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EU'S IMPORT DEMAND FOR FRESH GRAPEFRUIT

BY

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This report provides fresh grapefruit import data regarding European Union 15 (EU-15)[1] and an in-depth look into the share changes for fresh grapefruit imports by country of origin. EU-15 as a whole is a major exporting region of U.S. fresh grapefruit and about 27% of U.S. fresh grapefruit were shipped to EU-15 during the period from 1989 through 2006 (Table 1).

Table 1. U.S. fresh grapefruit exports by destination

Year	Total Exports		Japan (% of Total)		EU 15 (% of Total)		Canada (% of Total)	
	1,000 MT	$mil	Q	Dollar	Q	Dollar	Q	Dollar
1989	484.85	241.61	56.1%	57.8%	29.1%	26.4%	4.9%	5.9%
1990	320.67	178.50	45.9%	51.9%	30.5%	26.3%	18.2%	16.5%
1991	466.88	273.11	54.3%	59.4%	24.7%	22.2%	16.4%	14.1%
1992	430.19	236.28	55.4%	56.4%	22.8%	21.7%	15.4%	15.2%
1993	443.68	221.33	50.6%	49.8%	26.0%	27.7%	16.5%	15.8%
1994	475.73	231.48	54.4%	58.4%	23.1%	22.4%	15.8%	12.4%
1995	494.30	248.43	49.4%	55.3%	25.9%	22.9%	15.3%	12.1%
1996	479.23	249.17	48.1%	54.8%	27.2%	22.7%	14.6%	11.4%
1997	486.14	235.87	45.4%	52.0%	30.9%	26.9%	14.9%	12.2%
1998	385.57	193.49	44.5%	50.1%	35.6%	28.7%	13.0%	14.8%
1999	422.72	219.36	48.7%	53.7%	31.1%	26.2%	13.1%	13.2%
2000	392.18	209.42	52.9%	56.2%	28.4%	25.7%	12.6%	12.0%
2001	384.12	196.52	51.3%	54.2%	29.4%	25.9%	12.5%	13.0%
2002	406.93	207.43	51.5%	55.0%	27.2%	25.7%	12.4%	12.3%
2003	360.26	202.50	50.5%	52.2%	27.3%	25.4%	12.3%	12.3%
2004	412.26	254.60	54.9%	55.8%	24.7%	22.6%	11.3%	11.2%
2005	214.23	151.32	41.2%	43.3%	25.6%	23.8%	16.2%	16.9%
2006	45.15	37.16	43.5%	45.4%	24.5%	20.9%	11.7%	10.1%
Average	394.73	210.42	49.9%	53.4%	27.4%	24.7%	13.7%	12.9%

Source: U.S. Department of Commerce

EU-15 imported fresh grapefruit from countries all over the world. About 62% of the imports came from the Northern Hemisphere countries, 31% from the Southern Hemisphere countries, and 7% from the Central American countries. Fresh grapefruit imported into the EU-15 have decreased from 440,466 MT in 1997 to 325,522 MT in 2005, a decrease of 26% over the nine-year period. Imports from the countries in the Northern Hemisphere have decreased from 307,666 MT in 1997 to 162,571 MT in 2005, a decrease of 47%. Imports from Central American countries also decreased from 33,748 MT to 20,798 MT during the same period, a decrease of 38%; however, the imports from Central American countries rebounded to 24,642 MT during the first ten months in 2006.

[1] EU-15 includes Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxemburg, the Netherlands, Portugal, Spain, Sweden, and United Kingdom.

Imports from countries in the Southern Hemisphere stay around a little over 110,000 MT per year (Table 2).

Table 2. EU 15 fresh grapefruit imports by region

Year	World	North		Central		South	
	MT	MT	%World	MT	%World	MT	%World
1997	440,466	307,666	69.8%	33,744	7.7%	96,444	21.9%
1998	428,369	264,970	61.9%	24,668	5.8%	136,935	32.0%
1999	414,459	273,640	66.0%	30,730	7.4%	108,193	26.1%
2000	383,505	235,941	61.5%	23,895	6.2%	122,744	32.0%
2001	347,954	221,770	63.7%	28,110	8.1%	97,160	27.9%
2002	356,970	220,204	61.7%	18,950	5.3%	116,018	32.5%
2003	334,519	196,591	58.8%	26,190	7.8%	110,612	33.1%
2004	303,894	195,817	64.4%	22,456	7.4%	83,321	27.4%
2005	325,522	162,571	49.9%	20,798	6.4%	137,851	42.3%
2006[a]	256,367	127,923	49.9%	24,642	9.6%	101,579	39.6%
Average[b]	370,629	231,019	62.0%	25,505	6.9%	112,142	30.6%

[a]January through October only.
[b]1997 through 2005.
Source: EUROSTAT, http://epp.eurostat.ec.europa.eu accessed March 16, 2007.

