Is There a Price Premium for Local Food? The Case of the Fresh Lettuce Market in Hawaii

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"Buying local" has become one of the most important trends in food marketing. Despite widespread public attention, the influence of the "local" attribute on food prices is not well understood. We aim to begin to fill this gap in research by exploring the presence of a price premium for "local" in actual market transactions. Using scanner data on fresh packaged lettuce in the Honolulu market and hedonic modeling, we investigate consumers' revealed preferences for the attribute. Contrary to the positive willingness to pay for local food widely reported in previous studies, we find no local premium for fresh lettuce in the Honolulu market.

Key Words: elasticity of substitution, hedonic price model, lettuce, local food, price premium, scanner data

"Buying local" has become one of the most important trends in food marketing in the developed world. In 2011, the European parliament adopted a new proposal to establish local food systems and introduced a new European logo to promote locally produced food (Fresh Produce Consortium 2011). Likewise in the United States, the number of farmers' markets has more than quadrupled, growing from 1,755 in 1994 to 8,144 in 2013 (Agricultural Marketing Service (AMS) 2013). A recent online survey by the *Wall Street Journal* indicated that 76.7 percent of its readers expressed strong or significant interest in buying local food regardless of cost or when handy (*Wall Street Journal* 2012).

Several factors may explain the emergence of the local food movement. First, consumers have been increasingly concerned about health-related properties (such as organic and pesticide-free) of food from unknown sources (Darby et al. 2008, Scott-Thomas 2012). Foods produced by local farms have the natural advantage of being fresher and more flavorful and are considered more trusted dietary sources. Second, globalization has led to a severe decline in small-scale local farms and increased concentration of agricultural production that is dominated by large companies (Arita, Hemachandra, and Leung 2014). "Buying local" is a significant part of efforts to support regional economies and

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employment, especially during tough economic times, and to rebalance power in the food supply system (Halliday 2011).

Despite widespread public attention, the influence of the local attribute on market prices of local food is not well understood. In the existing literature, studies investigating such price aspects can be divided into two broad categories. The first has explored economic interpretations from the perspective of market demand and studied consumers' willingness to pay. Using a stated preference approach and hypothetical survey data, researchers have found that most consumers were willing to pay a positive premium for local food (Jekanowski, Williams, and Schiek 2000, Loureiro and Hine 2002, Brown 2003, Giraud, Bond, and Bond 2005, Thilmany, Bond, and Bond 2008, Carpio and Isengildina-Massa 2009, Ulupono Initiative 2011, Grebitus, Lusk, and Nayga 2013). The market demand studies have gleaned useful insights regarding consumers' perceptions of local, but one cannot readily conclude the existence of price premiums for local products in general from their findings, in part because consumers may have overstated their willingness to pay. For example, Buzby and Skees (1994) found that only a small fraction of the individuals who revealed positive willingness to pay for organic food actually purchased such food on a regular basis. In addition, some attitudinal studies may have oversimplified the consumers' decision-making processes (for example, in Darby et al. (2008) by assuming that local and imported products differ only in origin and freshness and are otherwise equivalent). When actually shopping, consumers may take many other product attributes that are related to being local but are not equal into account. Thus, the stated attitudes may not translate into real purchases in many circumstances.

The second category of studies involves comparing retail prices for local and imported foods and observing the degree of price difference (e.g., Bennett et al. 2007, Pirog and McCann 2009). These studies, however, failed to collect data on and control for other relevant product features, and those omissions make it difficult to determine whether observed price variations originate from locality or from other product properties.

Hand and Martinez (2010) pointed out that local production may influence product prices in several ways. For many consumers, primary reasons for buying local food are its freshness and flavor. Additionally, consumers may be motivated by interests in supporting local farmers, preserving biodiversity, and/or protecting the environment. Furthermore, supply-side conditions, though seldom discussed, may be equally important; factors such as production costs and seasonal output fluctuations could affect prices of locally produced products.

We proceed along this conceptual framework of "local" and attempt to measure the extent to which the local attribute influences prices through various channels using market transaction data for fresh packaged lettuce in the Honolulu, Hawaii, market. The hedonic modeling approach is applied to measure how locality and other product traits affect market prices. Using implicit information on product quality, we can control for quality effects and explore alternative market implications of the local label. We also estimate the consumer elasticity of substitution (Armington) for product origin and implicit quality. A comparison of the estimates provides valuable information about consumer demand elasticities in the face of relative price changes.

