Testing the Dynamic Characteristics of Competitiveness in Fresh Fish Exports of Euro Mediterranean Countries

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SC6 SC7 SC8 SC9 SC10
SC11
List of eigenvalues in descending order:
.34609 .22606 .17553 .16520 .060973 .031829 .0000
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Null	Alternative	Statistic	95% Critical Value	90%Critical Value
r = 0	r = 1	54.7967	40.5300	37.6500
r<= 1	r = 2	33.0574	34.4000	31.7300
r<= 2	r = 3	24.8983	28.2700	25.8000
r<= 3	r = 4	23.2933	22.0400	19.8600
r<= 4	r = 5	8.1155	15.8700	13.8100
r<= 5	r = 6	4.1727	9.1600	7.5300

****

Cointegration with restricted intercepts and no trends in the VAR
Cointegration LR Test Based on Trace of the Stochastic Matrix

Null	Alternative	Statistic	95% Critical Value	90%Critical Value
r = 0	r>= 1	148.3340	102.5600	97.8700
r<= 1	r>= 2	93.5373	75.9800	71.8100
r<= 2	r>= 3	60.4798	53.4800	49.9500
r<= 3	r>= 4	35.5815	34.8700	31.9300
r<= 4	r>= 5	12.2883	20.1800	17.8800
r<= 5	r = 6	4.1727	9.1600	7.5300

****

Table 9B

Estimated Cointegrated Vectors in Johansen Estimation (Normalized in Brackets)
Cointegration with restricted intercepts and no trends in the VAR

	Vector 1	Vector 2	Vector 3	Vector 4
LRP	.18499	-.13005	-.49152	-.43414
	(-1.0000)	(-1.0000)	(-1.0000)	(-1.0000)
LPF	-.13579	.45697	.55862	-.49686
	(.73401)	(3.5138)	(1.1365)	(-1.1445)
LPI	.33915	-.63862	.27364	.034793
	(-1.8333)	(-4.9105)	(.55673)	(.080142)
LPG	.20169	-.14006	.31841	.33423
	(-1.0903)	(-1.0769)	(.64781)	(.76987)
LPS	-.34553	-.080672	-.046582	.69664
	(1.8678)	(-.62031)	(-.094771)	(1.6046)
LPP	.54447	.32861	-.0042307	.065658
	(-2.9432)	(2.5267)	(-.0086075)	(.15124)
Intercept	-.50152	-.064524	-1.4904	-.67313
	(2.7110)	(-.49614)	(-3.0322)	(-1.5505)

****

Table 9C

Orthogonalized Forecast Error Variance Decomposition for variable LRP
Cointegration with restricted intercepts and no trends in the VAR

Horizon	LRP	LPF	LPI	LPG	LPS	LPP
0	1.00000	0.00	0.00	0.00	0.00	0.00
1	.92017	.0010904	.0014485	.012363	.051340	.013584
6	.70370	.12442	.0029475	.046320	.11112	.011496
12	.53694	.22149	.0046444	.077476	.15015	.0092993
18	.44908	.27292	.0060625	.093567	.16956	.0088082
24	.39659	.30376	.0069173	.10313	.18103	.0085605

****

Table 8A

Cointegration with restricted intercepts and no trends in the VAR
Cointegration LR Test Based on Maximal Eigenvalue of the Stochastic Matrix

130 observations from 1995M2 to 2005M11. Order of VAR = 2

List of variables included in the cointegrating vector:

LRS	LPF	LPI	LPG	LPS
LPP	Intercept			

List of I(0) variables included in the VAR:

SC1	SC2	SC3	SC4	SC5
SC6	SC7	SC8	SC9	SC10
SC11				

List of eigenvalues in descending order:

.53713 .36790 .30974 .24968 .11278 .024383 .0000

Null	Alternative	Statistic	95% Critical Value	90%Critical Value
r = 0	r = 1	100.1395	40.5300	37.6500
r<= 1	r = 2	59.6325	34.4000	31.7300
r<= 2	r = 3	48.1889	28.2700	25.8000
r<= 3	r = 4	37.3429	22.0400	19.8600
r<= 4	r = 5	15.5564	15.8700	13.8100
r<= 5	r = 6	3.2090	9.1600	7.5300

Cointegration with restricted intercepts and no trends in the VAR
Cointegration LR Test Based on Trace of the Stochastic Matrix

Null	Alternative	Statistic	95% Critical Value	90%Critical Value
r = 0	r>= 1	264.0693	102.5600	97.8700
r<= 1	r>= 2	163.9298	75.9800	71.8100
r<= 2	r>= 3	104.2973	53.4800	49.9500
r<= 3	r>= 4	56.1084	34.8700	31.9300
r<= 4	r>= 5	18.7654	20.1800	17.8800
r<= 5	r = 6	3.2090	9.1600	7.5300