The major fresh grapefruit exporting countries in the northern hemisphere are the U.S., Turkey, Israel, and Cyprus. Imports from the U.S. accounted for 47.7% of the imports from the northern hemisphere, which is followed by Israel (27.7%), Turkey (16.7%), and Cyprus (7.3%). Note that imports from the U.S. used to account for 45% to 50% of the imports from the Northern Hemisphere, but the three hurricanes (Charley,

Table 3. Fresh grapefruit imports from countries in the Northern Hemisphere (MT)

Year	Turkey	Israel	China	U.S.	Cyprus	Egypt & Morocco	Total	%World	%US of North
1997	27,520	93,372	35	158,533	27,792	414	307,666	69.8%	51.5%
1998	25,442	86,985	15	136,596	15,792	140	264,970	61.9%	51.6%
1999	40,854	87,252	31	124,720	20,577	205	273,640	66.0%	45.6%
2000	49,773	65,273	15	105,929	14,841	111	235,941	61.5%	44.9%
2001	40,276	55,704	53	109,813	15,571	353	221,770	63.7%	49.5%
2002	47,793	42,615	35	114,565	14,798	397	220,204	61.7%	52.0%
2003	35,929	44,001	223	100,593	15,487	356	196,591	58.8%	51.2%
2004	41,563	44,977	1,414	92,628	14,796	430	195,817	64.4%	47.3%
2005	37,976	56,699	5,911	49,118	12,468	391	162,571	49.9%	30.2%
2006[a]	42,222	36,390	5,765	33,574	9,428	532	127,923	49.9%	26.2%
Average[b]	38,570	64,098	859	110,277	16,902	311	231,019	60.8%	
%North	16.7%	27.7%	0.4%	47.7%	7.3%	0.1%	100.0%		

[a]January through October only.
[b]1997 through 2005.
Source: EUROSTAT, http://epp.eurostat.ec.europa.eu accessed March 16, 2007.

Frances, Jeanne) in 2004 decreased exports of fresh grapefruit from the U.S. for the period from 2004 through 2006, the U.S. market shares decreased from 47.3% in 2004 to 26.2% in 2006. It seems that the decreases in U.S. exports to the EU 15 provided a chance for China to export more. Imports from China increased from 223 MT in 2003 to 5,911 MT in 2005, an increase of 25 folds in three years.

The major fresh grapefruit exporting countries in Central American countries are Honduras, Cuba, and Mexico. Imports from Honduras accounted for 47.0% of the imports from Central America, which is followed by Cuba (36.7%), and Mexico (14.7%). The major fresh grapefruit exporting countries in the Southern Hemisphere are South Africa, Argentina, Swaziland, and Zimbabwe. Imports from South Africa accounted for 68.1% of the imports from the Southern Hemisphere, which is followed by Argentina (19.3%), Swaziland (8.4%), and Zimbabwe (2.9%) (Table 4).

Table 4. Fresh grapefruit imports from Central America and countries in the Southern Hemisphere (MT)

				Northern Hemisphere				
Year	Honduras	Mexico	Cuba	Bahamas	Jamaica	Dom. Rep	Total	%World
1997	15,685	1,473	15,998	2	460	127	33,744	9.2%
1998	12,313	2,452	8,923	567	154	258	24,668	6.9%
1999	15,227	2,730	12,588	115	36	35	30,730	8.9%
2000	11,934	1,619	10,291	0	19	32	23,895	7.5%
2001	10,643	5,781	11,284	372	17	15	28,110	9.7%
2002	8,912	3,926	5,848	240	15	9	18,950	6.4%
2003	9,862	5,910	9,855	479	77	7	26,190	9.4%
2004	13,547	6,840	1,722	269	77	1	22,456	8.9%
2005	12,340	5,361	2,305	442	17	334	20,798	7.7%
2006[b]	11,967	8,901	3,745	19	10	0	24,642	9.6%
Average	12,265	3,841	9,564	255	107	60	26,093	8.3%
%Central	47.0%	14.7%	36.7%	1.0%	0.4%	0.2%	100.0%	

