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# **Comparing the Effect of Country of Origin versus State-Specific Label on Fresh Tomato Marketing**

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**Abstract:**

This study investigates the acceptable price range for Florida fresh tomatoes and U.S fresh tomatoes using the van Westendorp pricing approach. A significant price difference was detected between the two types of fresh tomatoes, with Florida's higher. Consumers' knowledge of where was fresh tomatoes produced, and their perceptions of tomatoes from different locations will significantly influence the optimal price.

**Key Word:** Fresh tomatoes, van Westendorp pricing method, COOL

## **Introduction**

Tomatoes is one of the world's most popular fruit vegetables, and they are good sources of many important nutrition elements, like vitamins A and C, fiber, and lycopene. According to the data provided by USDA in 2004, a tomato in average-size could provide 40% of the U.S recommended Daily Allowance of vitamin C and 20% of Vitamin A. The lycopene of tomatoes is a carotenoid pigment, which makes the tomatoes red, and people could only absorb the lycopene through consumption. Researches in the field of epidemiology indicated that the consumption of lycopene was negatively related to the development of certain types of cancer. (Agarwal and Rao, 2000).

Unites States is one of the leading producer of tomatoes in the world, preceding only by China. In the year of 2012, the United States produced 27.6 million hundred weight (cwt) fresh tomatoes, valued at \$0.86 billion (USDA/NASS, 2013). Florida is the leading fresh tomato producer (Lucier, 2003; Cao, 2011), account nearly half of total crop value. What is more, Florida produce almost all the tomatoes to the U.S domestic market from November to May (USDA 2004).

As Florida is the largest supplier of fresh tomatoes to the U.S domestic market, it was expected that consumers might be more willing to buy fresh tomatoes produced in Florida other than U.S tomatoes, and the willing to pay for Florida tomatoes would be higher. However, a previous research conducted by Cao, and House in 2012, did not get this result, yet they found that the Florida sticker and "Grown in Florida" sign does not significantly increase the premium that consumers would to pay for Florida tomatoes compared the U.S tomatoes.

In this research, a follow-up online survey was conducted to determine awareness of production location for tomatoes, and consumers' knowledge and perception for the tomatoes produced in the state, with the hypothesis that if consumers are aware that tomatoes are produced in a State, they may be more willing to pay for them. We also analyzed the effectiveness of the country of origin labeling

versus the state-specific labels on consumers' optimal price for tomatoes from different locations.

## **Previous Studies**

In the United States, according to the Farm Security and Rural Investment Act 2002, it is required that retailers, such as grocery stores, supermarkets and club warehouse stores, to notify consumers of the country of origin for beef, lamb, pork, fish, poultry, goat, perishable agricultural commodities, macadamia nuts, pecans, peanuts, and ginseng. In 2005, the country of origin labelling requirement was implemented for seafood.

In the past few decades, there has been numerous researches investigating the effects of country-of-origin labelling (COOL) on consumers behaviors towards agricultural products, and most of these researches has come to the agreement that the implementation of COOL will influence consumers' attitudes and preference towards the food originating from their own country, and increase consumers' likelihood to purchase the products from their own country. For example, in 2001, Schupp and Gillespie employed the mail survey in Louisiana to analyze the effects of country of origin labeling for beef, and they found that the imposition of the COOL on fresh beef would likely to increase the demand for domestic beef relative to imported beef. Alfnes and Rickertsen (2003) used surveys and experimental auctions to examine Norwegian consumers' preference for beef from different countries, and the results indicated that Norwegian consumers preferred beef produced domestically.

When analyzing the effect of COOL information on food market, a highly researched dependent measurement is consumers' willingness to pay (WTP). Most of the previous researches demonstrated that consumers would offer a higher price for domestic foods than imported food. For example, Mabiso et al. (2005) investigated that American consumers would pay a premium for fresh apples and tomatoes labeled "Grown in the U.S". Loureiro and Umberger (2002) demonstrated that consumers in Colorado State would like to pay a premium for "U.S Certified" labels in beef.

Similar results were drawn by Lim et al, in 2011, they evaluated the extent that U.S consumers are receptive to imported steak from various countries, and they found that U.S consumers were willing to pay significantly less for imported steaks. Xie et al. (2013) found that U.S consumers' willingness to pay for domestic organic broccoli is higher than imported organic broccoli.

