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The Competitiveness of the Greek Meat Processing Enterprises

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Abstract. The objective of the present paper is to examine the effect of certain economic factors on the competitiveness of the Greek meat processing enterprises. The meat sector went through significant changes over the last ten years affecting the structure of the entire industry. Competitiveness will be measured following traditional approaches where profitability and market share account the most. Detailed data from the 2002-2006 balance sheets were used applying econometric procedures. Analysis performed using panel data and three stages least square (3SLS) estimation. The main results show that there is no correlation between profitability and market share. Moreover the way which other factors affect profitability and market share is discussed.

Keywords: competitiveness, market share, profitability, meat processing enterprises

1. Introduction

Over the last decade the meat processing enterprises in Greece have developed and diversified significantly. Despite the development and the diversification, the majority of them are of small size facing problems such as small facilities, the non-right maintain of the storage and delivery conditions, the difficulties both in the check of the quality and the implementation of existing legislation in combination with the lack of homogeneity in the network of product distribution. Nevertheless, there are a limited number of big-size enterprises which run vertical integrated units and deal with all the stages of production, from breeding of animals to meat production, processing /formulation and production of meat products and are among the most competitive enterprises of the Greek food industry. [1]

The concept of competitiveness is one of a major economic and political significance[2]. Studies on competitiveness can be distinguished in two major groups i) studies using indexes such as profitability, efficiency, market share etc and ii) studies dealing with the explanation of the causes of the competitiveness [3, 4]. Used techniques to measure competitiveness vary according to the level of analysis, (firm level, sector level or national economy).

The evaluation of competitiveness has a great importance for the enterprises because it determines some important factors for them such as their structure, their financial situation, their position in the market and their survival generally. [1]

For the reasons referred above the objective of this paper is to study the effect of certain economic factors on the competitiveness (identified as profitability and market share) of the meat processing enterprises and the way this effect takes place, making the meat processing enterprises in Greece to be competitive.

In the sections to follow, first a literature review on competitiveness and a short description of the Greek meat processing enterprises are presented, followed by a short explanation of the competitiveness measurement techniques. Then, the determination of the equations, the definition and the way of the variables measurement and also the model estimation are given. The results and the conclusions close the paper.

2. Literature Review

As referred in the introductory section the studies on competitiveness can be distinguished in two major groups. Studies examining the competitive performance (using profitability, market share, etc) and studies dealing with the competitive potential (examining why competitiveness is low or high). In the present paper we will occupy with the competitive performance. Following below are some of the most representative papers using the indexes which referred above.

A great part of the existing literature dealing with competitiveness, studies the structure-conduct-performance paradigm (S-C-P) examining the effect of advertising on profitability or on size (concentration, market share) both in the firm and in the sector level.

Pagoulatos and Sorensen[5] examined the relationship between advertisement-profitability and concentration (structure-conduct-performance) by applying these equations in the USA food sector. The results demonstrate that the price elasticity of demand is a significant factor of determining profitability. The volume of advertising influences both concentration and profits of the sector, raising barriers in entering it. Moreover, the profitability and the concentration of the sector influence, in an outstanding degree, the intense of its advertising, verifying the theory of Industrial Organization.

Zellner[6] studied the advertising effect on the competitiveness of the food sector in the USA. By using a four simultaneous equation system with dependent variables the advertising intensity, the gross profit margin, the sector concentration (CR4), and the product diversification, he concluded that advertising results more on persuading the consumers and raising barriers in entering the sector, than informing the consumers and facilitating their choices.

Vlachei and Oustapassidis[7] examined the association between advertising, concentration and profitability in a sample of 38 food and beverage industries on the basis of the four-digit system (SIC). The results show that profitability is considerably influenced by advertising, advertising is influenced by profitability and concentration, while concentration is influenced by the economies of scale.

