

## MARKET POWER IN THE POLISH FOOD SECTOR BRANCHES AND THE COMPETITION POLICY

Justyna KUFEL-GAJDA<sup>1</sup>

<sup>1</sup> Master, Assistant, Institute of Agricultural and Food Economics – National Research  
Institute, email: justyna-kufel@wp.pl

### Abstract

*Increasing market power decreases the consumers' welfare, whereas a role of the competition policy is to limit the market power expansion, protect market competition and improve welfare. The research questions were in which branches of the Polish food sector the market power was the highest, how was it changing within branches, and what are the role and possible actions in the framework of competition policy. In order to measure the exerted market power monopolistic markups were utilized. Their levels in the period 2000-2013 were estimated with the Roeger method, whereas their fluctuations in that period were obtained taking advantage of labor markups. The yearly data on food sector enterprises come from forms collected by the Polish Central Statistical Office. It turned out that special focus should be put on the concentration processes and price setting in manufacturing of sugar and beer, whereas the most variable market structures appeared in production of fruit and vegetable juices, milk processing and production of cheese, production of homogenised groceries and dietary food, and processing and preservation of potatoes. The possible policy directions were indicated based on literature review.*

### Keywords:

Competition policy, monopolistic markups, food sector

### Introduction

According to an assertion of the invisible market hand, perfect competition assures maximum social benefit (Samuelson and Marks, 2012). The common welfare measure is the total surplus, being the sum of consumer and producer surpluses. It's a value, which producers and consumers are willing to pay for the equilibrium quantity at the equilibrium price. This welfare measure is maximized in the competitive equilibrium and each departure decreases its value (Carlton & Perloff, 2005). The loss of welfare in the uncompetitive market structures may be an effect of: monopolistic pricing practices, achieving excessive profits, reduced production, unused production capacity, weak tendency to cost reduction and to innovate because of the lack of competitive pressure (Kufel, 2016). Samuelson and Marks (2012) added, that the welfare loss increase also because of rent-seeking of monopolistic enterprise, which comprise of actions within political (lobbying), justice (trials) and regulatory (patents) systems. Costs of monopolization are estimated on 0.5-6% of GDP. Pindyck and Rubinfeld (2013) admitted that competitive markets in order to reach effectiveness first of all must work well. Secondly, efforts must be made to cope with market errors. Among main reasons for ineffective markets, apart from incomplete information, externalities, and public goods, they enumerated market power. Because market power is defined as a firm ability to profitably rise the price above the marginal cost (Church, 2000), a measure of exerted market power are markups defined as a gap between a price a firm obtains and its marginal costs ( $\mu = \frac{P}{MC}$ ) [Olive 2002]. As may be noticed, the highest markups may be achieved in the monopoly, and the lowest in perfect competition. Therefore, they are also utilized as a measure of a degree of departure form perfect competition, so also of the welfare loss for society.

According to the latest research (Szczepaniak, 2012) the Polish food sector envisaged a process of increasing concentration and the significance of large firm grows. In the first years after the accession (2004-2007) because of integration with the EU market, the Polish food companies strengthen their market positions, and branch leaders and capital groups led in restructuring, what contributed to the globalization of companies. Concentration was accompanied by a development of specializations, what limited the market for micro and small entities and resulted in a labor productivity growth. The financial crises of 2007 caused a short slowdown in the Polish food industry, followed by a recovery, which was however lower than before the crises. Investments dropped, and in the period 2008-2013 the number of micro (less than 9 employees), small (9-49 employees) and medium (50-249 employees) enterprises decreased slightly, whereas big companies (above 250 employees) increased their shares in revenues. Consequently, in the period 2003-2013 the share of big companies in total number of entities above 9 workers decreased by 0.4%, while their share in sales increased by 9 and in employment by 5.5 p.p. Finally, in 2013 they constituted 4.4% of total number of entities hiring more than 9 employees, being responsible for 55% of total sales and 45% of total employment. In 2011 three biggest companies were responsible for more than 50% of sales in beer and oils production, for 25,1-50% in production of milk, confectionery, feed, spirits, non-alcoholic beverages, concentrates, sugar, tea and coffee, and tobacco, whereas bakery industry seemed to be the least concentrated with a share not exceeding 10%. The highest decrease in the number of companies took place in the production of sugar, milk products, noodles, feed, spirits, beer and wine.

