6

*International Journal of Economic Issues*, 1: 1 (2008) : 25-42


# THE DYNAMIC CHARACTERISTICS OF COMPETITIVENESS IN THE EU FISH MARKET

KONSTANTINOS POLYMEROS
Department of Ichthyology and Aquatic Environment
University of Thessaly, Greece
CONSTANTINOS KATRAKILIDIS
Department of Economics, Aristotle University of Thessaloniki

The aim of this paper is to estimate the competitive level of fresh fish exports among the Euro-Mediterranean countries. "Revealed Competitive Advantage" (RCA), indices of the Italian, French, Greek, Portuguese and Spanish fresh fish exports 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 dynamic linkages among countries and the way that their competitive level is affected, using Cointegration and Innovation Accounting analysis. The estimated RCA 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 affected at different levels by different factors, constituting a dynamic market that can be easily influenced by changes in the volatile marketing environment.

***JEL classification:*** F14, Q17, Q22

***Key words:*** Fish, Competitiveness, EU market.

## 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 (CAP) 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, 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 are not an exception as they face a very competitive worldwide market. 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 the Med5 countries present an upward trend over the last decade (Table 1). Specifically, EU fresh fish imports from the Med5 countries have increased remarkably, from €415 million in 1995 to €932 million in 2005. The Med5 exports to EU(15) presents an important upward trend, from 26% in 1995 to 36% in 2005. The lack of relevant literature does not offer an adequate explanation of the observed changes in the market of fresh fish, so an investigation into competitiveness and the factors affecting it might be conducive to policy formation and future marketing strategies.

**Table 1**
**EU fresh fish imports (€ million)***

| | *1995* | *1996* | *1997* | *1998* | *1999* | *2000* | *2001* | *2002* | *2003* | *2004* | *2005* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| EU15 | 1622 | 1770 | 1793 | 2030 | 2219 | 2441 | 2491 | 2445 | 2404 | 2450 | 2554 |
| Med5 | 415 | 503 | 571 | 633 | 692 | 797 | 832 | 911 | 920 | 917 | 932 |
| % | 26 | 28 | 32 | 31 | 31 | 33 | 33 | 37 | 38 | 37 | 36 |

*Source:* Eurostat
*Figures represent the annual means constructed from monthly data.

In this study, we attempt to investigate the competitiveness of the Med5 fresh fish exports in the EU market. A comparative approach for the Med5 countries 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, we investigate the factors affecting competitiveness employing the *Cointegration and Innovation Accounting* 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 Competitive Advantage (RCA) indices, Cointegration and Innovation Accounting analysis, as well as their implications are reported in Section III, followed by concluding remarks in Section IV.

## 2. THEORETICAL AND METHODOLOGICAL ISSUES

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

The competitiveness of national economies, sectors/industries and of individual firms and products can be evaluated through the estimation of the RCA index. The RCA index has been applied in a number of studies to check whether a country reveals or not comparative advantage in a specific sector/industry, (Balassa, 1965; Havrila and Gunawardana, 2003; Hillman 1980). In this case the index can be presented as

$$RCA_{ij} = (x_{ij}/X_j)/(x_{iw}/X_w) \quad (1)$$

where, $RCA_{ij}$ is the revealed comparative advantage index for industry $i$ of country $j$, $x_{ij}$ is exports of industry $i$ of country $j$, $X_j$ is total exports of country $j$, $x_{iw}$ is the world exports of industry $i$, and $X_w$ is total world exports. If the value of the index exceeds unity, it can be said that the country has a revealed comparative advantage. In other words, the industry's share in the country's total exports is greater than its share in the world trade. If the value is less than unity, the country is said to have a comparative disadvantage in the sector/industry. According to Havrila and Gunawardana (2003) there are three interpretations of the RCA values: dichotomous, ordinal and cardinal. In the dichotomous interpretation the RCA is applied to check whether there is a comparative advantage or not; in the ordinal interpretation the RCA is applied to rank sectors or countries in terms of comparative advantage; in the cardinal interpretation the RCA is applied to measure the dimension of comparative advantage.