Oustapassidis et al.[8] using a system of three parallel equations (profitability, advertising, market share) in a sample of 266 food and beverage firms in Greece from 1987 to 1995, examined the market power versus efficiency hypothesis. The results indicate a positive and statistically important relationship between profitability and market share, though not between profitability and concentration, which does not find support neither to the efficiency hypothesis nor to the market power hypothesis alone. On the contrary, it appears that the characteristics of both firms alone and industry overall are necessary for interpreting the differences on profitability among firms.

Other studies using profitability and market share as dependent variables examine the effect of other economic factors on them.

Martin et al[9] compared the competitiveness of five sectors in Canada and USA, by using as indexes for measuring competitiveness market share and profitability. These sectors included poultry, fruits and vegetables, dairy, meat and the bakery sector. As an index for measuring the market share he used the gap of the exports from the imports reflected as the percentage of the average domestic production and consumption. For measuring profitability, he used as an index the value added as a percentage towards the sales, the employees' number and the expenditure for the employees' salary. The emerging results show that the four sectors in Canada (except the bakery) have low competitiveness in comparison with the corresponding ones in the USA and that structural changes are necessary for their survival.

Gomez and Lorente[10] studied the effect of environmental friendly competitiveness measures of 51 fruit and vegetable firms in Spain. By using as competitiveness measures profitability, market share and the investment amount of environmental friendly measures as sales percentage, they proceeded to a system of three parallel equations. The results indicate a positive relation between the application of friendly environmental measures and the firms' competitiveness.

Apart from that, the profitability as a measure of competitiveness has been studied, as well.

Thomadakis and Drocopoulos[11] studied the factors affecting the competitiveness of small and medium firms of the Greek Industry during the years 1983-1990, by using as a parameter the share turnabout of

their overall sales. The results demonstrate that the share turnabout of the firms' overall sales among industrial sectors is negatively influenced by the market size conversely with variables such as the capital intensity and the efficiency that affect it positively.

Majumdar[12] examined the effect of both size and age of the firms on their competitiveness using a sample of 1020 firms in India. By measuring competitiveness as productivity and as profitability, she studied the effect of various variables with the use of two particular regressions, emphasizing on the age and the size of the firms. The results indicate that the older firms are less productive and more profitable while the larger ones in size are more productive and less profitable.

Anastasopoulos[13] examined the profitability differences between the Greek domestic food and beverage firms and similar firms that are branches of multinational corporations in Greece, in a sample of 75 firms for 5 years. The analysis shows that the factors determining profitability differ between the two firm categories. The profitability of the corporations' branches depends on their market share, knowledge and experience of the local market and the advertising intensity. As far as the Greek firms' profitability is concerned, it is influenced by the diversity of products and the investments in research and technology. The size affects negatively both firm categories.

Barbosa and Louri[14] examined the possibility whether multinational corporations in Greece and Portugal are more profitable than domestic firms. Both in Greece and Portugal, the corporations appear to be more profitable in the case that capital intensity is taken as a measure of competitiveness. In both countries, ownership does not influence their profitability.

Finally, a synthesis of the different theories which are related with competitiveness has been made by Fischer and Schornberg[15] with the application of a compound system of measuring competitiveness, including efficiency, profitability and output growth that examine the competitiveness of the food and beverage sector among the 15 countries of European Union from 1995 to 2002. Moreover, with the help of cluster analysis they determine distinct industrial groups that have common characteristics. The results raised indicate that the beverage industry is more competitive for the specific period while the United Kingdom presented the most competitive sectors. As for the cluster analysis results, the competitiveness among the E. U. industries appears to be almost equally distributed.

3. The meat processing enterprises in Greece

The Greek meat processing enterprises can be distinguished in the ones that produce pork meat, beef meat, poultry meat and sheep and goat meat. Generally, meat constitutes a major product in the Greeks' nutrition and its demand is characterized from a low price elasticity of demand. The changes which occur in its price do not affect drastically meat consumption, but they determine the degree of substitution between the different kinds of meat products[1]. According to the results of the National Statistical Service of Greece (NSSG) survey for the years 2005-2006 the average monthly expenses of Greek households for meat products were 67,66 € covering the 23,4% of their total expenses for nutrition commodities[16].