Hawaii's food market is largely similar in nature to many markets in the continental United States. Local production accounts for 11.6 percent and imported food for 88.4 percent (Loke and Leung 2013). One important advantage of the Hawaii market is its distinct geographic location and cultural background.

There, unlike most places in the United States, "local" is clearly defined[1] as food grown in the Hawaiian Islands and all other food is imported, from the continental United States and elsewhere. Most retail stores in the islands display signs that identify local products to differentiate them. Therefore, by studying the market for fresh packaged lettuce in Hawaii, we can more clearly identify the influence of the local attribute for food and related market systems.

Hawaii Market for Lettuce

Lettuce is the United State's second most popular fresh vegetable (Economic Research Service 2012). Per capita consumption of lettuce in the United States was about 26.2 pounds in 2011 (Cook 2012) and in 2010 the value of lettuce crops accounted for 19 percent of the total value for all U.S. fresh vegetable crops. The most commonly consumed type of lettuce is head lettuce, commonly referred to as iceberg. However, consumption of other types of lettuce, such as romaine and leaf, has been growing rapidly in recent years, largely due to increasing popularity of packaged salad greens (Boriss, Brunke, and Jore 2012).

California and Arizona produce nearly all of the lettuce in the United States (National Agricultural Statistics Service (NASS) 2013a). Like many states, Hawaii imports most of its fresh lettuce from California and Arizona; local production amounts to just 10.7 percent of the state's total supply. Despite this small share, local lettuce production has risen sharply in Hawaii, increasing 52 percent between 2007 and 2011 (NASS 2013b).[2] Several conditions led to this strong regional growth, including (i) public concerns about lettuce from California that was contaminated with *E. coli O157:H7*, (ii) hydroponic and aquaponic systems available in Hawaii to produce high-quality, high-value crops intensively in greenhouses, and (iii) expansion of the local food movement with increasing consumer interest in locally sourced produce.

California's iceberg lettuce industry is highly concentrated—the top four shippers control 60 percent of the market and the top eight shippers control 80 percent. That is not the case in Hawaii. According to the U.S. Department of Agriculture 2007 Census of Agriculture, Hawaii was home to 138 lettuce-producing farms and there were about a dozen wholesalers and importers of lettuce operating in the Honolulu supply chain for fresh produce.

Most of the lettuce imported in Hawaii is likely marketed in retail and wholesale stores. About 20 percent of the lettuce grown locally is categorized as processed and is used mainly as fresh-cut products in the food service industry. The majority of the rest is distributed through intermediated channels such as supermarkets and discount stores; a small portion is sold through direct marketing channels such as farmers' markets.

Methodology and Data

Hedonic Price Model

The hedonic price model was first developed by Lancaster (1966), who argued that consumers derive utility directly from characteristics and quality attributes

[1] Hand and Martinez (2010) documented a number of issues that have prevented development of a generally accepted definition of "local."

[2] This figure includes head, semi-head, and romaine lettuce but not leaf lettuce because leaf lettuce was not reported by NASS.

embedded in a product rather than from the product itself. The model has been successfully applied to studies of a large number of food products, including apples (Carew, Florkowski, and Smith 2012), fresh tomatoes (Huang and Lin 2007, Keahiolalo 2013), organic products (Lin, Smith, and Huang 2008, Smith, Huang, and Lin 2009), fresh eggs (Karipidis et al. 2005, Satimanon and Weatherspoon 2010, Kim and Chung 2011), frozen fish (Kristofersson and Rickertsen 2007, Roheim, Asche, and Santos 2011), and wine (Steiner 2004, Schamel 2006). Most of the frameworks used in recent years have built on work by Rosen (1974), who demonstrated that the observed price of a product can be considered as the sum of the prices of all of the quality attributes associated with it. While these prices are not explicitly expressed by the market, they can be estimated by employing the hedonic price (regression) model, which is capable of estimating the price of a product as a function of its quality characteristics.

