.