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THE IMPACTS OF CLEMENTINE IMPORTS ON FLORIDA TANGERINE PRICES

BY

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The Impacts of Clementine Imports on Florida Tangerine Prices*

Imports of Mandarins and Clementines (HS 0805200040) from Spain have increased from 67,000 95-lb boxes in 1989 to 1.5 million 95-lb boxes in 2006, an increase of 2,194% in 18 years (Table 1). Most of the growth of Mandarin and Clementine imports occurred before 2000 and imports from Spain accounted for 70% to 90% of the total imports. The U.S. Department of Commerce did not report Clementine imports until January 2007. Based on the import information for the first four months of 2007, Clementines accounted for 94% of the Mandarin and Clementine imports from Spain.

With recovery from the freezes in the 1980s, Florida fresh Tangerine shipments have increased from under 1 million 95-lb boxes in 1989-90 to 3.6 million 95-lb boxes in 2005-06 (Table 2). The on-tree and packing-house-door prices have declined over this time period (Tables 2 and 3; Figure 1). Florida Tangerines are classified as early Tangerines (Sunburst, Fallglo, Robinson, and Dancy) and Honey Tangerines (late). Most of the fresh early Tangerines are shipped from October to January, while most of the fresh Honey Tangerines are shipped from January to May. Roughly 95% of the early Tangerines and nearly 100% of the Honey Tangerines are shipped to domestic markets. Figure 2 shows total U.S. fresh Tangerine shipments, California shipments, and imports from Spain. In general, U.S. domestic fresh Tangerine shipments have been flat in the 2000s, but imports from Spain have increased tremendously.

Imports of Spanish Mandarins and Clementines start around October and end around March. The Spanish Mandarin and Clementine import season coincides with the Tangerine production season in Florida. It is suspected that the imports of Spanish Clementines had a negative impact on the prices of Florida Tangerines. The purpose of this study is to examine the impact of Spanish Mandarin and Clementine imports on Florida Tangerine prices.

In this study we assumed that Florida's Tangerine prices (on-tree and packing-house-door) are functions of fresh Tangerine utilization in Florida, California, Arizona, and Mandarin and Clementine imports from Spain. Formally, the relationship can be written as

$$(1) \quad FP_{it} = \alpha_i + \beta_1\,FQ_{it} + \beta_2\,CAQ_t + \beta_3\,AZQ_t + \beta_4\,SQ_{it} + \varepsilon_{it}; \quad i = \text{early, late, total.}$$

Where FP_{it} is the on-tree price (deflated by the CPI, or deflated packing-house-door price) for type i Tangerine (i is early (E), or Honey (L), or total (T)) for season t; FQ_{it} is the fresh utilization of ith type Tangerine in season t; CAQ_t is the fresh utilization of California Tangerines; AZQ_t is the fresh utilization of Arizona Tangerines; SQ_{it} is the Mandarin and Clementine imports from Spain during season t; and ε_{it} is the disturbance

term. Note that, in this study, imports between July and the end of December is defined as early imports and those imported between January and the end of June are considered late imports; and Florida Honey Tangerines are considered late Tangerines in this study.

Ordinary least squares method was used to estimate the parameters in (1), results are shown in Tables 4 and 5. Note that the R^2s are in the high 0.80s and low 0.90s, indications that the equations have a very good fit. However, there is only one parameter (intercepts are also statistically different from zero) in each equation that is statistically different from zero. The high R^2 and only one significant parameter indicate that there are serious multicollinearity problems. Table 6 shows the simple correlation coefficients for the variables used in the regression. Note that Florida fresh Tangerine shipments are highly correlated to California fresh Tangerine shipments and Mandarin and Clementine imports from Spain. Therefore, some of the parameter estimates shown in Tables 4 and 5 are not stable.

The results presented in Tables 4 and 5 show that Florida fresh Tangerine shipments are the dominant explanatory variable of Florida Tangerine prices. Two models were estimated to examine the impact of imports from Spain on Florida Tangerine prices: the first model has only Florida fresh shipments as the sole explanatory variable (call this model A) and the other model uses non-Florida shipments as explanatory variables (call this model B). Results of these two models are presented in Tables 5 (for PHD price), 7, and 8.