At the same time, a large body of research has studied the reasons why country of origins labelling would impact on consumers' behaviors. Many researches indicated that the country of origin labeling is an important tool to signal or suggest a specific degree of safety or quality. Verlegh and Steenkamp (1999) found that COOL has a larger effect on perceived quality than on attitude towards the purchase intention. Lusk et al (2006) also found that COOL could be a cognitive cue for consumers. In addition, COOL also has emotional impact on consumers. COOL would influence consumer's behavior through consumers' animosities, patriotism, ethnocentrism, and trust in the certification processes and agencies in the country of origin. Lusk et al. (2007) indicated that consumer's ethnocentrism and patriotism is a main reason why consumers would likely prefer the country of origin labelling on the product. Verlegh and Steenkamp (1999) summarized that there were three main effects of COOL: cognitive effect, affective effect and normative effect. The cognitive effect is that consumers would use the COOL as a signal for the product overall quality. The affective effect is that the COOL would have an emotional value to consumers such as enhancing social status. The normative effect is referred to the consumers' social and personal norms relating to COOL. For example, consumers might be more willing to buy domestic products because it is a way to support one's own country, while consumers might be refrained from purchasing products from foreign countries which they hold animosity towards (Klein et al. 1998).

Compared to the research of country of origins, there has also been lots of researches investigating the effects of region of origins. Some studies have found that the local-origin labels also influence consumer's behaviors. Loureiro & Hine (2002) found that consumers in Colorado were willing to pay a premium for potatoes labeled

“Colorado-grown” than other potatoes with labels indicating organic or no genetic modification.

Comparatively, according to my knowledge, there has been little work compared the effect of country of origin labelling (“U.S grown”) with region of origin labeling (“state grown”) with few exceptions. Howard & Allen(2006) reported the results of focus-group research and a survey in the Central Coast region of California to explore the consumers’ most interested labeling, and it turned out that the local origins are more important than country of origins for consumers. Suri and Thakor (2013) compared the effects of two types of manufacturing origins: “made in country” and “made in county” for expensive durable products, and the results indicated that when consumers were motivated to process information and when quality rating was high, the local identity effects were elicited. Thus questions remain that for agricultural products, how consumers make price-value tradeoffs for products with state of origin labels and country of origins labels, whether the evaluations of state-specific labels will be significantly different from that for country of origin labels. If there exists a significant difference, what will be the reasons driven such difference.

It is also noted that most previous researches explored the consumers’ evaluation for the label information and consumers’ willingness to pay used the method of open-ended contingent valuation method (CVM), an approach which asked an open-ended question regarding consumers’ willingness to pay for a specific product. Although this approach has advantages such as the data is easy to collect, yet, it suffers serious drawbacks. Particularly, it was observed that respondents often overstate their price sensitivity (Chhabra, 2015). In this research, van Westendorp’s price sensitivity model will be used to find out the optimal price and also the acceptable price range for the fresh tomatoes with country of origins and with state of origins.

## **Survey Design and Data Collection**

An online survey was conducted between September 22 and 23 in 2015. Our target sample included primary shopper, 18+ living in the northeastern and southeastern states of the United States. A total of 3,138 respondent initiated the survey and 1160 respondents completed the survey and met the screening questions. Since the purpose of this study is to analysis what, if any, is the reasons driven the difference between the optimal prices for fresh tomatoes with country of origin labels and fresh tomatoes with state of origin labels, thus the survey consist of four parts.

In the first part, respondents were asked to answer a series of questions concerning their consumption behavior towards vegetable consumptions, then tomatoes specifically. In the second part, consumers were asked about their knowledge and perceptions about Florida fresh tomatoes. In the third part, respondents were asked to answer a series questions of van Westendorp pricing sensitivity on fresh tomatoes to find out consumers' willingness to pay. In the last part, demographic information was collected.

The research differs from the previous studies is that we use the van Westendorp pricing sensitivity model to estimate the consumers' willingness to pay for Florida fresh tomatoes, and U.S fresh tomatoes. Van Westendrop method is one of the popular methods in marketing research, trying to figure out the optimal prices for different products. Like the method of direct open-ended questions for willingness-to-pay ("How much would you pay for the product"), it is also a direct technique, which assumes that consumers have prior understanding of what a product is worth and thus consumers could be explicitly about the price question directly. However, it combined the open-ended questions with quality and price. The VW approach assumed that consumers make their decision on how much to pay by balancing value against price, and there exist an upper and lower bound for the price that the consumer's willing to pay for the product.

