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## **COMPETITIVENESS IN FOOD AND BEVERAGE MANUFACTURING INDUSTRIES**

### **Abstract**

Competitiveness has been a topic of research in the manufacturing and related sectors since the early 1990s. While there is much agreement on the economic and social importance of competitiveness, it is less clear what exactly competitiveness is and what its most important determinants are. This paper looks at one of the important sectors of the European and national economy, at least from its potential for development perspective: food and beverage industry. The competitiveness of the food and beverage manufacturing sector in 17 countries is analyzed empirically, using 2002–2007 Eurostat data. After a review of earlier agribusiness competitiveness studies, an Industrial Competitiveness Index is used as a composite measure for multidimensional economic performance, covering profitability, productivity and output growth. This index approach enables relative competitiveness comparisons across industries, countries and over time. The results suggest the most competitive EU food and beverage industry and the country with the highest performance averaged across all food and beverage manufacturing activities. This study contributes to the literature on the discussion of the indices of competitiveness and the progress of competitiveness of EU food and beverage manufacturing industries.

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## 1. Introduction

In the literature, different definitions of competitiveness exist. The EU Commission (2003) uses as a definition of competitiveness: «the ability of an economy to provide its population with high and rising standards of living and a high level of employment for all those willing to work, on a sustainable basis». Another definition which is more focused on the manufacturing (Lall, 2001) sectors states: «competitiveness in industrial activities means developing relative efficiency along with sustainable growth». According to Canada's Agri-Food competitiveness Task Force competitiveness is defined as: «the sustained ability to profitably gain and maintain market share (Martin, Westgren & van Duren, 1991; Fischer and Schornberg, 2007)

At the firm level, the view of competitiveness can be given as (Buckley, et al., 1988): «A firm is competitive if it can produce products and services of superior quality and lower costs than its domestic and international competitors. Competitiveness is synonymous with a firm's long run profit performance and its ability to compensate its employees and provide superior returns to its owners.» Hence, a firm's competitiveness can be measured by its relative price, market share, and degree of profitability over a relevant period of time. If the firm is an exporter, market share can be measured at the global level. Product quality can also be assessed and compared.

The Organisation of Economic Co-operation and Development (OECD, 1996) defines competitiveness as «the ability of companies, industries, regions, nations and supranational regions to generate, while being and remaining exposed to international competition, relatively high factor income and factor employment levels on a sustainable basis». The existence of these different definitions indicates that the concept of competitiveness is in fact, multidimensional in nature and that, as a consequence, it is difficult to deal with theoretically as well as empirically.

According to Fischer and Schornberg (2007) profitability certainly is a key variable for assessing sector competitiveness (EU Commission, 2005) and value added as a percentage of turnover is a kind of profit margin that one often has to rely. Market shares are usually defined as the proportion (percentage) of the total available market (or segment) output or sales that is produced or sold by a company or an industry (Werden, 2002). Fischer and Schornberg (2007) argued that market share is a useful competitiveness indicator at the company level even when analyzing aggregates, market shares may be problematic.

Competitiveness is adopted as a management or economics idea that is superior to the traditional economic indicators such as profitability, productivity or market share, which are seen as being insufficient to enable continuous improvement of performance (Lu, 2006). As declared by Buckley et al. (1988), the

concept not only reflects past performance, but also allows the perception of potential and the improvement of managerial processes. Traditional indicators can only reflect the historic quantitative facts. By embracing the aspects of performance, potential and process, competitiveness makes itself an inclusive concept that can be easily integrated into management, economics and operation research. This resonates with the suggestion that competitiveness can guide management on how to improve its competitiveness, and in turn its long-term and sustainable performance (IMD, 2004; Cattell et al., 2004). However, there is little empirical evidence of the co-relationship between competitiveness and sustainable performance. A possible reason for this is that the two concepts are highly controversial by nature, and so examining them empirically is not easy.

