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U.S. and Canadian Consumer Perception of Local and Organic Terminology

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Abstract

The varying terms associated with local and organic have the potential to confuse consumers as to their true meaning, especially with respect to production practices. For these reasons we examined the perceptions and misperceptions of the terms local and organic, specifically focusing on differences between U.S. and Canadian consumers. Our results show that a subset of consumers correctly identifies the main characteristics of local and organic. However, there is a subset of consumers that has inaccurate perceptions of these terms. Comparing U.S. and Canadian consumers we see numerous significant perception differences, especially with regard to local.

Keywords: consumer perception, local, organic, survey

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Introduction

The words local and organic have become common terminology within marketing campaigns throughout the world. These terms have found a special place within the lexicon of the United States and Canada as evidenced by large displays and merchandise areas devoted to promoting the sale of local and organic foods. As such, regulations have been enacted both in the U.S. and Canada to standardize definitions of local and organic. For instance, the U.S. government defines local (or regionally produced) as "(I) the locality or region in which the final product is marketed, so that the total distance that the product is transported is less than 400 miles from the origin of the product" or ''(II) the state in which the product is produced." (H.R. 6124 2008), while many state governments have limited the term local to mean produced within state boundaries. With respect to Canada, the Canadian Food Inspection Agency (CFIA) is in the process of changing their definition of local food, but the interim definition is similar to the U.S. definition in that it must be "produced in the province or territory in which it is sold, or ...sold across provincial borders within 50 km of the originating province or territory." (CFIA 2013). However, as noted in a litany of previous studies, these definitions may not be appropriate in many instances (Carter-Whitney 2008; Martinez el al. 2010; Campbell, Mhlanga, and Lesschaeve 2013; Johnson, Aussenberg and Cowan 2013). Organic, on the other hand, has defined production standards that are similar across the U.S. and Canada, see Canadian General Standards Board 2011a, 2011b; United States Department of Agriculture-Agricultural Marketing Service 2013.

Retail sales of both local and organic products have seen increasing demand over the last decade. Sales of organic products in the U.S. and Canada topped $26.7 billion and $2.6 billion in 2010, respectively (Organic Trade Association 2011; Globe and Mail 2011). Exact sales figures for locally sourced products are more challenging to acquire given the lack of local sales tracking by many retailers. However, recent estimates indicate that sales of products labeled as locally grown were $4.8 billion in the U.S. during 2008 (Low and Vogel 2011).

Viewing the increasing retail sales of local and organic at face value tends to indicate a strong and vibrant sector, but do consumers understand what they are purchasing? Not considering altruistic characteristics, such as helping the community or farmer, do consumers know what production related characteristics are inherent in local and organic food? For organic, government-mandated regulations exist in both Canada and the U.S. that dictate specific production practices. For the most part, Canadian and U.S. regulations align, especially for broad characteristics, such as "no synthetic pesticides used." However, regulations for local generally imply distance boundaries with no regulations on production practices. In both cases, there is considerable variety with what consumers perceive as local and organic compared to what regulations say it can and cannot be (Shipman 2012; Campbell, Mhlanga, and Lesschaeve, 2013).

Thereby, similar to Campbell, Mhlanga, and Lesschaeve (2013), the objective of this study was to both understand consumer perceptions of the terms local and organic and to understand the role of demographic, socio-economic, and purchasing behavior on consumer perception. However, unlike Campbell, Mhlanga, and Lesschaeve (2013), we focus our attention toward differences between U.S. and Canadian consumers. Given the considerable trade between the

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U.S. and Canada, understanding differences in consumer perception within these markets is critical since producers and marketers are increasingly marketing products across this border. Furthermore, we examine the role of consumer characteristics on the perception of local and organic products being perceived as higher priced. Our results indicate that indeed U.S. and Canadian consumers do have many differing perceptions of local and organic especially with respect to local, providing helpful information to markets selling products with these terms. Using this information, agribusiness firm managers can gain a better understanding on how consumers in two markets perceive the terms local and organic. This information, and the corresponding consumer profiles, can be used to either develop marketing strategies to effectively deliver specific messaging to consumers that value it or to deliver educational programs that change perceptions.

Literature Review

Literature around the perceived value and definitions of local and organic labeling is widespread. For instance, numerous studies have found consumers are willing to pay a price premium for locally (e.g. Darby et al. 2008; Yue and Tong 2009; Onozaka and McFadden 2011) and organically (e.g. Batte et al. 2007; Campbell et al. 2010) labeled products. Given the heterogeneous nature of the market, research efforts have attempted to better understand how consumer characteristics might influence a consumer's propensity to purchase local and organic products (e.g. Zhang et al. 2008; Smith, Huang, and Lin 2009; Campbell et al. 2010). Just as the propensity to purchase varies across consumer characteristics, so too do consumer perceptions of local and organic. For instance, attributes such as fresher and supports the local farmer/ community consistently arise as important reasons to purchase local (Darby et al. 2008; Yue and Tong 2009; Onozaka et al. 2010). Conversely, reasons for purchasing organic tend to be centered around environmental and safety concerns (Ritson and Oughton 2007; Essoussi and Zahaf 2008). Still, when examining actual production practices associated with local and organic, consumers, or at least a subset thereof, tend to have inaccurate perceptions. As noted by Ipsos Reid (2006), 5% of Canadian consumers perceive local as having no chemicals or synthetic pesticides and 5% say it is not genetically modified (GMO). In light of the regulations around local, these perceptions are inaccurate as local is most often defined by governmental sources as some geographic delineation.

Consistent with the Ipsos Reid (2006) findings, Campbell, Mhlanga, and Lesschaeve (2013) found that many Canadian consumers have inaccurate perceptions of the production practices surrounding the local and organic foods they purchase. Of interest between these two studies is that the misperception about chemical/pesticide use and non-genetically modified nature of local seems to have doubled from 5% and 5% in 2006 (Ipsos Reid 2006) to 11% and 13% in 2010 (Campbell, Mhlanga, and Lesschaeve, forthcoming), respectively. However, little is known about the [mis]perceptions of U.S. consumers and any potential differences between U.S. and Canadian consumers.