We adopt the methodological approach developed by Rosen and specify the hedonic price model as

$$P_{it}(\mathbf{Z}) = P_{it}(z_1, z_2, \ldots, z_j, \ldots, z_n) \tag{1}$$

where P_{it} is the price of product i at time t and $\mathbf{Z} = z_1, z_2, \ldots, z_j, \ldots, z_n$ is a vector of n objectively measured attributes that determine the price of the product. Each attribute j can be measured on a continuous scale or by a dummy variable. This theoretical model assumes that the market operates under perfect competition and general economic equilibrium. Therefore, prices are revealed in the market through the usual mechanisms—consumers maximizing utility by selecting available products subject to budget constraints, producers maximizing profits given available technology and factor prices, and market clearing conditions.

The partial derivative of the hedonic price function with respect to a particular attribute is an implicit or shadow price at equilibrium that reflects both the maximum price consumers are willing to pay for an additional unit of that attribute and the minimum price for which suppliers are willing to sell according to their costs. Furthermore, consumers make decisions about whether to purchase the product based on the retailers' offered prices. Hence, the price collected from retailers is valid in determining the value of the product's attributes using hedonic analysis without ignoring the consumer side.

A review of the literature determined that linear and log-linear specifications have been most commonly used in hedonic price studies. Interpretation of the log-linear form is straightforward and represents the percentage change of the dependent variable in response to additional units of specified independent variables. We adopt the log-linear specification used in Roheim, Asche, and Santos (2011).

Elasticity of Substitution Model

In the Armington (1969) model, the assumption is that products are differentiated simply by their production origin. Hence, a consumer treats local and imported goods (lettuces in this case) as substitutes in consumption. And by our assumption that this consumer has a well-behaved utility function, the consumption decision is consistent with neoclassical theory of utility maximization.

The same consumer derives utility from a composite lettuce product (Q) composed of imported (M) and locally produced (L) lettuces. Assuming the

potential for substitution between M and L, the consumer's decision problem is to maximize utility given product prices and the consumer's budget. Accordingly, Armington's constant elasticity of substitution (CES) utility for Q can be expressed as

$$Q = [\beta M^{(\sigma-1)/\sigma} + (1-\beta)L^{(\sigma-1)/\sigma}]^{\sigma/(\sigma-1)} \tag{2}$$

where M is the quantity of imported good, L is the quantity of local good, σ is the elasticity-of-substitution coefficient between the local and imported good, and β is a distribution parameter calibrated in the demand function.

The first-order conditions of this problem imply that the local-to-import ratio must be a function of the price ratio to satisfy the following:

$$M / L = [(\beta / (1-\beta))(P_L / P_M)]^{\sigma}. \tag{3}$$

Taking the natural logarithm of equation 3, we obtain an estimation equation:

$$\ln(M / L) = \alpha + \sigma \ln[P_L / P_M] + \mu \tag{4}$$

where α and σ are the coefficients to be estimated, σ is the Armington elasticity of substitution between local and imported lettuce, and μ is the random error.

Data Set

The data used to estimate the hedonic and Armington elasticity models are Nielsen retail scanner data. Scanner data sets have been used effectively to evaluate demand for frozen pollock eco-labeling (Roheim, Asche, and Santos 2011), carbonated soft drinks (Martínez-Garmendia 2010), and fresh eggs (Kim and Chung 2011) and generally are suitable for studying consumers' revealed preferences based on observations of actual purchases.

The data set covers Hawaii's three leading grocery chains (Foodland, Safeway, and Times Supermarket), which have a total of 19 stores in the Honolulu metropolitan area, and provides scanner-generated information on fresh packaged lettuce products with unique universal product codes (UPCs) that were sold during a 52-week period in 2011. We exclude loose-weight items because those product codes were not available for all stores.

The data set provides information for 373 fresh packaged lettuce products. Of those, 42 products recorded sales for at least one week during the period and the information for 23 of those was complete. We selected eight product attributes for the analysis: producer, color, type, package option, weekly sales revenue, weekly sales units, product weight,[3] and organic origin. The observations are assigned to groups according to lettuce type—iceberg, romaine, Manoa,[4] and leaf—and form of packaging—wrap, bag, and molded tray. As a result, the data set consists of 565 data points:[5] 53 observations for iceberg lettuce, 229 for romaine lettuce, 147 for Manoa lettuce, and 136 for leaf lettuce. In terms of

[3] Some of the observations lacked information on product weight. We obtained the missing information via visits to stores and direct contact with retailers.