Different from the open-ended question asking a single question to provide a point estimate of the price for certain product, van Westendrop questions consists of a



series of four questions trying to elicit the price from different perspectives: 1. too expensive: At what price would you consider the one unit of the product to be too expensive and you would not consider buying them; 2. too cheap: At what price would you consider one unit product to be too inexpensive that you would doubt the quality and would not consider buying them; 3. expensive: At what price would you consider the product to be starting to get expensive, so you would have to give some thought to buying them; 4. Cheap/bargain: At what price would you consider the product a bargain-a great buy for your money. Upon completion of the questions, the cumulative percentage of respondents for each of the four questions against the price was drawn. The intersection of expensive price curve and the reversed too-cheap price curve is called the “marginal cheapness”, the intersection point of the reversed cheap curve with the too-expensive curve is called the “marginal expensiveness”. These two points are respectively be the lower and upper bound of the acceptable price. The interval between the upper and lower bound are called the acceptable price range. The intersection point of too-expensive curve and the reserved too-cheap curve is called the optimal price.

Paired t-test was employed to analyze the whether there exist a significant difference between the acceptable price range for Florida fresh tomatoes and U.S fresh tomatoes. Ordered Logistic models will further be used to explore the possible reasons that stimulate the consumers’ willingness to pay for these two types of fresh tomatoes.

## **Data Analysis and Survey Results**

The summary of the demographic characters were displayed in Table 1. As the respondents were screened to be the primary shopper at home, the sample is not expected to be the U.S representative. The age range of the participants was 18 years of age to 89. 79.7% of the respondents are female.

96.21% of the participants indicated that they often purchased fresh tomatoes from grocery stores, 57.07% purchased tomatoes from farmers’ market. 28.97%

reported that they bought the fresh tomatoes from roadside stands. As for the tomatoes types, the type that consumers mostly often choose to buy is the regular tomatoes, 26.47% participants just chosen to purchase the regular type with no specific type; Then, Roma (21.72%), On the vine (20.69%), and beefsteak (10.6%) are the following popular types. When making decisions to purchase fresh tomatoes, the most important five factors are the freshness, firmness, color, price and type.

More than half (50.78%) of the participants known that fresh tomatoes are produced in the State of Florida. 77.67% agreed that Florida fresh tomatoes are in premium quality, 69.67% agreed that Florida fresh tomatoes are safer than other tomatoes, 73.36% agreed that Florida fresh tomatoes have better taste, 81.03% agreed that Florida fresh tomatoes assured a consistent quality. These numbers illustrate that more than half of the participants in this survey have good images of Florida fresh tomatoes.

Following the van Westendorp's method, the participants' answers to the four PSM questions were aggregated and yielded four cumulative distributions. Because, for the four questions with price from low to high, the answers 'validity were checked before analyzing the data, only the answers of the four price in the right order ( from the too cheap to too expensive) were kept. The two questions regarding respondents' perception of "not expensive" and "too cheap" were reversed. For each of the four questions, the cumulative frequencies are plotted against the current price on the same graph. The plot graph for the van Westendorp pricing for U.S tomatoes was displayed in figure 1, and the plot graph for the van Westendorp pricing for Florida tomatoes was displayed in figure 2.

In figure 1, the lower bound (The intersection of expensive price curve and the reversed too-cheap price curve) of the price for Florida fresh tomatoes is approximate \$1 and the upper bound (the intersection point of the reversed cheap curve with the too-expensive curve) is approximate \$1.8. From this graph, we could also get that the approximate optimal price (the intersection point of too-expensive curve and the reserved too-cheap curve) for Florida fresh tomatoes is \$1.5.

From figure 2, the approximate lower bound price for U.S fresh tomatoes is \$0.9, the upper bound price is \$1.7, and the optimal price is around \$1.4. It turns to be a slightly less than the price range of Florida fresh tomatoes. To compare it more clearly, the curves for both U.S fresh tomatoes and Florida tomatoes are displayed together in Figure 3.

In figure3, it illustrated the comparisons of all the four price curves for U.S and Florida fresh tomatoes. Although the difference is slight, yet, it illustrates that the Florida tomatoes' expensive curve and too-expensive curves are to the left of those of U.S tomatoes, and the Florida tomatoes' reversed cheap and too-cheap curves are to the right of those of U.S tomatoes. Thus, from this graph, we could find that the acceptable price range for Florida fresh tomatoes are little bit higher than that of the U.S fresh tomatoes.

In order to test whether the price differences were significant or not, a paired t test was employed, and the results are given in table 1 and table 2.

