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# DOMESTIC DEMAND FOR FLORIDA FRESH CITRUS: PRICE FLEXIBILITIES

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# Domestic Demand for Florida Fresh Citrus: Price Flexibilities\*

## Introduction

This study examines the demands for Florida fresh oranges, grapefruit, Temples, tangelos, tangerines (excluding honey tangerines), and honey tangerines. Inverse or price-dependent demand equations for each of the above varieties of citrus were estimated, based on annual data for the domestic market.

## Model

In this study, quantity of citrus is treated as fixed and price is determined by market demand. In this case, demand can be written as

$$(1) \quad \log\left(\frac{P_c}{x}\right) = \beta_0 + \beta_1 \log\left(\frac{q_c}{n}\right) + \beta_2 \log\left(\frac{q_0}{n}\right) + \beta_3 \log\left(\frac{q_f}{n}\right),$$

where  $P_c$  is the nominal FOB price of citrus variety  $c$ ;  $x$  is nominal per capita U.S. personal expenditures;  $q_c$  is domestic shipments of citrus variety  $c$ ,  $n$  is the U.S. population; and  $q_0$  and  $q_f$  are consumption of other fresh citrus and other fresh fruit, respectively. Equation (1) relates the normalized price,  $P_c/x$ , to own and substitute per capita shipments; the double log specification means the coefficients  $\beta_1$ ,  $\beta_2$  and  $\beta_3$  are flexibilities, each indicating

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the percentage change in the normalized price in response to a one percent change in the per capita shipments in question.

### **Data**

Prices of Florida fresh citrus, by variety, the  $P_c$ 's in equation (1), were obtained from the Citrus Administrative Committee's (CAC's) *Annual Statistical Report* for various seasons. U.S. personal expenditures and the U.S. population were obtained from the U.S. Department of Commerce and U.S. Bureau of Census, respectively. Florida fresh shipments, by variety, to the domestic market, the  $q_c$ 's in equation (1), were taken from the "Florida Fresh Fruit Shipments" report for various seasons, by the Economic and Market Research Department, Florida Department of Citrus. Other U.S. fresh citrus consumption  $q_0$  was U.S. fresh citrus consumption, obtained from the U.S. Department of Agriculture's *Fruit and Tree Nut Situation and Outlook*, less Florida fresh shipments of the variety in question ( $q_c$ ). Other U.S. fresh fruit consumption ( $q_f$ ) was also from the later USDA report.

### **Results**

The estimated price flexibilities for equation (1), by variety, are shown in Table 1. As expected, own shipments  $q_c$  significantly and negatively effected price for oranges, Temples, tangerines and honey tangerines; unexpectedly, own shipments were not significant in determining price for grapefruit and tangelos. The significant own price flexibilities ranged from -.11 for honey tangerines to -.32 for tangerines. The magnitude of the own flexibilities, all less than one in absolute value, indicates own shipments have a relatively

small impact on price. The cross flexibilities for other citrus and fresh fruit consumption were all negative and significant, except those for tangerines which were insignificant. The cross flexibilities were larger than the own flexibilities, indicating Florida fresh shipments are relatively more sensitive to other citrus and other fresh fruit consumption than to own fresh shipments.

An example is given to further help explain the table. If orange shipments, other fresh citrus consumption and other fresh fruit consumption increase by 10%, 5% and 2%, respectively, then the real FOB price of fresh oranges is estimated to decline by 9.0% ( $-.28*10\%-0.42*5\%-2.06*2\%$ ). In addition, if inflation is 3% and real per capita personal expenditures grow by 2% (i.e., nominal per capita personal expenditures grow by 6%), then the nominal fresh FOB price is estimated to decline by 3% ( $6\%-9\%$ ). (Each estimated demand equation has the log of the nominal FOB price minus the log of nominal per capita personal expenditures as its dependent variable.) Over the sample period, the average growth in nominal per capita personal expenditures was about 6.5% per year. The average growth in other per capita fresh fruit (non-citrus) consumption was 1.9% per year. Other per capita fresh citrus consumption tended to vary about 10% to 15% (i.e., for each variety, the standard deviation for this variable was in this range). Orange, grapefruit, Temple, tangelo, tangerine and honey tangerine per capita shipments tended to vary 20%, 15%, 71%, 23%, 56% and 57%, respectively, over the sample.

Table 1. Price flexibilities for Florida fresh citrus shipments to the domestic market based on annual data for the 1977-78 through 1992-93 seasons.<sup>a</sup>

Variety of Citrus	Estimated Parameter (Flexibility)			
	Own Shipments	Other Fresh Citrus Consumption	Other Fresh Fruit Consumption	R <sup>2</sup>
Oranges	-.28 <sup>b</sup>	-.42 <sup>b</sup>	-2.06 <sup>b</sup>	.79
Grapefruit	-.06	-.44 <sup>b</sup>	-1.07 <sup>b</sup>	.59
Temples	-.18 <sup>b</sup>	-.53 <sup>b</sup>	-2.37 <sup>b</sup>	.90
Tangelos	.29	-.51 <sup>b</sup>	-.90 <sup>c</sup>	.66
Tangerines	-.32 <sup>b</sup>	.43	-.57	.51
Honey Tangerines	-.11 <sup>b</sup>	-.74 <sup>b</sup>	-.70 <sup>b</sup>	.83

<sup>a</sup>For each variety, the dependent variable was the log of price minus the log of per capita personal expenditure, while the independent variables were the log of per capita shipments of the variety in question to the domestic market, the log of per capita other citrus consumption, and the log of per capita other fresh fruit consumption.

<sup>b</sup>Statistically different from zero at the  $\alpha = .10$  level of significance.

<sup>c</sup>Statistically different from zero at the  $\alpha = .20$  level of significance.