Benefit Evaluation of the Country of Origin Labeling in Taiwan: Results from Auction Experiment

Wen S. Chern (National Chung Cheng University, Taiwan)
Chun-Yu Chang (National Chung Cheng University, Taiwan)

Corresponding Author:
Wen S. Chern
Distinguished Research Professor
Department of Economics
National Chung Cheng University
168 University Road
Ming-Hsiung, Chia-Yi 621 Taiwan
E-Mail: chern.1@ccu.edu.tw, Fax: 886-5-272-0816

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Abstract

This research is aimed at investigating the consumer's preference for food produced in Taiwan and the economic benefits for the country of origin labeling. The study uses both experimental auction and contingent valuation method (CVM) to investigate factors that affect the consumer's willingness to pay (WTP) for products under country-of-origin labeling (COOL).

Experimental auctions of Taiwan and China preserved olives as well as Taiwan, China and Vietnam oolong teas were conducted using the Vickrey's second price sealed bid auction. For CVM, the study used the double-bounded dichotomous choice method in which we started assuming the same base price for all products in the first question and then varied the prices in the second CV question. The products not chosen in the first question were offered with a discount in a range from 10% to 50% in the following question.

Based on auction data, the Tobit model shows that the estimated premiums are 58.1%, 78.15% and 98.13% for Taiwan products over their alternatives of China olives, China oolong tea, and Vietnam oolong tea, respectively. Based on the CVM, the estimated premiums for Taiwan over China olives from a Logit model is 67%, and the premiums for Taiwan produced oolong tea should lie between 50% to an unknown upper bound over China and Vietnam alternatives as the Multinomial Logit model cannot be successfully estimated due to too few choice switches with discounted prices. The study thus demonstrates the superiority of the experimental auction over the CVM in eliciting the WTP for foods produced in Taiwan. The study concludes that enacting a COOL law would increase economic benefits to consumers in Taiwan, and at the same time, placing the imported products in the level playing field.

Introduction

The increasing standards of living and concerns about food safety have raised the consumer's demand for information about the safety, origin, and processes used to produce the food they consume. Since Taiwan joined the World Trade Organization (WTO) in 2002, its agricultural sector has faced great competition from foreign imports of food products, especially from China, the United States, and those from South East Asia like Thailand and Vietnam. The flooded foreign imports, especially those from developing countries are often with lower quality and higher probability of contamination than those produced domestically in Taiwan. Since food produced domestically in Taiwan is probably safer than those from South East Asia, Taiwanese consumers would be willing to pay a premium to avoid contamination of foreign food. Unfortunately, without a country-of-origin label, Taiwanese consumers currently can not tell where the food is from. Therefore, to protect Taiwanese consumers away from imported contaminated food, Taiwan government should enact a COOL law.

Many countries already have enacted mandatory country-of-origin labeling (MCOOL) law. In the 2002 Farm Bill, the U.S. congress first introduced country-of-origin labeling on beef, lamb, pork, fish, perishable agricultural commodities, and peanuts. The bill states, "…for a commodity to be labeled a USA product, it must be born, raised, and processed in the United States" (U.S. Senate, Farm Bill Conference Framework, 2002). It later became mandatory in 2004, which has become known as MCOOL. In August 2007, the U.S. congress enacted a legislation requiring MCOOL for meat products.

Taiwan has recently passed an act to mandate COOL on all packaged food in 2006 and the law became effective in January, 2008. But Taiwan's law covers only packaged processed foods. The COOL of unpackaged and fresh products is not mandatory. Therefore, whether the government should also include the COOL of unpackaged food and make it compulsively would also be an important issue.

The objectives of this paper are to develop a methodology for soliciting the consumer's willingness to pay (WTP) for food products produced in Taiwan as compared with those produced in foreign countries, to analyze factors affecting the consumer's behavior on purchasing products under COOL, and to quantitatively estimate the premiums that Taiwanese consumers are willing to pay for food produced in Taiwan. On methodology, we will attempt to compare the auction experiment and the contingent valuation method (CVM) and to assess the existence of hypothetical bias in CVM. The estimates of the WTP premiums for Taiwan products can be used to assess the economic benefits for expanding Taiwan's

COOL law and to evaluate the impacts of COOL on the agricultural trade between Taiwan and its trading partners especially China.

Literature Review

The 2002 U.S. COOL law has been studied by many economists. Schupp and Gillespie (2001) first conducted a research on the attitude of food handlers and restaurants on the country-of-origin labeling law for fresh and frozen meats in the U.S. They found that the COOL would be supported as long as the producer believes that consumers would benefit from the labeling. Umberger et al. (2003) used both survey and the auction (forth-price, sealed-bid) to estimate the willingness to pay premiums for country-of-origin labeled steaks. The price premium estimated from the auction method for the steak labeled with "USA guaranteed, born and raised in the U.S." was 19%, which was larger than those from contingent valuation (CV) survey (11%). This result may be because consumers would like to see the product they are bidding on. They also showed that food-safety concerns, preferences for labeling source and origin information, strong desire to support U.S. products and beliefs on U.S. beef were reasons why consumers preferred COOL.

Loureiro and Umberger (2003) conducted a CV survey of shoppers in grocery stores. They found that the willingness to pay premiums for steak and hamburger labeled as "U.S. Certified Steak" and "U.S. Certified Hamburger" was 38% and 58%, respectively. Although most authors suggested that legislation of COOL would generate price premium on the domestic products, having a price premium does not mean there will be enhanced social welfare. Schmitz et al. (2005) showed that there exists a break - even cost that maintains the welfare at its original level during the COOL shock (COOL may cause supply shift and demand shift). So, when the labeling cost is less than the break-even cost, having the country-of-origin labeling will increase the welfare. On the contrary, it will not. Lusk et al. (2004) found that the cost of COOL could transfer from industry to industry. Costs of COOL could be shifted from producers to processors and retailers, and in this case, producers would be better off while consumers will be worse off. According to their study, an increase in aggregate consumer demand of 2% to 3% is likely sufficient to offset the losing producer welfare due to increased COOL costs.

Methodology

This study employs auction experiment. It is important to design an experimental auction mechanism correctly. Hoffman et al. (1993) used auction experiment to estimate the willingness to pay premiums for the vacuum-skin (VS) packaged steaks over the traditional

overwrapped styrofoam tray (OST) steaks. Through the auction, they found that the auction order of the products did not affect the estimation results. They also suggested that to design learning trials and instructions that explain incentive compatible auctions carefully was very important. Specifically, learning trials could teach respondents how to bid and the explanation of the auctions could minimize the impact of strategic behavior. To improve the accuracy on the auction results, Vickrey (1961) suggested that the second-price auction, in which the highest bidder would be awarded the object by just paying the second-highest bid price, is relatively easy to implement and it is a weakly dominant strategy for the participants to reveal their true valuations.

Second-price auction helps to reveal the true WTP for the respondents. Therefore, it is adopted in this study. Corrigan et al. (2006) suggested that the bids of the purchase auction (coffee mug) would be influenced by posted prices for unrelated goods in trial auction (candy bar). To avoid the posted effect, they also suggested that we should calculate the WTP of the bid premiums instead of WTP of the bids. Therefore, we also estimate the WTP of the bid premiums of the products in this study. Since the willingness to accept (WTA) measures of value are often larger than WTP, whether to use WTP or WTA is also important to experimental auction. However, recent research suggests that the difference between WTP and WTA can be consistent with economic theory (Hanemann, 1991; Hoffman and Spitzer, 1993). Thus, an observed difference between WTP and WTA is not a per se behavioral violation of the incentive compatibility of the auction mechanism. Shogren et al. (1994) even showed that for market goods with close substitutes, there was a convergence of WTP and WTA measures of value. In this study, various oolong teas as well as preserved olives are market goods with close substitutes, so we consider estimating only Taiwanese consumer's WTP not WTA for the preserved olives and tea.