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Data

During the spring 2011, we launched an online survey to better assess the market for horticultural products in the U.S. and Canada. Utilizing Global Market Insite, Inc.'s (GMI) database of U.S. and Canadian consumers, potential respondents were contacted via email and invited to participate in the survey. Respondents willing to participate were directed to an online survey link and proceeded to take the survey. A total of 2,511 consumers were surveyed with 68% and 32% of respondents being from the U.S. and Canada, respectively. Each contiguous U.S. state and Canadian province was represented within the survey. The demographics of our sample (see Table 1) were similar to the average census demographics for the U.S. and Canada. Our U.S. sample's average age (35.8) and percent Caucasian (78.1%) were similar to the census reported average age (37.2) and percent Caucasian (78.1%), respectively. Average household income ($65,273) was significantly higher than the average census household income ($52,762).

Table 1. Descriptive statistics for the variables of interest by country.

Variables	**U.S.**	**Canada**
Number of observations	1,716	809
Age	35.76	42.74
Adults in household	2.62	2.47
Children in household	1.69	1.61
Household income	$65,273	$66,747
Gender (1=male)	0.58	0.49
Urban	0.21	0.40
Suburb	0.59	0.40
Rural	0.20	0.20
Education		
High school or less	0.20	0.20
Between high school and 4-year	0.42	0.41
Bachelor's degree	0.27	0.28
Greater than bachelor's	0.11	0.11
Race (1=Caucasian)	0.78	0.86
Heard of term		
Eco-friendly (1=yes)	0.92	0.95
Sustainable (1=yes)	0.73	0.76
Frequency of purchasing when available [1]		
Local produce	3.24	3.49
Organic produce	2.81	2.70
Recycling index [2]	2.89	3.43

[1] Frequency of purchasing : 1=never, 2=seldom, 3=sometimes, 4=most times, and 5=always.

[2] Respondents were asked how often they recycle glass, cardboard, and aluminum. The rating scale used was 1=do not purchase, 2=never, 3=sometimes, 4=usually, and 5=always. Do not purchase and never were then combined. The index was created by averaging the ratings for recycling of glass, cardboard, and aluminum.

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In regard to the Canadian sample, the average age (42.7) and household income ($66,747) were similar to the census reported average age (39.7) and household income ($69,860). For the ethnicity question, we used the U.S. census question which is different from the Canadian census question, thereby; a direct comparison between the percent Caucasian in our sample and amongst the Canadian population is not possible. However, rough calculations based on the ethnic heritages reported in the Canadian census indicate that 80% of people in Canada would fall in the Caucasian group compared to 86% in our sample.

The survey asked a variety of questions around purchasing and recycling patterns, along with traditional demographic and socio-economic questions. Demographic questions included income, education, marital status, age, gender, household characteristics, and ethnicity. Purchase behavior questions consisted of whether they were the primary shopper in the household, the types of stores generally shopped in, and their purchasing of local and organic produce. Recycling questions revolved around frequency of recycling of a number of recyclable materials. Also, respondents were shown a list of potential local and organic characteristics (Table 2). They were then asked to mark any and all characteristics that they perceived characterized a local product. Then they were asked to mark any and all characteristics they perceived to be associated with an organic product.

Methodology

In order to examine whether U.S. and Canadian consumers are different with regards to their perceptions, we utilized a t-test as a preliminary indicator of statistical difference. However, we not only wanted to understand whether there are statistical differences, but we also wanted to have an idea of the impact of consumer characteristics on perception. We, therefore, ran binary logit models to assess the role of consumer characteristics on consumer perception of local and organic. Given respondents were asked to denote characteristic(s) from the list provided as being a characteristic of local in general, then organic in general, each characteristic received a binary coding of 1 if the respondent indicated the characteristic was associated with local or 0 if the characteristic was not associated with local. Since the dependent variable is categorical in nature, i.e. 0 or 1, the binary logit model is an appropriate modeling technique. After coding each characteristic for local, we ran a binary logit model with each characteristic as a dependent variable and consumer characteristics as predictors. The subsequent binary logit probability for each characteristic can be modeled as

$$1) \qquad P_i = \frac{1}{1+e^{-x_i'}}\beta$$

where P_i is the probability of the i^{th} respondent choosing the characteristic from Table 2 and x_i is a set of demographic, environmental variables, and purchasing behaviors associated with the i^{th} respondent. Environmental variables included: recycling index and having heard of the terms eco-friendly and sustainable. The recycling index variable is used as an indicator of respondent's environmental concern/activity and is calculated as the mean of the respondent's frequency of recycling (as measured by a rating scale) of aluminum, glass, and cardboard. Having heard of eco-friendly and sustainable were included as proxies for environmental awareness. After specifying the model, we examined whether the U.S. and Canadian respondents could be pooled

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together. Based on the results of likelihood ratio tests of the equality of coefficients we could not pool the U.S. and Canadian sample. Thereby, we analyzed the respondents separately and present the results for both the U.S. and Canadian respondents. After running the binary logit models, we estimated the marginal effects for each consumer characteristic as the marginal effects are easier to interpret than the log-likelihoods from the initial binary logit output.

The marginal effects are interpreted differently depending on whether it is used to explain a binary or continuous variable. For a continuous variable, the interpretation is that for a one unit increase from the mean, there is a percentage, as defined by the marginal effect associated with the variable, change in the likelihood of perceiving the characteristic is associated with local. For dummy variables, the interpretation is that moving from the base category to the category in question, there is a corresponding percentage change in the likelihood of the characteristic being associated with local. After obtaining the marginal effects for the first characteristic, we proceeded to model all the other characteristics using a binary logit model, then moving on to each organic characteristic using a similar procedure.

Results

In Table 2, we see that our overall results are similar to those of Campbell, Mhlanga, and Lesschaeve (2013) with respect to consumers having both accurate (such as local means lower miles to transport and organic implies no synthetic pesticide use) and inaccurate (such as local is organic, organic is local, local means no pesticide use, and organic implies lower miles to transport) perceptions of local and organic. For instance, 67% of the total sample correctly perceives decreased miles to transport as a characteristic of local. However, 23% and 17% of the total sample inaccurately perceive local as being grown organically and without synthetic pesticide use, respectively. The organic results show 67% of the total sample perceived organic as produced with no synthetic pesticides, but approximately one in five (17%) believe local is a characteristic of organic. The importance of these results to agribusiness firms is considerable. Take for example the organic industry that has spent years (and millions of dollars) building brand awareness and now sees as much as 17% of the consumer base mistakenly associating local with organic. This fact has not been lost on organic growers/associations. As noted by the Canadian Organic Growers website, "Sadly, 'local' and 'organic' have had the misfortune of entering our vocabulary as separate concepts and then getting jumbled into one, unclear concept." There is reason for concern. Assuming only a small share of consumers now purchase local believing it is organic; there is considerable potential for harm to organic growers in the form of potentially reduced sales. However, the potential upside to this finding is that approximately 40% of the sample indicated organic product is more nutritious, even though the validity of this claim has not been scientifically documented (Dangour et al. 2009).