A comparison of the own-price parameters in Table 4 and those in Table 7 reveals that the own-price parameters in model A are, in general, larger then those in (1), or biased upward. The parameter estimates for model B show that Mandarin and Clementine imports from Spain had negative impacts on Florida PHD prices (the last two columns in Table 5) and on-tree prices for Florida early Tangerines (Table 8). Note that model B left out an important explanatory variable – Florida fresh Tangerine shipments; therefore, the parameters are biased, and in this case, they are probably biased upward – because the parameter estimates for Spanish imports are much larger than the corresponding own-price parameter estimates, and the results in Table 4 show that the Florida's Tangerine price is the dominant explanatory variable. In other words, the results indicate that Spanish Mandarin and Clementine imports had negative impacts on Florida fresh Tangerine prices; however, because of the multicollinearity problem, the exact impacts are difficult to estimate.

Table 1. US imports of Mandarin and Clementine (HS 0805200040)*

Year	World			Spain			Spain' Share	
	Quantity	Value	$/box	Quantity	Value	$/box	%q	%$
1989	93	4,339	46.86	67	2,989	44.87	72.0%	68.9%
1990	206	9,802	47.59	163	7,287	44.76	79.0%	74.3%
1991	163	8,609	52.92	105	5,243	49.74	64.8%	60.9%
1992	172	11,010	63.83	138	9,064	65.45	80.3%	82.3%
1993	149	8,165	54.93	102	5,869	57.58	68.6%	71.9%
1994	366	19,592	53.50	296	16,495	55.78	80.8%	84.2%
1995	353	19,229	54.45	329	18,182	55.32	93.1%	94.6%
1996	574	33,338	58.05	537	31,374	58.46	93.4%	94.1%
1997	875	53,478	61.09	798	49,233	61.71	91.1%	92.1%
1998	932	53,782	57.73	824	47,868	58.11	88.4%	89.0%
1999	1,995	123,935	62.12	1,797	112,190	62.42	90.1%	90.5%
2000	2,126	150,476	70.79	1,941	141,253	72.78	91.3%	93.9%
2001	1,655	127,355	76.94	1,386	108,968	78.64	83.7%	85.6%
2002	1,339	118,582	88.59	896	84,927	94.77	67.0%	71.6%
2003	2,189	192,432	87.91	1,675	148,625	88.75	76.5%	77.2%
2004	1,705	138,700	81.35	1,293	107,468	83.11	75.8%	77.5%
2005	2,103	182,738	86.87	1,456	134,930	92.65	69.2%	73.8%
2006	2,411	228,321	94.72	1,528	164,113	107.38	63.4%	71.9%
% increase								
92-96	233%	203%	-9%	288%	246%	-11%		
97-01	89%	138%	26%	74%	121%	27%		
02-06	80%	93%	7%	71%	93%	13%		

Source: US Dept of Commerce.
*Quantity in 1,000 95-lb boxes and the value in dollars (c.i.f. value).

Table 2. Florida Tangerine utilization and on-tree prices

Season	Fresh Utilization (000 boxes)				On-Tree Prices ($/box)			
	FL		CA	AZ	FL		CA	AZ
	Early	Honey			Early	Honey		
1989-90	792	207	1,240	460	25.10	24.94	22.28	18.68
1990-91	529	698	925	497	24.30	26.00	23.68	20.18
1991-92	1,000	965	1,680	880	23.50	21.70	18.58	14.78
1992-93	1,091	974	1,465	702	18.20	18.40	15.39	15.19
1993-94	1,715	1,270	1,600	808	13.50	13.00	14.05	11.95
1994-95	1,794	868	1,700	582	10.40	26.50	18.92	16.12
1995-96	2,025	1,119	1,800	766	14.85	20.25	13.72	12.12
1996-97	2,713	1,044	2,120	677	9.85	20.15	16.52	14.72
1997-98	2,060	1,368	1,648	482	10.40	15.70	14.62	13.52
1998-99	2,172	1,398	1,063	720	13.05	19.65	18.72	21.92
1999-00	2,630	1,790	1,700	590	9.50	10.40	14.09	11.79
2000-01	2,475	1,280	1,710	468	8.50	14.50	15.92	16.72
2001-02	2,790	1,424	1,970	571	11.20	15.20	17.23	14.73
2002-03	2,110	1,804	2,450	377	12.20	11.90	15.54	18.14
2003-04	2,307	2,133	1,939	466	10.50	12.70	14.03	12.63
2004-05	1,814	1,504	2,477	322	14.00	18.20	18.40	13.70
2005-06	1,913	1,695	2,696	357	15.70	11.30	18.66	15.16

Source: FASS, *Citrus Summary*

Table 3. Florida, California, and Arizona Tangerine packing-house-door (PHD) prices

