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**Measuring the Potential Economic Impact of a Regional  
Agricultural Promotion Campaign:  
The Case of South Carolina**

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# **Measuring the Potential Economic Impact of a Regional Agricultural Promotion Campaign: The Case of South Carolina**

## **Abstract**

This study evaluated the impact of the South Carolina (SC) agricultural promotion campaign after its first season. Analysis of the survey data revealed that consumer demand for state grown produce has increased by 3.4% which could result in an increase in producer surplus of \$2.9 million. Since the SC Department of Agriculture invested \$500,000 in the promotion program in 2007, this figure indicates a benefit-cost ratio of 5.8.

Key words: Demand for local products, state branding and promotion programs

## **Measuring the Potential Economic Impact of a Regional Agricultural Promotion Campaign: The Case of South Carolina**

The South Carolina Department of Agriculture launched its agricultural marketing and branding campaign on May 22, 2007. The campaign was initially funded with a \$500,000 grant from the South Carolina Department of Agriculture. This campaign was designed to promote agricultural products grown in the state of South Carolina. The campaign consists of 5 steps: (1) engage farmers, processors and distributors – all key players in meeting increased consumer demand and preference for locally grown products, (2) create an actionable and emotional brand or “tie” to South Carolina products, (3) sell “South Carolina” through an on-going, phased-in multimedia campaign, (4) create product labels and in-store promotional materials to let consumers know where they can find South Carolina products, (5) create brand identities for individual product categories (a more detailed description of the campaign is available at

[www.certifiedSCgrown.com](http://www.certifiedSCgrown.com) or from the South Carolina Department of Agriculture).

The campaign’s logo in 2007 was “Nothing’s Fresher, Nothing’s Finer.” The initial focus of the campaign was on fresh fruits and vegetables grown in the state. During the summer of 2007, a promotional campaign was delivered via television, radio, magazines and billboards. Additional promotional materials were also available at some grocery stores. Substantial effort was made to make SC grown products easier to identify.

The goal of this study was to measure the South Carolina agricultural marketing campaign effectiveness after its first season (summer of 2007). The specific objectives include:

1. To evaluate the impact of the first stage of SC agricultural branding campaign on SC consumer preferences for SC grown products.
2. To evaluate the potential economic impact of the estimated change in consumer preferences on the State's agricultural sector.
3. To provide an estimate of the potential return on investment of the campaign.

While state branding programs have been used for promoting agricultural products since the 1930s, little is known about their effectiveness (Patterson, 2006). Several previous studies have evaluated the overall impacts of the State-grown promotion programs with inconclusive results. For example, a study on the *Arizona Grown* campaign mounted during the winter of 1999 provided little evidence of the program increasing product sales (Patterson et al., 1999). On the other hand, Govindasamy et al. (2003) argue that *the Jersey Fresh* program provided about \$32 in return for fruit and vegetable growers for every dollar invested in the campaign. This result suggests that the \$1.16 million campaign in 2000 generated \$36.6 million in sales for New Jersey produce growers. The total impact of the Jersey Fresh program in the total economic activity of the State of New Jersey was estimated at \$63.2 million.

Traditional approaches used for the evaluation of agricultural promotional efforts rely on times series market level data for the estimation of supply and demand equations of the product being advertised (e.g., Kaiser et al., 2005). In other words, the evaluation of the advertisement effectiveness is conducted using several years of data on quantities, prices, annual expenditures on promotion as well as other factors affecting the demand and supply relationships (e.g., Govindasamy et al., 2003). Since the South Carolina

agricultural branding campaign has been in place for less than a year a different modeling approach is proposed and utilized. Specifically, we utilized the results of contingent valuation analysis in combination with a partial displacement equilibrium model to estimate the effect of the campaign on the aggregate market for SC agricultural products. From the contingent valuation analysis, the change in consumer “Willingness to Pay” (WTP) for SC grown products is modeled as a shift in demand for SC products. The partial displacement equilibrium model is then used to track the impact of this shift in demand on the SC market for locally grown products.

### **Evaluation of the impact of the first stage of SC agricultural branding campaign on consumer preferences for SC grown products**

The data for the first objective were collected via statewide telephone surveys of South Carolinians age 18 or over before the beginning of the campaign (March, 2007) and six months thereafter (September, 2007). The surveys were conducted by Richard Quinn & Associates using questionnaires developed in cooperation with the Department of Applied Economics and Statistics at Clemson University. The purpose of the surveys was to measure attitudes and perceptions of SC consumers about state-grown agricultural products. The surveys also collected information on the socioeconomic characteristics of the respondents. Each survey generated 500 responses (different households were interviewed on each occasion).

Consumer preferences for SC grown products were elicited using a contingent valuation framework. Contingent valuation methods ask respondents hypothetical

questions about their willingness to pay (WTP) for products with specific attributes. The product attribute examined in this study was the “South Carolina grown” characteristic.