Table 8B

Estimated Cointegrated Vectors in Johansen Estimation (Normalized in Brackets)
Cointegration with restricted intercepts and no trends in the VAR

	Vector 1	Vector 2	Vector 3	Vector 4
LRS	1.3217	.21732	.21343	-.032509
	(-1.0000)	(-1.0000)	(-1.0000)	(-1.0000)
LPF	-.22182	.56002	-.18452	-.44799
	(.16783)	(-2.5769)	(.86457)	(-13.7805)
LPI	.14952	-.41106	.25354	-.40881
	(-.11312)	(1.8915)	(-1.1880)	(-12.5754)
LPG	.16498	-.10968	.19530	-.12222
	(-.12482)	(.50468)	(-.91508)	(-3.7597)
LPS	-.19496	-.28707	-.24866	.36516
	(.14751)	(1.3210)	(1.1651)	(11.2328)
LPP	-.13360	.18435	.45718	.097198
	(.10108)	(-.84828)	(-2.1421)	(2.9899)
Intercept	.90258	.0091192	-.29226	.68629
	(-.68289)	(-.041962)	(1.3694)	(21.1108)

Table 8C

Orthogonalized Forecast Error Variance Decomposition for variable LRS
Cointegration with restricted intercepts and no trends in the VAR

Horizon	LRS	LPF	LPI	LPG	LPS	LPP
0	1.0000	0.00	0.00	0.00	0.00	0.00
1	.90179	.018875	.0022424	.0083272	.062189	.0065777
6	.65805	.067155	.022509	.022259	.21211	.017922
12	.51783	.10467	.042970	.028724	.28575	.020061
18	.43825	.12634	.054621	.032379	.32726	.021144
24	.38696	.14031	.062131	.034735	.35402	.021841

Table 9A

Cointegration with restricted intercepts and no trends in the VAR
Cointegration LR Test Based on Maximal Eigenvalue of the Stochastic Matrix

129 observations from 1995M3 to 2005M11. Order of VAR = 2.

List of variables included in the cointegrating vector:

LRP	LPF	LPI	LPG	LPS
LPP	Intercept			

List of I(0) variables included in the VAR:

SC1	SC2	SC3	SC4	SC5

0	1.0000	0.00	0.00	0.00	0.00	0.00
1	.94751	.032126	.0040189	.014862	.1763E-4	.0014679
6	.69453	.19313	.0096259	.011690	.012487	.078537
12	.57943	.27629	.0089577	.011425	.020579	.10331
18	.52318	.31647	.0085333	.011293	.024547	.11597
24	.49016	.34004	.0082827	.011215	.026875	.12342

****

Table 7A

Cointegration with restricted intercepts and no trends in the VAR
Cointegration LR Test Based on Maximal Eigenvalue of the Stochastic Matrix

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129 observations from 1995M3 to 2005M11. Order of VAR = 2.
List of variables included in the cointegrating vector:
LRG LPF LPI LPG LPS
LPP Intercept
List of I(0) variables included in the VAR:
SC1 SC2 SC3 SC4 SC5
SC6 SC7 SC8 SC9 SC10
SC11
List of eigenvalues in descending order:
.35029 .25544 .21862 .17426 .072500 .031587 0.00

****

Null	Alternative	Statistic	95% Critical Value	90%Critical Value
r = 0	r = 1	55.6289	40.5300	37.6500
r<= 1	r = 2	38.0504	34.4000	31.7300
r<= 2	r = 3	31.8237	28.2700	25.8000
r<= 3	r = 4	24.7003	22.0400	19.8600
r<= 4	r = 5	9.7089	15.8700	13.8100
r<= 5	r = 6	4.1405	9.1600	7.5300

****

Cointegration with restricted intercepts and no trends in the VAR
Cointegration LR Test Based on Trace of the Stochastic Matrix

Null	Alternative	Statistic	95% Critical Value	90%Critical Value
r = 0	r>= 1	164.0527	102.5600	97.8700
r<= 1	r>= 2	108.4238	75.9800	71.8100
r<= 2	r>= 3	70.3734	53.4800	49.9500
r<= 3	r>= 4	38.5497	34.8700	31.9300
r<= 4	r>= 5	13.8494	20.1800	17.8800
r<= 5	r = 6	4.1405	9.1600	7.5300

****

Table 7B

Estimated Cointegrated Vectors in Johansen Estimation (Normalized in Brackets)
Cointegration with restricted intercepts and no trends in the VAR