Season	FL	CA	AZ
		$/Box	
1988-89	21.60	18.66	18.76
1989-90	27.00	24.41	20.81
1990-91	27.90	26.25	22.75
1991-92	25.20	20.38	16.58
1992-93	20.90	17.43	17.23
1993-94	16.60	16.08	13.98
1994-95	18.70	21.00	18.20
1995-96	20.60	15.80	14.20
1996-97	15.95	18.60	16.80
1997-98	15.70	16.70	15.60
1998-99	19.10	20.31	23.51
1999-00	13.40	16.39	14.09
2000-01	14.10	18.26	19.06
2001-02	16.00	19.62	17.12
2002-03	15.30	17.98	20.58
2003-04	14.75	17.09	15.69
2004-05	19.10	21.52	16.82

Source: FASS

Table 4. Florida on-tree price and fresh Tangerine supplies – model (1)

	FL Early Tangerines		FL Honey Tangerines		Average On-Tree Price	
Variable	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error
Intercept	39.8819*	7.0048	49.0294*	7.1468	44.3531	4.9476
SQ_E	0.0013	0.0362				
SQ_L			-0.0152	0.0482		
SQ_T					0.0111	0.0263
FEQ_E	-0.0119*	0.0025				
FHQ_L			-0.0153*	0.0028		
FQ_T					-0.0079	0.0015
CAQ	-0.0016	0.0026	-0.0033	0.0027	-0.0016	0.0019
AZQ	0.0062	0.0079	-0.0019	0.0077	0.0041	0.0066
R-Sq	0.8618		0.8490		0.9302	

*Statistically different from zero at $\alpha = 0.05$ level.

Table 5. Florida PHD price and fresh Tangerine supplies

Variable	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error
	Model (1)		Model B	
Intercept	46.7980*	5.0611	55.1842*	8.3526
FQ_T	-0.0077*	0.0015		
CAQ	-0.0015	0.0022	-0.0080*	0.0031
AZQ	0.0054	0.0066	-0.0158*	0.0089
SQ_T	0.0103	0.0270	-0.1065*	0.0243
	0.9317		0.7726	

Table 6. Simple correlation coefficients

	SQ_T	FQ_T	CAQ	AZQ	SQ_E	SQ_L	FQ_E	FQ_L
SQ_T	1.0000	0.7990	0.5014	-0.5696	0.9153	0.6835	0.6903	0.7916
		0.0001	0.0403	0.0170	<.0001	0.0025	0.0022	0.0002
FQ_T		1.0000	0.5656	-0.1939	0.8269	0.3729	0.9430	0.8762
			0.0180	0.4559	<.0001	0.1405	<.0001	<.0001
CAQ			1.0000	-0.4428	0.4396	0.3777	0.4743	0.5811
				0.0751	0.0775	0.1350	0.0544	0.0144
AZQ				1.0000	-0.4325	-0.5503	-0.1001	-0.2897
					0.0829	0.0221	0.7022	0.2594
SQ_E					1.0000	0.3315	0.7324	0.7932
						0.1936	0.0008	0.0001
SQ_L						1.0000	0.2895	0.4166
							0.2597	0.0962
FQ_E							1.0000	0.6659
								0.0035
FQ_L								1.0000

Table 7. Florida on-tree prices, PHD price, and fresh Tangerine utilization – model A

Variable	Parameter Estimate	Standard Error
	Early Tangerine On-tree Price	
Intercept	41.8390*	2.8194
FQ_E	-0.0125*	0.0014
R-Sq	0.8375	
	Honey Tangerine On-tree Price	
Intercept	44.5699*	2.7571
FQ_L	-0.0174*	0.0021
R-Sq	0.8282	
	Average On-Tree Price	
Intercept	44.7808*	2.0221
FQ_T	-0.0079*	0.0006
R-Sq	0.9181	
	PHD Price	
Intercept	48.2238*	2.0251
FQ_T	-0.0078*	0.0006
R-Sq	0.9185	

*Statistically different from zero at $\alpha = 0.05$ level.

Table 8. Florida Tangerine on-tree prices and non-Florida Tangerine supplies – model B

	FL Early Tangerines		FL Honey Tangerines		Average On-Tree Price	
Variable	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error
Intercept	44.8574*	11.2471	46.5346*	12.9809	52.0309*	8.4932
SQ_E	-0.1256*	0.0392				
SQ_L			-0.0883	0.0845		
SQ_T					-0.1103*	0.0249
CAQ	-0.0066**	0.0039	-0.0110*	0.0043	-0.0071*	0.0029
AZQ	-0.0113	0.0113	-0.0057	0.0139	-0.0191*	0.0089
R-Sq	0.6050		0.4581		0.7574	