The contingent valuation questions used in the consumer surveys are presented in Appendix 1. The questions use a dichotomous choice format, where a responder is asked to identify his/her choice to buy or not to buy a product at the stated price. Two types of products are investigated: produce products and animal products. Surveyed individuals were initially asked if they would purchase an in-state or out-of-state grown product at the same bid price, i.e., price differential ( $PD_I$ ) equal zero. If respondents indicated a preference for in-state products, they were subsequently asked if they would be willing to pay a randomly selected premium bid, i.e. price differential ( $PD_H$ ) greater than zero, to consume the in-state grown product over the out-of-state product. If they did not indicate a preference for in-state products in the first question, a follow up question with a price discount bid was not asked.

The initial and follow-up bids were expressed in terms of a percentage premium over the product price for two reasons. First, the approach controls for cross-price effects (Lusk and Hudson, 2004). Second, percentage premiums are a valid measure of price regardless of the variability in the quality and quantity of products purchased by households. The percentage price premium bids used for in-state products were 0% (for initial bid) and 5%, 10%, 20%, 30% and 50% (for a follow-up premium bid). These bid levels were determined by pre-testing of the survey. The initial and follow-up bids were expressed in terms of a percentage premium over the product price for two reasons. First, the approach controls for cross-price effects (Lusk and Hudson, 2004). Second, percentage premiums are a valid measure of price regardless of the variability in the

quality and quantity of products purchased by households. The percentage price premium bids used for in-state products were 0% (for the initial bid  $PD_I$ ) and 5%, 10%, 20%, 30% and 50% (for the follow-up bid  $PD_H$ ) above out-of-state product prices and were determined by pre-testing of the survey.

The three possible responses to the bid scenarios are (1) a “no” to the first bid (i.e., no preference for in-state over out-of-state products at 0% premium), (2) a “yes” followed by a “no” (preference at 0% premium, but no preference at higher premium), and (3) “yes” to both bids (i.e., preference at 0% premium and preference at higher premium). The sequence of questions defines the following ranges for the true WTP values:  $(-\infty, PD_I]$ ,  $[PD_I, PD_H)$ ,  $[PD_H, \infty)$ . The following three discrete outcomes of the bidding process are observable:

$$(1) \quad D = \begin{cases} WTP \leq PD_I & (\text{response outcome 1}) \\ PD_I \leq WTP < PD_H & (\text{response outcome 2}) \\ PD_H \leq WTP & (\text{response outcome 3}) \end{cases}$$

where WTP is the individual’s willingness to pay function for “South Carolina grown” attribute in products. Assume that the WTP function is:

$$(2) \quad WTP = X\beta + u$$

where  $X$  is a vector of explanatory variables,  $\beta$  is a conformable vector of coefficients and  $u$  is a random variable accounting for unobservable characteristics. By using equation (2) and assuming that  $u \sim F(0, \sigma^2)$ , where  $F$  is a cumulative distribution function with mean zero and variance  $\sigma^2$ , then the choice probabilities corresponding to expression (1) are:

$$(3.1) \quad P(WTP \leq PD_I) = P(u \leq PD_I - X\beta) = F(PD_I - X\beta)$$

$$(3.2) \quad \begin{aligned} P(PD_I \leq WTP < PD_H) &= P(PD_I - X\beta \leq u < PD_H - X\beta) \\ &= F(PD_H - X\beta) - F(PD_I - X\beta) \end{aligned}$$



$$(3.3) \quad P(PD_H \leq WTP) = P(u > PD_H - X\beta) = 1 - F(PD_H - X\beta)$$

and the log-likelihood becomes:

$$(4) \quad L = \sum_{D_1} \ln F(PD_I - X\beta) + \sum_{D_2} \ln [F(PD_H - X\beta) - F(PD_I - X\beta)] \\ + \sum_{D_3} \ln [1 - F(PD_H - X\beta)]$$

where  $D_j$  indicates the group of individuals belonging to the  $j$ th bidding process outcome.

Given a choice for the  $F$  cumulative distribution function, the parameters  $\beta$  and  $\sigma^2$  can be estimated. The approach outlined in equations (3) and (4) is an adaptation of the censored regression approach for the estimation of “closed-ended” contingent valuation surveys proposed by Cameron and James (1987) and Cameron (1988) for the case when survey participants respond in dichotomous fashion (yes/no) to a single bid. In this study their procedure is adapted to account for the double bidding process and three outcomes explained previously and summarized in expression 1.

Since consumer’s WTP for a good reflects his/her preference for the product, the effect of the campaign can be analyzed by looking at the consumers’ WTP before and after the campaign. Therefore, an objective measure of the effect of the advertising campaign is the mean WTP which can be obtained by estimating equation (2) using only an intercept (Cameron, 1988). To perform statistical tests related to the effectiveness of the campaign, both consumer surveys data were pooled together. In addition to the intercept, two dummy variables were included in the models. The first dummy variable is used to differentiate the pre-campaign and post-campaign data (equal 1 if post-campaign, 0 otherwise). The second dummy variable was used to distinguish the customers that indicated that they were aware of the SC agricultural branding campaign (equal 1 if aware, 0 otherwise).