There is a great deal of controversy over the definition of «industry». Porter (1980) defines an industry as a group of firms producing products that are close substitutes for each other. An industry is an arbitrary boundary within which firms compete with each other to produce related or similar products (Langford and Male, 2001). The industry level, between the nation (macro perspective) and the firm levels (micro perspective) is more often adopted as an analytical context rather than an entity for investigating competitiveness. Despite this, industry competitiveness will remain the subject of much debate.

*Following Canada's Agri-Food competitiveness Task Force: Competitiveness is the sustained ability to profitably gain or maintain market share.* The above definition has three measurable aspects – profits, market share and (sustained) time. So, competitiveness is attained if one is profitable with steady or increasing market share over time. The term focuses on results (profitability, market share), not on behavior. So, the distinction between one who is competitive and one who has a high degree of competitiveness is that the first displays competitive behavior, while the second shows results. The last distinction is important in that it implies that an analysis of competitiveness begins with the end – i. e. the industry has shown a high degree of profitability and an ability to gain market share.

The main objective of this work is the analysis of the current state of the EU food and beverage industry's Competitiveness. The analysis will focus on competitiveness indicators only (as opposed to competitiveness determinants!) The structure is as follows: After this Introduction section, competitiveness is discussed theoretically and, using several measures, a composite indicator for sector competitiveness is derived using data for 17 EU countries, in the third section. In the fourth section, the results from calculating the Industrial Competitiveness Index (ICI) for 17 EU countries, covering the period 2002–2007, are presented, along with the main conclusions.

## 2. Literature review

Some authors view competitiveness with the competency approach. They emphasize the role of factors internal to the firms such as firm strategy, structures, competencies, capabilities to innovate, and other tangible and intangible resources for their competitive success (Bartlett and Ghoshal, 1989; Doz and Prahalad, 1987; Hamel and Prahalad, 1989, 1990). This view is particularly among the resource-based approach towards competitiveness (Prahalad and Hamel, 1990; Grant, 1991; Barney 2001, 1991; Peteraf, 1993). Ability to develop and deploy capabilities and talents far more effectively than competitors can help in achieving world-class competitiveness (Smith, 1995).

For providing customers with greater value and satisfaction than their competitors, firms must be operationally efficient, cost effective, and quality conscious (Johnson, 1992; Hammer and Champy, 1993). Also related to this condition are a number of studies focusing on particular aspects like marketing (Corbett and Wassenhove, 1993), information technology (Ross et al, 1996), quality of products (Swann and Tahhavi, 1994), and innovative capability of firms (Grupp et al, 1997).

Some research (e. g. Ive et al., 2004) treats competitiveness as a modern word, and uses productivity to stand for competitiveness without recognizing the difference between the two concepts. Krugman (1993) mentioned that people who use the term «competitiveness» do so without a second thought. Some research, partly supported by Porter's (1990) argument that productivity is the true source of competitive advantage, defines competitiveness by using productivity. Porter defined competitiveness at the organisational level as productivity growth that is reflected in either lower costs or differentiated products that command premium prices. The generic strategies given by Porter also emphasises these criteria (Porter, 1990). It has been said the company, industry, or nation with the highest productivity could be seen as the most competitive (McKee and Sessions-Robinson, 1989). While various productivity measurements, i. e. labour productivity, capital productivity or total factor productivity, have captured the cornerstone of research on achieving excellence in the industry (e.g. Arditi, 1985; Chau and Walker, 1988; Arditi and Mochtar, 2000; Allmon et al., 2000), researchers (e. g. Cattell et al., 2004) have recommended a shift from looking just at productivity to the wider concept of competitiveness.

The limitations of measuring productivity include lack of availability and reliability of data; failure to measure more important things (e.g. the effectiveness of project management, the quality level achieved, and the innovations); the difficulty of productivity comparisons between industries, etc.(Cattell et al., 2004).