[4] Manoa lettuce is cultivated almost entirely in Hawaii. It is a very popular choice for salads and can be used in place of any other type of lettuce.

[5] We excluded organic products because there were not enough observations for meaningful analysis.

Table 1. Descriptive Statistics of the Data Set

	Average Price Dollars per Pound	Standard Deviation
Iceberg lettuce	1.75	(0.37)
Local	—	—
Imported	1.75	(0.37)
Romaine lettuce	3.42	(2.35)
Local	—	—
Imported	3.42	(2.35)
Manoa lettuce	9.33	(3.28)
Local	11.31	(1.32)
Imported	4.55	(0.35)
Leaf lettuce	8.29	(4.42)
Local	11.96	(0.86)
Imported	6.09	(4.24)

local production, there are 104 observations for Manoa lettuce, 51 for leaf lettuce, and none for iceberg and romaine lettuce.

In the marketplace, information on the origin of local lettuce is easily recognized from descriptions on the packaging. Common descriptors include "Produce of Hawaii," "Island Fresh," "Grown in Hawaii," and "Buy Fresh, Buy Local." The package labeling is complemented by highly visible shelf tags (e.g., "Hawaii Grown," "Local," and "Locally Grown"). Both can capture the attention and imagination of store customers interested in purchasing locally grown lettuce. In addition, the three major chain stores actively promote local products via in-store shelf displays and weekly newspaper advertisements. One chain's stores have dedicated display sections for local food products and all of the chains' stores display prominent signs identifying local products to gain consumer attention.

Table 1 reports means and standard deviations for lettuce prices. The average price is considerably higher for Manoa and leaf lettuce than for romaine and iceberg. Likewise, it appears that there is a price premium for local Manoa and leaf lettuce. A characteristic of the data set may have contributed to the pronounced difference in the price of local and imported lettuces. Package options for imported products range from basic wrapping to stronger protective covers such as bags and molded trays while locally produced lettuces are packaged exclusively in molded trays. On the other hand, summary statistics tend to average out price impacts of individual product characteristics. Hence, we cannot determine whether the observed price variation results from the products' origins or some other property or properties. We specify a hedonic regression model to measure the marginal effects of all product attributes fully.

Empirical Model

Using the information previously described, we specify the hedonic price equation as

$$lnprice_i = \alpha_i + \boldsymbol{\beta}\mathbf{X}_i + \varepsilon_i \quad (5)$$

Table 2. Description of the Variables in the Hedonic Price Model for All Lettuce

Variable	Type	Description	Mean (Std. Dev.)
Dependent			
Lnprice	Continuous	Log of weekly average price per pound	1.52 (0.74)
Product Origin			
Local	Dummy	1 if produced in Hawaii 0 if imported	0.27 (0.45)
Lettuce Type			
Manoa	Dummy	1 if product is Manoa/butterhead 0 otherwise	0.26 (0.44)
Leaf	Dummy	1 if product is leaf lettuce 0 otherwise	0.24 (0.43)
Romaine	Dummy	1 if product is romaine lettuce 0 otherwise	0.41 (0.49)
Iceberg	Dummy	1 if product is iceberg lettuce 0 otherwise	0.09 (0.29)
Packaging Type			
Tray	Dummy	1 if product package is tray 0 otherwise	0.35 (0.48)
Bag	Dummy	1 if product package is bag 0 otherwise	0.30 (0.46)
Wrap	Dummy	1 if product package is wrap 0 otherwise	0.35 (0.48)
Color			
Green	Dummy	1 if product is green 0 if red	0.76 (0.43)
Weight			
Lnweight	Continuous	Log of product weight measured in pounds	–0.28 (0.53)

where $\mathbf{X}$ is a vector of independent variables, $\boldsymbol{\beta}$ is the vector of coefficients to be measured, and ε is the error term. Table 2 provides descriptions of all of the variables used in the regressions.[6] The dependent variable is the logarithm of the average price per pound for each product sold in each week. Most of the independent variables are binary variables for product attributes such as packaging, lettuce type, and lettuce origin. Product weight is transformed into the logarithmic form with the coefficient measuring the percent change in price in response to a corresponding change in weight.