From Table 2, we see that perception and reality of the sample as a whole does not necessarily align as evidenced by the percentage of consumers that associated attributes with local and organic inaccurately. Given the common occurrence of inaccurate perceptions, we wanted to see if differences were present between U.S. and Canadian consumers and how consistent the misperceptions are. In examining this question we found key differences between U.S. and Canadian consumers, especially for local food perceptions (Table 2). For instance, Canadian consumers tend to be more likely to equate environmental benefits with local food more than

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U.S. consumers. A higher percentage of Canadians perceive the characteristics of better for the environment, lower carbon footprint, and lower greenhouse emissions as associated with local compared with their U.S. counterparts. A potential reason for this finding is that specific environmental safeguards, such as Ontario's home use pesticide ban, could be influencing the perception about local agricultural production.

We also see that two characteristics that may or may not be true, more nutritious and longer shelf-life, are also perceived as being associated with local by a higher percentage of Canadian consumers compared to U.S. consumers. In contrast, U.S. consumers are more likely to perceive organic as being local, which as noted by Yue et al. (2009) is not always true. When examining differences between U.S. and Canadian organic perceptions, there was one production related difference. The perception around the use of natural fertilizer was significantly different between Canadian and U.S. consumers, whereby, Canadian consumers perceive this as an organic characteristic in slightly higher numbers than U.S. consumers.

Table 2. Percentage of Consumers Associating Various Characteristics with Local and Organic by Country.

	Local Perception				**Organic Perception**			
	Total	**U.S.**	**Canada**		**Total**	**U.S.**	**Canada**	
Number of observations	2,517	1,716	809		2,517	1,716	809	
Characteristics								
I do not know what local (organic) is	4%	4%	4%		3%	3%	3%	
Decreased miles to transport product	67%	65%	72%	***	12%	12%	14%	
Better for the environment	40%	37%	45%	***	53%	53%	53%	
Lower carbon footprint	35%	32%	41%	***	30%	30%	29%	
Lower greenhouse gas emissions	26%	23%	31%	***	24%	24%	24%	
Less pesticide residue on products	20%	21%	18%		51%	50%	52%	
Artificial fertilizer used	3%	3%	3%		4%	5%	4%	
Natural fertilizer used	21%	21%	21%		61%	60%	64%	*
No natural pesticide use	9%	10%	8%		25%	26%	24%	
No synthetic pesticide use	17%	17%	16%		67%	67%	66%	
Non genetically modified	22%	22%	23%		57%	56%	59%	
Products have a longer shelf life	23%	21%	26%	***	9%	9%	10%	
Better taste	44%	44%	44%		36%	35%	37%	
More nutritious	29%	28%	32%	*	40%	41%	38%	
Produced organically (locally) [1]	23%	25%	20%	***	17%	17%	18%	
Higher prices	21%	20%	23%	*	54%	53%	57%	**
Some other characteristic not listed	5%	5%	6%		0%	0%	0%	

[1]When examining local perception we are evaluating the percentage of consumers that perceive organic is a characteristic of local and vice versa.

Note. *,**,*** represents statistical difference between U.S. and Canadian consumers at the 0.1, 0.05, and 0.01 significance level.

With respect to consumers perceiving higher prices for local and organic, we find that a higher percentage of consumers believe higher prices are associated with organic than for local food. Furthermore, Canadian consumers perceive this to be the case in higher numbers than U.S.

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consumers. For instance, a significantly higher percentage (23%) of Canadian consumers perceive local as having a higher price compared to U.S. consumers (20%). Comparatively, significantly more Canadian consumers perceive organic as having a higher price (57%) compared to U.S. consumers (53%). These findings are not without merit given organic products have been shown to have significant premiums associated with them (Lin, Smith, and Huang 2009).

Consumer Profiles: Local Perceptions

In examining local perceptions, we do not present or discuss all the characteristics listed in Table 2, but rather focus on specific characteristics.[1] Examining what is an accurate perception of local, "decreased miles to transport," we see that gender and age are significant for both U.S. and Canadian respondents (Table 3, see Appendix). For instance, a 10-year increase in age above the mean age results in an increased probability of 3.9% (for Canadian) and 3.8% (for U.S.) that decreased miles would be perceived as local. Canadian females were 10.1% more likely to associate decreased miles with local, while U.S. females were 10.3% more likely. However, Caucasians in the U.S. are 11% more likely to view decreased miles as local whereas Caucasians in Canada are no more likely than other races in Canada. Furthermore, consumers having heard of other environmental terms, had both an increased frequency of purchasing local and increased recycling play a role in perceiving decreased miles to transport as being local for both U.S. and Canadian respondents. Having heard of the term eco-friendly and sustainable increases the likelihood of perceiving decreased miles as local by about 30% and 20%, respectively. Furthermore, we see that increased frequency of purchasing local produce increases the likelihood of perceiving decreased miles to transport as a component of local. Finally, increased recycling has a positive impact on accurately perceiving decreased miles with local.

With regard to nutrition/taste characteristics, purchasing frequency of local and organic produce is the only variable that is consistently significant across countries and for both the "better taste" and "more nutritious" characteristics. In each case, purchasing more local and organic produce increases the probability that the respondent associates better taste and more nutritious with local. We do see similarities for variables across countries but that are not consistent between "better taste" and "more nutritious." For instance, older consumers are more likely to associate "better taste" with local, while age does not affect whether a respondent perceived "more nutritious" as a characteristic of local. This finding has practical implications for agribusiness retailers marketing local product in that older consumers are more likely to respond to messaging around "better taste" than messaging that focuses on the nutrition content of the local product.

We also see differences between U.S. and Canadian consumers. Increased income results in a decreased probability of perceiving a local product as "better tasting" compared to Canadian consumers. A $10,000 increase in the mean income (i.e. wealthier consumers) results in a 0.6% decrease in U.S. consumers perceiving local is better tasting, while income does not have an effect on Canadian consumer's perception of better taste. However, increasing Canadian

[1] Marginal effects for those characteristics listed in Table 2 not presented in the manuscript are available via the contact author.