In the following, we will follow Fischer's (2007) approach and we will define competitiveness as a function of profitability, efficiency, productivity, and growth  $COMPS = f(PROS, EFFS, GROS)$  That is, we will calculate a composite measure for relative and multidimensional economic performance as measured by profit-

ability, productivity, as well as output growth. The construction of the ICI builds on the methodology used for the calculation of the United Nations' Human Development Index (see United Nations Development Programme, UNDP, 2002). First, we transform all measures into individual indices that are combined into three component indices (one each for profitability, productivity and growth).

$$I_k^{ij} = \frac{M_k^{ij} - M_k^{\min}}{M_k^{\max} - M_k^{\min}} \times 100$$

These component indices are then aggregated into the ICI.

### 3. Data

The raw data for our empirical analysis were taken from Eurostat databases covering structural business statistics. In the annual enterprise statistics, economic sectors are classified according to the statistical classification of economic activities in the European Community («Nomenclature statistique des Activités économiques dans la Communauté Européenne», NACE) (Eurostat, 2011). For the food processing sector (DA15) and its sub-sectors (DA15x), gross operating surplus over turnover (GOS in €m / TURN, in €m), gross value added per employee (GVA/employee, in €m) and production value (PROD, in €m) for 17 EU countries were available.

The period of investigation was determined by 2003–2007. In order to buffer the inherent year – to – year volatility in our data, we calculated a four – year average (arithmetic means), for 2003–2007. All data were thoroughly checked for outliers, given the significance of the maxima and minima in the index calculation. Due to the calculation of four – year averages, the impact of missing data was minimised.

Profitability is measured by the ratio of sub-sector's (DA15x) annual gross operating surplus over the sub-sector's annual turnover (2003–07). Productivity is measured as the ratio of sub-sector's (DA15x) gross value added over the annual sub-sector's annual employees. Output growth is measured as the ratio of sub-sector's (DA15x) annual production value of year *t* over production value of year *t*–1.

### 4. Results and Discussion

The empirical results are presented in the following tables. Table 1 reports ICI scores in the component indices for the individual food industries, aggregated over 17 EU countries. The first column lists overall ICI scores (calculated as un-weighted means of the industry ICI scores of all countries) for the period 2003–07 while columns two to four list the values of the three component indices for the

same period. Following Fisher and Schornberg (2007), the chosen calculation method for the ICI is suitable in order to compare absolute index scores across different industries.

Thus, the results reveal that beverage manufacturing (ICI score 36.17), the manufacture of miscellaneous food products including the manufacture of bread, fresh pasty goods and cakes, rusks and biscuits, cocoa, chocolate and sugar confectionery, macaroni, noodles, couscous and similar farinaceous products and the processing of tea and coffee (31.13), and the manufacture of grain mill products, starches, and starch products (30.27) were the most competitive industrial activities in 2003–07. The manufacture of vegetable and animal oils and fats (29.83), The processing and preserving of fruit and vegetables (28.54) and the manufacture of prepared animal feed (27.37) were following in the list of the most competitive industrial activities. Finally, the manufacture of dairy products (26.32), the processing and preserving of fish and fish products (25.60) and the production, processing, and preserving of meat and meat products (23.85) were least competitive. These results are consistent with Fisher and Schornberg's results (2007), for the previous period 1999–2002.

Table 2 reports overall aggregate ICI scores for 17 EU countries. The first column lists overall ICI scores (calculated as unweighted means of the industry ICI scores of all countries) for the period 2003–07 while columns two to four list the values of the three component indices for the same period. The results show that Ireland (36.32) was by far the most competitive EU food processing country in the period. The second most competitive EU food processing country is UK (33.34) following by Austria (31.74), Netherlands (31.09) and Greece (31.05). Portugal holds the last position with 23.71 ICI score.