[6] The variable *Green* is dropped from the regression equations because its coefficients are insignificant in all specifications.

Table 3. Estimated Results of the Hedonic Price Model for All Lettuce

Lnprice	Ordinary Least Square Estimate	Generalized Least Square Estimate
Manoa	0.26***	0.31***
	(0.04)	(0.11)
Leaf	0.30***	0.37***
	(0.03)	(0.10)
Romaine	0.06**	0.29***
	(0.03)	(0.09)
Tray	0.82***	0.68***
	(0.04)	(0.09)
Bag	0.54***	0.41***
	(0.02)	(0.06)
Local	–0.05	0.07
	(0.03)	(0.09)
Lnweight	–0.77***	–0.83***
	(0.04)	(0.08)
Constant	0.70***	0.61***
	(0.02)	(0.08)
Adjusted *R*-square	0.9524	0.8226
F-statistic	1,611.57	374.62
Durbin-Watson *d*-statistic	0.27	1.99
Number of observations	565	565

Note: ***, **, and * denote significance at 1 percent, 5 percent, and 10 percent respectively.

Results and Discussion

Table 3 reports estimated coefficients from the ordinary least squares (OLS) regression for all types of lettuce. Overall, the estimated hedonic equation exhibits a high degree of goodness-of-fit and joint significance. To determine the reliability and robustness of the OLS results, we check for potential multicollinearity and perform tests for autocorrelation. The results of computing variance inflation factors show that the estimates for all of the explanatory variables are within a reasonable range, indicating the absence of a severe collinearity problem.[7] The Durbin-Watson *d*-statistic, however, suggests the presence of autocorrelation. Hence, we apply a generalized least squares (GLS) regression to the hedonic model and present those results in Table 3 as well. Note that the GLS and OLS results are quite similar in terms of the magnitudes and signs of the estimated coefficients. Since the GLS estimates correct for autocorrelation, we deem them to be more reliable and use them as the principal basis for the proceeding discussions.

The reference product in the hedonic regression is imported iceberg lettuce. Since it is relatively inexpensive, iceberg is the most popular lettuce product in the United States in terms of per capita consumption. However, demand for other types of lettuce has been steadily increasing since fresh-cut salad products were introduced in the late 1980s (Boriss, Brunke, and Jore 2012).

[7] In particular, the value of each variance inflation factor is less than 10, which is considered to be within the acceptable range, and the factor for the variable *Local* is less than 5.

The results of our regression equations show moderate price variations for different types of lettuce. The other types of lettuce are more expensive than iceberg: 36 percent more for Manoa, 45 percent more for leaf, and 34 percent more for romaine,[8] suggesting that these three types of lettuce are viewed as close substitutes for each other.

Tray and *Bag* are dummy variables for packaging options with *Wrap* as the reference category. We include these variables because the type of packaging used for fresh produce such as lettuce is a crucial price determinant that also may be correlated with the product's overall quality. Bags and trays are higher-quality, more expensive types of packaging, and it makes sense that producers would reserve such packaging for higher-quality, higher-value products. Thus, the packaging selected may serve as a form of grading of product quality. Grading has been used in other hedonic studies as a proxy for quality. For example, McConnell and Strand (2000) found that grading alone explained a considerable part of observed variation in tuna prices and that adding other quality characteristics did not substantially improve their hedonic regressions' goodness-of-fit.

Better packaging also may imply a greater degree of processing. Postharvest processing and storage at a proper temperature are crucial to producers' efforts to meet appropriate product specifications and food safety standards for freshly harvested produce. Processing procedures include cleaning/prewashing, sorting, cutting, and packing, and after such processing, products are more ready to serve, have a longer shelf life, and provide greater consistency of quality. These features contribute to the overall quality and value of the final product and may significantly influence consumers' purchasing decisions.

We find a consistent positive correlation between quality and packaging. The coefficients of *Tray* and *Bag* are greater than the coefficient for *Wrap* and are significant at the 1 percent level. In addition, the magnitude of the coefficients sorts out in a logical way: the best packaging (trays) has a premium of 97 percent while the intermediate packaging (bags) has a premium of 51 percent relative to the baseline wrapped products. Thus, the higher prices are likely due to greater overall quality.