In such a framework, research questions were, in which branches of the Polish food sector the market power was the highest, how it was changing in the period 2000-2013, and what possibilities of actions exist in the framework of a competition policy. Polish food sector branches were defined on the 4 digit level of the Polish Economic Activity Classification (see appendix 1), but due to lack of data 2 branches were defined on the 3-digit level (104, 109), one was created by combining groups 1102 and 1104, and one (1085) had to be omitted. In order to answer the research questions, firstly an analysis of market power in the Polish food sector branches was performed. An exerted market power was measured with monopolistic markups. As the direct measurement of marginal cost is problematic, two indirect methods of markups estimation were utilized – the Roeger (1995) one and the one based on labor margins. Branches where exerted market power was the highest were indicated, as well as branches with markups which increased the most in the period 2000-2013. As the state and the level of competition in the Polish food sector branches were diversified, also the instruments regarding competition policy should be adjusted to the situation in particular branches. Therefore, in the last step an idea, fields and instruments of competition policy were presented. A method utilized in this part was a literature review.

In the Roeger method, the following production function is utilized:  $Y(X_1, \dots, X_N, K, E) = F(X_1, \dots, X_N, K)E$ , where Y is an output, K is a capital input,  $X_i$  are inputs of other production factors from 1 to N, and E is a neutral Hicks technology change.

After transformations the primal Solow residual is received:  $SR = \frac{dY}{Y} - \sum_i \theta_i \frac{dX_i}{X_i} - (1 - \sum_i \theta_i) \frac{dK}{K} = \left(1 - \frac{1}{\mu}\right) \left(\frac{dY}{Y} - \frac{dK}{K}\right) + \frac{1}{\mu} \frac{dE}{E}$ , where  $\theta_i = \frac{w_i X_i}{PY}$ , and  $w_i$

are prices of production factors except capital. Similarly, after deriving marginal cost from the cost function and transformations the dual Solow residual is obtained:  $DSR = \sum_i \theta_i \frac{dw_i}{w_i} + (1 - \sum_i \theta_i) \frac{dw_k}{w_k} - \frac{dP}{P} = \left(1 - \frac{1}{\mu}\right) \left(\frac{dw_k}{w_k} - \frac{dP}{P}\right) + \frac{1}{\mu} \frac{dE}{E}$ .

Subtracting  $DSR$  from  $SR$  gives the nominal Solow residual ( $NSR$ ), which is afterwards approximated with an equation:

$$\Delta \ln(Y \cdot P) - \sum_i \theta_i \Delta \ln(X_i \cdot w_i) - (1 - \sum_i \theta_i) \Delta \ln(K \cdot w_K) = \left(1 - \frac{1}{\mu}\right) [\Delta \ln(Y \cdot P) - \Delta \ln(K \cdot w_K)]$$

. Estimating a coefficient of the regression function gives  $\left(1 - \frac{1}{\mu}\right)$ , from which  $\mu$  is easily obtained. The regressions for branches were performed taking advantage of data presented in tab. 1, for 14 years. Data come from the unpublished answers of the Polish food sector companies put in forms SP and Z-06 delivered yearly to the Central Statistical Office (CSO), as well as from other CSO publications.

**Table 1 Way of constructing variables utilized in the analysis**

Variable	Characteristics
Production value	Revenues from the products sold adjusted by a change in inventories and indirect taxes (excise tax, property tax, tax on means of transport, non-deductible value-added tax)
Materials costs	Costs of materials, external services, commodities and materials purchased for resale
Labor costs	Wages and salaries, costs of social insurance, training, business travels, health protection, property insurance, death benefits, accident compensation
Energy costs	Extracted as a separate production factor
Capital costs	A sum of fixed and intangible assets multiplied by the sum of depreciation ratio calculated as a ratio of amortization to the value of assets in the purchase prices, value added deflator, and 3-year bonds interest rate

Source: Own elaboration based on the Gradzewicz and Hagemer (2007).