*Statistically different from zero at $\alpha = 0.05$ level.
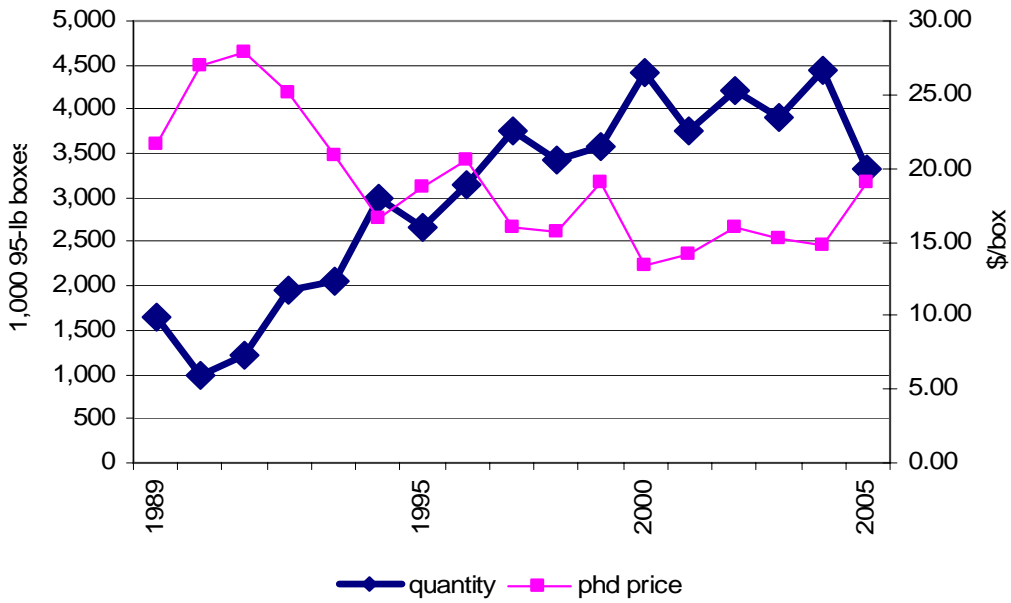**Statistically different from zero at $\alpha = 0.10$ level.

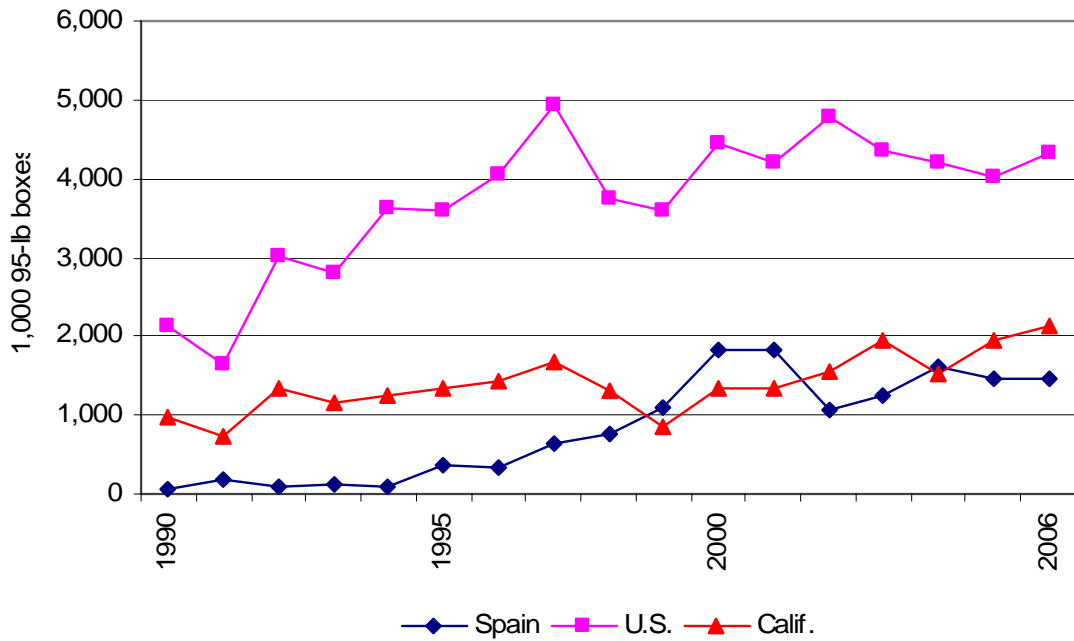Figure 1. PHD prices and Florida fresh Tangerine utilization

Figure 2. Spanish Mandarin and Clementine imports and U.S./California fresh Tangerine utilization