This study will also use the CVM and conduct a CV survey on the same subjects during the auction experiment. Single-bounded dichotomous choice format, which provides the respondents with some threshold value and asks them if they are willing to pay that amount, was first considered to be a better method than open-ended format, because it was easier for respondents to answer the questions. But through this method, the researcher can only know the respondent's WTP is greater or smaller than the threshold (Haab and McConnell, 2002). To solve this problem, Hanemann, et al.(1991) showed that double-bounded dichotomous choice format would improve the welfare measure. Although it has been pointed out that double-bounded dichotomous choice format may cause

inconsistency problem[1], it still retains efficiency (Cameron and Quiggin, 1994; Herriges and Shogren, 1996). Hanemann and Kanninen (1999) suggested that the gain in efficiency could override the problem of inconsistency. Alberini (1995) also showed that the format was robust for estimating the mean or median of the welfare measure. We therefore decided to use the double-bounded dichotomous choice in our CV survey.

Design of Auction and Survey

Choices of Products

Preserved olives and oolong tea are often imported in bulk and unpackaged. Since the retailers often try to fool consumers as though they were produced in Taiwan, those products are usually sold without a country-of-origin label. Although there are a lot of other unpackaged foods could be used for the auction experiment, such as preserved mangos and dried mushrooms. But preserved mangos from Thailand look different from Taiwan mangos, which are moister and softer than Thailand mangos. It took us much time to find that preserved olives and oolong tea products from different countries with very similar look. Another reason is that there were newspaper reports about imported contaminated preserved fruits and oolong tea. Most of the imported contaminated food, such as China olives and Vietnam tea, has too much preservative and insecticide residuals, which may be harmful for human health. The preserved olives have been marinated with Chinese herb and the color of preserved olives is black. It is very hard for us to distinguish their country-of-origin by their appearances. Oolong teas are also very hard for us to tell their differences by their look.

Experimental Design

After the focus group session held in Chiayi (National Chung Cheng University), we conducted three formal experimental auctions in Taipei (Academia Sinica), on March 13, 2008, Taichung (National Chung Hsing University), on March 14 and in Kaohsiung (National Kaohsiung Normal University), on March 18. Two sessions were held in each location; the experiments were conducted at 5:30 pm and 7:30 pm each day. Each experimental session recruited 12- 13 general public samples: The female ratio is set at 60%-76%. Although the ratio of females and males in Taiwan is almost 49% or 50% (Taiwan Ministry of the Interior, 2008), the particular sex ratio in the experiment was chosen because that females often play the role of buying food for the household. Therefore, we recruited more female respondents in our study. We screened potential participants recruited by the Survey Center of Academia

[1] Which means that the respondent's willingness-to-pay function may not be identical between the initial and follow-up CV questions.

Sinica to get a desired mix of sample by income and sex for each session. These respondents signed up through the internet or telephone to the Academia Sinica and were chosen if they never participated in any kind of experimental session. The total sample includes 74 participants. Participants were paid $1,000 for one and a half hours of their time and each of them was assigned an ID number. Each experiment started with three trial auctions of candy bar. The trial auctions were followed by six real auctions: three for preserved olives; three for oolong teas. The preserved olive auctions used olives from Taiwan and China. The oolong tea auctions involved teas from three different countries: Taiwan, China and Vietnam. Both of the olives and teas from different countries were packaged into a 150g bag. Candy bar auction was aimed at getting participants acquainted with the mechanism of the Vickrey second-price sealed-bid auction.

In each auction, participants bid for two or three products, but only one product is actually sold. After the auctions, a straw was randomly drawn to determine which trial was binding, and then another random drawing was made to determine which product needed to be purchased in the chosen trial. The use of random draws was made to control for the wealth effect: since only one product was sold, each participant did not need to split the budget over the trials or over the products (Shogren et al., 1994). The selling price was the second highest bid price and the panelist would have won the auction if their bid exceeded the selling price. Therefore the winner would only have to pay the second highest bid to buy the product.

Contingent Valuation Questions Design

The contingent valuation questions are questions for simulated market. The study used the double-bounded dichotomous choice method to guide the participants to make hypothetical purchase decisions under given price scenarios. We asked the respondents to make a purchase choice among the selected products (preserved olives and oolong tea) labeled with various countries of origin given various prices. The study designed a double bounded CV survey in which we started assuming the same base prices in the first question and then varied the prices in the second CV question. The prices for the products not chosen in the first question were lower (as discounted by 10%, 20%, 30%, 40% or 50%) in the following question. For preserved olives, there were four options of choice: Taiwan, China, “both of them are indifferent” or “buy neither of them”. If one chose Taiwan preserved olive as more preferable than the China preserved olives in the first purchase choice question, we would lower the price of the China preserved olive in the follow-up question with the same discount range. If one chose China preserved olives in the first question, we would lower the price of Taiwan preserved olives in the second question. For oolong tea, there were five

possible choices: Taiwan, China, Vietnam, "all of them are indifferent" or "buy none of them". Similar to the case of preserved olives, if one chose Taiwan tea, we would lower prices of China and Vietnam oolong teas at the same level of discount in the follow-up question. If one chose China tea, then Taiwan tea would be discounted in the second question. The same procedure would happen if one chose the Vietnam tea in the beginning. The price scenarios were randomly distributed among the participants. If the one selected "indifference" in the first question, the following question will ask whether they are still indifferent or whether they would choose the cheaper alternative. This part of the questionnaire also included other food purchasing behaviors, personal background and socio-demographic characteristics.

There were also two versions of the experiment in this study, three sessions with a total of 38 respondents were given auction first and then the CV survey, the other three sessions with 36 respondents were given the CV survey first and then followed by auction experiment.

Econometric Models

Test of Affiliation

It is important to examine whether the announced winning bid would affect the bidding behavior in the subsequent trials during auction experiment. It is possible that respondents found out that their bids were different from the posted price and therefore changed their bids in the next trial. Participants may also increase their bids if they observed the second highest bid was higher or lower than their last bid. If there was no affiliation then there would be no correlation between the bid adjustment and the difference between the winning bid and the participant's last bid. Following Kaneko and Chern, the model to investigate the possible affiliation can be expressed as:

$$\Delta B_{i,t}=\alpha+\beta_1 P_{i,t-1}+\beta_2 t+\varepsilon_{i,t} \qquad (1)$$

where i and t index individual and trial, respectively; $\Delta B_{i,t}$ is participant i's bid in trial t minus his or her bid in trial t-1; $P_{i,t-1}$ is the posted price in trial t-1 minus participant i's bid in trial t-1. Hence, if $\beta_1>0$, the participant would increase his or her bid if his or her last bid was lower than the posted bid, and vice versa. Trial number t is added as an explanatory variable to see if there is a trend that the individual bid prices would have more experience on bidding in repeated trials.

Table 1 shows the results of the affiliation test. The coefficients for the variable P are all significant and positive. These results show that participants would tend to increase their bids for all products when their last bid was lower than the posted bid. Based on this finding we should include the trial dummy variables in the auction bid regressions. For China olives as well as tea from all three countries, the coefficients of the variable t are significantly positive, indicating that participants tend to increase their bids over repeated trials.

Experimental Auction

We construct regression models for analyzing participants' biding behavior in experimental auction. Consider first the bids for preserved olives, we run regressions for preserved olives labeled Taiwan (B_0^o) and China (B_1^o). For oolong tea bids, we run regressions for Taiwan tea (B_1^T), China tea (B_2^T) and Vietnam tea (B_3^T) to investigate how various factors affecting the respondent's bids for these auctioned products. Table 5 shows the unconditional mean bids for each product by country. There were over 10% of respondents submitted zero bid for every product. Because the hypothesis of the linearity can not be held when there are too many zeros in the data set. This is a typical censoring problem in econometrics. Therefore, we use Tobit model for analyzing the bidding behavior for B_i^o (i=0, 1), B_j^T (j=1, 2, 3.). Since bided premiums of $(B_0^o\text{-}B_1^o)$, $(B_1^T\text{-}B_2^T)$ and $(B_1^T\text{-}B_3^T)$ for Taiwan products can be positive or negative, we can simply use ordinary least squares (OLS) method to run those premium regressions.

Tobit model can be expressed as:

$$y_i^* = \beta' x_i + u_i, u_i \sim N(0, \sigma^2)$$

$$y_i = \begin{cases} y_i^* \ \ if \ \ y_i^* > 0 \\ 0 \ \ \ if \ \ y_i^* \le 0 \end{cases} \qquad (2)$$

where y_i^* is a latent variable, y_i is the observed censored variable and x_i is a vector of independent variables. .