Table 3 summarizes the ICI scores for the individual EU country for each food industries. The results reveal that in a total of seventeen countries the beverage manufacturing sector is the most competitive sector in ten countries (Belgium, Czech Republic, Finland, France, Greece, Luxembourg, Netherlands, Portugal, Spain, Sweden) the second most competitive industry in two countries (Denmark and Ireland) and the third most competitive industry in two countries (Austria and UK). This sector comprises both alcoholic and non-alcoholic beverages. Furthermore, it includes geographically mobile industrial activities such as beer brewing and soft drink manufacturing, but also location-tied sub-sectors such as wine making and mineral water bottling. This implicit heterogeneity of the beverage industry makes a meaningful cross-country comparison of the findings difficult (Fisher and Schornberg, 2006). Nevertheless, our results confirm that the beverage manufacturing industry has a well-established place in the European Economy. The industry is usually defined in terms of a value chain centered on the actual production of the alcohol beverages. However, it also includes a wide variety of important «backward» and «forward» linkages. The backward linkages include supply chain of agricultural and raw materials, capital equipment, transportation, and energy, while the forward linkages relate to access to markets, transportation, distribution via retailers, wholesalers and hotels, restaurants and cafes (HORECA). The significant economic activities involved in the

production and distribution of beer, wine and spirits generate considerable employment and provide an important source of tax revenue for many governments (ICAP 2006).

Manufacture of grain mill products, starches, and starch products represents the first position concerning competitiveness sector for Italy, the second position for six countries (Austria, France, Germany, Portugal, Sweden and UK) and the third position for two countries (Denmark and Norway). The manufacture of vegetable and animal oils and fats is the most competitive sector for four countries (Denmark, Germany, Norway and UK) the second most competitive sector for Netherlands and the third most competitive sector for four countries (France, Greece, Italy and Sweden).

Table 4 presents the ICI scores for the individual food industries for each EU country depending on the geographical location. The countries of Southern Europe (France, Greece, Italy, Portugal and Spain) present as more competitive sectors, other than beverages, the manufacture of vegetable and animal oils and fats and the manufacture of grain mill products, starches and starch products, as expected, and the manufacture of dairy products. It is worth notice that processing and preserving of fish and fish products represents a high position concerning competitiveness for only one country among the countries of South Europe, Greece. Also, none country presents high competitiveness score for processing and preserving of fruit and vegetables sector although production of fruits and vegetables is coming from southern Europe.

The countries of Northern Europe (Denmark, Finland, Ireland, Norway, Sweden and UK) present as more competitive sectors, other than beverages, the manufacture of vegetable and animal oils and fats and the manufacture of grain mill products, starches and starch products. It is worth notice that manufacture of prepared animal feeds represents a high position concerning competitiveness for Norway. Finally, the manufacture of miscellaneous food products including the manufacture of bread, fresh pasty goods and cakes, rusks and biscuits, cocoa, chocolate and sugar confectionery, macaroni, noodles, couscous and similar farinaceous products and the processing of tea and coffee ranks high in Ireland and Finland concerning competitiveness. The competitiveness ranking for the countries of Central Europe (Austria, Belgium, Czech Republic, Germany, Luxembourg and Netherlands) is headed by manufacture of beverages. Beyond that the countries divide high places competitiveness in all sectors, except dairy industry and fish products.

Although the above analysis by geographical location is expected and generally useful, the generating performance rankings across countries and industries by using the index approach is not useful of identify and describe competitiveness groups of industries. In this case, cluster analysis can order countries and industries in groups of similar, three-dimensional performance variables (profitability, productivity and growth). Four competitiveness groups obtained from the performed cluster analysis. Table 5 reports the respective cluster statistics, descriptions and names. Cluster 1 ( $n = 19$ ) seems to be the one which is

overall highly competitive with highest levels of profitability and productivity. This cluster contains more than 75% of all NACE DA 159 (beverages) industries. Cluster 2 ( $n = 36$ ) is characterized by high levels of profitability and growth but low levels of productivity. This cluster consists of 88% of NACE DA 158 (manufacture of other food products) industries. Cluster 3 ( $n = 38$ ) is characterized by high levels of growth and productivity but lowest levels of profitability. The 64% of NACE DA 154 (vegetable and animal oils and fats) industries fall into this cluster. Cluster 4 ( $n = 51$ ) seems to be the one which is overall least competitive, with the lowest growth, productivity and profitability.