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consumer income by $10,000 from the mean would make them 0.8% less likely to perceive local as more nutritious where income changes for U.S. consumers would not effect this perception. Further, urban consumers in the U.S. are less likely than their suburban and rural counterparts to perceived local as better tasting, which is not the case with Canadian consumers. In contrast, females in Canada are more likely to perceive local as "more nutritious" compared to their U.S. counterparts.

With respect to a common claim of local being "better for environment," consumers purchasing increased amounts of local and organic are more likely to perceive this as being a characteristic of local. We also see that consumers that recycle more are more likely to believe this to be the case as well. However, older U.S. consumers are less likely to perceive local as better for the environment as are higher income U.S. consumers. Female Canadians are 3.8% more likely to have this perception compared with no difference for U.S. females. Having heard of the term sustainable increases the perception regarding environmental benefit, whereby having heard of the term eco-friendly only impacts U.S. consumers.

Examining Table 4 (see Appendix), we see that consumers perceiving local as having a higher price tend to be younger U.S. consumers. Income is only significant for U.S. consumers implying a higher income consumers are more likely (0.5% increase in the probability) to perceive local as higher priced. With respect to organic, we see that higher income Canadian consumers are less likely to associate organic with local. U.S. consumers that are younger, female, more educated, and non-Caucasian are more likely to associate organic with local. The consumer profile for U.S. consumers perceiving non-genetically modified organism (GMO) as being a part of local product is similar to that of those perceiving organic is local. For instance, younger, higher educated U.S. consumers are more likely to perceive non-GMO as local.

When examining specific environmental perceptions across all characteristics and countries, a specific consumer profile emerges. Young consumers that more frequently purchase local and organic produce are more likely to attribute environmental characteristics to local (Table 5, see Appendix). However, there are differences between characteristics and countries. Canadian females are more likely to perceive lower carbon footprint as local, while U.S. females are more likely to perceive less pesticide residue as a characteristic of local.

However, key differences emerge across characteristic and country. Notably, we can identify the consumer profile that misperceives no synthetic pesticide as local. For Canadian consumers, lower income, more adults in the household, more educated consumers that both purchase increasing amounts of local and organic and recycle more perceive local product as not having any synthetic pesticide applied to it. U.S. consumers that are younger, female, higher educated and non-Caucasian are more likely to share this belief. Interestingly, for U.S. consumers increasing purchases of local product does not affect this perception. From these results it is clear that the consumer profiles associated with misperceptions are not shared between countries.

Consumer Profiles: Organic Perception

As noted above, organic is more heavily regulated than local, especially in regard to production practices. This being said, a key characteristic of organic production is the lack of use of

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synthetic pesticides within production. This message of pesticide free is broadly emphasized throughout marketing material in the U.S. and Canada. However, only 2 in 3 consumers associate no synthetic pesticides with organic (Table 2). The reasons for this is unknown, especially given there are similar organic mandates within the U.S. and Canada for no synthetic pesticide use.

Using demographics and purchasing behaviors we can attempt to understand who has accurate perceptions. Caucasian females in the U.S. and Canada tend to be more likely to perceive no synthetic pesticide use as a characteristic of organic (Table 6, see Appendix). Of interest is the lack of significance for the local and organic purchasing variables. As local and organic produce purchasing increases there is no significant (except for U.S. local purchasing) differences for those purchasing more/less of local/organic produce. Also of interest is that increased recycling and having heard of the term sustainable is associated with the correct perception of organic as having no synthetic pesticide used.

In regards to the nutrition/taste characteristics (i.e. better taste and more nutrition), we see some variables show significant differences between the U.S. and Canada. Younger female consumers in both the U.S. and Canada are more likely to perceive organic as more nutritious, while more educated U.S. consumers are more likely to perceive organic as more nutritious. We also see that higher educated U.S. consumers are more likely to perceive organic as better tasting. Purchasing increased amounts of organic product also has a significant impact on a respondent perceiving organic as better tasting and more nutritious. This is not unexpected as this perception is most likely why respondents purchase organic product. However, unlike the local model results in Table 3 (see Appendix), purchasing more local does not have a significant impact on a respondent perceiving organic as better tasting or more nutritious. This seems to indicate that organic buyers see a nutrition/taste benefit in local and organic, while local buyers only see a nutrition/taste benefit in local.

As with the local results, there are some consumers who perceive organic as being higher priced (Table 7, see Appendix). Both U.S. and Canadian females and households with fewer adults are more likely to perceive organic as higher priced. With respect to other demographics there are both positive and negative signs for agribusiness firms marketing organic products. As a positive for firms providing organic product, Canadian households with increasing amounts of children are less likely to perceive organic as having a higher price. This seems to indicate that households with children may see organic as worth the investment for the perceived safety gain. However, Canadian households with higher incomes are more likely to perceive organic as higher priced. Given these households potentially have more disposable income to spend, this higher priced image could be problematic especially given our results that higher income U.S. consumers are less likely to perceive organic as better tasting and better for the environment.

As noted in Table 2, local and organic are being characterized together by 17%-25% of consumers. Efforts to change this misperception are routed in understanding the demographics and purchasing behaviors associated with each. Our findings indicate distinct consumer profiles emerging for each country. Canadian females living outside an urban location are more prone to characterize local as organic, whereas older, lower income, non-Caucasian consumers that live in larger households are more likely to perceive local as organic. Firms attempting to correct the

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misperception that local and organic are the same should utilize the above profiles to effectively and efficiently target the groups harboring these misperceptions.

In regards to the environmental characteristics, we see consistent profiles associated with commonly accepted characteristics (Table 8, see Appendix). For instance, higher educated consumers and consumers that purchase more organic produce are more likely to associate various environmental characteristics with organic. However, we do see differences emerge, especially for the misperception that organic implies decreased miles to transport. Older male U.S. consumers with lower incomes are more likely to have this misperception, while higher educated but lower income Canadian consumers are more likely to perceive decreased miles to transport with organic. For the other environmental characteristics we see that gender, education, and income play a role for several of the characteristics but in different ways. For instance, higher income U.S. consumers are more likely to perceive organic as having less pesticide residue, however, lower income U.S. consumers are more likely to associate lower carbon footprint with organic.

