Measuring the Efficiency of the Food Industry in Central and East European Countries by using the Data Envelopment Analysis Approach

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Abstract: The food industry plays an important role in economy of many countries. It is the leading manufacturing industry in EU in terms of turnover, value added and employment. However, it has been facing a decrease in competitiveness lately. In this paper we study the competitiveness of very large companies from the food industry sector in central and east European countries (CEE) by measuring their efficiency within the Data Envelopment Analysis (DEA) approach. The efficiency analysis is conducted by using the BCC model where certain financial ratios are used as its inputs and outputs. The study includes more than 200 very large companies from 13 CEE countries over time period from 2005-2013. The research results have shown that although some countries were more efficient than the others during the entire research period, no patterns in the efficiency of the food industry subsectors could be recognised. On the other hand, DEA approach enabled recognizing sources of inefficiency on a national level.

1 INTRODUCTION

The food industry is a very important component of the economy of many countries and has a unique role in expanding their economic opportunities. Its impact is not limited only to the economic growth but also affects various aspects of the society. Together with agriculture it is the main source of national income for most developing countries. Even in developed countries its role is of utmost importance. For example, the food and drink industry is the first manufacturing industry in the EU, leading in terms of turnover (€1090 billion or 15.6%), value added (€212 billion or 13%) and employment (4.25 billion people in direct employment or 15.2%) (FoodDrink Europe, 2016). Statistical classification of economic activities in the European Community, abbreviated as NACE, classifies food industry as sector C10. Its 9 subsectors are shown in Table 1.

In 2013, the food industry sector in Europe included 264.1 thousand enterprises that employed 13.6% of the total manufacturing workforce in and had a wage-adjusted labour productivity ratio of 157.1% (manufacturing ratio average is 148,0%). Almost 60% of these companies were engaged in activities classified under C.10.7, followed by approximately 15% in C.10.1 and 23.3% in C.10.8 (Eurostat 2013).

Table 1: Classification of food industry sector C10.

C10.1	Production, processing, preserving of meat, meat products
C10.2	Processing and conservation of fish, crustaceans and molluscs
C10.3	Processing and conservation of fruit and vegetables
C10.4	Manufacture of vegetable and animal fats and oils
C10.5	Manufacture of dairy products
C10.6	Manufacture of milling products, starches and starch products
C10.7	Manufacture of bakery products and pastas
C10.8	Manufacture of other foodstuffs
C10.9	Manufacture of products for animal feed

The leading European countries in the food industry are Germany, France, UK and Italy, but certain central and east European (CEE) countries, such as Bulgaria, Romania and Poland, have one of the greatest wage-adjusted labour productivity ratios. However, the EU food and drink industry is facing a decrease in competitiveness lately. Despite

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that fact, no analysis of the food sector in CEE has been made recently.

In this paper, we study the competitiveness of large companies from food industry sector in 13 CEE countries (Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Hungary, Latvia, Lithuania, Montenegro, Poland, Romania, Serbia, Slovakia and Slovenia). The study includes all very large companies from food sector for which data was provided by AMADEUS database, that is over 200 very large companies during the time period from 2005-2013. We investigated their relative efficiency using the BCC model from the Data Envelopment Analysis (DEA). DEA is a nonparametric method for measuring the relative performance of decision making units (DMU's) and identifying efficient production frontiers in presence of multiple inputs and outputs. The method was developed by Charnes, Cooper and Rhodes (Charnes, Cooper and Rhodes, 1978). In our analysis, DMUs are particular companies, while inputs and outputs of the BCC model are their financial ratios. Based on the efficiency scores of companies, we draw conclusions about the efficiency of the food industry subsectors as well as the efficiency of food industries of particular countries. Also, we were able to identify sources of inefficiency of certain countries, which might assist policy makers in developing strategies which might improve competitiveness of their food industry sectors and thus affect their economic growth.

2 LITERATURE REVIEW

Given the role the food industry plays in the economy of many countries as well as in global economy there are many publications issued by official governmental and non-governmental organizations, such as Food and Agriculture Organization of the United Nations (FAO) or European Commission (EC), that deal with the agribusiness, its role in economic development and its competitiveness. Each year FAO publishes The State of Food and Agriculture report. In its 1997 issue special chapter was devoted to the subject of agro-processing industry and economic development (FAO, 1997). In 2009, FAO has published another document on key factors affecting the development and competitiveness of agro-industries (FAO, 2009).