In this study, when the respondent's willingness to pay (y_i) is positive, the probability density function (pdf) is shown as:

$$prob(y_i^* > 0) = f(y_i \mid y_i > 0) = \Phi_i\left(\frac{\beta' x_i}{\sigma}\right) \qquad (3)$$

where $\Phi_i\left(\frac{\beta' x_i}{\sigma}\right)$ is a cumulative standard normal distribution function.

The expected willingness to pay for consumer *i* can be computed as:

$$
\begin{aligned}
E(\mathrm{y}_{\mathrm{i}}^{*}) &= \mathrm{E}(y_i \mid y_i > 0) \times f(y_i \mid y_i > 0) + \mathrm{E}(y_i \mid y_i = 0) \times \mathrm{F}(y_i = 0) \\
&= \left[x'\beta + \sigma\lambda(\beta' x / \sigma) \right] \times \Phi\left(\frac{\beta' x_i}{\sigma}\right) + 0 \qquad (4) \\
&= \beta' x_i \Phi\left(\frac{\beta' x_i}{\sigma}\right) + \sigma\phi\left(\frac{\beta' x_i}{\sigma}\right)
\end{aligned}
$$

where $\lambda(\beta' x / \sigma) = \phi(\beta' x / \sigma) / \Phi(\beta' x / \sigma)$ is called the inverse Mills ratio; it is a ratio between the standard normal pdf and standard normal cdf.

Following Wooldridge (2006), if $\mathrm{x_j}$ is a continuous variable, its marginal effect can be expressed as:

$$\frac{\partial \mathrm{E}(\mathrm{y_i})}{\partial \mathrm{x_j}} = \Phi\left(\frac{\beta' x_i}{\sigma}\right)\beta_{\mathrm{j}}. \qquad (5)$$

where $\mathrm{x_j}$ is the *j*th independent variable. If $\mathrm{x_j}$ is a binary variable, the effect of interest is obtained as the difference between $E(y_i | y_i > 0, x_j = 1)$ and $E(y_i | y_i > 0, x_j = 0)$. Marginal effects involving other discrete variables can be handled similarly.

Contingent Valuation Method

The basic framework for analysis is based on the random utility model (Haab and McConnell, 2002). Let U_{ij} denote consumer *i*'s utility from choosing alternative *j*. Then consumer *i* chooses alternative *j* if $U_{ij} > U_{ik}$ for all *k*≠*j*. It is standard to assume that $U_{ij} = V_{ij} + \varepsilon_{ij}$. V_{ij} is the deterministic component of the utility of respondent *i* from choosing *j*. ε_{ij} is the error term.

For preserved olives, the appropriate model is the binary logit model because the choice is between preserved olives labeled Taiwan and those labeled China alternatives. For oolong tea, the choice is between Taiwan (*j*=1) and China oolong tea (*j*=2) and between Taiwan (*j*=1) and Vietnam oolong tea (*j*=3), which is better handled by a multinomial logit model. We assume that the random components $\varepsilon_{\mathrm{ij}}$ are independently and identically distributed as a Gumbel distribution. Then the model for the choices of oolong tea is given by

$$pr(Y_i = j) = \frac{e^{V_{ij}}}{\sum_{k=1}^{3} e^{V_{ik}}} \qquad j=1, 2, 3 \qquad (6)$$

where the respondent *i*'s observed choice (Y_i) takes the value of 1 (Taiwan),2 (China), or 3 (Vietnam).

We further assume that the deterministic component is linear in parameters:

$$V_{ij} = \beta_{0j} + \beta_1 P_{ij} + \beta_{2j}' x_i \qquad (7)$$

where P_{ij} is the price of the *j*th alternative and x_i is a vector of consumer *i*'s demographic characteristics and other subjective and risk relative components.

Note that not all of the β_{0j}'s and β_{2j}'s are identifiable, so we adopt a normalization rule such that $\beta_{01} = 0$ and $\beta_{21} = 0$ (see Greene, p.860). Following the procedure used previously by Kaneko and Chern (2005) (*j*=1 for Taiwan, *j*=0 for China) we have the following utility functions for preserved olives:

$$\begin{aligned} U_{i0} &= \beta_1 P_{i0} + \varepsilon_{i0} \\ U_{i1} &= \beta_{01} + \beta_1 P_{i1} + \beta_{21}' x + \varepsilon_{i1} \end{aligned}, \qquad (8)$$

For the oolong teas, we have the following utility functions:

$$\begin{aligned} U_{i1} &= \beta_1 P_{i1} + \varepsilon_i \\ U_{i2} &= \beta_{02} + \beta_1 P_{i2} + \beta_{22}' x_i + \varepsilon_{i2} \\ U_{i3} &= \beta_{03} + \beta_1 P_{i3} + \beta_{23}' x_i + \varepsilon_{i3} \end{aligned} \qquad (9)$$

The model for the paired choice could be formulated by using the latent variable defined as

$$\begin{aligned} Y_i^* &= U_{i1} - U_{i0} = (\beta_{01} - 0) + \beta_1 (P_{i1} - P_{i0}) \\ &+ (\beta_{21} - \beta_{20}) x_1 + \ldots + (\varepsilon_{i1} - \varepsilon_{i0}) \\ &= \beta_0 + \beta_1 \Delta P_i + \beta_2' x_i + \varepsilon_i \end{aligned} \qquad (10)$$

Then, the respondent *i* chooses Taiwan preserved olives (Y_i=1) if Y_i^*>0 and China alternative (Y_i=0) if $Y_i^* \leq 0$. The latent variable approach would not work for the multinomial logit model, and hence the choice probably is not directly linked with the sign of the coefficient in equation (10).

Once the parameters are estimated, we can compute the sample mean of WTP. Consider the case of oolong teas. Let WTP_{i2} denote consumer *i*'s willingness to pay a premium on the Taiwan oolong tea. Then the following equation has to hold: $\beta_1 (P_{i2} + WTP_{i2}) + \varepsilon_{i1} = U_{i1} = U_{i2} = \beta_{02} + \beta_1 P_{i2} + \beta_{22}' x_i + \varepsilon_{i2}$. The left–hand side is the utility from

consuming Taiwan oolong tea at the price of Taiwan oolong tea plus the premium. The right-hand side is simply the utility from consuming the China oolong tea at its own price. The willingness to pay premium for Taiwan tea can be computed by:

$$WTP_{i2} = \frac{\beta_{02} + \beta_{22} \mathrm{x}_i + \varepsilon_{i2} - \varepsilon_{i1}}{\beta_1} \quad (11).$$

Taking the expected value of the WTP_{i2}, we obtain the expected willingness to pay premium for Taiwan tea in order to avoid China tea as:

$$E(WTP_{i2} \mid x_i) = \frac{\beta_{02} + \beta_{22}' \mathrm{x}_i}{\beta_1} \quad (12)$$

Similarly, we can also obtain the willingness to pay for Taiwan tea over Vietnam tea as:

$$E(WTP_{i3} \mid x_i) = \frac{\beta_{03} + \beta_{23}' \mathrm{x}_i}{\beta_1} \quad (13)$$

Results

Descriptive Statistics

Dependent variables and independent variables used in the econometric models for the experimental auction and the CVM may be different. Table 2 shows the definitions of dependent variables and symbols that are different from auction and CVM. For the experimental auction, we denote Ot and Oc as the respondent's bids for Taiwan and China preserved olives, respectively and Tt, Tc and Tv as the bids for Taiwan, China and Vietnam oolong teas, respectively. For the CVM, the dependent variables include binomial Y and multinomial Y for preserved olives and oolong teas, respectively. The symbol Y is based on the follow-up question in the CV format. Besides the dependent variables, Table 2 also shows definitions and coding of independent variables that are different between auction and CVM. Independent variables from the auction include behavior variables and trial variables. The behavior intention variables represent the respondent's choice based on the first question in the CV format when all products were offered at the same price. The trial variables are included in the auction in order to investigate whether the posted prices affected the respondent's bid in the subsequent trials. For the CVM, we use △PRICE to denote the price differences between Taiwan product and non-Taiwan product in the CV format.

Although there are some independent variables which are specifically defined for either auction or CVM, most of the independent variables are the same in both regression models.