Results of the full WTP model estimations are presented in Table 1. Two models are presented for each of the agricultural product groups under study. Model 1 includes the intercept and the post campaign dummy variable. This dummy variable assesses the change in the population mean WTP due to the campaign. Model 2 includes the post-campaign dummy as well as the “awareness of the campaign” dummy. Model 2 was estimated to isolate the change in the WTP due to the state campaign from other effects that might be influencing consumer preferences for locally grown products (e.g., national media).

**Table 1:** Estimation Results of the Willingness to Pay Model for South Carolina Grown Products

| Variable  | Produce             |                     | Animal products     |                     |
|---|---------------------|---------------------|---------------------|---------------------|
|   | Model 1             | Model 2             | Model 1             | Model 2             |
| Intercept                                       | 0.275***<br>(0.013) | 0.274***<br>(0.013) | 0.236***<br>(0.013) | 0.236***<br>(0.013) |
| Post-campaign (Yes=1, No=0)                     | 0.034**<br>(0.018)  | 0.013<br>(0.020)    | -0.004<br>(0.017)   | -0.016<br>(0.019)   |
| Aware of the SC branding campaign (Yes=1, No=0) |                     | 0.071***<br>(0.029) |                     | 0.044**<br>(0.026)  |
| $\sigma_2$                                      | 0.211***<br>(0.009) | 0.210***<br>(0.009) | 0.190***<br>(0.008) | 0.189***<br>(0.008) |
| Log-likelihood                                  | -704.630            | -701.637            | -658.692            | -657.313            |
| Sample size                                     | 817                 |                     | 728                 |                     |

Note: Numbers in parenthesis are asymptotic standard errors. One asterisk indicates significance at the 10% level, two asterisks indicate significance at the 5% level, and three asterisks indicate significance at the 1% level.

The results from Model 1 for produce indicate that the population mean willingness to pay for produce has indeed increased after the SC promotion campaign. The intercept shows that the mean WTP prior to the campaign was 27.5%, which is the premium consumers are willing to pay for produce identified as “SC grown.” The coefficient on the post-campaign dummy variable indicates that the mean WTP after the campaign is approximately 3.4% higher. Model 2 indicates that most of the increase in consumer preferences for SC grown produce is due to the SC branding campaign since the impact shifts from the post-campaign dummy variable to the awareness dummy variable, showing that only individuals aware of the campaign experienced change in preferences. The results show that the mean WTP of consumers that said they were aware of the campaign increased by 7.1%.

The results from Model 1 for animal products shows no change in the population mean WTP to pay after the campaign since the post-campaign dummy is not statistically different from zero. However, the results from Model 2 indicate that there has been an effect on the mean willingness to pay in the group of consumers who are aware of the campaign since their mean WTP grew by 4.4% relative to consumers who were not aware of the campaign. These somewhat contradictory results can be explained by the fact that the post campaign dummy variable measures the effect across all groups of consumers whereas the “awareness” dummy isolates the effect for a specific group of consumers who were aware of the campaign.

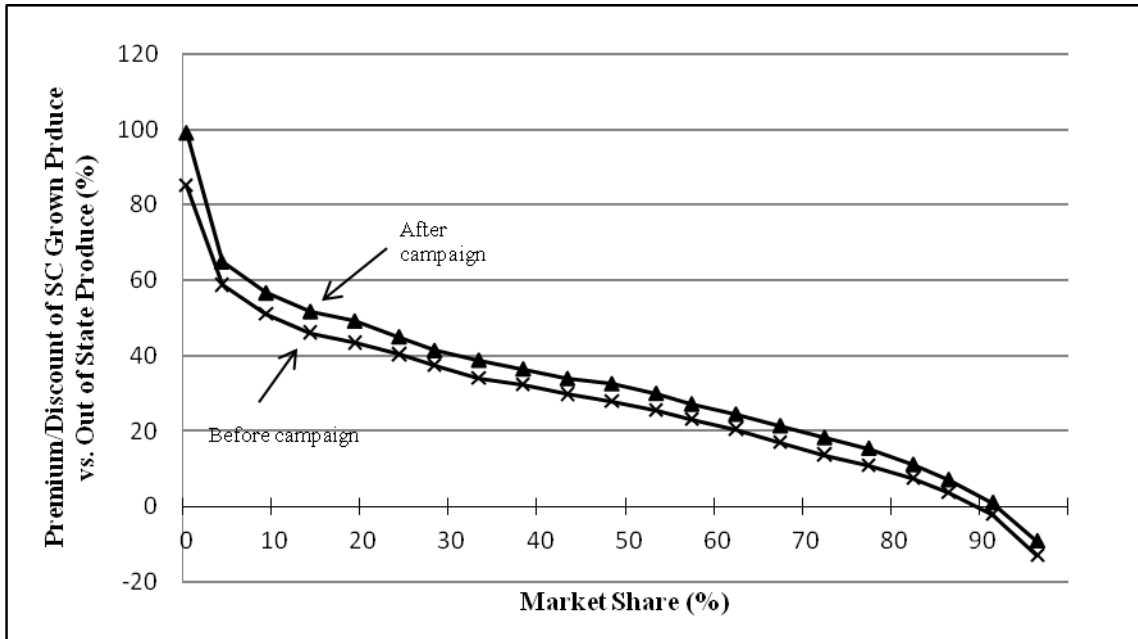
Therefore, the results of the WTP analysis provide evidence of a change in consumer preferences for SC grown products. Specifically we find that consumers that are aware of the campaign are willing to pay 7.1% and 4.4% higher premiums than those