Moreover, the RCA index has been extensively applied to analyze the competitive position of the export market share of a country for a specific product and its export market share for total trade in a set of countries, (Banterle, 2005; Drescher and Maurer, 1999; Pitts and Lagnevik, 1998; Jensen *et al.*, 1995; Hyvonen, 1995; Murphy, 1989). In this case, the index can formally be presented as:

$$RCA_{ij} = \left(X_{ij} \Big/ \sum_i X_{ij}\right) \Big/ \left(\sum_j X_{ij} \Big/ \sum_{ij}\sum X_{ij}\right) \quad (2)$$

where $X$ denotes exports, $i$ denotes country, and $j$ denotes product. The values of the index can be more or less than one. If a country has an RCA index higher than one, it has a competitive advantage, whereas if the RCA index is less than one then no competitive 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 of competitiveness for each country, but also provides valuable information regarding the competitive ranking among competing countries.

However, the RCA index measures the competitive advantage of a country in the trade of a specific product, rather than analyzing the source of competitive advantage (Havrila and Gunawardana, 2003; Lee 1995). Thus, a further empirical analysis is needed in order to identify the source of competitive advantage and to define the explanatory factors of the RCA fluctuations. In this study *Co-integration* and *Innovation Accounting* analysis have been implemented in order to investigate the relationship among RCA indices and price factors regarding fresh fish exports of the Med5 countries towards the EU market. Regarding the estimation of the price factors, the following formula was used:

$$P_{ij} = V_{ij}/Q_{ij} \tag{3}$$

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 is based in the following methodology:

## 2.1 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 (1974), and Phillips(1986), 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 f 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 $\phi$ exists, it will not be unique, unless $x(t)$ has only two elements. The Engle and Granger (1987), approach can deal with the possibility of only one linear combination of variables that is stationary. Recent advances in cointegration theory (Johansen and Juselius, 1990) 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

$$\Delta x(t) \sum_{i=1}^{q-1} \Pi_i \Delta x(t-i) + \Pi_q x(t-q) + \mu + v(t) \tag{4}$$

where $x(t)$ is a $n \times 1$ vector of variables, $\Pi_q$ is a $n \times n$ matrix of rank $r \leq n$, $\mu$ is a $n \times 1$ vector of constant terms, $v(t)$ is a $n \times 1$ vector of residuals and $\Delta$ is the first difference operator. The testing procedure involves the hypothesis $H_2$: $\alpha\beta'$, where $\alpha$ and $\beta$ are

$n \times r$ matrices of loadings and eigenvectors respectively, that there are $r$ cointegrating vectors $\beta_1, \beta_2, ..., \beta_r$ which provide r stationary linear combinations $\beta' x(t-q)$. The likelihood ratio (LR) statistic for testing the above hypothesis

$$-2\ln Q = T \cdot \sum_{i=r+1}^{n} \ln(1-\hat{\lambda}_i) \tag{5}$$

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

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

$$-2\ln(Q{:}r \mid r+1) = -T \cdot \ln(1-\hat{\lambda}_r + 1). \tag{6}$$

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

### 2.2 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 $y(t)$, $m \times 1$, has a moving average representation

$$y(t) = \sum_{s=0}^{\infty} \Phi(s)u(t-s) \tag{7}$$

with $\mathrm{Var}[u(t)] = \Sigma.$

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 (7) can be rewritten as

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

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

When $P$ is taken to be a lower triangular matrix, the coefficients of $\theta(s)$ represent "responses to shocks or innovations" in particular variables. More precisely, the jk-th element of $\theta(s)$ 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

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

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 the 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 a 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 as well as total EU(15) monthly data, regarding fresh fish product category, for the years 1995 to 2005 were used.