				Southern Hemisphere				
Year	S. Africa	Chile	Uruguay	Argentina	Zimbab-we	Swazi-land	Total[a]	%World
1997	53,384	27	868	27,453	3,894	9,260	96,444	26.3%
1998	90,776	5	1,643	24,863	2,519	16,567	136,935	38.4%
1999	72,788	5	349	19,943	2,859	11,241	108,193	31.3%
2000	92,183	0	58	14,456	4,148	10,928	122,744	38.4%
2001	64,330	0	1,325	19,084	3,534	8,604	97,160	33.5%
2002	84,392	0	483	18,882	3,117	9,144	116,018	39.0%
2003	76,658	0	665	24,504	2,586	6,111	110,612	39.7%
2004	55,770	200	352	19,415	1,436	5,369	83,321	32.9%
2005	97,077	474	513	26,672	4,999	7,197	137,851	50.8%
2006[b]	70,983	2,177	1,976	17,121	2,227	7,003	101,579	39.6%
Average[c]	76,373	79	695	21,697	3,232	9,380	112,142	36.7%
%South	68.1%	0.1%	0.6%	19.3%	2.9%	8.4%	100.0%	

[a]Includes Mozambique.
[b]January through October only.
[c]1997 through 2005.
Source: EUROSTAT, http://epp.eurostat.ec.europa.eu accessed March 16, 2007.

EU-15 imports fresh grapefruit year around. Imports are evenly distributed throughout the entire year except in May, August, and September when imports are smaller than those in other months. Almost all the imports came from Northern Hemisphere countries between December and April in the next year; more than 90% of the imports came from Southern Hemisphere countries between June and August; imports from Central American countries filled the gap in September and October (Table 5).

Table 5. Average fresh grapefruit imports by month -- 1997-2006 (MT)

Month	World	North		Central		South	
	MT	MT	%World	MT	%World	MT	%World
Jan	32,435	32,072	98.9%	235	0.7%	12	0.0%
Feb	35,959	35,257	98.0%	432	1.2%	122	0.3%
Mar	37,715	37,396	99.2%	111	0.3%	20	0.1%
Apr	28,950	28,561	98.7%	50	0.2%	158	0.5%
May	28,612	16,329	57.1%	48	0.2%	12,046	42.1%
Jun	40,263	3,105	7.7%	59	0.1%	36,966	91.8%
Jul	32,923	293	0.9%	133	0.4%	32,132	97.6%
Aug	20,028	43	0.2%	1,454	7.3%	18,373	91.7%
Sep	17,670	645	3.6%	8,176	46.3%	8,757	49.6%
Oct	28,370	16,058	56.6%	9,967	35.1%	2,244	7.9%
Nov*	36,402	31,543	86.7%	4,432	12.2%	277	0.8%
Dec*	26,129	25,069	95.9%	848	3.2%	7	0.0%
Avg	30,455	18,864		2,162		9,260	

*Does not include 2006.
Source: EUROSTAT, http://epp.eurostat.ec.europa.eu accessed March 16, 2007.

The U.S. has been a major supplier of fresh grapefruit for the EU-15, especially during winter months. The peak season for U.S. fresh grapefruit imports is between

Table 6. Fresh grapefruit imports from the Northern Hemisphere countries by month, 1997-2006 (MT)

Month	Turkey	Israel	China	U.S.	Cyprus	Total[a]	%US
Jan	5,893	6,254	337	16,917	2,616	32,072	52.7%
Feb	6,105	7,413	69	18,835	2,786	35,257	53.4%
Mar	6,290	9,230	50	18,832	2,929	37,396	50.4%
Apr	2,477	10,082	63	13,562	2,312	28,561	47.5%
May	1,021	8,414	10	5,877	945	16,329	36.0%
Jun	268	1,653	0	784	383	3,105	25.2%
Jul	49	129	0	49	63	293	16.7%
Aug	4	13	0	19	6	43	44.1%
Sep	4	498	10	124	8	645	19.3%
Oct	5,524	5,759	324	4,208	237	16,058	26.2%
Nov[b]	8,352	7,793	195	13,127	2,074	31,543	41.6%
Dec[b]	4,204	5,410	345	12,871	2,225	25,069	51.3%

[a]Includes Egypt and Morocco.
[b]Does not include 2006.
Source: EUROSTAT, http://epp.eurostat.ec.europa.eu accessed March 16, 2007.

November and April of the next year. The U.S. peak season coincides with the peak season of several major fresh grapefruit exporting countries in the Northern Hemisphere – Turkey, Israel, and Cyprus (Table 6).