that are not aware. The higher effect on produce than in animal products might be due to the fact that the first season of the advertising campaign focused on marketing fresh fruits and vegetables.

It is important to point out that the WTP measures do not reflect actual price differentials between SC grown and out of state products observed in the market. WTP measures reflect the premiums consumers are willing to pay for a product with given characteristics. Actual price differentials are determined by supply and demand for these products and may be observed from the prices and quantities of products consumed in the market. The data for prices and quantities of agricultural commodities is collected by the USDA National Agricultural Statistical Service and becomes available to the public about a year later. The WTP measures before and after the campaign were used in this study as a tool to measure the shift in the demand for SC products (see simulated demand curves in Figure 1). These findings will be verified when the actual market data becomes available.<sup>1</sup>

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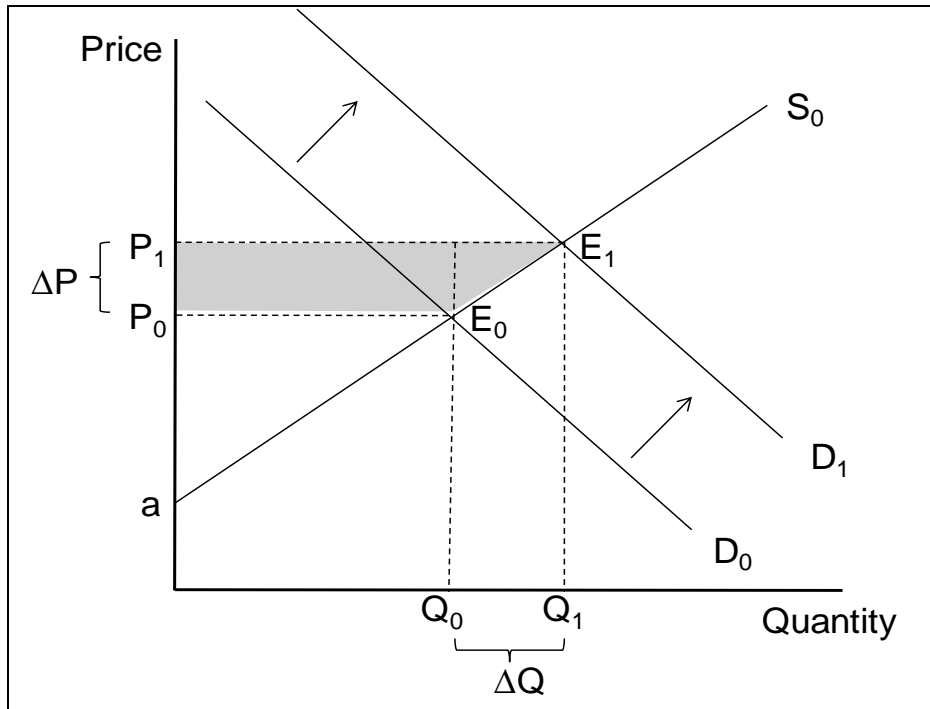
<sup>1</sup> A challenge is that data available from NASS and most other sources do not differentiate between locally grown and out of state products.



**Figure 1:** Simulated Demand for South Carolina (SC) Grown Products Before and After the Launching of the SC Agricultural Branding Campaign

### Estimation of the potential economic impact of the SC promotion program on the SC agricultural sector

A basic supply and demand model of a commodity market is used to illustrate the economic rationale behind the impact analysis of the SC branding campaign. In Figure 2,  $S_o$  represents the market supply of a commodity (quantity supplied as a function of price, holding other factors that affect supply constant) and  $D_o$  represents the market demand (quantity demanded as a function of price, holding other factors that affect demand constant). Market equilibrium is indicated by the intersection of supply and demand at point  $E_0$ , and  $P_0$  represents the point where quantity demanded equals quantity supplied,  $Q_0$ . Producer surplus is given by the triangle  $aE_0P_0$ .