## **5. Conclusions**

This analysis has aimed at developing an Industrial Competitiveness Index as a composite measure for relative and multidimensional economic performance of EU F&D manufacturing industries, covering differences in levels and development of profitability, productivity and growth for 2003–07. Following Fisher and Schornberg (2007), the main advantage of this approach is the aggregation of the different dimensions of the competitiveness concept into one final index score, on which an overall assessment can be based. In this way, industry ranking tables for EU and individual country can be obtained.

Our results show that in 2003–07 the competitiveness ranking is headed by beverage manufacture both in Europe and in each country separately. Ireland was by far the most competitive EU food processing country in the period. According to their geographical location, countries present some differences on competitiveness ranking. Cluster analysis based on the index scores for profitability, productivity and growth variables has been used to identify four different types of performance groups. The most competitive cluster includes the majority of the beverage industries. Future research is needed for the measurement of the complex competitiveness index.



Table 1

**Industrial Competitiveness Index Scores and Indices of Profitability, Productivity and Growth for food and beverages sub sectors in EU-17 for 2003–2007**

Industry NACE category	EUROPE (17 countries)			
	ICI (2003–07)	Profitability index	Productivity index	Output- growth index
159-Beverages	36,17	45,49	34,24	34,80
158-Confectionery & other food products	31,13	40,82	18,68	36,71
156-Mill products	30,27	31,96	25,40	38,13
154-Oils & fats	29,83	27,15	29,47	40,42
153-Fruit & veg.	28,54	33,26	18,09	37,72
157-Animal feeds	27,37	25,11	22,47	38,41
155-Dairy products	26,32	26,10	20,34	36,15
152-Fish	25,60	28,15	13,38	40,13
151-Meat	23,85	24,33	13,27	36,53

Note: Industries are ranked by ICI 2003–07.

The NACE categories describe the following food (sub-) industries:

151: Production, processing, preserving of meat and meat products,

152: Processing and preserving of fish and fish products,

153: Processing and preserving of fruit and vegetables,

154: Manufacture of vegetable and animal oils and fats,

155: Manufacture of dairy products,

156: Manufacture of grain mill products, starches and starch products,

157: Manufacture of prepared animal feeds,

158: Manufacture of other food products,

159: Manufacture of beverages.

Source: authors' calculations from Eurostat data.

Table 2

**Countries' Industrial Competitiveness Index Scores and Indices of Profitability, Productivity and Growth for food and beverages sub sectors in EU-17 for 2003–2007**

NACE_R1/INDIC_SB	DA15	profitability index	productivity index	ΔPROD index
IRELAND	36,32	41,38	32,57	35,02
UK	33,34	39,48	22,87	37,67
AUSTRIA	31,74	37,90	18,86	39,28
NETHERLANDS	31,09	28,21	86,46	40,28
GREECE	31,05	39,41	11,43	42,29
NORWAY	30,01	29,24	23,04	38,40

NACE_R1/INDIC_SB	DA15	profitability index	productivity index	ΔPROD index
LUXEMBURG	29,79	37,07	14,47	37,84
BELGIUM	28,81	26,98	21,87	37,60
DENMARK	28,73	28,06	19,47	38,66
SPAIN	28,18	31,45	14,65	38,43
ITALY	27,68	28,26	17,75	37,03
FINLAND	27,05	29,81	17,67	35,47
GERMANY	26,99	27,23	16,88	36,87
SWEDEN	26,16	27,43	18,70	32,36
FRANCE	25,77	25,79	17,15	35,29
CHEZH REPUBLIC	24,50	31,85	3,00	38,65
PORTUGAL	23,71	30,07	6,65	36,97