As regards the total domestic production of meat products for the period 2002-2006, it followed a diminishing route with the average yearly rate of decrease to be 1,16%, reaching the 506,9 thousand tons for the year 2006. In contrast with the foreign production, the total meat imports present an increasing rate of 3, 15% for the period 1986-2006 reaching the 448,4 thousand tons in 2006. This number is increased at 4,7% comparatively with the year 2005. Concerning the exports of the domestic meat products, these are extremely low with a percentage of 3,2% the year 2006. However, in the period 1986-2006 they follow an increasing route. Specifically, in 1986 the total exports were 1,1 thousand tons, whereas in 2006 they were 448,4 thousand tons[1].

4. Model Specification

As referred above, competitiveness is a concept, which is difficult to be measured and to be defined accurately, while the way of measurement depends on the level which the measurement takes place (firm, sector, national economy). In the current paper, following Martin et al.[9] and Fisher and Schornberg[15] we accept that competitiveness is "the ability of a firm to succeed high profits and to maintain a high market share".

According to the above definition, two indexes of the competitiveness measurement are resulted. These are profitability and market share. Due to the fact that the variable of market share presents non-stationarity which occurred from the panel unit root test, a new variable is used instead of market share. This variable occurs from the difference of the market share of each enterprise for each year from the market share of the previous year[17]. In the table below the results of the panel unit root test are presented.

Table 1: Panel Unit root test results

Variables	Coefficient	t-value	t-star	P>t
pnp (profitability)	-0.34793	-12.583	-11.99739	0.0000
ms (market share)	0.19106	4.584	4.36893	1.0000
dms	-0.43279	-11.961	-11.43617	0.0000
sik (growth)	-0.07412	-8.882	-8.47404	0.0000
lev (leverage)	-0.78096	-29.743	-28.35618	0.0000
opc (operating costs)	-0.22142	-9.013	-8.59309	0.0000
age (operating years)	0.00000	2.496	2.36791	0.0000

As a result two equations with dependent variables, the profitability and the differences of market share occur and are estimated. In the section below, the theoretical substantiation of the equations is presented while the estimation and the results of them follow.

Profitability equation

According to Scheerer & Ross[18], the profits for a firm i, of a defined industrial market is derived from the following equation:

$$\Pi\iota = P(Q)qi - c(qi) \quad (1)$$

where P is output price, c is output cost, Q is output quantity and qi is the quantity produced from the firm i.

Following Cournot, that the competitors' production is constant derives:

$$d\pi/dqi = P + (dp/dQ)qi - MCi = 0 \quad (2)$$

where MCi is the marginal cost of the enterprise, while P+(dP/dQ)qi is the marginal revenue of it. After a number of calculations the marginal revenue of the enterprise can be expressed as follows:

$$P\,[1 + (dp/dQ)\,(Q/P)\,(qi/Q)] = P - (P/e_{Qp})si \quad (3)$$

where e_{Qp} is the price elasticity of demand and si the market share of the enterprise.

After a number of calculations and substitutions we come to the following equation:

$$pqi - wLi/pqi = si/\,e_{Qp} + \lambda\iota\rho K\iota/pqi \quad (4)$$

From the equation (4) it seems that the market share of an enterprise, the rate of capital to sales and some other factors which influence the price elasticity of demand affect the profitability of an enterprise.

As a result the equation of profitability which is going to be estimated takes the following form:

$$PNP= a_0+a_1DMS+a_2DMSLAG+a_3OPC+a_4AGE+a_5SIK+a_6KS$$

where:
PNP (dependent variable) is the profitability of the enterprise, DMS is the differences of the market share, DMSLAG is the variable of the market share differences with lag of one period, OPC are the operating costs of the enterprise, AGE are the operating years, SIK is the rate of growth of the enterprise and KS the capital intensity of each enterprise.