	Vector 1	Vector 2	Vector 3	Vector 4
LRG	-.74606	-1.2686	-.75008	.44736
	(-1.0000)	(-1.0000)	(-1.0000)	(-1.0000)
LPF	.060145	.48298	-.28869	.68904
	(.080616)	(.38072)	(-.38488)	(-1.5402)
LPI	.20168	-.53093	.49401	.23642
	(.27033)	(-.41852)	(.65861)	(-.52846)
LPG	.079826	-.48000	-.0043962	.10503
	(.10700)	(-.37837)	(-.0058610)	(-.23477)
LPS	-.15584	.12800	.26103	-.58287
	(-.20889)	(.10090)	(.34800)	(1.3029)
LPP	.67180	.15556	-.20027	-.14558
	(.90046)	(.12262)	(-.26700)	(.32541)
Intercept	-.15215	1.3500	.50981	-.96792
	(-.20394)	(1.0641)	(.67968)	(2.1636)

****

Table 7C

Orthogonalized Forecast Error Variance Decomposition for variable LRG
Cointegration with restricted intercepts and no trends in the VAR

Horizon	LRG	LPF	LPI	LPG	LPS	LPP
0	1.0000	0.00	0.00	0.00	0.00	0.00
1	.91662	.0036577	.016616	.016530	.014678	.031898
6	.71730	.074541	.029261	.071428	.033953	.073522
12	.57275	.13711	.043717	.11745	.067072	.061899
18	.47948	.17636	.052714	.14740	.089659	.054386
24	.41432	.20368	.058990	.16835	.10549	.049171

****

LPP	-.16570	.45262	-.15935	-.082039
	(-.19250)	(1.0060)	(-.13632)	(-.15111)

****

Table 5C

Orthogonalized Forecast Error Variance Decomposition for variable LRF

Horizon	LRF	LPF	LPI	LPG	LPS	LPP
0	1.00000	0.00	0.00	0.00	0.00	0.00
1	.95888	.024303	.6300E-3	.014767	.0013752	.4976E-4
6	.75344	.073304	.018214	.11824	.033412	.0033874
12	.59592	.089197	.043624	.19768	.065546	.0080330
18	.49976	.098242	.059523	.24604	.085431	.011001
24	.43528	.10429	.070192	.27846	.098772	.012996

****

Table 6A

Cointegration with restricted intercepts and no trends in the VAR
Cointegration LR Test Based on Maximal Eigenvalue of the Stochastic Matrix

****

129 observations from 1995M3 to 2005M11. Order of VAR = 2.
List of variables included in the cointegrating vector:
LRI LPF LPI LPG LPS
LPP Intercept
List of I(0) variables included in the VAR:
SC1 SC2 SC3 SC4 SC5
SC6 SC7 SC8 SC9 SC10
SC11
List of eigenvalues in descending order:
.33547 .25918 .19775 .14709 .067269 .031628 0.00

****

Null	Alternative	Statistic	95% Critical Value	90%Critical Value
r = 0	r = 1	52.7188	40.5300	37.6500
r<= 1	r = 2	38.6997	34.4000	31.7300
r<= 2	r = 3	28.4237	28.2700	25.8000
r<= 3	r = 4	20.5235	22.0400	19.8600
r<= 4	r = 5	8.9834	15.8700	13.8100
r<= 5	r = 6	4.1460	9.1600	7.5300

****

Cointegration with restricted intercepts and no trends in the VAR
Cointegration LR Test Based on Trace of the Stochastic Matrix

Null	Alternative	Statistic	95% Critical Value	90%Critical Value
r = 0	r>= 1	153.4951	102.5600	97.8700
r<= 1	r>= 2	100.7763	75.9800	71.8100
r<= 2	r>= 3	62.0766	53.4800	49.9500
r<= 3	r>= 4	33.6529	34.8700	31.9300
r<= 4	r>= 5	13.1294	20.1800	17.8800
r<= 5	r = 6	4.1460	9.1600	7.5300

****

Table 6B

Estimated Cointegrated Vectors in Johansen Estimation (Normalized in Brackets)
Cointegration with restricted intercepts and no trends in the VAR

	Vector 1	Vector 2	Vector 3
LRI	-.20894	-.62875	-.42047
	(-1.0000)	(-1.0000)	(-1.0000)
LPF	.24050	.71169	.20512
	(1.1511)	(1.1319)	(.48783)
LPI	-.35124	-.22473	.65747
	(-1.6811)	(-.35743)	(1.5637)
LPG	-.22160	.13006	.31587
	(-1.0606)	(.20685)	(.75123)
LPS	.14952	-.45019	-.25957
	(.71563)	(-.71601)	(-.61733)
LPP	-.49212	.38279	-.16227
	(-2.3554)	(.60882)	(-.38592)
Intercept	.56408	-.87486	-.95650
	(2.6998)	(-1.3914)	(-2.2748)