From table 1 and table 2, the price difference between the fresh tomatoes with Florida origins labelling and U.S. fresh tomatoes are significant from all of the three perspectives. The optimal price of Florida fresh tomatoes is significantly higher that of U.S fresh tomatoes; the upper and lower bound price of Florida fresh tomatoes are also significantly higher than those of U.S fresh tomatoes. Thus it indicated that the price range of Florida fresh tomatoes are significantly higher than that of U.S fresh tomatoes.

### **Model Specification**

In this study, an ordered logistic model was employed to find out the possible factors that cause the difference of consumers' willingness-to-pay for Florida fresh tomatoes and U.S fresh tomatoes. To be more specifically, as we want to compare the effectiveness of state-specific label versus country of origins labels, the dependent variable will be the optimal price difference of Florida fresh tomatoes versus U.S fresh tomatoes. The independent variables include consumers' knowledge and

perception of Florida fresh tomatoes, consumers' shopping habits towards tomatoes, consumers shopping habits, and demographic information. The empirical model was specified as follows:

$$\text{Difference} = F(X_i, S_i, P_i, D_i, e_1) \quad (1)$$

Where the variable difference is an ordered variable with three categories. If the Florida fresh tomatoes price is higher than the U.S, the difference equals to 2; if the Florida fresh tomatoes price is equal to the U.S, the difference equals to 1; if the Florida fresh tomatoes price is lower than the U.S, the difference equals to 0; D is a vector of demographic variables (gender, age, education level, income, and race/ethnicity); X is a vector of variables indicating consumers' shopping preference toward tomatoes, and the preference include consumers preference towards tomatoes 'attributes including size, fresh, smell, brand, type, gmo, firmness, region, and organic. To reduce the dimension of preference, a factor analysis was employed, and finally only two summarized underlying attributes were attained: observed attributes , which include size, color, type, fresh, brand, firm; and unobserved attributes, which include gmo, region, and organic. P is a vector, indicating consumers' knowledge and perceptions towards Florida fresh tomatoes. S is a vector indicating consumers shopping habit: where to buy the fresh tomatoes, and what type of tomatoes to buy.

## Results and Conclusion

The model results were illustrated in Table 4. Caucasians and Asians are statistically significant that they would like to pay more for Florida fresh tomatoes compared to U.S tomatoes. The more consumers known about Florida tomatoes, the better perceptions that they had on Florida tomatoes, the higher probability that they would pay more for Florida fresh tomatoes. The tomatoes type also statistically significant, it indicated that for the type of on the vine, consumers would like to pay more for tomatoes with "Florida grown" labelling than those with country of origins labeling. All the other factors are not statistically significant in this model.

Consumer's knowledge of Florida's tomatoes, and their perception toward Florida tomatoes quality are significantly positive related to the price difference.

From this research, by using the van Westendorp Price Sensitivity Analysis, the acceptable price range for Florida fresh tomatoes and U.S fresh tomatoes were estimated, and by using this dataset, it turns out that the price range of Florida tomatoes are statistically higher than that of U.S fresh tomatoes. Concerning the factors influencing this price difference, Caucasians and Asians seems to be more likely to pay the premium for Florida fresh tomatoes. Consumers' awareness of production location for tomatoes, and consumers' knowledge and perception for the tomatoes produced in the state do play an important role. The more consumers knows about Florida tomatoes, the higher perception, and the more likely they would like to pay the premium to the Florida tomatoes.

It is implied that the use of "locally made" is a signal of the agricultural food quality, taste and freshness, and it would allow the consumers to express themselves with less fear of a quality penalty. The strategy of promoting the fresh tomatoes with "Florida grown" labelling, consumers' knowledge and perception about the Florida fresh tomatoes is the key point.

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Figure 1. Van Westendorp Price Sensitivity Analysis for Florida tomatoes