Discussion and Conclusion

The results of this study provide critical insights into the nature of local and organic perceptions and misperceptions, especially in regards to differences between U.S. and Canadian consumers, from a relatively large (n=2511) sample. Consistent with previous studies, notably Campbell, Mhlanga, and Lesschaeve (2013), we find that many consumers have accurate perceptions of local and organic for characteristics that are heavily touted, such as no synthetic pesticide use for organic and decreased miles to transport for local. However, we also see that many consumers have inaccurate perceptions of both local and organic terminology. Consumers' inaccurate perceptions of (especially) local production indicate broader concern in terms of understanding its long-term economic impacts, regardless of organic or conventional practices. More research needs to be conducted to investigate the relationship between consumer preferences, demand for local production, and regional economic growth, and whether or not benefits of local production will offset lost economic gains from trade.

A closer investigation of consumer profiles showed noticeable differences between U.S. and Canadian consumers with respect to certain characteristics. These differences are not well understood and deserve more in-depth study, especially given the flow of products between these countries. We also see key perception differences between males and females and Caucasian versus other races. Purchasing behaviors also play a key role in a consumer's perception of local and organic.

Marketers need to be aware of the terms for which consumers have accurate perceptions and develop marketing messages to capitalize on those perceptions. Conversely, we recommend avoiding the use of words or messaging which have confusing, inaccurate, or ambiguous meaning to consumers. Some may theorize that above-average returns could be extracted by firms because of these misperceptions, as was the case early on in the life cycle of organic fruits and vegetables (Kremen et al. 2012). However, as standards were developed and consumers more fully understood the definitional aspects of the term "organic" then above-average returns

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dissipated and were accrued mainly by producers who educated as a part of their marketing efforts. The authors hypothesize this being true of the term "local" as well.

Perhaps an element of education could be added throughout the marketing process to help to aid plant producers clarify and correct terminology for all consumers. Marketers may consider being more precise in their terminology if an accurate perception of their production systems is desired. Given the ambiguity in meaning for the terms local and organic, adding specific semantics to underscore the specific production practices (e.g. no synthetic pesticides used) may further emphasize the importance of the organic attribute. Still, a positive aura may be derived from the positive ambiguity either local or organic have, serving only to enhance the desirability of the product from the ambiguous term. The desirability resulting from such positive perceptions may either translate into price premiums if consumers view this as a resonating point of differentiation or may sway their purchasing conditions at current price levels given that all other attributes among competing products are similar.

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Appendix

Table 3. Marginal effects associated with the binary logit models for the accurate, nutrition/taste, general environment characteristic of local.

	Accurate: Decreased Miles to Transport		Nutrition/Taste: Better Taste		Nutrition/Taste: More Nutritious		General Environment: Better for Environment	
	Canada	**U.S.**	**Canada**	**U.S.**	**Canada**	**U.S.**	**Canada**	**U.S.**
Demographics [1]								
Age [2]	0.039 ***	0.038 ***	0.038 ***	0.034 ***	0.020	0.005	0.014	-0.028 ***
Number adults in household	-0.041 ***	-0.023 **	-0.012	0.017	0.000	0.014	0.017	0.009
Number children in household	-0.014	0.014	-0.015	-0.002	-0.005	0.008	0.021	0.005
Income [3]	-0.000	-0.000	-0.006	-0.006 *	-0.008 *	-0.004	0.000	-0.006 *
Gender (1=male)	-0.101 ***	-0.103 ***	-0.008	-0.023	-0.077 **	-0.006	0.038 *	-0.033
Area type								
Suburban Education	0.052	0.052	0.070	0.075 **	0.031	0.017	0.043	-0.048
Rural Education	0.036	0.060	0.030	0.167 ***	0.020	0.027	0.053	0.008
High school 4 years	-0.113 *	-0.032	0.047	0.009	0.009	0.052	0.058	0.020
Bachelor's degree	-0.019	0.066 **	-0.007	0.066 **	0.051	0.021	0.047	0.037
Bachelor's degree >	-0.072	0.018	0.076	-0.035	0.079	-0.055	0.067	-0.011
Race (1=Caucasian)	0.061	0.110 ***	0.055	-0.037	-0.016	-0.013	0.059	-0.002
Heard of term								
Eco-friendly (1=yes)	0.295 ***	0.299 ***	0.267 ***	0.147 ***	0.098	0.112 ***	0.104	0.100 **
Sustainable (1=yes)	0.196 ***	0.203 ***	-0.040	-0.048	0.034	0.024	0.048 ***	0.075 ***
Frequency of purchasing when available [4]								
Local produce	0.046 **	0.038 **	0.103 ***	0.082 ***	0.078 ***	0.027 *	0.026 **	0.035 **
Organic produce	-0.024	-0.032 **	0.050 **	0.052 ***	0.091 ***	0.070 ***	0.022 ***	0.063 ***
Recycling index [5]	0.068 ***	0.041 ***	0.013	-0.002	0.030	-0.010	0.027 *	0.054 ***
Log pseudo likelihood	-400.8	-968.1	-510.1	-1101	-458.6	-971.5	-510.2	-1060.5
Wald chi2	132.9	216.1	68.7	124.0	72.7	79.5	75.6	108.9
Pseudo R2	0.157	0.126	0.074	0.061	0.085	0.043	0.077	0.058
Sensitivity	0.729	0.708	0.664	0.626	0.665	0.633	0.642	0.645
Specificity	0.643	0.603	0.597	0.622	0.627	0.574	0.591	0.586
Correctly Classified	0.705	0.671	0.626	0.624	0.639	0.591	0.615	0.608

[1] The base categories are gender=female, live in urban area, education=less than high school, race=other, heard of…=no.
[2] The marginal effect for the age variable is multiplied by 10 years changing the interpretation to a 10 year increase/decrease in the mean results in the probability change in perceiving the characteristic as local.
[3] The marginal effect for the income variable is multiplied by $10,000 changing the interpretation to a $10,000 increase/decrease in the mean results in the probability change in perceiving the characteristic as local.
[4] Frequency of purchasing was measured by a scale where 1=never, 2=seldom, 3=sometimes, 4=most times, and 5=always.
[5] Respondents were asked how often they recycle glass, cardboard, and aluminum. The rating scale used was 1=do not purchase, 2=never, 3=sometimes, 4=usually, and 5=always. Do not purchase and never were then combined. The index was created by averaging the ratings for recycling of glass, cardboard, and aluminum.
Note. *,**,*** represents statistical difference at the 0.1, 0.05, and 0.01 significance level.