According to the Industrial Organization theory, profitability is expected to be related positively with market share (a1>0, a2>0). The increase of market share results in the reduction of the competitiveness, the creation of monopolies and the increase of profits[14]. On the other hand, the concentration of market share at a very high level has a negative effect on profitability[19].

Operating costs are associated negatively with profitability, because their increase results in the decrease of profits (a3<0), in contrast to the operating years which are associated positively with profitability (a4>0) [14]. Referring to the rate of growth, the increase of it results either in the increase of the demand or in the decrease of the cost production. So, it is expected to influence positively the profits increase (a5>0). As regards the capital intensity, the more capital intensive the production techniques the higher will be the profits (a6>0) [7]

Market share equation

According to previous papers[9,20] market share is adjusted in a long-standing level of balance, which is formed from the scale economies and from other factors which influence the conditions of entry of the firm in an industrial sector. Such a model can be expressed as follows:

$$MS_t = \Theta\ MS^* + (1-\Theta)\ MS_{t-1}$$

where:

MSt	:	market share of the enterprise i in the time period t.
MS*	:	the long-standing level of balance of market share
MS_{t-1}	:	market share of the enterprise i in the time period t-1
Θ	:	a parameter which measures the market share speed of adjustment in the long-standing level.

MS* is a function of the entry barriers which a firm face in the market. Consequently, the factors which influence the market share are the initial level of market share and the barriers of entry. The barriers of entry can be derived from some factors such as high expenses of advertising, scale economies, expenses for fixed assets and R&D. Moreover the capital intensity, which is expressed as the cost of capital which is included in the profit margin, creates entry barriers. For that reason the sectors with high concentration are characterized by high values of the rate capital over sales.

Based on the Industrial Organization Theory, and taking as a dependent variable the differences of market share (dms) due to the existence of non-stationarity of market share (ms) which derived from the panel unit root test[16] the equation which is going to be estimated is as follows:

$$DMS= b_o+ b_1DMSLAG+b_2PNP+b_3OPC+b_4SIK+b_5SIKLAG+b_6KS+b_7\ LEV$$

where:
PNP is the profitability of the enterprise, DMS (dependent variable) is the differences of market share, DMSLAG is the variable of the market share differences with lag of one period, OPC are the operating costs of the enterprise, AGE are the operating years, SIK is the rate of growth of the enterprise, SIK LAG is the rate of growth of the enterprise with lag of one period, KS is the capital intensity of each enterprise and LEV is the index of the loans of the enterprise.

Following the Industrial Organization theory, the increase of the profitability is expected to result in the decrease of market share in the future[20]. The increase of both capital intensity (KS) and rate of growth (SIK) are expected to result in the increase of market share (b4>0, b6>0). The operating costs are associated positively with market share because the higher operating costs the bigger will be the size of an enterprise (b3>0) [14]. The influence of loans on the market share is ambiguous. If the enterprise raises loans and make investments for the increase of its size, the effect of them on market share will be positive (b7>0). On the other hand, if the loans are used for other purposes, they will not affect the increase of market share (b7<0).

5. Data and Measurement of Variables

In contrast to other countries, where firm level data are confidential, Greek food and beverage enterprises are obliged to publish their annual balance sheets. This fact makes their classification into the relevant 4-digit and 3-digit international industry classification system (SIC) easier. Our sample is consisted of eighty six (86) meat processing enterprises which published their annual balance sheet for the years 2002-2006. The source of the balance sheets was the database of Hellastat. The analysis of the data took place with the use of panel data.

Profitability (pnp) is measured as the net profits of each enterprise for each year over the sales of the enterprise for the same year. Market share (ms) is calculated from the sales of each enterprise for each year over the total sales of the enterprises for the same year. Due to the fact that the market share presented non-stationarity, which derived from the panel unit root test, instead of market share the difference of the market share of each enterprise for each year from the market share of the previous year (dms) is used. The rate of growth is the difference of the total own assets of each enterprise for each year minus the total own assets of the previous year over the total own assets of the previous year. The index of loans (lev) derives from the total loans of the enterprise for each year over the total assets of the enterprise for the same year. Moreover as referred above, in the equations the operating years of each enterprise (age) and the operating costs (opc) of it are included, whereas lagged variables for dms and sik are estimated for the year 2002[14].