**Figure 2: Producer Benefits of the SC Agricultural Branding Campaign**

Since the SC advertising campaign has shifted the demand curve to the right (as shown in Figure 2), this shift can be represented in Figure 2 as a shift from  $D_0$  to  $D_1$ . This shift reflects an increase in consumer willingness to pay for SC grown products estimated in the first part of this study. As a result of the shift in consumer preferences, the industry equilibrium shifts from  $E_0$  to  $E_1$ , the equilibrium price increases to  $P_1$  and the new quantity demanded and supplied increases to  $Q_1$ . The implications for producers can be represented by the change in producer surplus between the initial equilibrium at point  $E_0$  and the final equilibrium  $E_1$  representing the shift in demand due to advertising. The producer net benefit can be measured as the area of additional producer surplus associated with the increase in production from  $Q_0$  to  $Q_1$  and increase in price from  $P_0$  to  $P_1$  (shaded area in Figure 2).

## *SC Agricultural Products Supply and Demand Model*

A multi-equation market equilibrium model for two regions which are related in price, advertising and costs is specified as:

### **South Carolina**

Demand

$$(5) \quad D_{SC}^L = D_{SC}^L(P_L, P_M) \quad [\text{SC demand for locally grown branded products}]$$

$$(6) \quad D_{SC}^M = D_{SC}^M(P_L, P_M) \quad [\text{SC demand for mass – quality products}]$$

Supply

$$(7) \quad S_{SC}^L = S_{SC}^L(P_L, P_M) \quad [\text{SC supply of locally grown branded products}]$$

$$(8) \quad S_{SC}^M = S_{SC}^M(P_L, P_M) \quad [\text{SC supply of mass – quality products}]$$

### **Region B (rest of the country)**

Demand

$$(8) \quad D_B^L = D_B^L(P_L, P_M) \quad [\text{Region's B demand for mass-quality products}]$$

Supply

$$(9) \quad S_B^L = S_B^L(P_L, P_M) \quad [\text{Region's B supply of mass-quality products}]$$

Market clearing conditions

$$(10) \quad D_{SC}^L = S_{SC}^L \quad [\text{Locally grown branded products market clearing}]$$

$$(11) \quad D_{SC}^M + D_B^M = S_{SC}^M + S_B^M \quad [\text{Mass – quality products market clearing}]$$

where D, S, P denote quantity demanded, quantity supplied and price, respectively; superscripts SC, B, L and M denote South Carolina, region B, locally grown branded products and mass quality products (unbranded products and/or out-of state products).

This model is meant to represent the conditions of the SC agricultural market versus the rest of the United States (Region B). The model does not rule out the possibility that

producers can sell their products without using the locally grown label. The demand functions in SC allow for substitute relationships between the locally grown and mass quality products.

An equilibrium displacement modeling (EDM) approach is adopted to evaluate how the advertising campaign will affect the endogenous variables in the system (prices and quantities). This approach requires total differentiation of equations (5) to (11), converting partial derivatives into elasticities and expressing the changes in the endogenous variables as proportional changes. Moreover, because the exogenous shifts in demand due to the campaign were measured in terms of inverse demand relationships (obtained from the contingent valuation analysis), the demand relationships are expressed in terms of price flexibilities.<sup>2</sup> The EDM approach including an exogenous shock due to advertising  $\gamma$  yields:

$$(5)' \quad d\ln D_{SC}^L = \frac{\varepsilon_{SC}^{MM}}{D} d\ln P_L - \frac{\gamma \varepsilon_{SC}^{MM}}{D} - \frac{\gamma \varepsilon_{SC}^{LM}}{D} d\ln P_M$$

$$(6)' \quad d\ln D_{SC}^M = -\frac{\varepsilon_{SC}^{ML}}{D} d\ln P_L + \frac{\gamma \varepsilon_{SC}^{ML}}{D} + \frac{\gamma \varepsilon_{SC}^{MM}}{D} d\ln P_M$$

$$(7)' \quad d\ln S_{SC}^L = \beta_{SC}^{LL} d\ln P_L + \beta_{SC}^{LM} d\ln P_M$$

$$(8)' \quad d\ln S_{SC}^M = \beta_{SC}^{ML} d\ln P_L + \beta_{SC}^{MM} d\ln P_M$$

$$(9)' \quad d\ln D_B^M = \varepsilon_B^{MM} d\ln P_M$$

$$(10)' \quad d\ln S_A^M = \beta_B^{MM} d\ln P_M$$

$$(11)' \quad d\ln D_{SC}^L = d\ln S_{SC}^L$$

$$(12)' \quad w_{SC}^{DM} d\ln D_{SC}^M + w_B^{DM} d\ln D_B^M = w_{SC}^{SM} d\ln S_{SC}^M + w_B^{SM} d\ln S_B^M$$

$$(13) \quad D = \varepsilon_{SC}^{LL} \varepsilon_{SC}^{MM} - \varepsilon_{SC}^{LM} \varepsilon_{SC}^{ML}$$

<sup>2</sup> The demand relationships for region SC were initially expressed as inverse demand equations. The equations were then totally differentiated and the partial derivatives converted into price flexibilities. Finally, using matrix algebra, quantities were expressed as a function of prices.