The import prices for the fresh grapefruit that came from the U.S. are usually higher than those imported from other Northern Hemisphere countries. Note that the prices of fresh grapefruit imported from China decreased from more than €20 per carton during the period from 1997 through 1999 to around €12-€13 per carton during the period from 2004 through 2006, which makes China's fresh grapefruit competitive among the Northern Hemisphere grapefruit producing countries (Table 7).

Table 7. Average import price per carton (€/42.5 lbs)

Year	Turkey	Israel	China	U.S.	Cyprus	Egypt	Morocco	Avg
1997	8.10	8.56	22.72	8.79	7.53	7.31	8.71	8.54
1998	9.79	9.13	30.43	9.62	7.33	6.78	8.30	9.34
1999	10.08	10.01	25.72	9.46	8.69	7.56	9.17	9.67
2000	10.74	10.62	19.35	11.23	8.57	6.89	9.68	10.79
2001	11.86	12.41	19.43	12.36	10.27	9.64	15.11	12.14
2002	10.96	11.99	16.97	12.47	10.71	11.40	11.88	11.93
2003	12.64	12.62	11.87	13.64	10.54	11.22	13.29	12.98
2004	11.63	11.85	10.75	11.60	10.60	16.30	13.00	11.58
2005	14.19	13.73	12.85	15.64	10.66	12.24	16.78	14.15
2006*	13.12	14.29	13.72	16.11	12.44	12.33	17.26	14.23
Average	10.84	11.08	19.26	11.61	9.34	9.71	11.58	11.08

*January through October only.
Source: EUROSTAT, http://epp.eurostat.ec.europa.eu accessed March 16, 2007.

The above information shows that the U.S. has many competitors for the EU-15 fresh grapefruit import market. A formal analysis was conducted to examine the fresh grapefruit import relationships among the major suppliers of fresh grapefruit in the Northern Hemisphere to the EU-15.

The Rotterdam model was used in this study to examine the fresh grapefruit import demand relationships among the exporting countries. Formally, the model can be written as

(1) $w_{it}dlnq_{it} = \mu_iDQ_t + \sum_j \pi_{ij}dlnp_{jt} + \varepsilon_{it}$

where q_{it} is the quantity of fresh grapefruit imported by EU 15 from country *i* during time period t, p_{jt} is the average price of the fruit from the *j*[th] country of origin in period t, $w_{it} = (s_{it} + s_{it-6})/2$ (s_{it} is the expenditure share for the fresh grapefruit from i[th] country of origin in time period t), $dlnq_{it} = log(q_{it}/q_{it-6})$, $dlnp_{jt} = log(p_{jt}/p_{jt-6})$, $DQ_t = \sum_i w_{it}dlnq_{it}$, μ_i (marginal expenditure share or MES), and π_{ij} (the Slutsky price term) are parameters to be estimated, and ε_{it} is the disturbance term. The Rotterdam demand coefficients in (1) obey the following basic properties:

(2a) Adding-up $\sum_i \mu_i = 1$ and $\sum_i \pi_{ij} = 0$;
(2b) Symmetry $\pi_{ij} = \pi_{ji}$
(2c) homogeneity $\sum_j \pi_{ij} = 0$.

Monthly data on quantities imported and prices for the months November through April of the next year from the WTA were used in this study, i.e., six monthly observations per year. The period from 1997 through 2006 was studied. Fresh grapefruit imports from the major Northern Hemisphere exporting countries were used in this study. These countries are Turkey, Israel, the U.S., and Other (aggregate of Cyprus, China, Egypt, and Morocco).

The models were estimated by the maximum likelihood method obtained by iterating the seemingly unrelated regression method. As the data add up by construction, the error covariance matrix was singular and an arbitrary equation was excluded (Barten, 1969); the parameters for the excluded equation can be obtained using conditions (2a) – (2c) or by re-estimating the model omitting a different equation. In addition to adding-up, homogeneity and symmetry are imposed as our maintained hypothesis. Demand parameters (μ_i and π_{ij}), income elasticity ($\eta_i = \mu_i/w_i$), compensated and uncompensated price elasticity ($\eta_{ij}^* = \pi_{ij}/w_i$ and $\eta_{ij} = (\pi_{ij} - w_j\eta_i)/w_i$, respectively) estimates are presented in Table 8.

Results in Table 8 show that all MES, μ_i, are statistically different from zero except the one for Israel; own-price Slutsky coefficients, π_{ij}, are all negative. Cross-price Slutsky coefficient estimates show substitution relationship between the imports from Turkey and Israel, between imports from Israel and Other countries.