Given the decrease in the relative competitiveness of EU food and drink industry compared to other world food producers in terms of slower growth in labour productivity and added value, EC is actively taking efforts to come up with the policy measures which would support the competitiveness of that sector. It also publishes studies which assess EU food and drink industry competitive positions. Some of such recent studies on the competitive position of the European food and drink industry commissioned by EC are (Wijnands and Verhoog, 2016) and (European Commission, 2016).

Verschlede et al. (2014) conducted a general study to obtain insight into firm-level competitiveness across all sectors in Europe, including the food industry, by using a semiparametric stochastic metafrontier approach. Many studies have used DEA approach to measure efficiency and competitiveness of the food industry. Charles and Zegarra (2014) have developed a regional competitiveness index by using the methodology based on DEA to measure and rank the competitiveness of all the regions of Peru. Rodmanee and Huang (2013) have used a relational two-stage DEA to evaluate the efficiency of 23 food and beverage companies in Thailand. Shamsudin et al. (2011) used the DEA approach to evaluate the market competitiveness of small and medium enterprises in the food industry in Malaysia. Study conducted by Tektas and Tosun (2010) benchmarks the supply and chain performance of Turkish food and beverage companies by using DEA. The DEA-efficiency and productivity changes in the food industry in India during pre and post liberalisation period were studied by Ali et al. (2009). The former also identifies the causes of inefficiency across various sectors. Kocisova (2015) investigates the relative efficiency of the agricultural sector in the EU using DEA during the period 2007-2011, where decision-making units (DMUs) are agricultural subsectors. The paper by Kocisova (2015) also gives a good literature review of different approaches to measuring efficiency in the agricultural sector in Europe. However, there are no recent studies of the competitiveness of European food industry by using the DEA approach.

3 METHODOLOGY

The mathematical formulation of the basic DEA CCR model (Charnes, Cooper and Rhodes, 1978) is as follows. We observe N decision making units, denoted as DMU_1, DMU_2,…,DMU_N, that use the same n inputs in order to produce the same m outputs. Let x_{ij} be an input i for some DMU_j,

$i \in \{1,\ldots,n\}$ and y_{rj} its output $r, r \in \{1,\ldots,m\}$, $j \in \{1,\ldots,N\}$. Therefore, a particular DMU_j is described by vectors $\mathbf{X} = (x_{1j}, x_{2j}, \ldots, x_{nj})$ and $\mathbf{Y} = (y_{1j}, y_{2j}, \ldots, y_{mj})$. In order to make the model stable, it is recommended that $N \geq \max\{mn, 3(m+n)\}$. For an arbitrary decision making unit DMU_0=DMU_j, $j \in \{1,\ldots,N\}$, a virtual input $u_1x_{1o} + \ldots + u_nx_{no}$ and a virtual output $v_1y_{1o} + \ldots + v_my_{mo}$ are formed with (initially) unknown weights (v_r) and (u_i). The model can be input or output oriented, depending on whether DMUs' aim is to minimize the inputs for a given level of outputs or vice versa. In the output oriented approach, these weights are determined by solving the following fractional programming model for each DMU_0=DMU_j:

$$\max_{v_1,\ldots,v_m,u_1,\ldots,u_s} \frac{v_1y_{1o} + v_2y_{2o} + \ldots + v_my_{mo}}{u_1x_{1o} + u_2x_{2o} + \ldots + u_nx_{no}},$$
$$\text{subject to} \tag{1}$$
$$\frac{u_1y_{1j} + u_2y_{2j} + \ldots + u_my_{mj}}{v_1x_{1j} + v_2x_{2j} + \ldots + v_nx_{nj}} \leq 1,\ j \in \{1,\ldots,N\},$$
$$u_i, v_r \geq \varepsilon > 0, \forall i, r,$$

where $\varepsilon > 0$ is a non-Archimedean element. Using Charnes-Cooper transformation (Charnes and Cooper, 1962) this fractional programming model can be linearized and also written in its envelopment form (Cooper, Seiford and Zhu, 2011).