****

Table 6C

Orthogonalized Forecast Error Variance Decomposition for variable LRI
Cointegration with restricted intercepts and no trends in the VAR

Horizon	LRI	LPF	LPI	LPG	LPS	LPP

APPENDIX

Table 4

Unit-Root Tests for the Variables in Levels

****

		LRF	LRI	LRG	LRS	LRP	LPF	LPI	LPG	LPS	LPP
Not a trend	ADF(6)	-1.0189	-3.1889	-2.8502	-3.0652	-3.7486	-1.4247	-2.7130	-1.3467	-1.9168	-5.4670
	ADF(12)	-.32710	-1.3627	-2.6241	-2.2939	-1.9448	.077671	-1.2307	-1.0542	-2.0070	-2.2106
Linear Trend	ADF(6)	-3.0005	-3.2845	-3.4608	-6.1786	-4.2380	-3.4442	-4.4315	-2.3706	-3.3168	-6.3328
	ADF(12)	-1.6283	-1.0607	-1.5004	-3.3933	-2.2647	-2.0669	-2.5528	-1.6951	-3.4154	-1.8894

Note: 95% critical value for the augmented Dickey-Fuller statistic with intercept but not a trend = -2.8859

95% critical value for the augmented Dickey-Fuller statistic with intercept and a linear trend = -3.4481

Unit-Root Tests for the Variables in First Differences

		DLRF	DLRI	DLRG	DLRS	DLRP	DLPF	DLPI	DLPG	DLPS	DLPP
Not a trend	ADF(6)	-8.2519	-7.4590	-5.6488	-7.4024	-7.9196	-5.6842	-5.7317	-6.2083	-6.6250	-6.9662
	ADF(12)	-4.4862	-4.3611	-4.7872	-5.1941	-4.5298	-5.4832	-4.4037	-2.9982	-4.0725	-4.9946
Linear Trend	ADF(6)	-8.2589	-7.4349	-5.6486	-7.3831	-7.8948	-5.6877	-5.7043	-6.1852	-6.5729	-6.9419
	ADF(12)	-4.8539	-4.3757	-5.0936	-5.2831	-4.4931	-5.5885	-4.3818	-3.0023	-4.0926	-5.0215

Note: 95% critical value for the augmented Dickey-Fuller statistic with intercept but not a trend = -2.8861

95% critical value for the augmented Dickey-Fuller statistic with intercept and a linear trend = -3.4484