Table 3 shows the common independent variables that are shared between auction and CVM. The average age of the sample is 44 years old and almost 70% of respondents are females. About 73% of participants are married. An interesting statistic is that over 74% of the respondents are overweight. With respect to income distribution, 51% of participants had their average household income in 2007 more than $680,000 and the average monthly personal income is $41,000. Mean statistics also show that the average household expenditure for FAH is $12,965 and the average expenditure of FAFH is $5,344. With respect to education, the respondents with a high school diploma accounted for 48.5%, the highest percentage among all education groups.

Survey data also shows that 67% of respondents checked food labels. Furthermore, respondents considered safety (98.7%), freshness (100%), nutrition (85.9%), and country-of-origin (87.2%) to be very or somewhat important for their food choices. Note that the means of FRESH and SAFETY are virtually ones. If we add these variables in the model, there will be a collinear problem. Therefore, these variables are excluded from both Tobit and CVM regressions. Environmental consciousness, price, calorie, convenience, color and brand are less important for the respondents. Note that only 25.6% of respondents considered the government's regulatory performance on food safety being excellent or good. The survey also shows that there are 24.3% of respondents who do not know about the country-of-origin labeling law in Taiwan. More than 78% of respondents regarded imported contaminated food as the most important food safety issue.

Although there were 74 participants in the sample, but there were only 70 participants who filled out the CV questionnaire carefully and completely. All respondents had handed in their bidding cards during the experimental auction. Therefore, we still have 74 bids for all selected product and the mean bids of the total sample are shown previously in Table 2. Table 4 shows the unconditional mean bids for each product by country, which is computed from the raw auction bids. Since there are four respondents without completing their forms or having irrational answers to our questions, we exclude them in the econometric analysis and therefore the descriptive statistics of bids from the auction in Table 4 only include 70 bids. The mean bids for Taiwan preserved olives ($46.71) and Taiwan oolong tea ($200.27) are higher than those from other countries. Therefore, most of the respondents consider Taiwan preserved olives and tea are more preferable than China preserved olives as well as China and Vietnam oolong teas. It is interesting to note that 66% of respondents who submitted zero for Taiwan olives and tea indicated that they have never eaten preserved olives or drank oolong

tea. But most of the respondents who bid zero for China and Vietnam products questioned the safety of these products.

Let us examine the patterns of responses to the initial CVM question where the products were sold at equal price. When the respondents facing 10% and 30% price discounts on the China olives, they still considered buying Taiwan preserved olives. When facing a 20% discount on the China preserved olives, only one respondent switched the original preference to China. When facing a 40% discount on China preserved olives, there were only 14.3% of respondents turned to China olives. When facing a 50% discount on the China preserved olives, the percentage of respondent's preference switching increased to 15.4%. There were 8 respondents who chose the neither option. For the preserved olives, most of them (50%) indicated that they never buy preserved olives and for the oolong teas, almost 50% of participants who chose the neither option mentioned that they never drink tea.

Survey results also show that almost every respondent chose Taiwan oolong tea when all teas were sold at the same price, except one respondent chose China Oolong tea initially. All respondents facing a 20% price discount on non-Taiwan oolong tea still chose Taiwan oolong tea. When facing a 30% discount on the non-Taiwan Oolong tea, only one (6.6%) of respondents switched to China oolong tea. Moreover, 76.9% of respondents did not switch even when other teas were offered with a 40% price discount. Only one person, who chose China tea in the first question, switched preference to Taiwan tea in the follow-up question. Only one respondent (7.7%) chose Vietnam Oolong tea at a 50% price discount from initially chosen Taiwan tea. Therefore, almost all respondents chose Taiwan products at the same price, and over 85% of them did not change their preference under the selected price discounts. It shows that respondents would stick to Taiwan products even under 10%-50% price discount, their preferences on Taiwan products are very strong.

Regression Results of Experimental Auction

Table 5 shows parameter estimates of bid regressions for preserved olives and oolong tea using data from all trials. Since there are 70 respondents and each of them can bid three times, these regressions are based on 210 observations. For preserved olives, the Tobit results for the Taiwan bid equation in the first column show that the estimated coefficients for INFO2, AGE, EDU3, FAH, GOV, BRAND and RISK are significant, those variables are also significant for the OLS results for the bid premium of Taiwan olives over China olives in the third column. Positive signs of the INFO2 imply that people whose information is mostly from food package labels will bid more on Taiwan olives. Negative signs of the coefficient of AGE show that younger respondents tend to bid more on Taiwan olives. Older people often

care more about their blood sugar and show less interest on preserved olives than younger people. Respondents with college education (EDU3) tend to have higher bids on Taiwan olives, which also cause a higher bid premium for Taiwan olives over China olives. Positive signs for the estimated coefficients of FAH in the Taiwan olive equation and the olive premium equation show that respondents who spend more of food expenditure on food at home tend to bid higher on Taiwan preserved olives, which is consistent with the assumption that people who spend more on food at home would probably care more about where their foods come from than those who spend less on food at home. Positive signs for GOV show that respondents who think the government's regulatory performance is excellent will trust Taiwan's food safety legislation and will probably believe that Taiwan produced food should be relatively safe under the government's protection. Therefore, these respondents tend to place higher premium on Taiwan produced olives.

The second column in Table 8 shows the Tobit results for the China olive bids. The sign of the coefficient for BUYPF is negative, which shows that respondents who purchase preserved food more often should have more experience in judging the quality of preserved olives and thus they may bid less on China olives than on Taiwan olives. Therefore, the positive sign for BUYPF in the bid premium can obviously be expected.

Positive signs of BMI in Taiwan olive bid equation and China olive bid equation show that respondents with slim or normal figures tend to bid more on preserved olives. The reason may be that overweight people usually eat more than slim or normal people, and if under the same budget, overweight people will have to distribute their money for other real meals, and therefore tend to bid less on olives than respondents with normal or slim figures. Although the signs for CHECK are negative in both individual bid equations (for Taiwan and China), the coefficient in the China olive bid equation is still smaller than that in Taiwan olive bid equation. This result shows that respondents who consider checking the labeling of food as important factor on food purchasing would decrease their bids on all olives, but lowering their bids on China alternative more than Taiwan olives. Since signs for SECTION are significant in both the olive equations and the tea equations, we will discuss them later.

To sum up, since the coefficients of INFO2, GOV, FAH, EDU3, BUYPF and RISK in the olive bid premium equation are all positive, suggesting that respondents whose information are mostly from food package labels, who spend more on food expenditure at home, respondents with higher education level, and who purchase preserved olives frequently and think imported contaminated foods as the most important food safety issue in Taiwan tend to have higher price premium on Taiwan olives.

Table 5 also presents the parameter estimates of bid regressions for oolong tea. Variables CALORIE, ZONE2, ZONE3, FAH and SECTION are either significant or marginally significant determinants for Taiwan, China and Vietnam oolong tea bids. In all three tea bid equations, positive signs for CALORIE show that respondents who consider calorie to be an important factor when making food purchasing decisions tend to have higher bids. Since respondents who were more concerned about how much Calorie they eat often pay more attention on keeping their figures slim and fit, they tend to have higher willingness to pay on tea. Positive signs of the coefficients for ZONE2 and ZONE3 also show that respondents from Taipei and Kaohsiung tend to have higher bid on tea than respondents from Taichung. Since the signs for FAH are negative, respondents who spend most food expenditure on food at home tend to decrease their bids on all three teas. Perhaps food away from home is always too greasy than food we cook by ourselves. Therefore, respondents who spend more on food at home expenditure do not want to increase their bids on tea.

For the preserved olives as well as oolong teas, positive signs for SECTION suggest respondents who did the auction first and the CVM later tend to have higher bids on olives and tea. In other words, respondents may lower their bids after seeing the offered prices we had given on the CV questions.

The coefficients of INFO2, EDU3, AGE and CALORIE in the Taiwan tea bid equation are significant and positive. Therefore, respondents whose food information is mostly from food package labels, and who are older and better educated may bid more on Taiwan tea. The positive sign of AGE shows that older respondents like to drink more tea, and thus tend to bid higher than younger people and the negative sign of BUYTEA in the Taiwan tea bid equation shows that the respondents who purchase tea more frequently would tend to decrease their bids for tea products. This is perhaps because most of heavy tea drinking respondents have their own tea suppliers, they would not be interested in the teas we offered in the auction.