Under an assumption of Cobb-Douglas (C-D) production function, a labor markup might be expressed as follows [Klein 2011]:  $\mu = \frac{P}{MC} = \frac{P \cdot MPL}{W_A} = \frac{P \cdot Y}{h \cdot N \cdot \alpha} = \frac{\alpha}{s}$ , where  $MPL$  is a marginal productivity of labor,  $W_A$  is an average wage,  $h$  – hours per worker,  $N$  – a number of workers,  $\alpha$  is a constant elasticity of output with respect to hours received from the generalized C-D production function in the form proposed by Basu and Kimball [1997] taking into account the costs of four production factors listed in tab. 1, and  $s$  is a labor share calculated simply as a ratio of labor costs to a production value.

### 1. Literature review

Estimating market power and its changes in the Polish food sector branches is undoubtedly a field where studies are lacking. Seremak-Bulge (2012) analyzed prices on producer, manufacturer and retailer levels on three main agro-food markets of cereals, meat and milk. The price data come from the CSO and were on a monthly basis, covering a period 2000-2012. A manufacturing margin was defined as a difference between a producer and a manufacturer prices, while a trade margin as a difference between retail and manufacturer prices. Regarding the manufacturing margin, its share in a retail price hasn't decreased. On the milk market, shares of manufacturing and trade margins in retail prices of final products were generally equal, apart from butter. On the contrary, on the meat and grain products markets, both kinds of margins differ considerably, depending on a level of processing. The highest manufacturing margins were observed regarding bread and meat processed products and the lowest regarding grain products of primary processing and chicken carcasses. Although it was stated, that the shares of producers, manufacturers and retailers in the retail

food price haven't changed in the analyzed period, significant fluctuations of both a short and a medium term character were observed. It was concluded however, that a price mechanism was functioning quite well, providing efficient price transmissions between consecutive levels of marketing food chains, and markets recovered after each price shocks, coming back to a long term equilibrium.

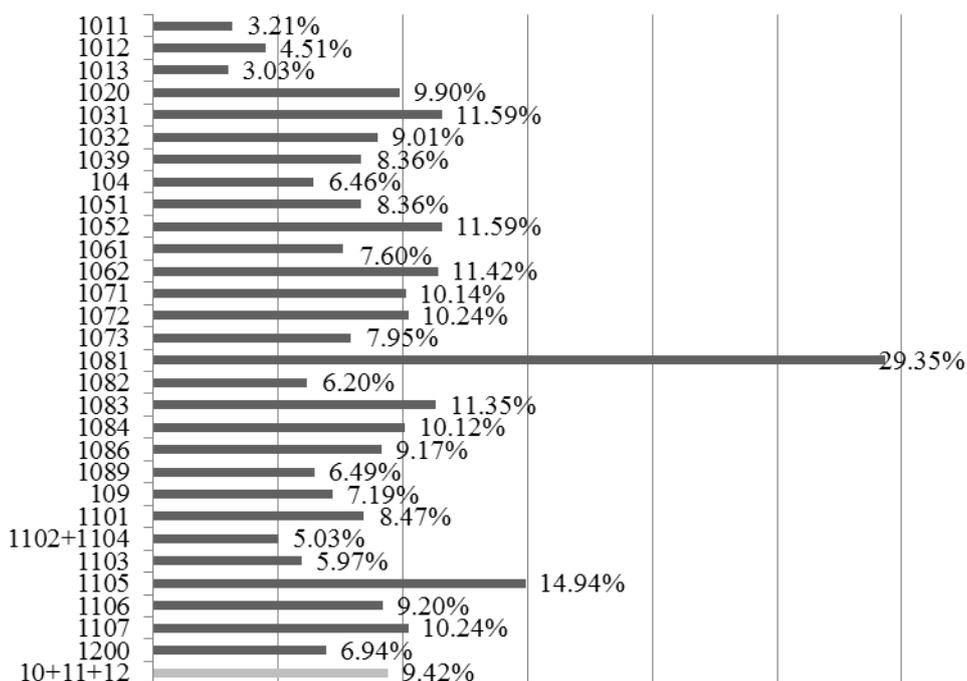
A more sophisticated approach to the Polish food sector markups analyse was presented in the study conducted by Urban (2001). The analysis focuses on both a level and a structure of value added, as well as manufacturing margins in 1994 and 1999 and their shares in a food sector output were calculated. The data were derived from financial statements of enterprises. In a search for cost divisions in food manufacturing enterprises with different specialisations, an additional primary study was conducted, what enables to present a structure of manufacturing margin. Results showed that the share of manufacturing margins in the retail price amounted to over 60%, which includes a margin of processing industry estimated at 29% and a value of raw materials – at about 32%. The price of foodstuffs included also a trade margin (24%) and direct taxes (15%). A structure of the price varied however for different segments of the market. The highest farmer share was noted in the price of meat (50%), which is followed by the prices of milk, flours, and plant oils (40%). The share was the lowest in the price of stimulants, secondary processing products, processed potato products, fruit and vegetable processing products as well as sugar products (25%). In branches representing major food processing branches, differences in manufacturing margins were smaller. They are estimated at the 25-40% of the retail price. Moreover, it was showed that the Polish food industry margin consists of: labour cost, additives and packaging costs and external services cost. They accounted for about 65-70% of the margin, whereas the labour cost – 25-30% and external services – 15-20%. Shares of an energy cost (3-11.5%) and a capital cost (10-25%) in the margin varied depending on the branch.