## 3. RESULTS AND DISCUSSION

Applying formula (2), RCA indices were derived for the Med5 countries. Results demonstrate that all countries, except Spain, reveal competitive 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) fish exports. The evoluıion of competitiveness reveals that Portugal and Greece have strengthened their position considerably, 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%).

**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
*Figures represent the annual means constructed from monthly data.

Applying formula (3), 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

**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
*Figures represent the annual means constructed from monthly data.

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%).

The results obtained by the empirical analysis, reveal the following:

### 3.1 Integration Analysis

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 (Table 4). In particular, when the Dickey-Fuller (ADF) test is applied on the levels of the variables and the testing statistic includes only an intercept all variables are non stationary. However, when the test statistic includes a linear trend LRG, LRP, LPI and LPP exhibit stationary properties though they turn to non-stationary procedures after the sixth lag. Furthermore, when the variables are tested in first difference form either without or with a linear trend they become stationary. Since the results might be considered vague and having in mind that the conventional stationarity tests are of low power, we decided at this step, to consider that all series are $I(1)$. Dealing with nonstationary series implies the possible existence of a long run equilibrium relationship (cointegration) among them and hence causal interactions among the examined variables in the short and long run time horizon.

**Table 4**
**Unit-Root Tests for the Variables in Levels**

| | | *LRF* | *LRI* | *LRG* | *LRS* | *LRP* | *LPF* | *LPI* | *LPG* | *LPS* | *LPP* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Not a | ADF(6) | –1.0189 | –3.1889 | –2.8502 | –3.0652 | –3.7486 | –1.4247 | –2.7130 | –1.3467 | –1.9168 | –5.4670 |
| trend | ADF(12) | –.32710 | –1.3627 | –2.6241 | –2.2939 | –1.9448 | .077671 | –1.2307 | –1.0542 | –2.0070 | –2.2106 |
| Linear | ADF(6) | –3.0005 | –3.2845 | –3.4608 | –6.1786 | –4.2380 | –3.4442 | –4.4315 | –2.3706 | –3.3168 | –6.3328 |
| Trend | 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 | ADF(6) | –8.2519 | –7.4590 | –5.6488 | –7.4024 | –7.9196 | –5.6842 | –5.7317 | –6.2083 | –6.6250 | –6.9662 |
| trend | ADF(12) | –4.4862 | –4.3611 | –4.7872 | –5.1941 | –4.5298 | –5.4832 | –4.4037 | –2.9982 | –4.0725 | –4.9946 |
| Linear | ADF(6) | –8.2589 | –7.4349 | –5.6486 | –7.3831 | –7.8948 | –5.6877 | –5.7043 | –6.1852 | –6.5729 | –6.9419 |
| trend | 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

### 3.2 Cointegration and Error Correction (EC) Analysis

Regarding the cointegration tests among RCA indices 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 country – France, Italy, Greece, Spain and Portugal – are presented in Tables 5A, 6A, 7A, 8A and 9A, respectively. The estimated cointegrated vectors are presented in tables 5B, 6B, 7B, 8B and 9B, respectively.

**Table 5A**
**Cointegration with no Intercepts or 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:

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

**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**

*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 7A**
**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:

| | | | | |
|---|---|---|---|---|
| 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**

*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 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**

*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 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 |
| SC6 | SC7 | SC8 | SC9 | SC10 |
| SC11 | | | | |

List of eigenvalues in descending order:

| | | | | | | |
|---|---|---|---|---|---|---|
| .34609 | .22606 | .17553 | .16520 | .060973 | .031829 | .0000 |

| 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**

*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) |

Based on visual inspection of the graphical representations corresponding to the estimated cointegrating vectors, we adopt only the ones that fit to the properties of a stationary procedure. These vectors were next employed in the EC specifications constructed to explore the short and long run dynamics of the examined relationships. Actually, we adopt the 1st cointegrating vector for the cases of France, Spain and Portugal while for Italy and Greece we adopt the 2nd one.