Since CCR model assumes constant returns to scale, Banker, Charnes and Cooper (Banker, Charnes and Cooper, 1984) developed a generalised DEA model that assumes variable returns to scale (VRS). Their significant contribution to the DEA was the idea to let each DMU use the set of weights that puts it in the best position regarding the other DMUs (www.deazone.com [10.7.2013]). In output-oriented BCC model, the measure of technical efficiency ϕ is obtained by solving the following linear program for each DMU_0=DMU_j:

$$\max_{\lambda,\phi} \phi - e(s^+ + s^-)$$
$$\sum_{j=1}^{N} \mathbf{X}_j\lambda_j + s^- = \theta\mathbf{X}_0,$$
$$\sum_{j=1}^{n} \mathbf{Y}_j\lambda_j - s^+ \geq \mathbf{Y}_0, \tag{2}$$
$$\sum_{j=1}^{N} \lambda_j = 1,$$
$$\lambda_j \geq 0, (j \in \{1,2,\ldots,N\}),$$

where s^-, s^+ are vectors of slack variables and θ is the solution of the dual problem. If we denote the optimal solution as (ϕ^*, s^{+*}, s^{-*}), then DMU_0 is efficient iff ϕ=1 and $s^{+*} = s^{-*} = 0$. DMU_0 is weakly efficient iff $\phi^* = 1$ and $s^{+*} \neq 0$ or $s^{-*} \neq 0$ in some alternate optima (Cooper, Seiford and Zhu, 2011).

This study uses BCC model for several reasons. First, it is a relatively simple tool that gives the needed results. Secondly, it allows assuming variable returns to scale, and thirdly, it can handle negative data that is often found in financial analysis (Pastor and Ruiz, 2007).

4 DATA AND RESULTS

The data sample for our study included all the very large food manufacturers in CEE countries for which data were available in AMADEUS database. We considered the time period from 2005-2013. The number of companies varies between 235 in 2005 and 284 in years 2007 and 2008 (table A1 in appendix). There are several reasons why it is interesting to analyse the segment of very large companies. On average, very large companies from this database hold on around 40.2% of total asset and 37,52% of all the capital in food industry of the countries observed during the period of analysis. Also, very large companies have employed 22.28% of the total workforce (on average) within the CEE food industry sector. The data shows that during 2005-2013 the average profit margin (PM) of very large producers in food industry sector was smaller than the PM of large companies. Compared to medium sized companies, the profit margin of very large companies was smaller only in years before 2010. Furthermore, when compared to companies classified as small, they reaped greater profit margin. Data shows that the number of very large food producers has been increasing over the years. The choice of variables used for evaluating the companies was determined by the availability of data. Since the most commonly reported data in AMADEUS dataset are operating revenue, total asset, capital and profit margin, these variables were used to investigate the relative efficiency of the very large food producers in CEE countries. Given the fact that DEA cannot deal with missing values (Smirlis, Maragos and Despotis, 2006), companies with missing data were excluded from the study. This reduced the sample by not more than 5% of the total number of companies in each year. The ratio of profit/loss before tax to total asset (ROA) and profit

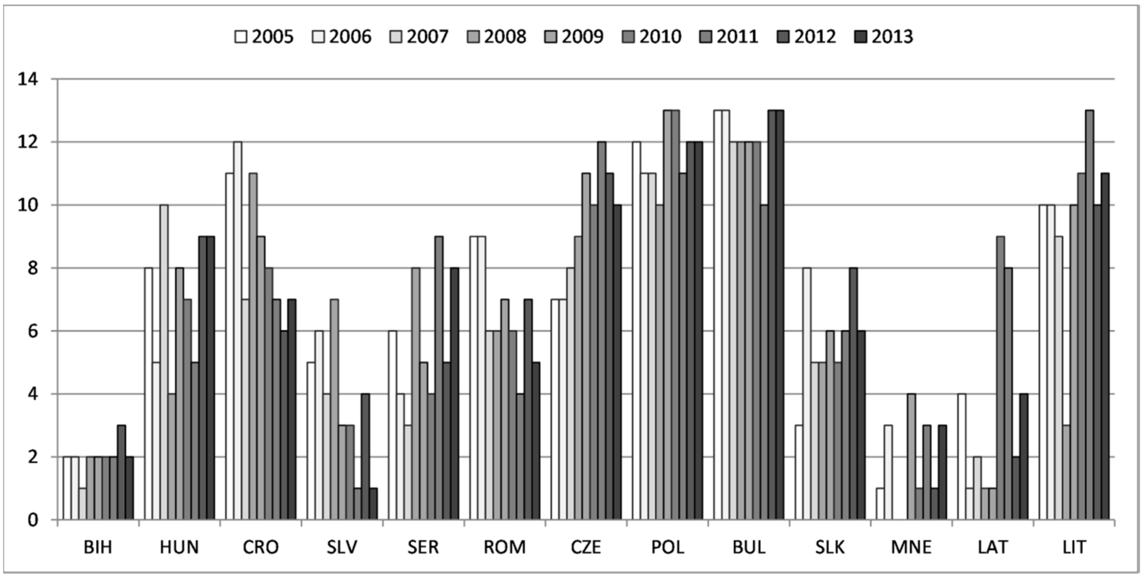

Figure 1: Relative position of countries by years during 2005-2013.