****

Table 5A

Cointegration with no intercepts or trends in the VAR

Cointegration LR Test Based on Maximal Eigenvalue of the Stochastic Matrix

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*******************************************************************************
 130 observations from 1995M2  to 2005M11. Order of VAR = 2
 List of variables included in the cointegrating vector:
 LRF             LPF             LPI             LPG             LPS
 LPP
 List of I(0) variables included in the VAR:
 SC1             SC2             SC3             SC4             SC5
 SC6             SC7             SC8             SC9             SC10
 SC11
 List of eigenvalues in descending order:
.41275     .31283     .26489     .22101    .027225   .1702E-3
*******************************************************************************
```

Null	Alternative	Statistic	95% Critical Value	90%Critical Value
r = 0	r = 1	69.1992	36.2700	33.4800
r<= 1	r = 2	48.7730	29.9500	27.5700
r<= 2	r = 3	40.0052	23.9200	21.5800
r<= 3	r = 4	32.4691	17.6800	15.5700
r<= 4	r = 5	3.5883	11.0300	9.2800
r<= 5	r = 6	.022128	4.1600	3.0400

****

Cointegration with no intercepts or trends in the VAR

Cointegration LR Test Based on Trace of the Stochastic Matrix

Null	Alternative	Statistic	95% Critical Value	90%Critical Value
r = 0	r>= 1	194.0569	83.1800	78.4700
r<= 1	r>= 2	124.8577	59.3300	55.4200
r<= 2	r>= 3	76.0847	39.8100	36.6900
r<= 3	r>= 4	36.0795	24.0500	21.4600
r<= 4	r>= 5	3.6104	12.3600	10.2500
r<= 5	r = 6	.022128	4.1600	3.0400

****

Table 5B

Estimated Cointegrated Vectors in Johansen Estimation (Normalized in Brackets)

	Vector 1	Vector 2	Vector 3	Vector 4
LRF	-.86081	-.44992	-1.1689	-.54292
	(-1.0000)	(-1.0000)	(-1.0000)	(-1.0000)
LPF	-.59905	-.16243	.10579	.34361
	(-.69592)	(-.36103)	(.090499)	(.63289)
LPI	.42315	-.027838	-.32963	.26442
	(.49158)	(-.061874)	(-.28199)	(.48703)
LPG	.34876	.098926	.21300	-.010736
	(.40515)	(.21988)	(.18222)	(-.019775)
LPS	.15905	-.22980	.098513	-.54781
	(.18477)	(-.51076)	(.084276)	(-1.0090)

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Portugal do not comprise important explanatory factor for RCA of these countries, indicating that non prices factors play the most important role in their competitive position. Among countries revealing comparative advantage, only export prices of Greece comprise important explanatory factor for the RCA behaviour of this country. Finally, French export prices comprise the most explanatory factor for the behaviour of RCA of almost all countries, either in short or in medium run.

Thus, the competitive position for each country is affecting by different factors and in all cases at different level, constituting a dynamic market, that can be easily affected by the continual changes in the volatile marketing environment. Therefore, marketing strategies should be cautiously devised aiming to improve the particular explanatory factors for each country, fostering the competitiveness of Euro Mediterranean fresh fish exports towards the E.U market.

country- France, Italy, Greece, Portugal and Spain- are presented in Tables 5A, 6A, 7A, 8A, 9A, respectively. The estimated cointegrated vectors are presented in tables 5B, 6B, 7B, 8B, and 9B, respectively.

iii) Thereafter, we estimated the implied error correction VAR system (ECVAR), for each country, in order to proceed with the investigation of the dynamic characteristics of the examined relationships in the short and medium run time horizon (1-24 months ahead), which seems rather more meaningful for the purposes of our analysis. More specifically, we applied Innovation Accounting analysis and especially the Variance Decomposition technique, in order to make clear the way each one of the RCAs responds when shocked in the context of the estimated ECVAR system. The findings, reported in tables 5C, 6C, 7C, 8C and 9C, demonstrate significant variations between the considered countries. In specific, the most significant explanatory factor for RCA of French exports are the prices of Greek exports, both in short and medium run (10-27%). The prices of French exports do not comprise an important explanatory factor for the behaviour of RCA of this country (Table 5C). For Italian exports, the main explanatory factor for RCA are the prices of French exports, both in short and medium run (11-34%). The prices of Italian exports are not important in explaining the behaviour of RCA of this country (Table 6C). Next, with regard to the Greek exports, the results suggest that the prices of French exports are the most important explanatory factor for RCA though only in short run (14-20%). In the medium run, it is the prices of Greek exports that comprise the main explanatory factor for the behaviour of RCA (10-17%), of this country (Table 7C). For Portugal, RCA is explained by the prices of French exports, both in short and medium run (10-30%). The prices of Portuguese exports do not exhibit any causal effect on the behaviour of the Portuguese RCA (Table 8C). Finally, for the Spanish case the results reveal that the prices of Spanish exports comprise the dominating explanatory factor for the behaviour of RCA of this country, both in short and medium run (10-17%) while the prices of French exports explain another 10-14%, in the medium run (Table 9C).

4. Conclusions