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Table 4. Marginal effects associated with the binary logit models for the price and trending issues characteristic of local.

	Price		Trending Issues			
	Higher Priced		Organic		Non-Genetically Modified Organism	
	Canada	**U.S.**	**Canada**	**U.S.**	**Canada**	**U.S.**
Demographics [1]						
Age [2]	-0.013	-0.040 ***	-0.012	-0.029 ***	-0.002	-0.023 ***
Number adults in household	0.012	-0.009	-0.001	0.006	0.004	-0.002
Number children in household	-0.057 ***	-0.007	0.005	-0.010	-0.009	-0.011
Income [3]	-0.004	0.005 **	-0.010 **	-0.000	-0.005	-0.003
Gender (1=male)	-0.072 **	-0.023	-0.012	-0.042 *	-0.052 *	-0.021
Live in suburban area	-0.004	-0.014	0.042	0.046 *	0.004	-0.009
Live in rural area	-0.098 ***	-0.017	0.055	0.056	0.004	0.029
Education						
High school - 4 year degree	-0.006	-0.029	0.018	0.067 *	0.011	0.096 ***
Bachelor's degree	0.050	0.004	-0.007	0.055 **	0.015	0.066 **
Bachelor's degree >	0.174 **	0.017	0.089	0.041	0.070	0.010
Race (1=Caucasian)	0.042	0.032	-0.017	-0.066 **	0.015	0.029
Heard of term						
Eco-friendly (1=yes)	0.058	0.035	-0.002	0.095 ***	0.064	0.074 **
Sustainable (1=yes)	0.070 **	0.045 **	-0.055	-0.006	-0.019	0.046 **
Frequency of purchasing when available [4]						
Local produce	-0.066 ***	-0.046 ***	0.026	-0.003	0.059 ***	0.006
Organic produce	-0.034 **	0.017	0.111 ***	0.115 ***	0.050 ***	0.064 ***
Recycling index [5]	0.025	0.020 *	0.023	-0.003	0.056 **	0.034 ***
Log pseudo likelihood	-407.2	-825.1	-353.0	-880.0	-404.5	-839.1
Wald chi2	47.06	56.33	84.07	161.71	40.2	102.38
Prob > chi2	0.0001	0.000	0.000	0.000	0.0007	0.000
Pseudo R2	0.068	0.037	0.117	0.089	0.059	0.063
Sensitivity	0.644	0.6093	0.673	0.6566	0.6593	0.6532
Specificity	0.626	0.5735	0.6568	0.6349	0.5942	0.6114
Correctly Classified	0.630	0.5807	0.66	0.6404	0.609	0.6205

[1] The base categories are gender=female, live in urban area, education=less than high school, race=other, heard of…=no.
[2] The marginal effect for the age variable is multiplied by 10 years changing the interpretation to a 10 year increase/decrease in the mean results in the probability change in perceiving the characteristic as local.
[3] The marginal effect for the income variable is multiplied by $10,000 changing the interpretation to a $10,000 increase/decrease in the mean results in the probability change in perceiving the characteristic as local.
[4] Frequency of purchasing was measured by a scale where 1=never, 2=seldom, 3=sometimes, 4=most times, and 5=always.
[5] Respondents were asked how often they recycle glass, cardboard, and aluminum. The rating scale used was 1=do not purchase, 2=never, 3=sometimes, 4=usually, and 5=always. Do not purchase and never were then combined. The index was created by averaging the ratings for recycling of glass, cardboard, and aluminum.
Note. *,**,*** represents statistical difference at the 0.1, 0.05, and 0.01 significance level.

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Table 5. Marginal effects associated with the binary logit models for the environmental characteristic of local.

	Lower Carbon Footprint		Lower Greenhouse Emissions		No Synthetic Pesticide Used		Less Pesticide Residue	
	Canada	U.S.	Canada	U.S.	Canada	U.S.	Canada	U.S.
Demographics [1]								
Age [2]	-0.011	-0.025 ***	-0.022 *	-0.020 ***	0.005	-0.017 **	0.007	-0.010
Number adults in household	-0.027	-0.023 **	-0.006	0.006	0.020 *	0.000	-0.015	0.007
Number children in household	-0.060 ***	0.000	-0.024	0.004	0.000	0.001	0.011	0.001
Income [3]	0.003	0.001	-0.003	-0.002	-0.013 ***	0.001	-0.006	0.000
Gender (1=male)	-0.094 **	-0.022	-0.027	0.011	-0.013	-0.057 ***	-0.021	-0.034 *
Live in suburban area	-0.022	-0.064 **	-0.011	-0.073 ***	-0.001	-0.015	-0.002	0.011
Live in rural area	-0.038	-0.040	-0.031	-0.045	0.043	0.026	0.017	0.014
Education								
High school - 4 year	-0.135 **	-0.019	-0.042	-0.017	0.042	0.055 *	0.023	0.111 ***
Bachelor's degree	-0.042	0.003	-0.054	-0.027	0.062 *	0.044 *	0.020	0.092 ***
Bachelor's degree >	-0.073	-0.012	-0.021	-0.046	0.121 *	-0.025	0.032	0.010
Race (1=Caucasian)	-0.008	0.097 ***	0.058	0.047 **	-0.043	-0.058 **	-0.035	-0.014
Heard of term								
Eco-friendly (1=yes)	0.072	0.131 ***	0.220 ***	0.088 **	0.039	0.083 ***	0.088 *	0.085 ***
Sustainable (1=yes)	0.212 ***	0.133 ***	0.089 **	0.098 ***	-0.023	-0.007	-0.059	-0.032
Frequency of purchasing when available [4]								
Local produce	0.037	-0.009	0.020	0.013	0.032 **	-0.001	0.059 ***	0.006
Organic produce	0.078 ***	0.048 ***	0.074 ***	0.038 ***	0.059 ***	0.057 ***	0.062 ***	0.047 ***
Recycling index [5]	0.067 **	0.048 ***	0.017	0.035 ***	0.041 **	0.010	0.005	0.026 **
Log pseudo likelihood	-486.5	-1014.0	-469.9	-871.1	-319.2	-741.8	-354.0	-838.7
Wald chi2	86.2	105.8	48.0	95.5	61.1	81.9	61.0	66.4
Prob. > chi2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pseudo R2	0.103	0.059	0.058	0.056	0.098	0.059	0.078	0.043
Sensitivity	0.678	0.670	0.665	0.645	0.682	0.628	0.642	0.647
Specificity	0.606	0.564	0.556	0.570	0.656	0.593	0.637	0.588
Correctly Classified	0.635	0.598	0.590	0.587	0.660	0.599	0.638	0.600