As it can be seen, margins calculated by Seremak-Bulge and Urban don't follow the definition of monopolistic markups, and therefore cannot approximate an exerted market power. Regarding monopolistic markups, they were calculated only for the whole Polish food sector. Kufel (2016) found that in the period 2003-2013 the average Roeger markup in the Polish food sector amounted to 1.10 and it was increasing over time. The standard deviation from the mean was also relatively low – 0.12, and the coefficient of variation amounted to 0.11. The author analyzed the Roeger markups for the chosen food sector branches too, but utilizing less reliable and precise data from Z-01 forms (where some categories were not present and had to be approximated). Taking advantage of the SP forms and extending the study period by 3 years enabled to overcome these weaknesses and improve the confidence in the final results. Importantly, the methodology utilized in the current study is improved, as less precise information from Z-01 forms (not all needed categories were present there) was replaced with the data from SP forms, and the analyzed period was extended by 3 years. Consequently, obtained results won't be compared with the ones in Kufel (2016). The average Roeger markup over marginal cost in the Polish food sector estimated by Gradzewicz and Hagemeyer (2007) for the period 1996-2004 amounted to 0.22, and its variability – 0.56. These outcomes indicated the moderate level of market power exerted in the Polish food sector.

## **2. Roeger markups in the Polish food sector branches**

Estimating the parameters of regression functions within the Roeger method allowed for calculation of markups in the Polish food sector branches for the period 2000-2013 (fig. 1). All coefficients proved to be statistically significant. The highest market power was exerted in the manufacturing of sugar and beer, where markups in price amounted to 29.35 and 14.94%, respectively. The slightest departure from perfect competition was identified in the

production of meat (3.03%), processing and preserving of meat (3.21%), as well as processing and preserving of poultry (4.51%). The markup in price for the whole food industry amounted to 9.42%, what taking into consideration results received by Gradzewicz and Hagemeyer (2007) indicates a decrease as compared with the period 1996-2004, whereas the coefficient of variation amounted to 52%.



Source: Own elaboration.