margin were used as indicators of profitability. Since capital and operating revenue are given in absolute terms, we introduce their ratio (capital/operating revenue) as a measure of productivity of capital.

Classification of companies by their subsector is presented in table A2 in the appendix.

DEA demands that there is at least one variable considered as input and one variable considered as output. Since greater values of ROA and profit margin are preferred, these variables were taken as outputs, while the productivity of capital was taken in its inverse form (revenue/capital) and considered as an input of the BCC model. The minimum and maximum values of correlation coefficients among variables for each year during the time period from 2005-2013 are given in Table 2. The correlation coefficients between input and output variables are meaningful and indicate that there are no redundant variables.

Table 2: Minimum and maximum values from the correlation matrix.

	cap/rev	ROA	RM
cap/rev	1		
ROA	-0,22 / -0,08	1	
RM	-0,61 / -0,05	0,6 / 0,73	1

For each year, the rankings of companies were obtained by solving the BCC model. The results showing the most efficient and 5 least efficient companies are reported in tables A3 (years 2005-2009) and A4 (years 2010-2014) in the appendix.

Averaging the efficiency ratios of food companies from a specific country allows ranking of countries by their food industry efficiency. Figure 1 shows the relative positions of countries in time period 2005-2013. It is obvious that Bulgaria, Poland, Czech Republic and Hungary are the leading countries in this sector. Bosnia and Herzegovina is the least efficient country. On the other hand, averaging the rankings within each food industry subsector allows recognising the changes in the relative efficiency over the years. The results illustrated in Figure A1 in the appendix show that subsector C10.7 is strongly at the bottom. Also, C10.9 and C10.2 are in the middle of the range of relative rankings with respect to other sectors for each year of the considered period. However, there are large oscillations of average efficiency ranking within subsectors during 2005-2013.

DEA also allows recognizing the weaknesses of a specific *DMU*. It is given by the percentage difference of *DMU*s inputs and outputs compared to its efficient projection on the efficient frontier. By averaging these percentage differences within a single country, we got indicators of competitive advantages and inefficiency sources, as shown in tables A5, A6 and A7 in the appendix. These results show that, on average, efficient countries have small deviations from their projections in both outputs and input. On the other hand, the inefficient countries have large deviations from projections, again in both outputs and input. Overall, each country has different sources of strengths and weaknesses, as shown by table A5, A6 and A7 in the appendix.. The results obtained on a company level, as well as on the country level, can be used as guidelines for assisting policy makers in creating policies which might lead to improving efficiency and competitiveness, thus also having positive effects on economic growth.

5 CONCLUSIONS

The food industry plays an important role in the economy of many countries. Developing its competitiveness has positive effects on long-term economic growth. Therefore it is important to assist the policy makers in identifying sources of inefficiency and developing strategies which would improve its competitiveness. In this study we have conducted efficiency analysis of very large companies in the food sector of CEE countries using the DEA approach, namely the BCC model. The results of the BCC model identified Bulgaria, Poland, Czech Republic and Hungary as leader CEE countries in terms of efficiency of very large companies in the food sector in the period of 2005-2013. Bosnia and Herzegovina, Montenegro and Slovakia were relatively inefficient in this dataset. Croatia and Romania showed to be somewhere in the top middle, which is rather surprising since Romanian food industry is considered as more developed. Moreover, the model detects the *ex-post* efficiency/ inefficiency of decision-making units. The results indicate variables where improvements can be made. It also indicates the sources of efficiency which a company/ country should strengthen as its competitive advantage. The findings are company/country specific. However, the analysis does not include any future projections or effects of the uncertainty. Limitations of this study are related to the availability of financial data. It must be noted that small and medium enterprises are poorly covered in AMADEUS database. This restricts the number of companies in the sample, leading to conclusions that cannot be generalized. As for further research, in order to derive the generalized results, the analysis should also include small, medium and large companies within food industry, but that would require using models which allow missing data. Also, it would be interesting to conduct the similar analysis for all European countries.