The last two columns in Table 8 present the estimation results for Taiwan tea premiums. Variables GOV, AGE, EDU3, VEGE, MAR, BUYPF, NUM, RISK and BRAND are either significant or marginally significant. Positive signs of AGE and EDU3 show respondents with higher education level and older age have a higher price premium for Taiwan tea. Since older people love to drink tea, they have ample experience on choosing them. Most of the older respondents said that their preferences on Taiwan tea were not only for the concerns of food safety but also for the good quality of Taiwan tea, they suggested that Taiwan tea tastes better than China and Vietnam teas (Even though we stressed that they tasted the same during the auctions). Therefore, they think Taiwan tea is better than those from other countries and

are willing to pay more for it. Negative signs of GOV mean that respondents who think that the government is doing a god job on legislation tend to decrease their premiums. This is perhaps because respondents who think the government's regulatory performance is excellent may trust that government will strictly restrain the import of contaminated food, and therefore no matter what country-of-origin labeling of the food, they are safe enough to eat or drink. We note that the coefficients of GOV have the opposite signs between the tea premiums and olive premium equations. This seemingly strange result is mainly caused by those who think the government's regulatory performance being excellent bid significantly higher for Taiwan olives while this GOV variable is not significant in all other bid equations. Unfortunately, there is still no good explanation on the opposite results between olive and tea premiums. Coefficients of VEGE in all tea premium regressions are positive, suggesting that if respondents were vegetarian, their willingness to pay for Taiwan tea are more than those from China and Vietnam. Positive signs of the coefficients of MAR and BUYPF show that respondents who are married and who purchase preserved olives frequently tend to increase their bid premium on Taiwan tea. Since variables BRAND and RISK are significant in both the Taiwan olive premium and tea premium equations, we will discuss them together at the end of the paragraph. Table 5 shows that BRAND has a negative impact and RISK has a positive impact on all Taiwan product premiums. This is perhaps because respondents who place more importance on brand believe that brand already gives them enough food protection. On the other hand, respondents who consider imported contaminated food as a very important issue in Taiwan currently will bid higher (lower) on Taiwan (non-Taiwan) tea and olives.

In the affiliation test, we show that the participants would tend to increase their bids for all the products when their last bids were lower than the winning bid. Therefore, variables TRIAL should be significant in the bid or premium equations. However, the coefficients of TRIAL1 and 3 are not significant except in the Taiwan olive bid equation. One possible reason is that when including other variables, the TRIAL variables become less important than other variables. Previous studies suggest that using only the data from the first trial to estimate parameters of bid regressions is better than using data from all trials, because the respondent's bid for the next trial is often affected by the posted price from the previous trial. Therefore, we also estimated the parameters for bid regressions for preserved olives and oolong teas using data from the first trial. We noted that regression results based on data from all trials have more significant variables than those based on the first trial only. Also there are not many significant variables in the bid equations for olives and teas using data only from

the first trial. Therefore, using bids from all trials is more efficient than using only data from the first trial.

Table 6 shows the marginal effect calculated from the parameter estimates of the bid regressions in Table 8. Since AGE, KID, NUM, FAH and FAFH are continuous variables, we use equation (5) to calculate the marginal effect. For other dummy variables, we use the difference between $E(y_i|y_i > 0, x_j = 1)$ and $E(y_i|y_i > 0, x_j = 0)$ to calculate the marginal effect. In this section, we discuss the marginal effects for significant variables only.

The results for INFO2 show that respondents whose information is from the food package labels would bid more than other respondents by \$7.4 (\$3.69) for Taiwan preserved olives (Taiwan oolong tea). The marginal effect on RISK shows that respondents who think imported contaminated food is the most serious food problem in Taiwan are willing to pay \$14.94 more on Taiwan tea and \$8.59 less on China olives than those who do not. For BUYPF, respondents who purchase preserved olives frequently would pay \$11.27 (\$37.11 and \$40.44) less on China olives (China tea and Vietnam tea) than who do not. Since most respondents who purchase tea frequently may have a specific tea dealer, they may care less on COOL of tea and pay \$18.1 less on tea we auctioned than those who purchase tea not as frequently. The marginal effect of CHECK shows that respondents who often check the food labels would pay \$47.66 (\$35.39) less on non-Taiwan tea than those who does not check food labels frequently. Though for both olives, respondents who often check the food labels would bid lower than who do not, but their bids on Taiwan olives were less than the China alternative. The marginal effect on Taiwan olives for GOV is \$4.7, which means that respondents who believe in Taiwan government are willing to pay \$4.7 more on Taiwan olives than those who do not think that Taiwan government is doing a good job on food safety. The variables SEX and AGE show that males tend to pay \$2.94 and \$3.03 more on China olives and tea, respectively, than females and respondents who are one year younger will increase (decrease) their bids by \$0.51 (\$3.52 and \$1.3) for Taiwan olives (Taiwan tea and Vietnam tea). These results show that females are more concerned on COOL than males and respondents with different age shows different reaction on Taiwan olives and tea. The variable EDU3 shows that respondents who have college degree will pay \$8.1 (\$64.1) more on Taiwan olives (tea) than those whose education level is lower than college. The variable SECTION shows that respondents who did the auction first and CV question would increase his or her bid on Taiwan and China preserved olives (Taiwan, China and Vietnam teas) by \$12.64 and \$11.56 (\$57.3, \$46.13 and \$41.05, respectively) more than respondents who did the CV survey first and auction later. The positive marginal effects of the ZONE2 (ZONE3)

on Taiwan, China and Vietnam teas are $21.39, $37.4 and $32.14 ($23.76, $8.13 and $3.42), which means that respondents from Taipei and Kaohsiung tend to have higher bids on tea than respondents from Taichung.

Regression Results of CVM

Table 7 shows parameter estimates for the contingent valuation model for preserved olives. These logit regressions are based on the responses from the follow-up questions. We exclude those who selected "indifference" and "neither of both products" in the first question, because the follow-up questions for the "indifference" and "neither" options were not asked to make further choices with specific price scenarios. For preserved olives, the logit results show that the estimated coefficients for variables CHECK, COOL, MAR, AGE, FAFH and △PRICE are significant. The negative sign of the △PRICE indicates that the higher the price is, the lower the utility of both Taiwan and non-Taiwan alternatives is. Furthermore, it implies that respondents are more likely to choose the non-Taiwan alternative if it is less expensive than the Taiwan product. The positive signs of CHECK and COOL mean that respondents who consider checking the labeling of food and country-of-origin of food as important tend to have higher utility on Taiwan olives relative to non-Taiwan alternatives. This is reasonable, since people put emphasis on what they consider important, the positive signs show that respondents who read food labels and country-of-origin of food prefer Taiwan olives more than China olives. They appear to believe that Taiwan olives are better than China olives. The negative signs of MAR, AGE and FAFH imply that respondents who are not married, younger and spend less on food away from home have higher aversion on Taiwan olives. The signs of the coefficients for AGE and FAFH are the same as the signs for AGE and FAFH appear in the auction results in Taiwan olive bid equation.

In order the estimate the WTP for teas under COOL, we would have had estimated a multinomial Logit model since there are three different teas – from Taiwan, China and Vietnam. Unfortunately the model has never converged even after we narrowed down to a few variables similar to those used for preserved olives. The main and perhaps the only problem for not getting convergence is that there are few choice switches when we discounted the prices for those teas which were not chosen in the first CV questions offering all teas with the same price. As noted earlier in the descriptive analysis (Table 7), only one respondent chose China tea and the rest chose Taiwan tea in the first question. In the second question, 59 respondents still chose Taiwan tea and only six respondents switched to non-Taiwan tea. Even with a 50% discounts for China and Vietnam teas, only one respondent

switched from Taiwan to Vietnam tea. Overall we have 118 paired choices and about 95% of observations did not change their preferences. With such a few respondents choosing non-Taiwan teas with discounts in the data set, the model just simply did not work. Note also the maximum discount that we offered in the CV questions is 50%. We can thus conclude that the willingness to pay premiums for Taiwan tea over both China and Vietnam teas are at least 50% of the base price used in the first CV question. However, we would not be able to determine the upper bound for the WTP premium. This finding suggests that in order to obtain usable results, we should have offered more discounts, perhaps up to 70% or even 90% to investigate whether the consumer has such a strong preference that they will never purchase China tea or Vietnam tea no matter how cheap they are. Of course, that should not be the case because we have observed that many of the participants in the auction experiments gave non-zero bids for China and Vietnam teas. The fact that the WTP for all three teas can be successfully estimated with experimental auction, but could not be estimated with the CVM would demonstrate the superiority of the experimental auction for this particular study.