Where:  $dlnX$  is the proportional change in variable  $X$ ;  $\varepsilon_k^{ij}$  is the price flexibility of price  $i$  with respect to the quantity of product  $j$  in the  $k$ th region;  $\beta_k^{ij}$  is the supply elasticity of product  $i$  with respect to the price of product  $j$  in the  $k$ th region;  $w_k^{Di}$  and  $w_A^{Di}$  are demand and supply market shares. For example,  $w_A^{DM}$  is the market share of region A of the total demand for product  $M$ .

Given the exogenous market shares and the advertising shock, the linear equation system (5)' to (12)' can be solved for the endogenous price and quantities change variables. Now, since at the aggregate level, the quantity of agricultural products supplied by SC to the rest of the country is very small (see Table 2), we use the simplifying assumption that any shock occurring in SC would have a negligible effect on the price of the mass quality agricultural products (i.e.,  $dlnP_M \approx 0$ ). Therefore, the change in the quantity of locally grown products in SC due to the advertising shock can be shown to equal:

$$(14) \quad dlnD_{SC}^L = \frac{\gamma}{\frac{1}{\beta_{SC}^{LL}} - \varepsilon_{SC}^{LL} + \frac{\varepsilon_{SC}^{LM} \varepsilon_{SC}^{ML}}{\varepsilon_{SC}^{MM}}}$$

Equation 14 shows that the higher the value of the locally grown own price flexibility, the lower the effect of the advertising shock. On the other hand, the higher the value of the own price flexibility of the mass quality product or the value of the locally grown supply elasticity, the higher the effect of the advertising shock.

The change in the price due to the advertising effect is:

$$(15) \quad dlnP_L = \frac{\gamma}{1 - \beta_{SC}^{LL} \varepsilon_{SC}^{LL} + \beta_{SC}^{LL} \frac{\varepsilon_{SC}^{LM} \varepsilon_{SC}^{ML}}{\varepsilon_{SC}^{MM}}}$$

Equation 15 shows that the final change in the price due to the advertising effect is lower than the initial shock  $\gamma$ . As in the case of the change in quantity demanded, equation (15) indicates that the higher the value of the locally grown own price flexibility, the lower the effect of the advertising shock on price.

**Table 2:** United States and South Carolina Agricultural Commodity Trade (millions of dollars)

| Commodity                       | Industry output |       | Total imports |      | Total exports |      | Internal consumption |       |
|---------------------------------|-----------------|-------|---------------|------|---------------|------|----------------------|-------|
|                                 | SC              | US    | SC            | US   | SC            | US   | SC                   | US    |
| Vegetable and melon farming     | 53              | 16315 | 170           | 3392 | 8             | 2315 | 215                  | 17392 |
| Tree nut farming                | 2               | 4263  | 42            | 69   | 0             | 736  | 44                   | 3596  |
| Fruit farming                   | 57              | 15873 | 220           | 8390 | 12            | 2792 | 265                  | 21471 |
| Cattle ranching and farming     | 216             | 75993 | 593           | 1917 | 0             | 110  | 809                  | 77800 |
| Poultry and egg production      | 769             | 28850 | 12            | 66   | 414           | 300  | 366                  | 28617 |
| Animal production-except cattle | 111             | 20046 | 153           | 3242 | 6             | 1172 | 257                  | 22115 |

Source: IMPLAN data for 2006.

Important parameters needed for this study are the quantities, prices, price flexibilities, and supply elasticities for the agricultural goods under study. The data on flexibilities of demand were constructed using the elasticities of demand from Huang and

Lin (2000).<sup>3</sup> Supply elasticities for livestock were obtained from Shumway and Lim (1993). The supply elasticities for fruits, nuts and vegetables were extrapolated from Chavas and Cox (1995). The shift in the demand  $\gamma$  is obtained by using the change in the mean WTP measures.

**Table 3:** 2006 South Carolina Annual Quantity Demanded, Average Prices, Price Flexibilities and Supply Elasticities for Fruits, Nuts and Vegetables and Animal Products

| Commodity                                | Quantity demanded <sup>b</sup> | Price <sup>b</sup> | Price flexibility <sup>c</sup> | Supply elasticity |
|--|--------------------------------|--------------------|--------------------------------|-------------------|
|  | Thousand Pounds                | \$/lb              |                                |                   |
| Fruits, Nuts and Vegetables <sup>a</sup> | 357,600                        | 0.24               | -1.56                          | 1.00 <sup>d</sup> |
| Animal Products                          | 1,690,000                      | 0.41               | -1.29                          | 0.88 <sup>e</sup> |

<sup>a</sup> Does not include cucumbers used for processing.