Thereafter, we estimated the implied error correction VAR system (ECVAR), in order to proceed with the investigation of the dynamic characteristics of the examined relationships in both the short and long run time horizons. The results for each country case are presented in Tables 5C, 6C, 7C, 8C and 9C respectively. In particular, these Tables report the Wald tests for the hypothesis that the involved groups of first differenced lagged explanatory variables do not Granger cause the respective RCA index. Furthermore, we report the *t*-tests applied on the lagged EC terms to examine for the existence of possible long run causal effects directed towards the dependent variable.

**Table 5C**
**WALD Tests for Granger-causality Effects Based on the Error Correction Model for LRF**

| *Lagged groups of Explanatory variables* | *$X^2$ value* | *p-value* | *t-ratio* | *p-value* |
|---|---|---|---|---|
| LPF | 4.85 | 0.08 | | |
| LPI | 4.07 | 0.13 | | |
| LPG | 7.20 | 0.03 | | |
| LPS | 3.48 | 0.17 | | |
| LPP | 1.64 | 0.44 | | |
| Lagged EC term | | | –8.23 | 0.00 |

**Table 6C**
**WALD Tests for Granger-causality Effects Based on the Error Correction Model for LRI**

| *Lagged groups of Explanatory variables* | *$X^2$ value* | *p-value* | *t-ratio* | *p-value* |
|---|---|---|---|---|
| LPF | 7.22 | 0.03 | | |
| LPI | 0.94 | 0.62 | | |
| LPG | 1.71 | 0.48 | | |
| LPS | 2.11 | 0.35 | | |
| LPP | 5.00 | 0.08 | | |
| Lagged EC term | | | –2.48 | 0.01 |

**Table 7C**
**WALD Tests for Granger-causality Effects Based on the Error Correction Model for LRG**

| *Lagged groups of Explanatory variables* | *$X^2$ value* | *p-value* | *t-ratio* | *p-value* |
|---|---|---|---|---|
| LPF | 5.84 | 0.05 | | |
| LPI | 3.65 | 0.16 | | |
| LPG | 5.78 | 0.06 | | |
| LPS | 3.94 | 0.14 | | |
| LPP | 5.82 | 0.05 | | |
| Lagged EC term | | | –3.38 | 0.00 |

**Table 8C**
**WALD Tests for Granger-causality Effects Based on the Error Correction Model for LRG**

| *Lagged groups of Explanatory variables* | *$X^2$ value* | *p-value* | *t-ratio* | *p-value* |
|---|---|---|---|---|
| LPF | 5.80 | 0.06 | | |
| LPI | 3.92 | 0.14 | | |
| LPG | 3.57 | 0.16 | | |
| LPS | 7.91 | 0.02 | | |
| LPP | 3.36 | 0.18 | | |
| Lagged EC term | | | –3.98 | 0.00 |

**Table 9C**
**WALD Tests for Granger-causality Effects Based on the Error Correction Model for LRP**

| *Lagged groups of Explanatory variables* | *$X^2$ value* | *p-value* | *t-ratio* | *p-value* |
|---|---|---|---|---|
| LPF | 6.94 | 0.03 | | |
| LPI | 1.52 | 0.47 | | |
| LPG | 4.52 | 0.11 | | |
| LPS | 6.11 | 0.04 | | |
| LPP | 3.60 | 0.16 | | |
| Lagged EC term | | | –3.38 | 0.00 |