CLUSTER 1		CLUSTER 2		CLUSTER 3		CLUSTER 4	
153	AUSTRIA	152	GREECE	153	BELGIUM	151	GREECE
153	UK	152	AUSTRIA	153	NETHERLANDS	151	AUSTRIA
156	SWEDEN	152	NETHERLANDS	154	AUSTRIA	151	BELGIUM
156	UK	152	UK	154	BELGIUM	151	CHEZH REPUBLIC
158	IRELAND	153	GREECE	154	DENMARK	151	DENMARK
158	UK	153	CHEZH REPUBLIC	154	FRANCE	151	FINLAND
159	GREECE	153	FINLAND	154	GERMANY	151	FRANCE
159	AUSTRIA	153	IRELAND	154	ITALY	151	GERMANY
159	BELGIUM	153	NORWAY	154	NETHERLANDS	151	IRELAND
159	CHEZH REPUBLIC	153	PORTUGAL	154	NORWAY	151	ITALY
159	DENMARK	153	SPAIN	154	SPAIN	151	LUXEMBURG
159	FINLAND	154	GREECE	154	SWEDEN	151	NETHERLANDS
159	FRANCE	154	IRELAND	154	UK	151	NORWAY
159	IRELAND	155	GREECE	155	AUSTRIA	151	PORTUGAL
159	LUXEMBURG	155	PORTUGAL	155	BELGIUM	151	SPAIN
159	NETHERLANDS	155	SPAIN	155	GERMANY	151	SWEDEN
159	SPAIN	156	GREECE	155	IRELAND	151	UK
159	SWEDEN	156	AUSTRIA	155	NETHERLANDS	152	BELGIUM
159	UK	157	GREECE	156	BELGIUM	152	DENMARK
		157	AUSTRIA	156	DENMARK	152	FINLAND
		158	GREECE	156	FRANCE	152	FRANCE
		158	AUSTRIA	156	GERMANY	152	GERMANY
		158	BELGIUM	156	IRELAND	152	IRELAND
		158	CHEZH REPUBLIC	156	ITALY	152	NORWAY
		158	DENMARK	156	NETHERLANDS	152	PORTUGAL
		158	FINLAND	156	NORWAY	152	SPAIN
		158	FRANCE	157	BELGIUM	152	SWEDEN
		158	GERMANY	157	DENMARK	153	DENMARK
		158	ITALY	157	FINLAND	153	FRANCE
		158	LUXEMBURG	157	GERMANY	153	GERMANY
		158	NETHERLANDS	157	IRELAND	153	ITALY
		158	NORWAY	157	ITALY	153	SWEDEN
		158	PORTUGAL	157	NETHERLANDS	154	CHEZH REPUBLIC
		158	SPAIN	157	NORWAY	154	FINLAND
		158	SWEDEN	157	UK	154	PORTUGAL

CLUSTER 1		CLUSTER 2		CLUSTER 3		CLUSTER 4	
		159	PORTUGAL	159	GERMANY	155	CHEZH REPUBLIC
				159	ITALY	155	FINLAND
				159	NORWAY	155	FRANCE
						155	ITALY
						155	NORWAY
						155	SWEDEN
						155	UK
						156	CHEZH REPUBLIC
						156	FINLAND
						156	PORTUGAL
						156	SPAIN
						157	CHEZH REPUBLIC
						157	FRANCE
						157	PORTUGAL
						157	SPAIN
						157	SWEDEN