Estimated Premiums

Table 8 presents all estimated premiums for Taiwan products. From auction experiments, for Taiwan olives and teas, estimated Taiwan product premiums based on the OLS parameter estimates are higher than the Tobit model and the unconditional auction. But it is not appropriate to compare in absolute value of Taiwan premium derived from the OLS regression, Tobit regression and the raw auction since there is no base price for auction bids. Therefore, we added a row of Taiwan premiums in percentage terms. The percentage premium of the Tobit model is calculated by the individual expected WTP. That is, the difference of the Taiwan product expected WTP and the non-Taiwan alternative is divided by the expected WTP of non-Taiwan alternative derived from the Tobit model. Specifically the estimated mean WTPs of Taiwan and China preserved olives are $46.81 and $29.61, respectively. The estimated mean WTPs for Taiwan, China and Vietnam teas from the Tobit model are $205.15, $115.15, and $103.54, respectively. Table 8 shows that the estimated percentage premium of the CVM is shown to be higher by factors of 1.15 and 1.14 than those from the Tobit model and raw auction data, respectively, for the preserved olives. Based on these results, there appears to be a considerable hypothetical bias.

For oolong tea, as indicated earlier, we could not successfully estimate the needed multinomial Logit model from the CVM survey data. We can only conclude that the

willingness to pay premiums for Taiwan tea over China and Vietnam teas would be more than 50%, but we could not get the mean estimate, nor the upper bound. Based on the data from the auction experiments, the Tobit model shows that the estimated WTP premiums for Taiwan tea over China and Vietnam alternatives are 78% and 98%, respectively which are higher than those unconditional means estimated directly from the raw data. The OLS estimates which are less credible are even higher. Overall these results show a strong preference of the Taiwanese consumer for both preserved olives and tea produced domestically over those of imported alternatives from China and Vietnam.

Conclusions

This study attempts to use the auction experiment and CVM to explore the Taiwanese consumer's preference for several selected foods produced in Taiwan vs. their imported alternatives. The study has important implications for the country-of-origin labeling legislation in Taiwan. The econometric results show that Taiwanese consumers have higher willingness to pay for Taiwan preserved olives and tea than the imported alternatives from China and Vietnam. It is clear that respondents are willing to pay more to avoid China and Vietnam alternatives.

The results also show that the estimated Taiwan tea premiums in percentage terms are more than the estimated Taiwan preserved olive premium. Since food safety is the most important factor for these preference differentials, the results suggest that Taiwanese consumers are more concerned about the safety of tea than preserved olives. Results from the experimental auction show that higher educated respondents and respondents who think food label reading as well as imported contaminated food problems in Taiwan are important tend to have positive price premiums for both Taiwan olives and tea. If the respondents considered brand as an important factor for food purchasing, they would rely on the brand and neglect the importance of COOL, and therefore they tend to reduce the price premiums for Taiwan produced olives and tea. For oolong teas, respondents from Taipei and Kaohsiung have higher bids on teas than those from Taichung.

The study also shows that the order of auction and survey as well as the order of the trial will affect the respondent's bidding behavior, but it would not affect the respondent's bid premium. Respondents who did the CVM questions fist and then auction later tend to lower his or her bids. The results from the affiliation test show that participants in the auction would tend to increase their bids for all the products when their last bid was lower than the posted second - highest bid. Therefore, it is very important to design the experimental auction

carefully. It would be an interesting task for the followers to design the order of the section well and to discuss how does the posted price affect the bids.

For the CVM questionnaire, almost every respondent chose Taiwan products when all products were offered at the same price. Even after a discount up to 50%, few switched to cheaper items in the follow-up question. The survey suggests that the Taiwanese respondents were not responsive to the price differences when they come to choices between Taiwan tea and those from China and Vietnam. Almost all Taiwanese respondents were not willing to accept Chinese or Vietnamese tea. Since the logit and the multinomial logit models require the data with sufficiently large proportions of respondents falling into each choice category, the parameters based on CVM are extremely difficult to estimate. To solve this problem, we should increase the price discount range to 70% or even 90% and also expand the sample size in future research. In order to elicit the WTP for the Taiwan tea as compared to its imported alternative in this study, the experimental auction is clearly superior to the CVM.

Since 59.5% of respondents think country-of-origin of food is a very important food attribute, the COOL legislation is important for Taiwan. The study also shows that if the government enacts a country of origin labeling law on preserved olives and tea, the consumer's willingness to pay for the Taiwan olives and tea relative to those from China and Vietnam, can than be revealed in the market place. Taiwanese consumers would definitely benefit from this labeling legislation. Since Taiwan product premiums in percentage terms are more than 50%, we would offer suggestions on COOL to the Taiwan government. First, since only 5% of respondents are very well informed about COOL in the study, the government should spread the information on the existing COOL law more progressively to the public. It can be done through building website for COOL and giving propaganda and lectures to the public. Second, according to the study, respondents who think food label and imported contaminated food problems in Taiwan are important tend to have positive price premium on Taiwan olives and tea. Therefore, adding the country-of-origin labels on non-packaged food would help the competitiveness of Taiwan products. Third, education is shown to be a very important factor affecting consumer purchasing behavior. Specifically, respondents with college degree would bid $8.1 more on Taiwan olives and $64.1 on Taiwan tea than respondents with lower education level. With increasing emphasis on education in Taiwan, the payoff for COOL legislation would increase in the future.

The United States and Japan and many other countries have more rigorous COOL law than Taiwan. They enacted MCOOL not only on packaged food but also on unpackaged food as well as fresh products. Therefore, Taiwan should take them as a role model to improve its

current COOL law.

In summary, imported contaminated food has become a threat to food safety for Taiwanese consumers since Taiwan joined the WTO in 2002. Many foods or related products we consume are found to be contaminated, such as bleaching chopsticks from China, pesticide residuals from Vietnam tea. We should urge the Taiwan government to enact the COOL legislation for non-packaged food products as soon as possible.

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Table 1. Affiliation Test Results

Variable	Preserved Olives		Oolong Tea		
	Taiwan	China	Taiwan	China	Vietnam
Constant	-8.47***	-8.45***	-45.47**	-51.08***	-38.18***
	(2.76)	(3.13)	(20.1)	(11.54)	(10.14)
t	1.75	3.55**	29.36**	24.16***	1.84
	(2.02)	(1.95)	(14.32)	(8.16)	(7.09)
P	0.17***	0.13***	0.16***	0.2***	0.2***
	(0.04)	(0.04)	(0.05)	(0.04)	(0.05)
N	140	140	140	140	140

Notes: The symbols ***, **, and * indicate that the variables are significant at the 1%, 5%, and10% levels, respectively. Numbers in parentheses are estimated standard errors. N is the number of observations.

Table 2. Variable Definitions and Sample Mean from Experimental Auction and CVM

Variable Name	Definition and coding	Mean	S.D
Dependent Variables	**…..Experimental Auction…..**		
Ot	The bids of respondents for the Taiwan preserved olives (NT$)	48.56	25.44
Oc	The bids of respondents for the China preserved olives (NT$)	31.46	23.07
Tt	The bids of respondents for the Taiwan oolong tea (NT$)	206.58	120.6
Tc	The bids of respondents for the China oolong tea (NT$)	118.54	86.78
Tv	The bids of respondents for the Vietnam oolong tea (NT$)	107.97	75.54
	…..Contingent Valuation Method…..		
Y(binomial)	1 if Taiwan preserved olives are chosen; 0 if China preserved olives are chosen.	0.833	0.375
Y(multinomial)	1 if Taiwan oolong tea is chosen; 2 if China oolong tea is chosen; 3 if Vietnam oolong tea is chosen.	1.077	0.553
Independent Variables	**…..Experimental Auction…..**		
Choice of First Question			
NTW	1 if non-Taiwan products are chosen; 0 otherwise.		
TW	1 if Taiwan product is chosen; 0 otherwise.		
IND	1 if non-Taiwan and Taiwan products are equally good initially; 0 otherwise.		
Trial			
Trial1	1if the bid is the first bid of the respondent; 0 otherwise.		
Trial2	1 if the bid is the second bid of the respondent; 0 otherwise.		
Trial3	1 if the bid is the third bid of the respondent; 0 otherwise.		
	…..Contingent Valuation Method…..		
△PRICE	Difference between price of Taiwan products and non-Taiwan products.		