Income elasticity estimates show that a one percent increase (or decrease) in total expenditures in importing fresh grapefruit, imports from Turkey, the U.S., and Other countries would increase by 1.43%, 1.30%, and 0.74%, respectively. The elastic income responses for fresh grapefruit from Turkey and the U.S. indicate that the grapefruit from these two countries is more desirable than the one exported by Israel and Other countries. The uncompensated own-price elasticity estimates are -1.40, -0.69, and -0.79 for Turkey, Israel, and the U.S. fresh grapefruit imports, respectively. Note that the own-price elasticity for Other countries is insignificant. The compensated cross-price elasticity estimates indicate that fresh grapefruit imports from Turkey and Israel, and those imports from the Israel and Other countries are net substitutes. The uncompensated cross-price elasticity estimates (i.e., after compensated for the income effect of a price change) indicate that fresh grapefruit imports from the U.S. and from Israel are complements.

Concluding Remarks

The above discussions show that EU-15's fresh grapefruit imports have decreased in recent years. Most of the decreases were the result of decreased imports from the Northern Hemisphere countries, especially the exports from the U.S. The decreased imports from the U.S. were the results of reduced supplies from Florida after three hurricanes in 2004.

The Rotterdam demand system was used to study the relationship among the fresh grapefruit imported by the EU-15 from several major Northern Hemisphere grapefruit producing countries. Results show that if the EU-15 is going to spend more in importing fresh grapefruit during winter months, Turkey would benefit the most, which is followed by the U.S., Other countries, and Israel benefits the least.

The own-price elasticity estimate of U.S. fresh grapefruit imports shows that the imports of fresh grapefruit from the U.S. is price inelastic; a one percent decrease in price would result in less than one percent of import increase. When Florida's grapefruit industry bounced back from the damages caused by hurricanes and diseases, price would decrease and exports to the EU-15 would expect to increase. Note that the uncompensated cross-price elasticity estimates show that Turkish, Israeli, and Other fresh grapefruit are not substitutes of U.S. fresh grapefruit.

Table 8. Demand parameter and elasticity estimates – 1997 through 2006

Quantity	Total Expenditure	Price			
		Turkey	Israel	US	Other
	MES (μ_i)	Slutsky Coefficient (π_{ij})			
Turkey	0.2479*	-0.2001*	0.1350*	0.1254	-0.0603**
	(0.0573)	(0.1300)	(0.0809)	(0.1245)	(0.0345)
Israel	0.0347		-0.1577*	-0.0560	0.0786*
	(0.0458)		(0.0979)	(0.0889)	(0.0440)
US	0.6607*			-0.0634	-0.0060
	(0.0639)			(0.1611)	(0.0416)
Other	0.0567*				-0.0123
	(0.0172)				(0.0304)
		Demand Elasticity Estimates			
		Compensated Price Elasticity (π_{ij}/w_i)			
Turkey		-1.1538*	0.7787*	0.7231	-0.3480**
		(0.7495)	(0.4665)	(0.7178)	(0.1992)
Israel		0.5580*	-0.6515*	-0.2314	0.3248*
		(0.3343)	(0.4047)	(0.3673)	(0.1818)
US		0.2471	-0.1104	-0.1250	-0.0118
		(0.2453)	(0.1752)	(0.3174)	(0.0821)
Other		-0.7825**	1.0193*	-0.0776	-0.1592
		(0.4479)	(0.5705)	(0.5399)	(0.3941)
	Income Elasticity (μ_i/w_i)	Uncompensated Price Elasticity $((\pi_{ij} - w_j\eta_i)/w_i)$			
Turkey	1.4294*	-1.4017*	0.4327	-0.0022	-0.4582*
	(0.3305)	(0.7479)	(0.4790)	(0.7423)	(0.1999)
Israel	0.1432	0.5332	-0.6861*	-0.3041	0.3138*
	(0.1893)	(0.3338)	(0.4117)	(0.3779)	(0.1816)
US	1.3021*	0.0213	-0.4255*	-0.7857*	-0.1122
	(0.1259)	(0.2454)	(0.1794)	(0.3243)	(0.0824)
Other	0.7353*	-0.9100*	0.8414*	-0.4507*	-0.2159
	(0.2231)	(0.0387)	(0.0540)	(0.1132)	(0.3928)

Numbers in parentheses are standard errors of the estimates.
*Statistically different from zero at α = .05 level.
**Statistically different from zero at α = .10 level.