**Fig. 1 The Roeger markups (in price) in the 29 Polish food sector branches for the period 2000-2013**

### 3. Changes in market power in the period 2000-2013

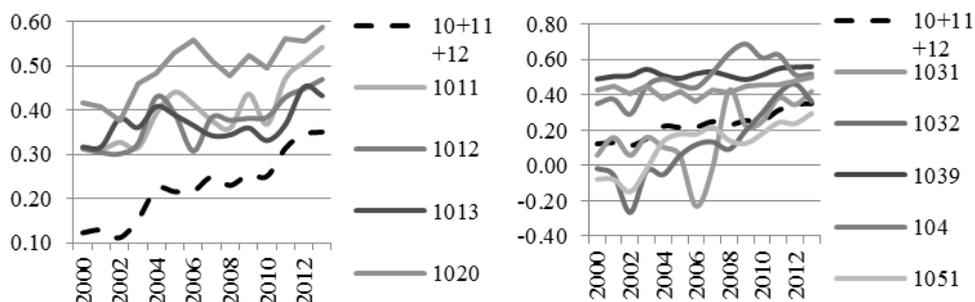
Estimating parameters of the C-D production functions for the food sector branches allows measuring labor markups in the period 2000-2013 (see appendix 1). Fig. 2 illustrates their values for branches, in which average labor markups were positive. The negative values, obtained in the following branches: 1062, 1072, 1073, 1082, 1107, 1102+1104, 1200, were caused by low estimates of production elasticity in regards to labor costs. An increase of production in those branches was accompanied by relatively higher increase of labor costs, what may be caused by for example lower effectiveness or a higher labor-input ratio. Negative markups are hard to interpret, though. Moreover, markups estimation in production of sugar wasn't possible, as an elasticity of production in regards to labor costs was negative. An increase of production was here accompanied with a drop of labor costs, what was caused probably by an efficiency increase and restructurings in the food chain.

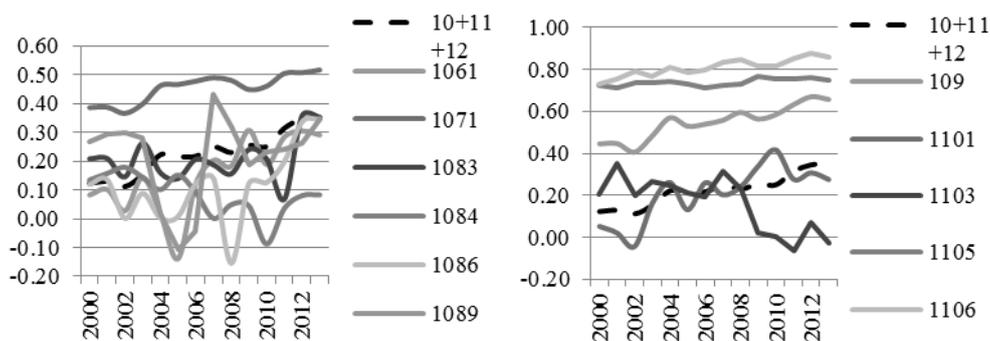
The average labor markup in price for the whole food sector in the analyzed period amounted to 22.6%, so it was much higher than the similar Roeger markup. The highest average labor markups were obtained in malt production (80.9%), beer production (73.8%), production of ready feed for animals and domestic animals (54.9%), other processing and preservation of fruits and vegetables (52.0%), and processing and preserving of fish,

crustaceans and molluscs (49.6%). The lowest values characterized spices production (8.3%), as well as milk processing and production of cheese (11.1%).

Branch markups deviated on average by 50.7% from the mean, what is in accordance with the results of the Roeger method. The most variable were markups in the following branches: production of fruit and vegetable juices (average deviation 168.4% from the mean), milk processing and production of cheese (120.4%), production of homogenised groceries and dietary food (114.8%), processing and preservation of potatoes (107.9%). Interestingly, the most stable appeared to be markups in the production of beer (2.3%) and malt (5.2%). In 20 out of 22 branches with a positive average markup, markups were increasing yearly by minimally 0.3 (in malt production) to maximally 4.5 p.p (in production of fruit and vegetable juices). In two branches negative trends were observed. These were spices production, where markups were decreasing by 1.1 p.p. yearly, and production of beer with a yearly drop of 2.5 p.p.. Markups in price in the whole food industry in the analyzed period were increasing yearly by 1.8 p.p. Finally, in the analyzed period the highest increase of exerted market power was noticed in production of fruit and vegetable juices (markups in price increased by 39.96 p.p.), in milk processing and production of cheese (by 37.27 p.p.), and in processing and preservation of potatoes (by 35.14 p.p.), so in the branches in which markups were the most variable. Drops appeared in production of cider and other wines (by 23.31 p.p.), and spices production (by 5.2 p.p.). During analyzed 14 years branch markups (in price) increased on average by 15.13 p.p. This may indicate an intense development of concentration and consolidation processes, leading to higher level of oligopolization. Moreover, it might be noticed that an increasing trend in majority of branches was disrupted before entering the EU, when intense restructuring processes had to take place, as well as in 2008-2009 as an outcome of the world financial crises.