Table 3. Common Independent Variables, Definition and Coding

Variable Name	Definition and Coding	Mean	S.D.
Information			
INFO1	1 if very well/somewhat informed about COOL; 0 otherwise.	0.769	0.424
INFO2	1 if information is from the food package; 0 otherwise.	0.187	0.392
RISK	1 if imported contaminated food is the most important issue; 0 otherwise.	0.782	0.416
Attitude and perception			
BUYPF	Frequency of preserved fruit purchasing. 1 if once a month, once in two weeks or if once a week; 0 if never or rarely	0.923	0.268
BUYTEA	Frequency of tea purchasing.	0.538	0.502
BUYOG	Frequency of organic food purchasing. 1 if sometimes. often, or always; 0 if never or rarely	0.462	0.502
CHECK	Check the labeling of the food.	0.667	0.474
BRAND	Brand. 1 if the characteristics of food are considered to be very / somewhat important for the respondents; o if not very important, not important or so - so	0.705	0.459
PRICE	Price.	0.449	0.501
FRESH	Freshness.	1	0
SAFETY	Food Safety.	0.987	0.113
COOL	Country-of-origin labeling.	0.872	0.336
NUTRI	Nutrition.	0.859	0.35
ENVIR	Environmental consciousness.	0.679	0.469
CONVEI	Convenience.	0.628	0.486
COLOR	Color.	0.423	0.497
CALORIE	Calorie.	0.641	0.483
GOV	1 if the government's regulatory performance is excellent or good; 0 otherwise.	0.256	0.439
Demographic			
SEX	1 if male; 0 otherwise.	0.303	0.446
MAR	1 if marriage; 0 if single.	0.744	0.439
AGE	Age of respondent as of 2007.	44.077	10.71
KID	Number of kids under age 15.	0.77	1.092
NUM	Number of persons per household.	3.718	1.553
VEGE	1 if the respondent is a vegetarian; 0 otherwise.	0.104	0.307
BMI	1 if BMI≦24 (Normal or slim figure); 0 if otherwise.	0.423	0.497
EDU1	1if Elementary school; 0 otherwise.	0.051	0.222
EDU2	1 if Completed high school; 0 otherwise.	0.551	0.3
EDU3	1 if >college; 0 otherwise.	0.398	0.493
MINC	Monthly Income of each respondent ÷1000.	41.026	71.32
INC	1 if Average income of the household in Year 2007≧680,000; 0 if otherwise.	0.513	0.503
FAH	Monthly food expenditure at home per household÷1000.	12.635	7.051
FAFH	Expenditure of food away from home per household÷1000.	5.262	4.664
ZONE1	1 if respondent is from Taichung; 0 otherwise.	0.324	0.47
ZONE2	1 if respondent is from Taipei; 0 otherwise.	0.34	0.48
ZONE3	1 if respondent is from Kaohsiung; 0 otherwise.	0.34	0.48
Survey versions			
SECTION	1 if respondents do the auction first and CVM later; 0 otherwise.	0.526	0.503

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Table 4. Unconditional Auction Results, Total Sample

Item	Preserved Olives		Oolong Tea		
	Taiwan	China	Taiwan	China	Vietnam
Mean Bid (NT$)	46.71	29.43	200.27	113.22	110.01
S.D	25.44	23.07	120.59	86.78	75.54
Max Bid (NT$)	200	160	720	500	400
Number of Respondents Biding Zero	9(12%)	39(52%)	9(12%)	30(40%)	24(32%)
Number of Irrational Respondents[a]	4	4	4	4	4
Sample Size	70	70	70	70	70

[a] Participants who did not fill out their form carefully and completely. Therefore, we can not use their data.

Table 5. Regression Results on Bids and Premiums for Preserved Olives and Oolong Teas, Experimental Auction

Variable	Preserved Olives			Oolong Tea				
	Taiwan (TW)	China (CH)	Premium (TW-CH)	Taiwan (TW)	China (CH)	Vietnam (V)	Premium (TW-CH)	Premium (TW-V)
Constant	69.88***	58.62***	23.86**	-105.21	18.77	44.84	-115.55**	-109.37*
	(15.27)	(15.64)	(10.3)	(73.17)	(58.81)	(47.74)	(51.24)	(57.45)
INFO2	8.7**	0.63	7.89***	45.5**	3.8	15.77	40.24***	16.13
	(4.02)	(4.04)	(2.72)	(18.85)	(14.65)	(12.49)	(13.52)	(15.16)
RISK	-7.84*	-16.11***	4.86*	49.25**	23.79	-3.24	39.78***	56.04***
	(4.56)	(4.64)	(2.92)	(22.56)	(16.9)	(13.78)	(14.54)	(16.3)
BUYPF	2.62	-11.34**	11.10***	23.93	-47.38**	-41.19***	60.42***	57.89***
	(5.18)	(5.12)	(3.8)	(25.13)	(19.18)	(15.82)	(18.87)	(21.16)
BUYTEA	-3.2	-3.10	0.3	-47.7***	-16.45	-17.45	-28.18**	-21.42
	(3.63)	(3.83)	(2.52)	(17.89)	(14.11)	(11.43)	(12.56)	(14.08)
BUYOG	1.31	5.94	-1.37	-35.82	-28.64	3.46	-3.05	-22.05
	(4.53)	(4.65)	(3.12)	(23.61)	(19.14)	(14.92)	(15.54)	(17.42)
CHECK	-14.24***	-21.13***	3.56	-11.46	-31.94*	-32.18**	18.46	11.22
	(4.57)	(4.7)	(2.98)	(21.84)	(17.32)	(13.8)	(14.82)	(16.61)
BRAND	-5.94**	-1.35	-6.06**	-10.18	3.38	11.74	-20.97*	-25.57**
	(3.49)	(3.47)	(2.48)	(17.83)	(13.45)	(11.07)	(12.34)	(13.83)
NUTRI	1.78	-4.802	3.36	-27.68	-10.75	-35.02**	-16.7	10.24
	(4.5)	(4.66)	(3.25)	(21.34)	(17.93)	(14.97)	(16.16)	(18.12)
ENVIR	11.19***	11.02***	2.47	-6.05	30.28*	-4.613	-31.01**	0.17
	(3.93)	(4.21)	(2.81)	(19.09)	(15.72)	(12.79)	(14.01)	(15.71)
COLOR	-11.96***	-3.25	-7.76***	-16.23	19.45	4.87	-21.87	-13.44
	(3.76)	(3.97)	(2.66)	(18.89)	(14.73)	(11.87)	(13.26)	(14.87)
CALORIE	2.88	-7.24**	6.01**	46.35***	24.05**	29.56***	24.71**	21.4
	(3.36)	(3.58)	(2.36)	(16.55)	(12.74)	(10.66)	(11.77)	(13.19)
GOV	9.42**	2.31	5.55*	-31.01	-1.89	3.7	-30.56*	-32.63*
	(4.55)	(5.05)	(3.12)	(23.76)	(18.92)	(15.77)	(15.52)	(17.4)
SECTION	12.02***	13.91***	0.031	86.95***	67.94***	49.66***	22.67**	33.99***
	(3.03)	(3.09)	(2.11)	(15.24)	(11.63)	(9.51)	(10.5)	(11.78)
TRIAL1	-5.51*	-3.27	-2.16	-19.9	-17.22	-9.16	-6.07	-13.06
	(3.12)	(3.2)	(2.21)	(16.06)	(12.32)	(10.21)	(10.98)	(12.31)
TRIAL3	2.83	2.38	0.91	8.36	-1.7	5.46	14.29	7.63
	(3.04)	(3.18)	(0.68)	(15)	(11.68)	(9.61)	(10.98)	(12.31)

Notes: The symbols ***, **, and * indicate that the variables are significant at the 1%, 5%, and10% levels, respectively. Numbers in parentheses are estimated standard errors. Blank space indicates that the variable is not applicable. N is the number of observations.