Local is the primary variable of interest. Many consumers buy local foods because such foods are considered fresher and more flavorful; the farm-to-market distance is much shorter and local produce is harvested closer to ripening. In addition to such quality aspects, however, people choose to buy local food for various other reasons, including supporting area farmers (see, for example, Hand and Martinez (2010)). If there can be multiple motivations for valuing the local attribute, it is important to uncover the relative significance of those motivations and determine the most crucial ones.

In our model, the packaging variables serve as proxies for product quality and control for quality effects. Consequently, any impacts on price associated with other motives related to local production are captured by the coefficient of the *Local* variable.[9] The results of the hedonic regression, however, contradict our expectation. The estimated coefficient of *Local* is close to zero and

[8] When interpreting the results, we convert the coefficients of the dummy variables using the formula $e^{\beta} - 1$ (β is the coefficient) to provide a more accurate measure.

[9] Ideally, one would add interaction terms of *Local* and the packaging variables to the present specification so that the estimated coefficients would further indicate if consumers consistently valued product quality regardless of the product origin. As noted, however, all local lettuce products are packaged in trays, and such a specification is not possible with the present data set.

Table 4. Estimated Generalized Least Square Results for Manoa and Leaf Lettuce in General and in Trays

Lnprice	Manoa and Leaf	Manoa and Leaf Trays
Manoa	–0.07 (0.05)	–0.06 (0.06)
Tray	0.72*** (0.10)	—
Bag	0.26*** (0.06)	—
Local	0.04 (0.07)	–0.01 (0.07)
Lnweight	–0.72*** (0.13)	—[a]
Constant	1.06*** (0.06)	2.48*** (0.06)
Adjusted *R*-square	0.9199	0.9157
F-statistic	649.15	972.88
Durbin-Watson *d*-statistic – OLS	0.30	0.13
Durbin-Watson *d*-statistic – GLS	1.92	1.68
Number of observations	283	180

[a] The coefficient of *Lnweight* is dropped because products packaged in trays of the same source, be they local or imported, have the same weights.

Note: ***, **, and * denote significance at 1 percent, 5 percent, and 10 percent respectively.

statistically insignificant, which suggests that there is no price effect from the local-production attribute. Thus, even though consumers have stated a willingness to pay more for local produce, there is no demonstrable evidence of such a price premium in actual transactions in the retail scanner data for lettuce in the Honolulu market.

Lnweight measures the influence of a product unit's weight. As expected, the coefficient from our model has a negative sign; a 1 percent increase in a product's weight decreases the price per pound by 0.83 percent. This is consistent with the common retail practice of offering weight discounts on purchases of fresh food in single units.

Since the only local products are Manoa and leaf types of lettuce, we perform a parallel hedonic regression using a Manoa and leaf subset of the data to validate robustness of the results. Table 4 reports those results as estimated GLS coefficients with leaf lettuce as the reference product. The results of this regression model are quite similar to those for all lettuce (Table 3). The estimated coefficients of packaging and unit product weight are highly significant and have similar magnitudes while the *Local* variable remains statistically insignificant. The estimated coefficient on Manoa lettuce loses significance relative to leaf lettuce so there appears to be no price difference between those two types of lettuce.

As one more robustness check of the results, we run a hedonic regression on an even smaller subset of the data by comparing only products packaged in trays. Those results are also reported in Table 4. Once again, *Local* is statistically insignificant, providing further evidence that consumers are not paying a price premium for local products.

Finally, we apply equation 4 to measure the Armington elasticity of substitution between local and imported lettuces using the data on Manoa and leaf lettuce. The resulting estimates using GLS regression are reported in Table 5. After correction for autocorrelation, the estimate of the elasticity of substitution is 2.05, suggesting a relatively high degree of substitutability between local and imported lettuce when there is a change in their relative prices. That value, however, is smaller than similar values found in studies in the literature on trade. Donnelly et al. (2004), for example, reported estimates of elasticity that ranged from 2.2 to 3.9 for fruits, nuts, and vegetables using data aggregated at three digits or more. The difference may be related to the nature of the data sets. We use weekly data so the transactions were recorded over a much shorter period than data collected quarterly or annually. Over an extended period of time (a longer run), estimated elasticities are often higher because the effect of trade responses is accounted for or is fully played out (see McDaniel and Balistreri 2002).