6. Model estimation and results

In the equations, which are mentioned above, for the competitiveness estimation, profitability is used as an independent variable in the market share equation as well as the differences of market share in the profitability equation. Taking into account the existence of endogeneity, the regressions are estimated as a system of simultaneous equations with the use of the Three Stages Least Square Method (3SLS) [5,6,10]. The estimation takes place with the use of the econometric program STATA.

Beginning from the profitability equation, the variables of dms and dmslag do not influence profitability, which is in contrast to the Industrial Organization Theory. This means that taking into consideration the endogeneity between profitability and differences of market share (dms), the increase of dms which creates monopolies does not affect the profitability of the meat processing enterprises of our sample. Operating costs have a negative effect on profitability, because their increase is expected to reduce the profits of the enterprise.

Operating years affect positively profitability, which means that the older enterprises employ more experienced and better educated staff which succeeds in increasing profitability. The rate of growth has a positive effect on profitability because an increase of 1% will result in a small increase of the profits at 2, $03E^{-03.}$ This means that the meat processing enterprises of our sample, invest their profits intending to their development through the increase of their total own assets. As regards the capital intensity (KS) a more intensive use of the capitals results in the increase of profitability, since the coefficient of it is positive and statistically important.

Continuing with dms equation, dmslag influences positively on dms. Contrary to dms, profitability does not influence dms, which may be caused by the fact that the meat processing enterprises do not invest their profits in the increase of their market share. Operating costs have a positive effect on dms, something which is verified from the Industrial Organization Theory because high operating costs are expected to be related with big size enterprises. The rate of growth (sik) and the rate of growth with lag of one period (siklag) affect positively dms, which means that the increase of total own assets of the enterprise contribute to in the increase of its market share.

The index of loans (leverage) does not affect dms, which means that the meat processing enterprises of our sample do not invest their loans for the increase of their size. As regards capital intensity (KS), it has a negative effect on dms. This means that a more intensive use of the total assets of the enterprise does not result in investments for the increase of their market share. In the table below the results from the estimation of the simultaneous equations with the 3SLS method are presented. The values in parenthesis is p-value while the value out of parenthesis is coefficient value.

Table 2: 3SLS estimation results.

Dependent variables	**pnp**	**dms**	**dmslag**	**opc**	**age**	**sik**	**siklag**	**ks**	**lev**	**R-sq**
pnp		30,66 (0,08)	11,99 (0,18)	-0,38 (0,02)	0,001 (0,001)	$2{,}03^{e-03}$ (0,00)		0,019 (0,002)		29,95
dms	-0,013 (0,61)		0,29 (0,00)	$1{,}62^{e-03}$ (0,00)		$9{,}53^{e-03}$ (0,018)	$9{,}26^{e-03}$ (0,014)	-0,0017 (0,02)	0,003 (0,516)	22,48

7. Conclusions

The meat sector in Greece went through significant changes during the last decade establishing the meat processing enterprises between the most competitive in the food industry despite the problems they may face. In this paper a sample of eighty six (86) meat processing enterprises which published their annual balance sheets for the years 2002-2006 is examined. The indexes which are used for the measurement of the competitiveness are profitability (pnp) and differences of market share (dms). The estimation of the equations is realized with the three stages least square method (3SLS).

The results show that profitability does not affect the differences of market share (dms) and vice versa. The rate of growth has a positive effect both on profitability and on differences of market share. Capital intensity influences positively profitability but negatively on the differences of market share in contrast to operating costs which have a positive effect on differences of market share and a negative one on profitability. The index of loans does not affect differences of market share while operating years affect positively profitability.