<sup>b</sup> USDA, NASS, South Carolina Agricultural Statistics, E 497. For poultry and egg production we used the consumption figures rather than the production figures since production is higher than internal consumption.

<sup>c</sup> Huang and Lin (2000).

<sup>d</sup> Average of elasticities reported in Chavas and Cox (1995).

<sup>e</sup> Average of elasticities reported in Shumway and Alexander (1988) and Chavas and Cox (1995).

Two types of demand shifts were analyzed. The first one is the current demand shift due to the effect of the campaign, 3.4% for fruits and vegetables and 0% for animal products (Table 1). The second shift in demand is the potential shift that would have occurred if all consumers were aware of the campaign. Hence, we use the effect of the “awareness” dummy variables shown in Table 1 which is 7.1% for produce and 4.4% for

<sup>3</sup> Huang and Lin (2000) demand elasticities for animal products include elasticities for the beef, pork, poultry, other meat, fish, dairy and eggs subgroups; and demand elasticities for fruits and vegetables separately. The disaggregated demand elasticities were transformed to price flexibilities by inverting the demand elasticity matrix. Aggregate price flexibilities for the animal products and fruits and vegetables groups were then calculated from the subgroups price flexibilities adapting the approach outlined in Carpio, Wohlgenant and Safley (2008).

animal products for all consumers. In addition, two scenarios are considered. The first one is a short run scenario which is labeled “fixed supply” in Table 4. This scenario aims to analyze the advertising effect in a very short run when producers cannot react to the increase in demand by increasing the quantity supplied (graphically, this scenario would be represented by a vertical supply curve in Figure 4). Therefore an increase in producer surplus is only due to the change in price. The second scenario corresponds to that presented in Figure 3 where both quantity and price adjust to the shift in the demand curve. Finally, given that there is no data on cross price elasticities between SC grown and out-of-state agricultural products, the change in quantity demanded was calculated

ignoring the term  $\frac{\epsilon_{SC}^{LM} \epsilon_{SC}^{ML}}{\epsilon_{SC}^{MM}}$  which provides a more conservative estimate (lower value) than the estimate of the change if those elasticity values were known.

### ***Results***

Table 4 summarizes the results of the analysis used to measure the change in prices, quantities and producer surplus (may be viewed as revenue, calculated as price time quantity) due to the SC branding campaign. The results show that if consumers are able to identify SC grown produce, the campaign’s first season will result in increase in SC producer surplus by \$2.9 million in the short run. This increase in producer surplus reflects the effect of the 3.4% increase in consumer demand for locally grown fruits and vegetables due to promotion campaign on producer incomes while keeping production unchanged. As producers adjust their production in the longer run, the campaign will likely result in a 1.3% increase in production price (rather than 3.4% as measured for the short run) yielding a total increase in producer surplus of \$1.2 million. This conclusion is

based on the assumption that consumer preferences will remain at the level measured in the fall of 2007. This preference level reflects only about a 30% rate of campaign awareness. If the campaign is able to reach all consumers over the long run and their reaction to advertising is the same our estimates indicate a total increase in producer surplus of almost \$17 million dollars. This figure is based on the increase in demand for produce by 7.1% and for animal products by 4.4% (as measured for individuals aware of the campaign). This increase in demand will result in a 2.8% increase in production and price for produce yielding a consumer surplus of \$2.4 million and a 1.8% increase in production and a 2.1% increase in price for animal products yielding consumer surplus of \$14.4 million. Again these estimates only reflect the change in consumer preferences resulting from campaign's first season and kept constant in the future. As the campaign continues to have effect on consumer preferences in the coming years, these estimates can be revised to reflect further changes in consumer demand.

### **Potential Return on Investment of the Campaign**

The final objective of this report was to present a benefit/cost analysis of the expenditures on the SC branding campaign. This analysis is performed using the producer surplus measures shown in Table 4 since they represent the potential benefits to producers due to the campaign effects. Specifically, we include the \$2.9 million change in the producer surplus (the short run effect after the first season of the campaign) and the total amount spent by the SC Department of Agriculture in 2007 (\$500,000). This ratio is 5.8. This benefit cost ratio indicates that, for every dollar spent by the SC Department of

Agriculture in the promotion program, SC vegetable and fruits producers will gain \$5.8 in additional revenues.