[1] The base categories are gender=female, live in urban area, education=less than high school, race=other, heard of…=no.
[2] The marginal effect for the age variable is multiplied by 10 years changing the interpretation to a 10 year increase/decrease in the mean results in the probability change in perceiving the characteristic as local.
[3] The marginal effect for the income variable is multiplied by $10,000 changing the interpretation to a $10,000 increase/decrease in the mean results in the probability change in perceiving the characteristic as local.
[4] Frequency of purchasing was measured by a scale where 1=never, 2=seldom, 3=sometimes, 4=most times, and 5=always.
[5] Respondents were asked how often they recycle glass, cardboard, and aluminum. The rating scale used was 1=do not purchase, 2=never, 3=sometimes, 4=usually, and 5=always. Do not purchase and never were then combined. The index was created by averaging the ratings for recycling of glass, cardboard, and aluminum.
Note. *,**,*** represents statistical difference at the 0.1, 0.05, and 0.01 significance level.

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Table 6. Marginal effects associated with the binary logit models for the accurate, nutrition/taste, and general environment characteristic of organic.

	Accurate No Synthetic Pesticides Used						Nutrition/Taste More Nutritious						General Environment Better for Environment			
	Canada		**U.S.**		**Canada**		**U.S.**		**Canada**		**U.S.**		**Canada**		**U.S.**	
Demographics [1]																
Age [2]	0.016		0.014		0.006		-0.004		-0.024	*	-0.028	***	-0.014		-0.004	
Number adults in household	-0.045	***	-0.028	***	-0.003		0.016		-0.029	*	0.011		0.002		0.003	
Number children in household	-0.025		0.008		0.004		0.009		-0.020		-0.016		-0.025		-0.004	
Income [3]	0.004		0.002		-0.007		-0.006	**	-0.001		-0.004		-0.001		-0.011	***
Gender (1=male)	-0.085	**	-0.118	***	-0.004		0.006		-0.091	**	-0.106	***	-0.091	**	-0.086	***
Area type	-0.038		0.029		0.005		-0.028		-0.001		-0.058	*	0.026		-0.034	
Suburban	-0.055		0.050		0.027		-0.022		0.022		-0.034		0.014		0.034	
Rural																
Education	-0.048		0.006		0.017		0.072	*	0.056		0.126	***	0.044		0.045	
High school - 4 year	-0.028		0.029		-0.016		0.076	**	0.015		0.104	***	-0.017		0.082	**
Bachelor's degree	-0.163	**	-0.037		0.073		-0.040		-0.035		-0.003		-0.012		0.017	
Bachelor's degree >	0.137	**	0.148	***	0.068		-0.055	*	-0.025		-0.027		0.045		0.010	
Race (1=Caucasian)																
Heard of term	0.143		0.298	***	0.054		0.102	**	0.237	***	0.178	***	0.116		0.279	***
Eco-friendly (1=yes)	0.180	***	0.167	***	-0.134	***	0.011		-0.016		0.003		0.113	**	0.063	**
Sustainable (1=yes)	0.016		0.014		0.006		-0.004		-0.024	*	-0.028	***	-0.014		-0.004	
Frequency of purchasing when available [4]																
Local produce	0.017		0.037	**	0.006		0.020		-0.004		-0.009		0.030		0.009	
Organic produce	0.022		0.002		0.225	***	0.147	***	0.180	***	0.143	***	0.127	***	0.118	***
Recycling index [5]	0.104	***	0.043	***	0.064	**	0.000		0.070	***	0.008		0.026		0.037	***
Logpseudo likelihood	-454.5		-958.8		-452.6		-1008.0		-471.9		-1056.6		-512.5		-1079.2	
Wald chi2	104.6		205.7		112.9		159.7		101.2		170.9		78.5		167.1	
Prob > chi2	0.000		0.000		0.000		0.000		0.000		0.000		0.000		0.000	
Pseudo R2	0.118		0.119		0.143		0.092		0.116		0.087		0.078		0.087	
Sensitivity	0.718		0.717		0.718		0.679		0.692		0.671		0.646		0.689	
Specificity	0.608		0.590		0.643		0.631		0.629		0.631		0.623		0.596	
Correctly Classified	0.680		0.674		0.670		0.648		0.653		0.647		0.636		0.645	

[1] The base categories are gender=female, live in urban area, education=less than high school, race=other, heard of…=no.
[2] The marginal effect for the age variable is multiplied by 10 years changing the interpretation to a 10 year increase/decrease in the mean results in the probability change in perceiving the characteristic as local.
[3] The marginal effect for the income variable is multiplied by $10,000 changing the interpretation to a $10,000 increase/decrease in the mean results in the probability change in perceiving the characteristic as local.
[4] Frequency of purchasing was measured by a scale where 1=never, 2=seldom, 3=sometimes, 4=most times, and 5=always.
[5] Respondents were asked how often they recycle glass, cardboard, and aluminum. The rating scale used was 1=do not purchase, 2=never, 3=sometimes, 4=usually, and 5=always. Do not purchase and never were then combined. The index was created by averaging the ratings for recycling of glass, cardboard, and aluminum.
Note. *,**,*** represents statistical difference at the 0.1, 0.05, and 0.01 significance level.

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Table 7. Marginal effects associated with the binary logit models for the price and trending issues characteristic of organic.