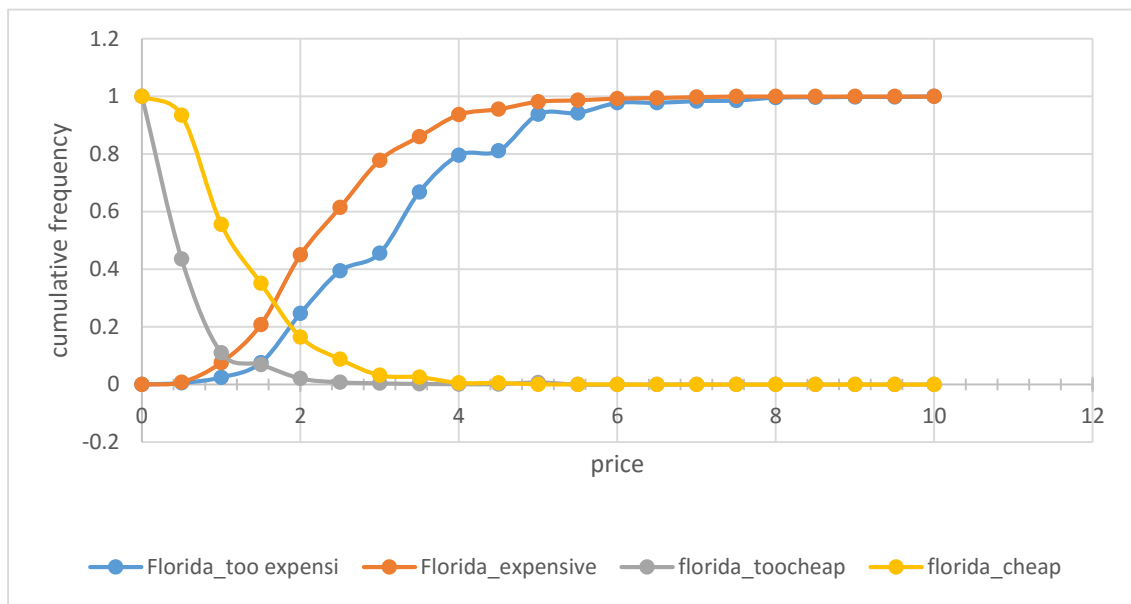


Figure 2. Van Westendorp Price Sensitivity Analysis for U.S. tomatoes

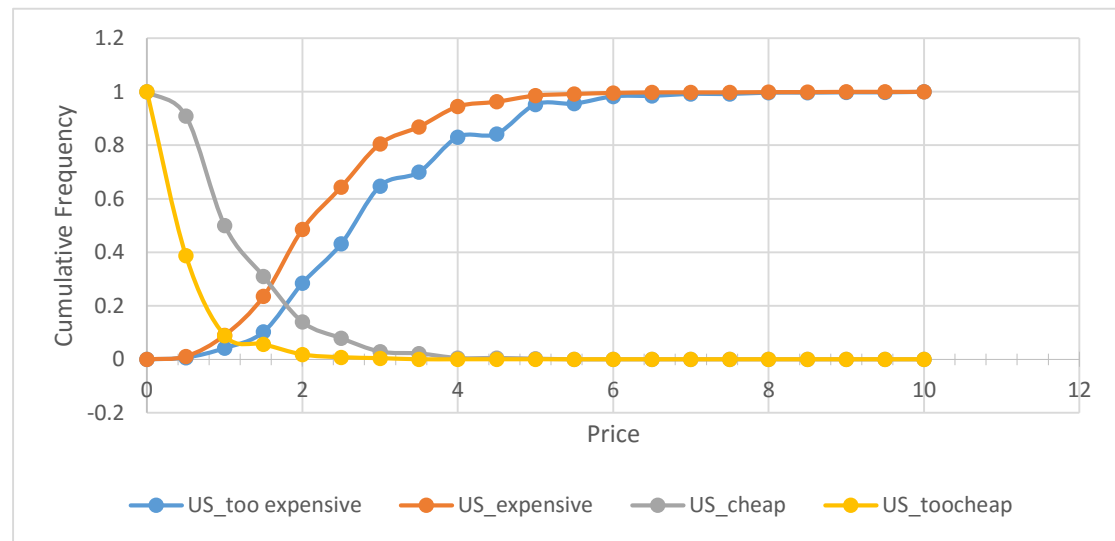


Figure 3. Comparing the Van Westendorp Price Sensitivity Analysis of Florida tomatoes and U.S. tomatoes