This paper has attempted to evaluate the competitive position of French, Italian, Greek, Portuguese and Spanish fresh fish exports towards the E.U market and to investigate the possible factors affecting this competitive level. RCA indices and prices of exports of the above countries were estimated. Afterwards, econometric analysis was used in order to investigate the dynamic interactions between the estimated RCA indices and prices. Results demonstrate that all countries, except Spain, reveal comparative advantage. Greek exports present the highest competitive level, followed by French, Portuguese and Italian. Prices estimations reveal that exports from all countries present an upward trend, except Greek exports that portray a downward trend. Furthermore, export prices of France, Italy and

Table 2. RCA Indices

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Gain/ Loss(%)
France	1.19	1.31	1.36	1.23	1.31	1.17	1.21	1.29	1.18	1.06	1.18	- 0.55
Italy	1.13	0.95	1.09	1.08	0.97	0.99	1.03	0.85	0.93	0.97	1.12	- 0.55
Greece	1.70	1.65	1.87	1.83	2.20	2.17	2.48	2.51	2.56	2.46	2.34	+ 37.42
Portugal	0.79	0.80	0.63	1.04	0.76	0.97	0.75	0.82	1.19	0.99	1.13	+ 43.92
Spain	0.57	0.56	0.52	0.54	0.53	0.57	0.54	0.54	0.51	0.65	0.60	+ 4.54

Source: own calculations based on Eurostat data

Applying the formula (2), prices were estimated for the exports of each country. Results demonstrate that export prices for all countries, except Greece, present an upward trend (Table 3). In 1995 Greek exports hold the highest price level (5.85), followed by French (4.21), Portuguese (1.95), Italian (1.84) and Spanish (1.60). In 2005 French exports hold the highest prices (5.36), followed by Greek (4.00), Spanish (3.11), Italian (2.52) and Portuguese (1.97). Concerning the percentage gain/loss, Spanish exports present the highest increase (+94.54%), followed by Italian (+36.9%), French (+27.39%) and Portuguese (+1.40%), while Greek exports reveal a considerable loss (-31.64%).

Table 3. Prices ((in €)

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Gain/ Loss (%)
France	4.21	3.61	2.68	3.22	3.50	3.28	3.83	3.95	4.01	4.40	5.36	+ 27.39
Italy	1.84	1.90	1.98	2.05	2.16	1.93	2.31	2.74	2.33	2.04	2.52	+ 36.90
Greece	5.85	5.94	6.38	5.87	5.57	4.60	4.96	3.70	3.88	3.91	4.00	- 31.64
Portugal	1.95	2.01	2.12	2.45	2.62	2.07	3.41	2.49	3.53	2.95	1.97	+ 1.40
Spain	1.60	1.86	2.20	2.33	2.35	2.44	3.03	2.87	3.46	3.30	3.11	+ 94.54

Source: own calculations based on Eurostat data

The results obtained by the empirical analysis, are presented in the appendix and reveal the followings:

i)Regarding the integration characteristics of the involved variables (RCA and prices), findings demonstrate that series are non stationary at levels while they become stationary when tested in first difference form. This implies a further use of all the series in first differences and indicates the possible existence of a long run equilibrium relationship (cointegration) among them and hence causal interactions among the examined variables (Table 4).

ii)Regarding the cointegration test among RCA and the whole set of the price series for each one of the examined countries, the findings, based on Maximal Eingevalue and Trace tests, reveal the existence of long run equilibrium relationships which implies the existence of causal effects in either/or both the short and long run time horizon. The results for each

When P is taken to be lower triangular matrix, the coefficients of θ(s) represent "responses to shocks or innovations" in particular variables. More precisely, the jk-th element of θ(s) is assumed to represent the effect on variable j of a unit innovation in the k-th variable that has occurred s periods ago. Furthermore, we can allocate the variance of each element in y to sources in elements of w, since w is serially and contemporaneously uncorrelated. The orthogonalization provides

$$\sum_{s=0}^{T} \theta(s)_{ij}^{2}$$

which is the components-of-error variance in the T+1 step ahead forecast of y_i which is accounted for by innovations in y_j.

However, performing the analysis of competitiveness at sector/industry level reveals an average measure of competitiveness for that sector/industry but does not reflect particular strengths and weaknesses of individual products unless the competitiveness is analyzed at a disaggregated level. In case of fresh fish, numerous individual fresh fish products exist in the EU market, and considering all of them requires barely available data and the estimation of a large number of parameters. To avoid these impediments, the current analysis is performed with more broadly defined fresh fish product category. According to the official classification of Eurostat, fresh fish product category includes fresh or chilled fish (category 0302). Available country-by-country and total EU(15) monthly data, regarding fresh fish product category, for the years 1995 to 2005 was used.

3. Results and Discussion

Applying the formula (1), RCA indices were derived for the Med5 countries. Results demonstrate that all countries except Spain reveal comparative advantage (Table 2). Specifically, Greek fish exports have the highest competition level (2.34), followed by French (1.18), Portuguese (1.13) and Italian (1.12). The evolution in competitiveness reveals that Portugal and Greece considerably have strengthened their position, while France and Italy reveal an almost constant trend. In terms of percentage gain/loss, Portugal achieved the highest increase (+44%) followed by Greece (+37%) and Spain (+5%), while France and Italy reveal a negligible loss (-0.5%).

constant terms, v(t) is a n×1 vector of residuals and Δ is the first difference operator. The testing procedure involves the hypothesis H_2: αβ′, where α and β are n×r matrices of loadings and eigenvectors respectively, that there are r cointegrating vectors β_1, β_2,..., β_r which provide r stationary linear combinations β′x(t-q). The likelihood ratio (LR) statistic for testing the above hypothesis

$$-2\ln Q=-T\cdot\sum_{i=r+1}^{n}\ln(1-\hat{\lambda}_i) \quad (4)$$