From the results above, it is obvious that the investments which intend in the increase of their own total assets is an important factor for their competitiveness affecting both the increase of their profitability and their market share. On the other hand, the no-significant effect of profitability on market share and inversely is one of the most important problems for the Greek meat processing enterprises which requires further study.

References

1. ICAP (2006). *Annual Report for the meat sector in Greece*. Athens

2. Martin, R. (2003). *A Study on the Factors of Regional Competitiveness. A final report for the European Commission Directorate-General Regional Policy.* Available at: www.camecon.com

3. Porter, M., (1985). *Competitive Advantage: Creating and Sustaining Superior Performance.* New York, Macmillan Co., (1985).

4. Pitts, E., Traill, W., Lenihan, H., (1999). *Measuring the competitive performance of the Irish food sector.* Available at: www.tegasc.ie/research/reports/foodprocessing .

5. Pagoulatos, E., Sorensen, R., (1981). A Simultaneous Equation Analysis of Advertising, Concentration and Profitability. *Southern Economic Journal,* Vol. (47), pp.728-741.

6. Zellner, J., (1989). A Simultaneous Analysis of Food Industry Conduct. American Journal of *Agricultural Economics,* Vol. (71), pp. 105-115.

7. Vlachvei, A., Oustapassidis, K., (1997). Advertising, concentration and profitability in Greek food manufacturing industries. *Agricultural Economics,* Vol. (18), pp.191-198

8. Oustapassidis, K., Vlachvei, A., Notta, O., (2000). Efficiency and Market Power in Greek Food Industries. *American Journal of Agricultural Economics.* Vol. (82), pp. 623-629.

9. Martin, L., Westgren, R. and Duren, E., (1991). Agribusiness Competitiveness across National Boundaries. *American Journal of Agricultural Economics* Vol (73) pp. 1456-1464.

10. Gomez, E., Lorente, J., (2004). The Effect of Quality- Environmental Investment on Horticultural Firms' Competitiveness. *Canadian Journal of Agricultural Economics.* Vol (52), pp.371-386.

11. Thomadakis, S.B., Droucopoulos, V., (1996). Dynamic Effects in Greek Manufacturing: The Changing Shares of SMES, 1983-1990. *Review of Industrial Organization,* Vol (11), pp.69-78.

12. Majumdar., S. (1997). The Impact of Size and Age on Firm-Level Performance: Some Evidence from India. *Review of Industrial Organization.* Vol. (12), pp.231-241.

13. Anastassopoulos, G., (2004). Profitability Differences Between MNE Subsidiaries and Domestic Firms: The Case of the Food Industry in Greece. *Agribusiness,* Vol. (20), pp. 45-60.Shepherd W. (1990). *The Economics of Industrial Organization.* Prentice Hall.

14. Barbosa, N., Louri, M., (2004). Corporate Performance: Does Ownership Matter? A Comparison of Portugal and Domestic Owned Firms in Greece and Portugal. *Review of Industrial Organization.* Vol. (27), pp.73-102.

15. Fischer, C., Schornberg, S., (2007). Assessing the Competitiveness Situation of EU Food and Drink Manufacturing Industries: An Index-Based Approach. *Agribusiness,* Vol. (23), pp.473-495.

16. National Statistic Service of Greece (NSSG), (2007). *Survey for the monthly expenses of the Greek households.* Athens

17. Levin, A, Lin, Chien-Fu and Chia-Shang James Chu (2002). Unit Root Tests in Panel Data: Asympotic and Finite Sample Properties. *Journal of Econometrics,* 108, pp.1-24.

18. Scherer F. M. and Ross D. (1990). *Industrial market structure and economic performance.* Houghton Mifflin Company, Boston, USA.

19. Shepherd W. (1990). *The Economics of Industrial Organization*. Prentice Hall.

20. Notta O. (2000). The effect of advertising on the competitiveness of the food and drink industry in Greece. *Phd thesis.* Aristotle University of Thessaloniki, School of Agricultural Sciences, Department of Agricultural Economics.