**Table 4:** Estimated Change ( $\Delta$ ) in Quantity Demanded (QD), Producer Surplus (PS) and Price (P) due to the SC Agricultural Branding Campaign

|                             | Commodity                   | % Change in demand due to campaign <sup>a</sup> | Scenarios    |            |             |                |            |             |
|-----------------------------|-----------------------------|---|--------------|------------|-------------|----------------|------------|-------------|
|                             |                             |   | Fixed supply |            |             | Elastic supply |            |             |
|                             |                             |   | $\Delta$ QD  | $\Delta$ P | $\Delta$ PS | $\Delta$ QD    | $\Delta$ P | $\Delta$ PS |
|                             |                             |   | %            | %          | million \$  | %              | %          | million \$  |
| After first campaign season | Fruits, Nuts and Vegetables | 3.4   | 0            | 3.4        | 2.9         | 1.3            | 1.3        | 1.2         |
|                             | Animal Products             | 0   | 0            | 0          | 0           | 0              | 0          | 0           |
| Estimated potential         | Fruits, Nuts and Vegetables | 7.1   | -            | -          | -           | 2.8            | 2.8        | 2.4         |
|                             | Animal Products             | 4.4   | -            | -          | -           | 1.8            | 2.1        | 14.4        |

<sup>a</sup> Expressed as a change in price holding quantity fixed. All calculations are based on 2006 average prices and quantities.

### Summary and Conclusions

This study evaluates the impacts of the South Carolina agricultural promotion campaign after its first season. Consumer surveys before and after the campaign were utilized with the purpose of measuring consumer awareness and preferences for SC grown products and the campaign. The potential economic impact of the campaign and its return on investment were evaluated by first constructing a stylized model of the SC agricultural sector and analyzing the impact of the change in consumer's preferences.

In order to make the problem tractable, we had to rely on a plethora of simplifying assumptions. When confronted with a choice of assumptions affecting the final result, we have chosen the route that resulted in conservative benefit estimates rather than the ones resulting in higher benefit estimates. All these assumptions have been explicitly stated in this report. As more data becomes available we will be able to use actual purchase data instead of the stated preferences data obtained through the consumer surveys. A final limitation of this study that should be noted is the use of annual aggregate data (one year) rather than monthly data. This is important because even though at the aggregate level SC is a net importer of agricultural products, in a month by month basis the situation may be different. In any case, our benefit cost ratio estimates are within the range of previous published studies dealing with the economics of agricultural promotion programs (Kaiser et al., 2005).

The results of the WTP analysis provide evidence of a change in consumers' preferences for SC grown products. Specifically, we found that consumers that are aware of the campaign are willing to pay 7.1% and 4.4% higher premiums for produce and animal products, respectively, compared to those that are not aware of the campaign. We also found that at the aggregate level, the demand for has increased by 3.4% after the campaign. The effect in the change of consumer preferences and the corresponding shift in the demand curves are estimated to have increased SC fruits and vegetables producer surplus by \$2.9 million. Finally, our benefit/cost analysis indicates that, for every dollar spent by the SC Department of Agriculture in the promotion program, SC vegetable and fruit producers will gain \$5.8 in additional revenues.

Over the long run, if the campaign is able to reach all consumers our estimates indicate a total increase in sales for produce and animal products of almost \$17 million dollars. This can be achieved by increasing expenditures on the campaign; increasing the effectiveness of advertising; and convincing more producers to take advantage of consumers' increase interest in locally grown products. Also, a multi-year campaign is more likely to have a long lasting impact on consumer preferences compared to only a one year campaign.

The benefit calculations included in this study are only the benefits received directly by fruits and vegetables and animal products farmers. As the campaign expands its efforts to include other processed and raw agricultural products (e.g., peanuts) the impacts might be higher. Also, this impact in the SC farming sector is likely to have a positive impact in the rest of the economy as well. For example, a previous study looking at the potential impact of the SC branding campaign in the SC economy found that \$1 million increase in production of fruits and vegetables has an additional impact of \$1.52 million throughout the entire state economy (Carpio, Isengildina and Hughes; 2007).



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## Appendix

### Contingent Valuation Questions Used in the Consumer Survey

If you were buying vegetables or fruit from the market, and you could choose *at equal prices* between produce grown in South Carolina and out-of-state produce, which one would you choose? [Categorize based on response]

|   |   |
|---|---|
| Produce grown in SC [if chosen go to a] | 1 |
| Out-of-state produce                    | 2 |

If the person takes more than a few seconds, ask: are you

|                                |   |
|--------------------------------|---|
| Not sure? [go to a]            | 4 |
| Makes no difference? [go to a] | 5 |
| Don't know ? [go to a]         | 6 |

a. [If produce marked as grown in SC was the respondent's first choice then ask]  
Okay, what if the price of SC grown produce was [5%, 10%, 20%, 30%, 50%] more expensive than out of state products, which one would you choose?

|  |   |
|--|---|
| Produce marked as grown in SC [go to 17.a.1] | 1 |
| Out-of-state produce [go to 17.a.1]          | 2 |

If the person takes more than a few seconds, ask: are you

|                                     |   |
|-------------------------------------|---|
| Not sure? [go to 17.a.1]            | 4 |
| Makes no difference? [go to 17.a.1] | 5 |
| Don't know ? [go to 17.a.1]         | 6 |