	Price		Trending Issues			
	Higher Priced		Local		Non-Genetically Modified Organism	
	Canada	**U.S.**	**Canada**	**U.S.**	**Canada**	**U.S.**
Demographics [1]						
Age [2]	-0.005	-0.012	0.012	0.016 **	-0.000	-0.021 **
Number adults in household	-0.040 **	-0.027 ***	0.005	0.017 ***	-0.008	-0.030 ***
Number children in household	-0.048 **	-0.010	0.003	0.016 **	-0.050 **	0.015
Income [3]	0.012 **	-0.003	-0.014 ***	-0.006 **	0.001	0.003
Gender (1=male)	-0.115 ***	-0.110 ***	0.075 ***	0.020	-0.066 *	-0.062 **
Live in suburban area	-0.067	-0.018	0.063 **	0.002	0.012	-0.010
Live in rural area	-0.080	-0.028	0.093 **	0.015	0.063	0.003
Education						
High school - 4 year degree	0.052	-0.103 ***	0.010	0.020	-0.056	0.011
Bachelor's degree	0.030	-0.005	0.006	0.007	0.022	0.071 **
Bachelor's degree >	-0.004	-0.035	0.076	-0.020	0.003	-0.020
Race (1=Caucasian)	0.053	0.076 **	0.018	-0.060 **	0.095	0.066 **
Heard of term						
Eco-friendly (1=yes)	0.085	0.170 ***	0.061	0.068 **	0.197 **	0.324 ***
Sustainable (1=yes)	0.188 ***	0.083 ***	-0.034	0.000	0.093 **	0.185 ***
Frequency of purchasing when available [4]						
Local produce	0.008	0.035 **	0.004	-0.006	0.005	0.005
Organic produce	-0.078 ***	-0.068 ***	0.086 ***	0.076 ***	0.067 ***	0.049 ***
Recycling index [5]	0.055 **	0.031 **	0.032 *	-0.005	0.090 ***	0.041 ***
Log pseudo likelihood	-509.0	-1127.1	-333.9	-721.5	-505.5	-1070.4
Wald chi2	66.7	98.5	83.2	94.7	74.9	163.7
Prob. > chi2	0.000	0.000	0.000	0.000	0.000	
Sensitivity	0.666	0.644	0.6875	0.6319	0.6631	0.7274
Specificity	0.615	0.5691	0.6742	0.6287	0.5512	0.5501
Correctly Classified	0.644	0.6088	0.6766	0.6292	0.6169	0.6497

[1] The base categories are gender=female, live in urban area, education=less than high school, race=other, heard of…=no.
[2] The marginal effect for the age variable is multiplied by 10 years changing the interpretation to a 10 year increase/decrease in the mean results in the probability change in perceiving the characteristic as local.
[3] The marginal effect for the income variable is multiplied by $10,000 changing the interpretation to a $10,000 increase/decrease in the mean results in the probability change in perceiving the characteristic as local.
[4] Frequency of purchasing was measured by a scale where 1=never, 2=seldom, 3=sometimes, 4=most times, and 5=always.
[5] Respondents were asked how often they recycle glass, cardboard, and aluminum. The rating scale used was 1=do not purchase, 2=never, 3=sometimes, 4=usually, and 5=always. Do not purchase and never were then combined. The index was created by averaging the ratings for recycling of glass, cardboard, and aluminum.
Note. *,**,*** represents statistical difference at the 0.1, 0.05, and 0.01 significance level.

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Table 8. Marginal effects associated with the binary logit models for the environmental characteristic of local.

	Lower Carbon Footprint		Lower Greenhouse Emissions		No Synthetic Pesticide Used		Less Pesticide Residue	
	Canada	**U.S.**	**Canada**	**U.S.**	**Canada**	**U.S.**	**Canada**	**U.S.**
Demographics [1]								
Age [2]	0.000	-0.006	0.004	-0.019 **	-0.007	0.003	0.010	0.010 *
Number adults in household	0.009	-0.010	0.017	-0.003	0.001	0.000	0.013	0.009
Number children in household	-0.010	0.007	-0.021	0.005	0.007	0.005	-0.018	0.013 *
Income [3]	-0.004	-0.006 **	0.000	-0.003	0.002	-0.001	-0.010 ***	-0.004 **
Gender (1=male)	-0.028	-0.039 *	-0.045	-0.070 ***	0.003	0.008	0.022	0.032 **
Live in suburban area	0.020	-0.002	-0.024	-0.031	0.005	-0.003	0.010	-0.012
Live in rural area	0.026	-0.048	-0.013	-0.021	0.018	0.004	0.037	-0.019
Education								
High school - 4 years	-0.013	0.077 **	0.029	0.065 *	-0.001	0.025	0.076 *	0.019
Bachelor's degree	-0.011	0.104 ***	-0.019	0.082 ***	0.007	0.023 *	0.072 **	0.014
Bachelor's degree >	0.007	-0.048	-0.058	-0.021	0.016	-0.008	0.067	-0.030
Race (1=Caucasian)	0.039	-0.020	0.059	0.002	-0.001	-0.013	-0.014	-0.005
Heard of term								
Eco-friendly (1=yes)	0.046	0.160 ***	0.131 **	0.123 ***	0.014	-0.034	0.004	0.048 **
Sustainable (1=yes)	-0.042	0.106 ***	-0.050	0.035	-0.063 ***	0.005	-0.010	-0.006
Frequency of purchasing when available [4]								
Local produce	0.028	-0.003	0.017	0.017	0.009	-0.003	0.007	0.007
Organic produce	0.096 ***	0.055 ***	0.095 ***	0.041 ***	0.007	0.011 **	0.068 ***	0.046 ***
Recycling index [5]	0.045 *	0.027 **	0.033	0.025 **	0.000	0.003	0.024	0.003
Log pseudo likelihood	-456.1	-985.7	-414.8	-888.3	-129.6	-308.3	-281.7	-573.0
Wald chi2	49.3	87.1	59.8	78.2	29.9	22.0	76.0	67.7
Prob. > chi2	0.000	0.000	0.000	0.000	0.018	0.1423	0.000	0.000
Pseudo R2	0.054	0.056	0.071	0.050	0.080	0.028	0.122	0.062
Specificity	0.604	0.577	0.604	0.575	*0.669*	0.591	0.674	0.619
Correctly Classified	0.610	0.606	0.607	0.591	*0.668*	0.590	0.683	0.619

[1] The base categories are gender=female, live in urban area, education=less than high school, race=other, heard of…=no.
[2] The marginal effect for the age variable is multiplied by 10 years changing the interpretation to a 10 year increase/decrease in the mean results in the probability change in perceiving the characteristic as local.
[3] The marginal effect for the income variable is multiplied by $10,000 changing the interpretation to a $10,000 increase/decrease in the mean results in the probability change in perceiving the characteristic as local.
[4] Frequency of purchasing was measured by a scale where 1=never, 2=seldom, 3=sometimes, 4=most times, and 5=always.
[5] Respondents were asked how often they recycle glass, cardboard, and aluminum. The rating scale used was 1=do not purchase, 2=never, 3=sometimes, 4=usually, and 5=always. Do not purchase and never were then combined. The index was created by averaging the ratings for recycling of glass, cardboard, and aluminum.
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