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APPENDIX

In this section we bring the figure and tables that we have referenced in the text.

Table A1: Number of companies per country per year included in the study.

	2005	2006	2007	2008	2009	2010	2011	2012	2013
BIH	11	12	15	14	14	12	11	7	8
HUN	11	10	13	13	13	14	15	15	15
CRO	17	17	17	17	17	17	17	17	15
SLV	3	4	4	4	4	4	4	4	4
SER	50	53	54	55	49	48	48	49	43
ROM	40	28	40	42	42	40	43	42	42
CZE	13	11	14	14	16	17	16	17	17
POL	51	65	72	76	86	85	85	84	78
BUL	3	4	5	6	7	6	6	6	7
SLK	6	11	10	11	11	11	11	11	11
MNE	3	3	0	0	6	6	7	6	1
LAT	1	1	1	1	1	1	1	2	2
LIT	7	8	8	8	8	8	8	8	8
	216	227	253	261	274	269	272	268	251

Table A2: Number of companies per activity (by NACE classification) per year included in the study.

	2005	2006	2007	2008	2009	2010	2011	2012	2013
C10.7	5	5	3	3	5	5	4	4	2
C10.7.1	26	26	28	28	27	29	28	25	24
C10.8.2	16	16	17	18	21	21	20	21	20
C10.8.4	1	1	2	2	2	2	2	2	2
C10.6.1	29	29	31	34	33	32	31	33	29
C10.8.6	3	3	3	3	3	3	3	3	3
C10.5.2	1	1	1	1	1	1	1	1	1
C10.7.3	1	1	2	2	3	3	3	3	3
C10.8.9	3	3	5	6	7	6	9	9	8
C10.9.1	22	22	23	23	24	23	25	23	22
C10.9.2	5	5	5	5	6	6	6	6	6
C10.6.2	6	6	6	7	7	7	7	7	7
C10.8.1	14	14	15	15	18	16	17	17	16
C10.5.1	39	39	47	47	49	49	48	48	47
C10.2	7	7	7	8	9	9	9	8	8
C10.1.1	25	25	29	29	27	26	29	27	26
C10.3.1	2	2	2	2	2	2	2	2	2
C10.1.2	9	9	12	12	12	12	11	12	9
C10.1.3	13	13	15	16	18	17	17	17	16

Table A3: Efficient and 5 least efficient companies, 2005-2009.

2005	2006	2007	2008	2009
ROM124.C10.1.1	POL145.C10.1.3	ROM160.C10.6.2	POL51.C10.8.2	POL94.C10.9.2
CRO143.C10.1.3	SER169.C10.1.1	POL184.C10.1.3	SER120.C10.1.1	POL150.C10.8.2
POL192.C10.9.1	POL191.C10.9.1	POL206.C10.5.1	BUL194.C10.8.6	BUL157.C10.8.6
POL207.C10.8.1		ROM211.C10.1.1	ROM199.C10.1.1	ROM175.C10.5.1
		POL222.C10.9.1	POL228.C10.9.1	ROM177.C10.1.1
		ROM240.C10.1.3		ROM188.C10.1.3
		POL260.C10.3.1		POL239.C10.9.1
…	…	…	…	…
BIH133.C10.1.1	BIH1.C10.7	BIH179.C10.1.1	SER72.C10.6.1	SER78.C10.6.1
MNE161.C10.8.4	ROM154.C10.8.2	SER42.C10.7.1	LAT216.C10.2	BIH6.C10.6.1
SER61.C10.6.1	SER37.C10.8.2	SER74.C10.6.1	SER93.C10.6.2	ROM217.C10.6.1
BIH6.C10.6.1	BIH126.C10.1.1	ROM201.C10.6.1	SLK156.C10.8.1	ROM189.C10.1.3
SER59.C10.6.1	BIH4.C10.6.1	SER193.C10.9.1	ROM205.C10.7.1	BIH77.C10.6.1

Table A4: Efficient and 5 least efficient companies, 2010-2014.