When comparing levels of markups calculated with both methods it may be observed that labor markups were on average 3.5 times higher than the Roeger ones. Also the correlation between both types of markups wasn't high amounting only 0.128. These may indicate that elasticities of production in regards to labor costs weren't stable on the branch level in the analyzed period, what may be caused by structural changes. On the other hand, the C-D production function didn't have to be the proper one. Consequently, only the Roeger markups may be regarded as indicators of markups levels, whereas labor markups may only serve as indication of how markups in the Polish food sector branches fluctuated in the period 2000-2013.





Source: Own elaboration.

**Fig. 2 Labor markups (in price) variability in the Polish food sector branches in the period 2000-2013**

#### 4. Competition policy for the Polish food sector branches

Another question that emerges is how to cope with the increasing market power in the food branches, the answer for which is not so obvious. Samuelson and Marks (2012) highlight the evolutionary character of the competition policy. Its significance rose at the end of XIX century as an answer for a high increase in a number of mergers and acquisitions in the US. The opinion that market domination and monopoly are adverse in themselves held until 60-ties. 70-ties and 80-ties on the other hand were dominated by the Chicago school of economic thought, according to which market competition is better than competition policy in limiting strength of monopolies. If only barriers to entry are eliminated, market power is supposed to be only temporary. Consequently, the role of competition policy in 90-ties decreased. Importantly, the basic criterion for using it was not the size of a company, but rather if the obtained market power allows for a significant prices increase. Mergers started to be perceived as rising competition in some circumstances. The aim was to analyze each case separately.

The US model differs however from that in the EU, where the competition policy is one of integration instruments within single market with an aim to regulate uncompetitive behavior. While firstly it concentrated on preventing practices harming structural adjustments, research, technological progress, innovations and other processes on the competitive market, now it concentrates on market structures and companies aiming at gaining market power – main areas of interest concern an abuse of dominant position and uncompetitive agreements. Particularly, a high emphasis is put on the protection of small and medium enterprises. Therefore, new regulations relate mostly to competition, economic and technological progress and economic and social cohesion. The outstanding feature of the EU competition policy is that national aid for branches and sectors is allowed after measuring its potential influence on the competition level (OECD, 1996). Moreover, the time of mergers assessment is shorter in the UE and here it is easier to prove the dominant position of a company, than in the US where the market power has to be proven. In the EU simply forbidden are mergers and acquisitions of companies, which total world turnover exceeds 5 bn euro yearly, and in the EU a turnover of at least two companies exceeds 250 million euro, unless each of companies involved gains more than 2/3 of its turnover in only one member country. Interestingly, horizontal mergers are regarded as harming competition, whereas vertical ones do this not per se. Moreover, in both systems common price setting is forbidden, although in Europe civil penalties are utilized, whereas in the US – penalties and prison sentences (Pindyck & Rubinfeld, 2013). The common European law

concerns only cases with a participation of companies from more than two member countries, whereas for execution of law regarding companies from the same country responsible are national authorities.

In Poland, the necessity to ensure conditions for competition is a constitutional obligation. The constitution guarantees freedom of economic activity and functioning of a mechanism of market competition. Particularly, the main aim of the Polish competition policy for the period 2014-2018 is to ensure conditions for competition through improving economic effectiveness, innovativeness and consumer welfare (UOKiK, 2014). In order to protect and promote competition the following horizontal priorities were indicated: increasing the effectiveness of the fight against anti-competitive agreements, more efficient elimination of dominant position abuse, improving the process of merger control, improving the quality of the competition protection system, increasing competition in the public procurement system, development of the system of public aid monitoring, competition advocacy through international cooperation. Additionally, an effort will be made in order to create and develop competition in telecommunications sector, energy sector, rail and air transport, postal and payment services.