More specifically, the results reveal the followings; for France, in the short run (1st quarter), LRF is causally affected by the prices of Greek and French exports at the 3% and 8% level of significance respectively. The EC term has the correct negative sign and is significant at a significance level lower than 1%, revealing a long run causal effect from the exports prices of the examined countries on LRF; for Italy, in the short run, LRI is causally affected by the prices of French and Portuguese exports at the 3% and 8% level of significance respectively. The EC term has the correct negative sign and is significant at the 1% level, revealing long run causal effect from the exports prices of the examined countries on LRI; for Greece, in the short run, LRG is Granger caused by the prices of French, Greek and Portuguese exports at the 5%, 6% and 5% significance levels respectively. The EC term is negative and statistically strongly significant (lower than the 1% level) , revealing long run causal effect from the exports prices of the examined countries on LRG; for Spain, LRS is Granger caused by the prices of French and Spanish exports at the 6% and 2% significance level respectively. The EC term is negative and statistically strongly significant (lower than the 1% level) , revealing long run causal effect from the exports prices of the examined countries on LRS; and finally, for Portugal in the short run, LRP is causally affected by the prices of French and Spanish exports at the 3% and 4% level of significance respectively. The EC term has the correct negative sign and is significant at a significance level lower than the 1% level, revealing long run causal effect from the exports prices of the examined countries on LRP.

### 3.3 Variance Decomposition Analysis

With regard to the medium run dynamics (1-24 months ahead), which seems a meaningful time horizon for the purposes of our analysis, we applied Innovation Accounting analysis and specifically 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 5D, 6D, 7D, 8D and 9D, demonstrate significant variations between the considered countries. In specific, the most significant explanatory factor for the RCA of French exports is the prices of Greek exports, both in the short and medium run (12%-28%). The prices of French and Spanish exports comprise a rather very weak explanatory factor (8%-10%) and only in the medium run (12-24months) for the behaviour of RCA of this country (Table 5D). For Italy, the main explanatory factor for the RCA is the prices of French exports, both in the short and medium run (19%-34%) as well as the Portuguese ones (10%-12%), after the 12th month. The prices of Italian exports are not important in explaining the behaviour of the RCA of this country (Table 6D). Next, with regard to the Greek case, the results suggest that the price of French exports is the most important explanatory factor for the RCA, though only in the medium run (14%-20%). The prices of Greek exports also constitute a significant explanatory factor for the behaviour of RCA (12%-18%) of this country for the same time horizon. Of less importance (7%-10%) and in the same time horizon appear the Spanish prices (Table 7D). Regarding the Spanish case, the results reveal that the prices of Spanish exports comprise the dominating explanatory factor for the behaviour of the RCA of this country, both in the short and medium run (21%-35%), while the prices of French exports explain another 10%-14% but only in the medium run (Table 8D). Finally, the RCA of the Portuguese exports is explained by the prices of the French and Spanish exports, mainly in the medium run (22%-30% and 15%-18% respectively). Of less importance (7%-10%) and in the same time horizon appear the Greek prices, while the prices of the Portuguese exports do not exhibit any causal effect on the behaviour of the Portuguese RCA (Table 9D).

**Table 5D**

**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 |
| 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 6D**

**Orthogonalized Forecast Error Variance Decomposition for Variable LRI**

| *Horizon* | *LRI* | *LPF* | *LPI* | *LPG* | *LPS* | *LPP* |
|---|---|---|---|---|---|---|
| 0 | 1.0000 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 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 7D**
**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 |
| 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 |

**Table 8D**
**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 |
| 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 9D**
**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 |
| 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 |

*Note:* Variables LRF, LRI, LRG, LRS and LRP represent the French, Italian, Greek, Spanish and Portuguese RCA indices respectively, while LPF, LPI, LPG, LPS and LPP represent the French, Italian, Greek, Spanish and Portuguese Prices, respectively.

## 4. CONCLUSIONS

This paper has attempted to evaluate the competitive position of the French, Italian, Greek, Portuguese and Spanish fresh fish exports towards the EU 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 competitive 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 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 competitive advantage, only export prices of Greece comprise important explanatory factor for the RCA behaviour of this country. Finally, French export prices comprise the most important explanatory factor for the behaviour of RCA of almost all countries, either in the short or in the medium run.

Thus, the competitive position for each country is affected by different factors and in all cases at different levels, constituting a dynamic market that can easily be influenced 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 Med5 fresh fish exports towards the EU market.