Table 5. Regression Results on Bids and Premiums for Preserved Olives and Oolong Tea, All Trials, Experimental Auction (Continued)

Variable	Preserved Olives			Oolong Teas				
	Taiwan (TW)	China (CH)	Premium (TW-CH)	Taiwan (TW)	China (CH)	Vietnam (V)	Premium (TW-CH)	Premium (TW-V)
AGE	-0.53**	-0.17	-0.55***	4.11***	0.99	1.49**	2.72***	2.03**
	(0.23	(0.23)	(0.16)	(1.07)	(0.85)	(0.69)	(0.78)	(0.88)
SEX	-2.03	8.52**	-8.43***	-10.17	29.89**	18.11	-30.57***	-24.89*
	(3.3)	(3.44)	(2.36)	(16.39)	(14.09)	(11.44)	(11.74)	(13.16)
MAR	1.35	2.19	6.45**	74.46***	12.58	21	78.16***	65.18***
	(5.11)	(5.28)	(3.21)	(23.16)	(18.44)	(15.6)	(15.97)	(17.9)
EDU3	11.39***	-1.02	10.31***	73.41***	19.42	30.19**	47.26***	36.71**
	(4.42)	(4.71)	(3.13)	(21.95)	(17.45)	(14.13)	(15.56)	(17.44)
KID	-5.34	-6.04***	0.11	-14.13	-18.97**	-6.24	4.22	-5.52
	(2.06)	(2.06)	(1.401)	(10.55)	(8.58)	(6.61)	(6.97)	(7.82)
NUM	-1.54	2.84	-4.31***	2.01	10.79*	9.3**	-13.46**	-11.95**
	(1.45)	(1.58)	(1.04)	(7.57)	(5.6)	(4.61)	(5.18)	(5.87)
FAH	0.88***	0.068	0.79***	-5.69***	-5.49***	-4.56***	-1.25	-1.64
	(0.26)	(0.28)	(0.18)	(1.29)	(1.12)	(0.93)	(0.92)	(1.03)
FAFH	-0.26	-0.08	-0.23	4.65**	3.79**	1.76	2.01	2.97**
	(0.37)	(0.38)	(0.26)	(1.89)	(1.54)	(1.2)	(1.301)	(1.46)
VEGE	6.86	-0.45	4.76	70.99**	1.55	-11.36	64.08***	71.83***
	(6.2)	(6.38)	(4.39)	(31.24)	(26.24)	(21.46)	(21.85)	(24.5)-
BMI	11.74***	12.47***	-0.46	13.05	15.71	31.08***	-0.6	-19.14
	(3.54)	(3.45)	(2.39)	(17.73)	(13.01)	(10.85)	(11.87)	(13.31)
INC	-16.24***	-10.94***	-4.99**	16.15	-9.39	-22.53**	31.9**	43.89***
	(3.52)	(3.58)	(2.47)	(17.5)	(13.65)	(10.86)	(12.29)	(13.78)
ZONE2	-0.257	-7.53	3.92	66.90**	84.36***	37.28*	-23.16	-1.4
	(6.48)	(6.94)	(4.58)	(33.96)	(26.67)	(20.73)	(22.81)	(25.57)
ZONE3	1.02	4.22	-3.5	50.83**	60.58***	30.18**	2.30	18.64
	(4.12)	(4.4)	(2.8)	(20.2)	(16.44)	(13.85)	(13.95)	(15.64)
σ	25.46	23.02	-	122.03	87.63	75.85	-	-
	(20.33)	(20.24)		(103.95)	(73.1)	(62.87)		
N	210	210	210	210	210	210	210	210

Notes: The symbols ***, **, and * indicate that the variables are significant at the 1%, 5%, and10% levels, respectively. Numbers in parentheses are estimated standard errors. Blank space indicates that the variable is not applicable. N is the number of observations.

Table 6. Marginal Effect for Olives and Tea, Experimental Auction

Variable	Unit of Measurement	Preserved Olives		Oolong Tea		
		Taiwan (TW)	China (CH)	Taiwan (TW)	China (CH)	Vietnam (V)
INFO2	1 or 0	7.4	-0.99	3.69	-5.31	-0.81
RISK	1 or 0	-1.69	-8.59	14.94	-4.73	-6.05
BUYPF	1 or 0	-6.48	-11.27	-8.48	-37.11	-40.44
BUYTEA	1 or 0	2.86	1.21	-18.1	4.74	6.98
BUYOG	1 or 0	-0.61	3.39	17.37	21.29	24.79
CHECK	1 or 0	-6.42	-9.37	-35.38	-47.66	-35.39
BRAND	1 or 0	-4.62	-3.11	-5.78	-2.76	-5.25
NUTRI	1 or 0	4.76	4.81	2.47	19.04	-1.89
ENVIR	1 or 0	2.81	2.24	-1.36	9.44	-8.64
COLOR	1 or 0	-10.53	-1.72	-24.72	0.91	0.18
CALORIE	1 or 0	-1.75	-3.18	27.9	16.82	12.81
GOV	1 or 0	4.70	-0.63	-55.65	-7.57	5.15
AGE	Year old	-0.51	-0.16	3.52	0.93	1.30
SEX	1 or 0	-1.73	2.94	-18.10	3.03	-1.11
MAR	1 or 0	-5.69	-0.95	33.29	3.45	6
EDU3	1 or 0	8.10	-0.96	64.1	8.74	16
KID	Head	-5.18	-5.76	-12.10	-17.80	-5.45
NUM	Head	-1.49	2.71	1.72	10.12	8.12
FAH	NT$	0.85	0.06	-4.87	-5.15	3.98
FAFH	NT$	-0.25	-0.08	3.98	3.56	1.54
VEGE	1 or 0	5.37	-0.95	6.67	-32.50	-21.56
BMI	1 or 0	11.31	6.43	9.28	-0.60	11.41
INC	NT$	-3.58	-1.70	10.35	-12.10	-15.19
SECTION	1 or 0	12.64	11.56	57.30	46.13	41.05
ZONE2	1 or 0	1.13	4.85	21.39	37.40	32.14
ZONE3	1 or 0	2.02	0.01	23.76	8.13	3.42
TRIAL1	1 or 0	-5.66	-2.97	-18.40	-10.98	-8.20
TRIAL3	1 or 0	4.62	2.72	14.13	4.61	7.00

Table 7. Parameter Estimates for Preserved Olives, CVM

Variables	Preserved Olives (Logit)
	Taiwan vs. China
Intercept	3.89
	(3.41)
CHECK	2.56**
	(0.87)
COOL	1.98**
	(0.76)
MAR	-1.85**
	(0.93)
AGE	-0.24**
	(0.09)
FAFH	-0.66**
	(0.27)
△Price	-0.67**
	(0.31)
N	69

Notes: The symbols ***, **, and * indicate that the variables are significant at the 1%, 5%, and10% levels, respectively. Numbers in parentheses are estimated standard errors. N is the number of respondents.

Table 8. Estimated Premiums for Taiwan Products over Alternatives

Item	CVM	Auction					
	Logit or Multinomial Logit	Unconditional[a]		Tobit		OLS	
		…..Preserved olives…..					
Mean	13.4	17.28		17.2		19.78[d]	
(Std. Dev)	(6.34)	(16.48)		(9.33)		(9.99)	
% Premium	67%[c]	58.35%		58.1%		67.5%	
N[b]	69	70		70		70	
		…..Oolong tea[e]…..					
	CH V	CH	V	CH	V	CH	V
Mean	> 75 > 75	87.32	90.26	90	101.61	98.97	109.07
(Std. Dev)		(80.81)	(84.46)	(39.8)	(35.43)	(47.95)	(45.22)
% Premium	50%~∞ 50%~∞	77.12%	82.05%	78.15%	98.13%	87.4%	99%
N	65	70		70	70	70	70

[a] The unconditional auction mean is the mean computed from the raw auction bids.
[b] N is the number of respondents.
[c] Percentage premium of Contingent Valuation is computed by dividing the point of willingness to pay by the base prices in the questionnaire.
[d] Percentage premium of OLS is computed by dividing the average raw auction bid for non-Taiwan product.
[e] CH and V denote China and Vietnam, respectively.