Nevertheless, apart from fulfilling these priorities, some deeper insight is needed regarding the situation in the branches with the highest exerted market power, as well as in branches where it is the most variable. Carlton and Perloff (2004) created the special framework to analyze the competition situation through the problem areas. They distinguished three action directions: international trade, antitrust law and policy, and regulation and deregulation. The aim of competition policy in the international trade is to solve problems such as: illegal trade of labelled products, price dumping, using quotas, subsidies and tariffs, creating and fighting monopolies. Also interest groups often want to be protected from external competition or subsidies through an introduction of a strategic trade policy or a protection of branches with positive externalities. Other problems in this area concern product and price differentiation and free riding. Antitrust law and policy aim at limiting market power exerted by companies and at controlling the ways in which firms compete. Not the monopoly itself, but rather the way of gaining and maintain market power is prohibited. Therefore, each antitrust law should be preceded by economic analysis of its influence on companies. Problem areas distinguished within this direction are as follows: cooperation among rivals (legal agreements, exchanging information among rivals, oligopolistic behavior (without collateral), mergers), exclusion and other strategic behavior (competition among rivals, vertical agreements) and price differentiation (price differentiation harming direct competitors and consumers, tying). The regulation and deregulation aim is to increase welfare on not perfectly competitive markets. Often however regulation is not optimal and cause increase of market inefficiency, for example when monopoly regulations cause shortages or when administration costs outweigh benefits, what may be illustrated by increasing number of regulatory agencies in many countries, including Poland. Consequently, the main problem areas within this direction are: increasing competitiveness of monopolies (state owning, privatization, franchise/concession, price control), rates of return regulation, and competition market monopolization (limiting access, regulations on the agricultural market – price support and quantity control).

Although a detailed insight into a situation in each branch seems to be necessary before giving final recommendations, and further research in this direction undoubtedly should be a next step, generally speaking it might be concluded that competition policy in regards to the Polish food sector should be still directed into antitrust law execution. Moreover, efforts should be put on creating strategic trade policy, which will accelerate the development of the sector, as well as on intensifying promotion of the Polish food products abroad. Taking

into consideration the regulation and deregulation area, vertical regulations and vertical integration needs special attention, both in the framework of the Common Agricultural Policy and the national policy towards agro-food sector. Particularly, concentration and price setting processes in the manufacturing of sugar and beer should be closely monitored.

### **Conclusions**

The research questions were in which branches of the Polish food sector the market power was the highest, how it was changing within branches, what the role of competition policy is and what possible actions within its framework might be taken. It appeared that markups were the highest in the manufacturing of sugar and beer, and the most variable in production of fruit and vegetable juices, milk processing and production of cheese, production of homogenised groceries and dietary food, and processing and preservation of potatoes. The evolution, aims and priorities of the competition policy were characterized. The framework, in which branches with the highest market power should be analyzed in the next step, was outlined. The research was the first study on the levels of monopolistic markups in the Polish food sector branches. It appeared that the competitive situation in the branches is quite diversified. Therefore, further research should be focused on looking for causes of this diversity. The possible factors are: a level of concentration or an exposition to external competition. Similarly, the reasons for markups variability might be searched. Also comparing market power with market structures in the particular Polish food sector branches seems to be an attractive research direction. Furthermore, some international comparisons of exerted market power and looking for the causes of discrepancies would be desired.

Although the results concern the Polish economy and couldn't be generalized for other countries or sectors, such studies are a necessary step before further analysis, as the methodology for markups measurement is quite complicated. As it was shown, the results are especially important while planning actions in the framework of the competition policy, both on the EU and the national level. The insight into the levels and changing patterns of exerted market power is especially important for increasing the welfare of society, but also for ensuring food security.