2010	2011	2012	2013
ROM139.C10.1.1	SER55.C10.7.1	ROM127.C10.1.1	HUN8.C10.6.2
POL148.C10.1.1	SER110.C10.8.1	ROM159.C10.1.1	ROM78.C10.8.9
POL180.C10.1.3	ROM135.C10.1.1	ROM198.C10.6.1	ROM116.C10.1.1
BUL193.C10.8.6	MNE197.C10.1.1	SER273.C10.6.1	BUL157.C10.8.1
ROM203.C10.1.1	ROM200.C10.1.1		ROM161.C10.1.1
POL227.C10.1.3	POL233.C10.8.2		POL207.C10.8.2
POL233.C10.8.2	POL238.C10.9.1		SER257.C10.6.1
POL238.C10.9.1			
POL273.C10.1.2			
…	…	…	…
SER86.C10.6.1	POL219.C10.2	CZE 50.C10.7.1	POL24.C10.6.1
BIH1.C10.7	ROM152.C10.1.3	SER68.C10.8.2	HUN44.C10.1.1
SER85.C10.6.1	ROM180.C10.7.1	ROM38.C10.5.1	ROM38.C10.5.1
ROM211.C10.6.1	ROM206.C10.6.1	ROM171.C10.7.1	SER152.C10.9.1
ROM158.C10.1.3	POL226.C10.1.1	POL232.C10.2	ROM37.C10.5.1

Table A5: Average inefficiency of input (%).

	2005	2006	2007	2008	2009	2010	2011	2012	2013	
BIH	-12.47	-93.43	-54.31	-71.16	-71.55	-68.24	-89.83	-69.37	-61.04	-66.30
HUN	0.00	-51.63	0.00	-6.53	-4.20	-3.30	-44.64	0.00	0.00	-13.79
CRO	-4.74	-78.34	-17.33	-29.32	-31.67	-30.31	-62.47	-23.32	-3.32	-34.69
SLV	0.00	-87.01	-1.48	-3.56	-1.79	0.00	-82.84	-1.81	0.00	-22.31
SER	-1.74	-88.61	-26.01	-34.22	-36.78	-33.64	-77.00	-18.06	-14.22	-39.51
ROM	0.00	-59.87	-3.49	-19.73	-15.72	-18.17	-56.67	-11.36	-14.91	-23.13
CZE	0.00	-67.09	0.00	-2.42	-6.37	-6.67	-50.13	-4.07	-3.70	-17.09
POL	0.00	-47.32	-3.23	-13.00	-12.57	-8.13	-37.01	-5.59	-7.65	-15.86
BUL	0.00	-42.88	-6.83	0.00	-13.23	0.00	-45.95	-11.62	-4.18	-15.06
SLK	0.00	-86.68	-20.31	-27.10	-32.90	-31.38	-72.88	-18.95	-20.80	-36.27
MNE	-33.30	-92.81			-61.96	-69.62	-82.42	-74.93	0.00	-69.17
LAT	0.00	-93.18	-13.73	-87.51	-57.19	-32.91	-92.54	-9.04	-16.19	-48.26
LIT	0.00	-75.23	0.00	-5.55	-8.28	-8.30	-66.28	-3.45	-7.47	-20.89
	-4.02	-74.16	-12.23	-25.01	-27.25	-23.90	-66.20	-19.35	-11.81	

Table A6: Average inefficiency of ROA (%).

	2005	2006	2007	2008	2009	2010	2011	2012	2013	
BIH	132.62	202.75	95.25	44.51	180.67	87.99	24.95	27.55	57.74	99.53
HUN	61.85	154.15	64.06	30.88	60.27	54.57	23.12	19.33	45.07	58.53
CRO	75.76	117.78	68.16	23.89	57.40	54.77	21.51	24.26	44.97	55.44
SLV	99.31	178.00	78.30	28.39	67.17	64.45	24.76	25.35	52.31	70.72
SER	130.10	210.06	89.24	36.81	73.81	71.13	19.59	24.73	46.22	81.93
ROM	71.17	149.79	67.95	66.78	187.90	74.18	26.33	21.96	50.27	83.26
CZE	64.00	151.69	68.51	27.62	61.50	50.22	18.84	18.45	36.53	57.60
POL	55.45	98.12	50.72	29.10	56.19	39.77	18.95	18.90	34.95	45.90
BUL	60.21	74.20	53.84	24.77	46.49	38.94	18.16	16.70	27.88	41.66
SLK	150.02	166.41	79.19	41.93	63.50	61.68	21.65	22.11	45.22	75.81
MNE	135.35	184.93			67.16	88.34	22.23	30.35	48.75	88.06
LAT	99.33	250.19	79.78	0.00	75.48	51.94	22.03	28.03	49.93	75.85
LIT	58.88	118.77	68.26	29.79	57.70	44.91	19.59	19.18	36.39	52.14
	91.85	158.22	71.94	32.04	81.17	60.22	21.67	22.84	44.33	

Table A7: Average inefficiency of profit margin (%).