Table 3

**Industrial Competitiveness Index Scores for each country  
and for each industry for 2003–2007**

Industry NACE category	151 ICI (2003–07)	152 ICI (2003–07)	153 ICI (2003–07)	154 ICI (2003–07)	155 ICI (2003–07)	156 ICI (2003–07)	157 ICI (2003–07)	158 ICI (2003–07)	159 ICI (2003–07)
COUNTRY									
AUSTRIA	25,81*	31,93	37,85 <sup>a</sup>	29,08	28,59	36,84 <sup>b</sup>	32,47	27,62	35,49 <sup>c</sup>
BELGIUM	24,66	26,26	30,66 <sup>b</sup>	28,07	27,48	29,37	25,94	29,41 <sup>c</sup>	37,49 <sup>a</sup>
CHEZH REPUBLIC	20,92	n/a	24,58 <sup>c</sup>	21,44	20,73	23,24	23,71	25,97 <sup>b</sup>	35,42 <sup>a</sup>
DENMARK	25,33	25,07	28,02	33,94 <sup>a</sup>	n/a	30,40 <sup>c</sup>	29,88	26,65	30,58 <sup>b</sup>
FINLAND	25,08	27,75	29,63 <sup>b</sup>	19,39	24,27	23,68	28,56	29,17 <sup>c</sup>	35,96 <sup>a</sup>
FRANCE	20,39	21,55	24,24	27,08 <sup>c</sup>	22,78	29,69 <sup>b</sup>	24,18	26,45	35,60 <sup>a</sup>
GERMANY	25,15	23,72	25,24	30,55 <sup>a</sup>	26,18	29,92 <sup>b</sup>	28,64 <sup>c</sup>	25,46	28,09
GREECE	23,91	35,14 <sup>*b</sup>	28,40	35,08 <sup>c</sup>	29,57	28,64	28,15	30,51	40,00 <sup>a</sup>
IRELAND	22,26	19,49	31,86	31,77	32,26 <sup>*c</sup>	32,69	26,99	68,73 <sup>*a</sup>	60,87 <sup>*b</sup>
ITALY	24,69	n/a	24,20	29,20 <sup>c</sup>	25,78	32,16 <sup>a</sup>	26,41	31,03 <sup>b</sup>	27,99
LUXEM- BURG	24,47 <sup>c</sup>	n/a	n/a	n/a	n/a	n/a	n/a	26,74 <sup>b</sup>	38,17 <sup>a</sup>
NETHER- LANDS	25,38	30,83	31,91 <sup>c</sup>	34,09 <sup>b</sup>	25,80	28,73	29,10	31,74	42,26 <sup>a</sup>
NORWAY	24,23	26,53	31,39	36,07 <sup>*a</sup>	26,21	32,54 <sup>c</sup>	34,96 <sup>*b</sup>	30,09	28,08
PORTUGAL	21,00	14,00	25,86	23,68	26,28 <sup>c</sup>	26,45 <sup>b</sup>	22,82	25,54	27,78 <sup>a</sup>
SPAIN	25,37	24,08	26,91	27,64	29,78 <sup>b</sup>	27,92	25,74	28,73 <sup>c</sup>	37,42 <sup>a</sup>
SWEDEN	22,03	24,24	21,81	30,15 <sup>c</sup>	22,74	32,66 <sup>b</sup>	18,62	27,59	35,64 <sup>a</sup>
UK	24,72	27,75	34,05	40,03 <sup>a</sup>	26,38	39,42 <sup>*b</sup>	31,79	37,85	38,07 <sup>c</sup>

Note: \* first position concerning competitiveness country for the sector.

a: first position concerning competitiveness sector for the country.

b: second position concerning competitiveness sector for the country.

c: third position concerning competitiveness sector for the country.

Source: authors' calculations from Eurostat data.