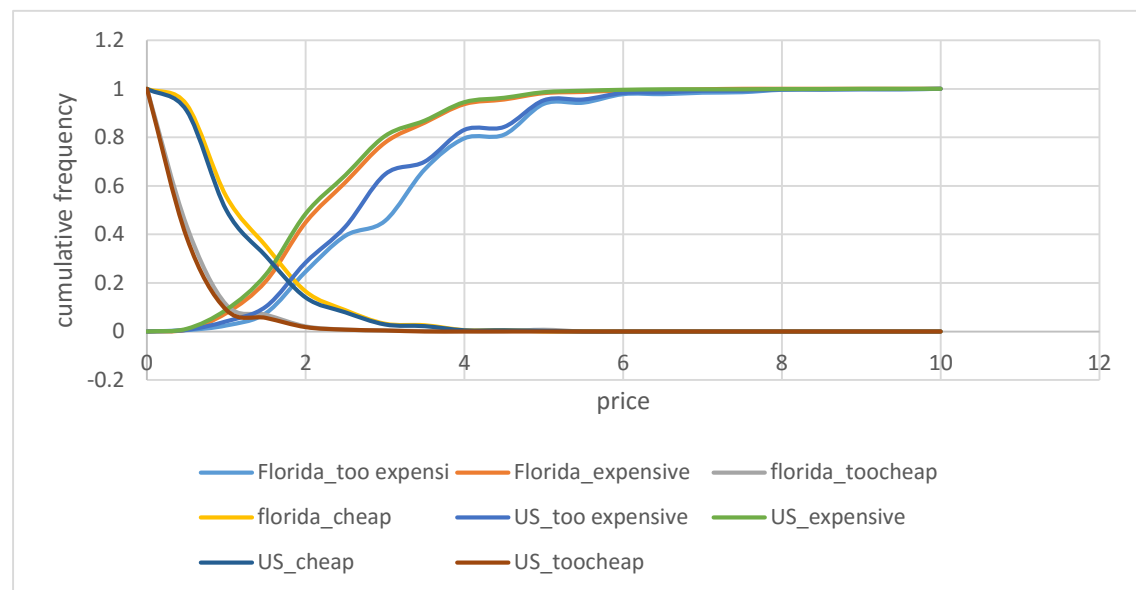


Table 1. Demographics of survey respondents.

Category	Percent	Category	Percent
Percent Female	79.7	Employment Status	
Age		Full-time	37.1
18-24	4.8	Part-time	12.2
25-34	23.2	Student	2.7
35-49	24.6	Retired	24.3
50-64	34.7	Not employed	23.7
65+	12.7		
		Income level	
Number of Children in house		less than \$25,000	15.2
none	56.7	\$25,000-\$34,999	13.1
1	34.6	\$35,000-\$49,999	16.3
2	8.1	\$50,000-\$74,999	24.4
3 or more	0.6	\$75,000-\$99,999	16.0
		\$100,000 or more	15.0
Education level		Ethnicity	
High school graduate or less	65.77	White/Caucasian	75.95
College and post graduate	34.23	African American	6.09
		Asian	4.73
		Hispanic	4.41
		Other	11.14

Table 2. Van Westendorp Price for Florida and U.S tomatoes

	N	Means	Std Dev	Std Err
Difference of Florida and U.S Price Lower bound	1184	0.05	0.24	0.26
Difference of Florida and U.S Optimal price	1184	0.08	0.31	0.01
Difference of Florida and U.S Price Lower bound	1184	0.09	0.35	0.38

Table 3. Difference of van Westendrop price of Florida and U.S tomatoes:

Matched Paired T-test

	t	df	Sig.	Mean Difference
Difference in Lower Bound Price	6.34	1183	<0.001	0.05
Difference Optimal price	9.09	1183	<0.001	0.08
Difference in Upper Bound Price	9.04	1183	<0.001	0.09

Table 4 Regression results of Logistic Model for consumers' willingness to pay

Variable	Estimate	Standard Error
<b>Intercept1</b>	<b>-2.29</b>	<b>0.60</b>
<b>Intercept2</b>	<b>1.22**</b>	<b>0.59</b>
male	0.07	0.15
education	0.10	0.13
<b>Caucasian</b>	<b>0.76**</b>	<b>0.30</b>
black	0.29	0.36
hispanic	0.27	0.33
<b>asian</b>	<b>0.80**</b>	<b>0.37</b>
roma	0.34*	0.18
grape	0.10	0.28
cherry	-0.10	0.24
beefsteak	0.30	0.23
heirloom	0.37	0.30
<b>vine</b>	<b>0.56***</b>	<b>0.18</b>
Observed_attributes	0.06	0.07
Unobserved_attributes	-0.04	0.08
income	-0.04	0.03
age	-0.01	0.004
grocery	0.43	0.33
farmers	0.01	0.13
convenience	0.33	0.35
roadside	0.23	0.14
upick	0.25	0.35
<b>knowledge</b>	<b>0.23*</b>	<b>0.13</b>
premiumq	0.04	0.04
safer	0.01	0.03
taste	0.04	0.04
<b>Quality</b>	<b>0.10**</b>	<b>0.04</b>

Number of Observations Used: n=1160

“\*”: Significant at 10%;

“\*\*”: Significant at 5%;

“\*\*\*”: Significant at 1%