is a test that there are at most r cointegrating vectors versus the general alternative (trace), where λ_i corresponds to the n-r smaller eigenvalues. The n×r matrix of cointegrating vectors β can be obtained as the r, n-element eigenvectors corresponding to λ_i.

The LR test statistic for testing r against r+1 cointegrating vectors is given by

$$-2\ln(Q{:}r|r+1)=-T\cdot\ln(1-\hat{\lambda}_{r+1}). \quad (5)$$

The above tests (2) and (3) are used to determine the significant eigenvalues and the corresponding number of eigenvectors.

Innovation Accounting

Innovation accounting consists of impulse response analysis and variance decompositions. More specifically, according to the Wold decomposition theorem, any finite linearly regular covariance stationary process y(t), m×1, has a moving average representation

$$y(t)=\sum_{s=0}^{\infty}\Phi(s)u(t-s) \quad (6)$$

with Var[u(t)]=∑.

Although u(t) is serially uncorrelated by construction, the components of u(t) may be contemporaneously correlated. Therefore, an orthogonalizing transformation to u(t) is done so that (4) can be rewritten as[1]

$$y(t)=\sum_{s=0}^{\infty}\Phi(s)P^{-1}Pu(t-s)=\sum_{s=0}^{\infty}\theta(s)w(t-s)$$

where $\theta(s)=\Phi(s)P^{-1}$, w(t-s)=Pu(t-s) and Var[w(t)]=Var[Pu(t)]=I.

regarding fresh fish exports of the Euro Mediterranean countries towards E.U market. Regarding the estimation of the price factors, the following formula was used.

$$P_{ij} = V_{ij} / Q_{ij} \tag{2}$$

where V denotes values (in €), Q denotes quantities (in Kg), i denotes country, and j denotes product.

Regarding the investigation of the relationship among RCA indices and prices, the empirical approach used in this study based in the following methodology.

Cointegration

The long-run relationship between a number of series can be looked at from the viewpoint of cointegration. Cointegration is a time series modelling technique developed to deal with non stationary time series in a way that does not waste the valuable long-run information contained in the data. Moreover, the need to evaluate models which combine both short-run and long-run properties and which at the same time maintain stationarity in all of the variables, has prompted a reconsideration of the problem of regression using variables measured in their levels. As Granger and Newbold, and Phillips pointed out, given that many economic time series exhibit the characteristics of the integrated processes of order one, I(1), estimating traditional OLS or VAR models with I(1) processes can lead to nonsensical or spurious results. Note that, I(1) processes are those which need to be differenced to achieve stationarity.

Let x(t) be a vector of n-component time series each integrated of order one. Then x(t) is said to be cointegrated CI(1, 0), if there exists a vector ϕ such that

$$s(t)=\phi' x(t)$$

is I(0). Stationarity of s(t) implies that the n variables of x(t) do not drift away from one another over the long-run, obeying thus an equilibrium relationship. If ϕ exists, it will not be unique, unless x(t) has only two elements. The Engle and Granger approach can deal with the possibility of only one linear combination of variables that is stationary. Recent advances in cointegration theory (Johansen and Juselius) have developed a maximum likelihood (ML) testing procedure on the number of cointegrating vectors which also allows inferences on parameter restrictions. The ML method uses a vector autoregressive (VAR) model

$$\Delta x(t)=\sum_{i=1}^{q-1} \prod_i \Delta x(t-i)+\prod_q x(t-q)+\mu+v(t) \tag{3}$$

where x(t) is a n×1 vector of variables, $\prod_q$ is a n×n matrix of rank r≤n, μ is a n×1 vector of which, in turn, reflects their ability to protect and/or improve their position in relation to competitors (Drescher and Maurer, 1999). A similar definition is given by Pitts and Lagnevik (1998), who define the competitiveness of an industry as the ability to profitably gain and maintain market share in domestic and/or in foreign markets. Another definition considers competitiveness as the "sustained ability of a nation's industry or firms to compete with foreign counterparts in foreign markets as well as in domestic markets under conditions of free trade" (Kim and Marion, 1997). According to Kennedy *et al*. (1997), competitiveness is the ability to achieve market share. Thus, a product for which market share is increasing can be said to be increasing in competitiveness and, conversely, a product is regarded as decreasing in competitiveness if the market share for that product is in decline.

According to Balassa (1965), Drescher and Mauer (1999) and Banterle (2005), the competitiveness of national economies, and of individual firms and products, can be evaluated through the estimation of the RCA index. The index is formally expressed as:

$$RCA_{ij} = \left(X_{ij} / \sum_i X_{ij} \right) / \left(\sum_j X_{ij} / \sum_{ij} \sum X_{ij} \right) \quad (1)$$

where X denotes exports (values in €), i denotes country, and j denotes product. The values of the index can be more or less than one. In the case that a country has an RCA index higher than one, it has a comparative advantage against its other exported products. In contrast, if the value is less than one, the country is not specialized in that product and no comparative advantage is revealed. However, the RCA index is affected by the total exports of the country. Thus, the same market share of a sector or product could lead to different RCA estimates in accordance with the level of the total exports of that country. For this reason, Pitts and Lagnevik (1998) suggest that RCA indices should be compared over a time period. This approach gives not only a better insight into the evolution in competitiveness for each country, but also provides valuable information regarding the competitive ranking among competing countries.