Table 4

**Industrial Competitiveness Index Scores for each country  
and for each industry for 2003–2007, (depending on the location)**

Industry NACE category	151 ICI	152 ICI	153 ICI	154 ICI	155 ICI	156 ICI	157 ICI	158 ICI	159 ICI
COUNTRY									
CENTRAL EUROPE									
AUSTRIA	25,81*	31,93	37,85 <sup>a</sup>	29,08	28,59	36,84 <sup>b</sup>	32,47	27,62	35,49 <sup>c</sup>
BELGIUM	24,66	26,26	30,66 <sup>b</sup>	28,07	27,48	29,37	25,94	29,41 <sup>c</sup>	37,49 <sup>a</sup>
CHEZH REPUBLIC	20,92	n/a	24,58 <sup>c</sup>	21,44	20,73	23,24	23,71	25,97 <sup>b</sup>	35,42 <sup>a</sup>
GERMANY	25,15	23,72	25,24	30,55 <sup>a</sup>	26,18	29,92 <sup>b</sup>	28,64 <sup>c</sup>	25,46	28,09
LUXEMBURG	24,47 <sup>c</sup>	n/a	n/a	n/a	n/a	n/a	n/a	26,74 <sup>b</sup>	38,17 <sup>a</sup>
NETHERLANDS	25,38	30,83	31,91 <sup>c</sup>	34,09 <sup>b</sup>	25,80	28,73	29,10	31,74	42,26 <sup>a</sup>
NORTHERN EUROPE									
DENMARK	25,33	25,07	28,02	33,94 <sup>a</sup>	n/a	30,40 <sup>c</sup>	29,88	26,65	30,58 <sup>b</sup>
FINLAND	25,08	27,75	29,63 <sup>b</sup>	19,39	24,27	23,68	28,56	29,17 <sup>c</sup>	35,96 <sup>a</sup>
IRELAND	22,26	19,49	31,86	31,77	32,26 <sup>*c</sup>	32,69	26,99	68,73 <sup>*a</sup>	60,87 <sup>*b</sup>
NORWAY	24,23	26,53	31,39	36,07 <sup>*a</sup>	26,21	32,54 <sup>c</sup>	34,96 <sup>*b</sup>	30,09	28,08
SWEDEN	22,03	24,24	21,81	30,15 <sup>c</sup>	22,74	32,66 <sup>b</sup>	18,62	27,59	35,64 <sup>a</sup>
UK	24,72	27,75	34,05	40,03 <sup>a</sup>	26,38	39,42 <sup>*b</sup>	31,79	37,85	38,07 <sup>c</sup>
SOUTHERN EUROPE									
FRANCE	20,39	21,55	24,24	27,08 <sup>c</sup>	22,78	29,69 <sup>b</sup>	24,18	26,45	35,60 <sup>a</sup>
GREECE	23,91	35,14 <sup>*b</sup>	28,40	35,08 <sup>c</sup>	29,57	28,64	28,15	30,51	40,00 <sup>a</sup>
ITALY	24,69	n/a	24,20	29,20 <sup>c</sup>	25,78	32,16 <sup>a</sup>	26,41	31,03 <sup>b</sup>	27,99
PORTUGAL	21,00	14,00	25,86	23,68	26,28 <sup>c</sup>	26,45 <sup>b</sup>	22,82	25,54	27,78 <sup>a</sup>
SPAIN	25,37	24,08	26,91	27,64	29,78 <sup>b</sup>	27,92	25,74	28,73 <sup>c</sup>	37,42 <sup>a</sup>

Note: a: first position concerning competitiveness sector for the country.

b: second position concerning competitiveness sector for the country.

c: third position concerning competitiveness sector for the country.

d: fourth position concerning competitiveness sector for the country.

Source: authors' calculations from Eurostat data.

Table 5

**Cluster Statistics**

	Cluster 1	Cluster 2	Cluster 3	Cluster 4
No of industries included	19	36	38	51
Mean index value: Growth	35	40	39	36
Mean index value:VA/EMPL	28	12	25	12
Mean index value GOS/TURN	50	37	27	24
Cluster description	Highly competitive	High profitability and growth but low productivity	High growth, high productivity but lowest profitability	Most common, lowest growth rates, lowest profitability

Source: authors' calculations from Eurostat data.

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