	2005	2006	2007	2008	2009	2010	2011	2012	2013	
BIH	79.26	44.78	281.26	145.80	169.59	87.99	28.68	41.88	85.22	107.16
HUN	27.23	26.89	60.99	29.82	57.04	53.67	24.22	29.04	45.07	39.33
CRO	29.28	19.22	66.83	23.86	55.33	52.77	36.07	37.24	44.97	40.62
SLV	33.85	28.11	78.30	28.39	67.17	64.45	25.54	41.09	52.31	46.58
SER	49.98	33.41	85.23	43.61	72.96	72.64	26.69	53.01	97.32	59.43
ROM	29.35	26.01	72.35	52.22	77.77	88.60	33.93	49.74	53.95	53.77
CZE	26.91	25.99	63.10	26.42	57.31	49.26	20.25	26.69	37.08	37.00
POL	25.25	21.16	50.09	27.23	46.72	38.34	20.23	28.16	34.87	32.45
BUL	23.71	16.48	53.84	24.77	43.70	38.94	18.83	23.00	27.88	30.13
SLK	42.78	24.71	79.19	41.93	63.50	61.68	26.38	33.47	45.22	46.54
MNE	76.80	34.08			67.16	65.20	29.64	299.42	48.75	88.72
LAT	33.45	37.07	79.78	131.69	75.48	51.94	23.11	45.77	49.93	58.69
LIT	27.62	23.84	68.26	29.79	57.70	44.91	21.48	28.79	36.39	37.64
	38.88	27.83	86.60	50.46	70.11	59.26	25.77	56.71	50.69	

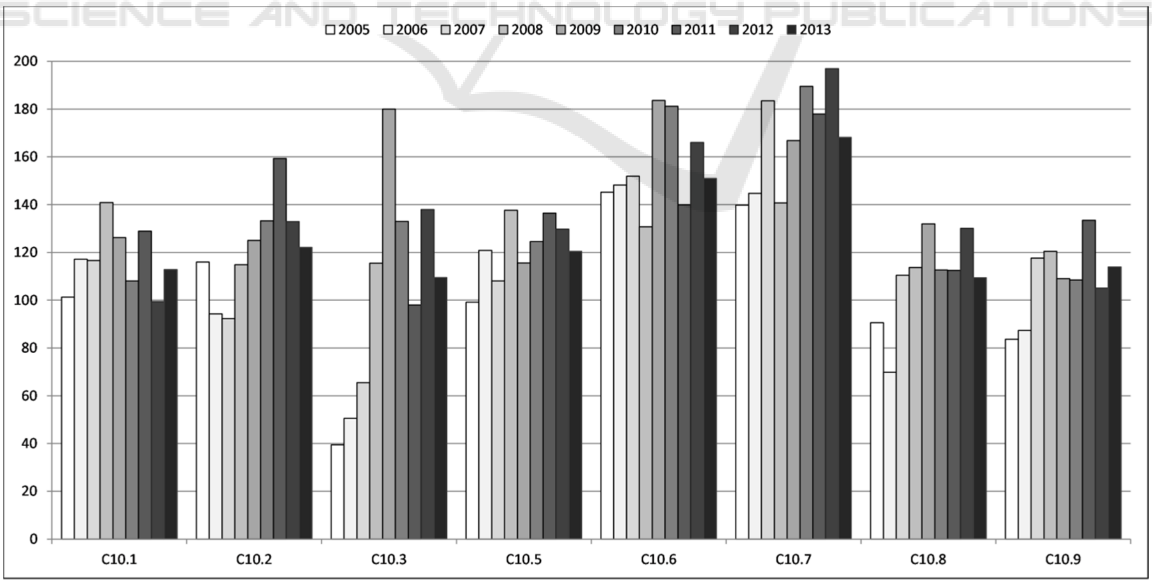

Figure A1: Rankings of food industry subsectors by years.