## *References*


Balassa B., (1965), Trade Liberalization and Revealed Comparative Advantage, *The Manchester School of Economic and Social Studies*, **33**, 99-123.

Baltzer K., (2004), Consumers' Willingness to Pay for Food Quality: The Case of Eggs, *Food Economics*, **1**, 78-90.

Banterle A.. (2005), *Competitiveness and Agri-food Trade: An Empirical Analysis in the E.U.*, Paper Presented at the 11th EAAE Congress, Copenhagen, August 24-27.

Dickey D. A., and Fuller W. A., (1981), Likelihood Ratio Statistics for Autoregressive Time Series with a Unit Root, *Econometrica*, **49**, 1057-1072.

Drescher K., and Maurer O., (1999), Competitiveneness in the European Dairy Industries, *Agribusiness*, **15**, 163-177.

Engle R. F., and C. W. J. Granger, (1987), Cointegration and Error Correction: Representation, Estimation and Testing, *Econometrica*, **55**, 251-76.

Granger C. W. J., and P. Newbold, (1974), Spurious Regressions in Econometrics, *Journal of Econometrics*, **2**, 111-20.

Havrila I., and Gunawardana P., (2003), Analysing Comparative Advantage and Competitiveness: an Application to Australia's Textile and Clothing Industries, *Australian Economic Papers*, **42**(1), 103-117.

Hillman A. L., (1980), Observations on the Relation Between "Revealed Comparative Advantage" and Comparative Advantage as Indicated by Pre-Trade Relative Prices, *Weltwirtschaftliches Archiv*, **116**, 315-321.

Hobbs J. E., Fearne A., and Spriggs J., (2002), Incentive Structures for Food Safety and Quality Assurance: An International Comparison, Food Control, **13**, 77-81.

Hyvonen S., (1995), Competitive Advantage, Bargaining Power and Organizational Performance: The Case of Finnish Food and Manufacturing Firms, *Agribusiness*, **4**, 333-348.

Jensen H., Voigt S., and Hayes D., (1995), Measuring International Competitiveness in the Pork Sector, *Agribusiness*, **2**, 169-177.

Johansen S., (1988), Statistical Analysis of Cointegration Vectors, *Journal of Economic Dynamics and Control*, **12**, 231-254.

Johansen S., and Juselius K., (1990), Maximum Likelihood Estimation and Inference on Cointegration with Application to the Demand for Money, *Oxford Bulletin of Economics and Statistics*, **52**, 169-209.

Kennedy L., Harrison W., Kalaitzantonakis N., Peterson C., and Rindfuss R., (1997), Perspectives on Evaluating Competitiveness in Agribusiness Industries, *Agribusiness* **13**(4), 385-392.

Kim D., and Marion B. W., (1997), Domestic Market Structure and Performance in Global Markets: Theory and Empirical Evidence from U.S. Food Manufacturing Industries, *Review of Industrial Organization*, **12**, 335-354.

Lee J., (1995), Comparative Advantage in Manufacturing as a Determinant of Industrialization: The Korean Case, *World Development*, **23**(7), 1195-1214.

Murphy E., (1989), Comparative Advantage in Dairying: An Intercountry Analysis within the European Community, *European Review of Agricultural Economics*, **1**, 19-36.

Pitts E., and Lagnevik M., (1998), What Determines Food Industry Competitiveness? In W. B. Traill and E. Pitts (Eds), *Competitiveness in the Food Industry*, London: Blackie, 1-34.

Phillips P. C. B., (1986), Understanding Spurious Regressions in Econometrics, *Journal of Econometrics*, **33**, 311-40.

Porter M., (1990), *The Competitive Advantage of Nations*, New York: Free Press.

Tefertiller K., and Ward R., (1995), Revealed Comparative Advantage Production Advantage: Implications for Competitiveness in Florida's Vegetable Industry", *Agribusiness*, **2**, 105-115.