For comparison purposes, we compute elasticities of substitution for product packaging for *Manoa & Leaf* and *All Lettuce* separately using the Armington specification. We categorize the packaging as either *Tray/Nontray* or *Wrap/Nonwrap*. The results, presented in Table 5, show that consumers' choices of packaging type are quite elastic; the estimated values range from 1.29 to 1.74. The estimates for *Tray/Nontray* are lower than those for *Wrap/Nonwrap*, which implies that consumers see a more distinct difference between tray and nontray products since their relative consumption rates are less sensitive to price changes.

Note that all of the estimated elasticities for packaging are lower than the elasticity for product origin. Thus, it appears that consumption patterns associated with packaging are less elastic than consumption patterns associated with local origin. Since packaging serves as an indicator of a product's overall quality, this result reinforces the notion that quality matters more to consumers than local production.

Conclusions

This study explores the existence of a price premium for local products using evidence from purchase transactions for fresh packaged lettuce in the Honolulu metropolitan market. A hedonic modeling approach and Nielsen scanner data are used in this consumer revealed-preference investigation. In contrast to

Table 5. Generalized Least Square Results for the Armington Elasticity of Substitution

	Manoa and Leaf Lettuce			All Lettuce	
	Local	Tray/ Nontray	Wrap/ Nonwrap	Tray/ Nontray	Wrap/ Nonwrap
Elasticity	2.05***	1.59***	1.64***	1.29***	1.74***
	(0.24)	(0.21)	(0.20)	(0.19)	(0.21)
Durbin-Watson *d*-statistic	2.40	1.93	1.95	1.89	2.17
Adjusted *R*-square	0.7510	0.5997	0.6368	0.7956	0.6501
No. of observations	52	52	52	52	52

Note: ***, **, and * denote significance at 1 percent, 5 percent, and 10 percent respectively.

findings from a number of prior studies on consumers' willingness to pay for local food,[10] we find no demonstrable price premium for fresh packaged local lettuce in the Honolulu retail market. Instead, the hedonic models show that price variations are primarily attributable to differences in the overall quality of the products and other product characteristics. The Armington analysis produces similar and consistent results. Thus, we find that consumer purchases are less elastic with respect to quality than to locality in the face of relative price changes.

Demand and supply conditions both may influence the existence of a price premium. The "Buy Local" campaign is an example of generic advertising, a marketing tool used to influence consumer choices by changing their awareness of and beliefs and attitudes about products (Kinnucan and Venkateswaran 1990). Public perceptions of the impacts of food in general on human health and the environment have changed tremendously during the past two decades. For locally produced food, however, public awareness of government programs is relatively limited (Onken and Bernard 2010), and consumer attitudes (in the form of stated preferences) found in prior studies have exhibited considerable variation across regions and demographic groups. The results of our study suggest that the effect of the local food movement on consumer choices may still be quite limited, understandably since it is a recent development.

In terms of supply, sales volumes for most local lettuce producers are relatively small, and they face significant marketing challenges (Martinez et al. 2010). Consequently, price discounting could be a realistic tool and viable competitive strategy for expanding sales and capturing market share. Given their high elasticity of substitution for local and imported lettuce, consumers may choose to buy more imported lettuce when there is a price premium for local products.

We find that product quality is the primary price determinant for fresh packaged lettuce. Consequently, producers should focus on delivering high-quality products perceived as adding value by discerning consumers. Likewise, given how rapidly the market is evolving, retailers and policymakers need to accommodate changing consumer preferences and other factors to most effectively and efficiently employ their marketing resources.

Though we find no local price premium for fresh packaged lettuce in the Honolulu market, any definitive statement on the general existence of a premium for local products and the efficacy of the "Buy Local" movement would be premature. Product prices are determined by many supply and demand elements, including production costs, transportation costs, consumer preferences, and specific attributes of each product. Therefore, research on other types of local products for which some or all of these characteristics may vary is needed to comprehensively assess and thoughtfully explain the effect of local products and their promotion.

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[10] For example, Carpio and Isengildina-Massa (2009) found that consumers in South Carolina were willing to pay an average price premium of 27 percent for local produce and 23 percent for local animal products.

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