However, RCA indices would be revealed through an analysis of trade patterns and reflect both relative costs and differences in non price factors (Havrila and Gunawardana, 2003; Lee, 1995). In other words, this index measures the comparative advantage of a country in the trade of a specific product, rather than analyzing the source of comparative advantage (Havrila and Gunawardana, 2003). Thus, a further empirical analysis is needed in order to identify the source of comparative advantage and to define the explanatory factors of the RCA fluctuations. In this study *Cointegration* and *Innovation Accounting* analysis have been implemented in order to investigate the relationship among RCA indices and price factors worldwide market that has vastly transformed to a very competitive one. Fisheries constitute a significant part of the EU food market, and spectacular import growth has been recorded over the last decade. The five Mediterranean (Med5) countries of the EU (France, Italy, Greece, Portugal and Spain) constitute important fresh fish suppliers, and EU imports from Med5 countries present an upward trend over the last decade (Table 1). Specifically, EU fresh fish imports from the Mediterranean countries have increased remarkably, from €415106 million in 1995 to €932030 million in 2005. Furthermore, the percentage of Med5 in relation to EU15, presents an important upward trend, from 26% in 1995 to 36% in 2005. Nevertheless, the lack of relevant literature does not offer any probable explanation of the observed changes in the market of fresh fish, so an investigation into the competitiveness and the factors affecting the competitiveness might be conducive to policy formation and future strategies.

Table 1: E.U Fresh Fish Imports (€ million)

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
EU15	1622967	1770571	1793236	2030292	2219184	2441083	2491146	2445812	2404279	2450145	2554900
Med5	415106	503545	571253	633441	692097	797683	832962	911978	920216	917732	932030
%	26	28	32	31	31	33	33	37	38	37	36

Source: Eurostat.

Note: Med5 = France, Italy, Greece, Portugal, Spain.

In this study, an attempt was made to investigate the competitiveness of the Mediterranean fresh fish exports in the EU market. A comparative approach for the five EU Mediterranean countries (Med5) is followed in order to study the competitive performance of fresh fish and to provide valuable information on the changes in competitiveness over the decade 1995–2005. In addition, this study investigates the factors affecting the competitiveness employing the Co-integration and ECM methodologies. The paper is organized as follows: a thumbnail review of the theoretical concepts and the employed models are presented in the next section. Estimates of Revealed Comparative Advantage (RCA) indices, Co-integration and Innovation Accounting parameters, as well as their implications are reported in Section 3, followed by concluding remarks.

2. Theoretical and Methodological Issues

The recent empirical estimation of competitiveness comprises many scientific approaches, since globalization has significantly increased the competition in the world trade. Literally, the term 'competitiveness' describes the ability of firms and industries to stay competitive

Testing the Dynamic Characteristics of Competitiveness in Fresh Fish Exports of Euro Mediterranean Countries

Abstract

The aim of this paper is to estimate the competitive level of fresh fish exports among the Euro Mediterranean countries. Revealed Comparative Advantage indices of Italian, French, Greek, Portuguese and Spanish fresh fish are estimated, in order to gain new insights regarding the position of these products in the market of the European Union, in terms of competitiveness. In addition, this study investigates the parameters affecting the competitive level among countries, using Cointegration and Innovation Accounting methodology. The estimated Comparative Advantage indices reveal that there is a wide range of competitiveness among Euro Mediterranean countries. In addition, the investigation of the dynamic characteristics of competitiveness reveals that the competitive position for each country is affecting at different level by different factors, constituting a dynamic market that can be easily affected by changes in the volatile marketing environment.

1. Introduction

It is widely argued that competitiveness recently became a major factor that determines the future opportunities and dynamics of the food industry (Kennedy *et al.*, 1997; Hyvonen, 1995; Jensen *et al.*, 1995; Tefertiller and Ward, 1995; Porter, 1990; Murphy, 1989). Major policy developments such as the World Trade Organization (WTO) negotiations, the Common Agricultural and Fisheries Policy (CFP) reforms, and the recent enlargement of the European Union, have caused significant progress in reducing and in some cases eliminating barriers to trade. Thus, the macro marketing environment is changing significantly and greatly intensifying the competition among exporting countries. Fisheries products are found amidst this competitive world and face new threats and opportunities.

In addition, consumers today are deeply concerned about issues of food quality, the environment and society (Baltzer, 2004; Hobbs *et al.*, 2002). Thus, competitiveness is becoming a very complex issue as food products must be competitive and at the same time meet all these consumer concerns. Fisheries cannot be made an exception as they face a

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