The main barrier of the research was a lack of data on the single entities level, so the Roeger markups could be estimated only for the whole analyzed period. Only labor markups allow to measure markups in the following years. The main problem which arose is however that the average labor markups and the Roeger markups calculated for the analyzed period weren't equal. The reasons for that may lie in the changes regarding elasticity of demand with respect to labor, which was assumed to be constant while calculating labor markups. Also including labor markup developments, like excluding overhead labor, replacing Cobb-Douglas production function with the CES one, or taking advantage of marginal wage instead of an average one (see Nekarda & Ramey, 2013) may improve the quality of results, making labor markups more similar to the Roeger ones. Further studies regarding markups estimation methods are certainly needed.

### **References**

1. Basu, S., & Kimball, M. (1997). Cyclical Productivity with Unobserved Input Variation. *NBER Working Paper, Washington*.
2. Carlton, D. & Perloff, J. (2005) Modern Industrial Organization. *Person, Addison, Wesley, Boston*.
3. Church, J., & Ware, R. (2000). Industrial Organization: A Strategic Approach. *Irwin McGraw-Hill, Boston*.

4. Gradzewicz, M., & Hagemeyer, J. (2007). Wpływ konkurencji oraz cyklu koniunkturalnego na zachowanie się marż monopolistycznych w gospodarce polskiej. *Bank i Kredyt*, 1.
5. Klein, N. (2011). The Cyclical Behavior of the Markups and its Implications for Monetary Policy. *IMF Working Paper, Washington*.
6. Kufel, J. (2016). Monopolistic Markups in the Polish Food Sector. *Equilibrium*, forthcoming.
7. Nekarda, C., & Ramey, V. (2013). The Cyclical Behavior of the Price-cost Markup. *NBER Working Paper, Washington*.
8. OECD (1996). Competition Policy and the Agro-Food Sector. *OECD Food, Agricultural and Fisheries Working Papers, Paris*.
9. Olive, M. (2002). Price and Markup Behaviour in Manufacturing: a cross country study. *Edward Edgar, Northampton*.
10. Pindyck, R., & Rubinfeld, D. (2013). Microeconomics. *Pearson, New Jersey*.
11. Roeger, W. (1995). Can Imperfect Competition Explain the Difference between Primal and Dual Productivity Measures? Estimates for US Manufacturing. *Journal of Political Economy*, 103(2).
12. Samuelson, W., & Marks, S. (2012). Managerial Economics. *Wiley, New York*.
13. Seremak-Bulge, J. (2012) Zmiany cen i marż cenowych na podstawowych rynkach żywnościowych. *Zeszyty Naukowe SGGW. Ekonomika i Organizacja Gospodarki Żywnościowej*, 100.
14. Szczepaniak, I. (2012). Struktura podmiotowa przemysłu spożywczego. In R. Mroczek (Ed.), *Procesy dostosowawcze polskiego przemysłu spożywczego do zmieniającego się otoczenia rynkowego (2)*. *IAFE-NRI, Warsaw*.
15. UOKiK (2014). *Polityka konkurencji na lata 2014-2018*. *Wydawnictwo UOKiK, Warsaw*.
16. Urban, R. (2001). Wartość dodana i marże w przetwórstwie głównych producentów rolnych. *IAFE-NRI, Warsaw*.

**Annex 1. Main characteristics of labor markups in Polish food sector branches  
in the period 2000-2013**

Branch code	Branch name	$\alpha$ and st. error	Mean and var. coeff.	Trend	Change in p.p.
1011	Processing and preservation of meat, excluding poultry	0.150 0.025	0.398 0.186	0.015	22.952
1012	Processing and preservation of poultry	0.128 0.023	0.375 0.152	0.011	15.614
1013	Production of meat preserves, including products of poultry	0.167 0.045	0.369 0.110	0.005	11.562
1020	Processing and preserving of fish, crustaceans and molluscs	0.214 0.026	0.496 0.128	0.013	16.962
1031	Processing and preservation of potatoes	0.230 0.012	0.172 1.079	0.027	36.142
1032	Production of fruit and vegetable juices	0.106 0.036	0.122 1.684	0.045	37.958
1039	Other processing and preservation of fruits and vegetables	0.274 0.055	0.520 0.048	0.003	7.044
104	Oils and fats production	0.123 0.072	0.498 0.231	0.021	16.901
1051	Milk processing and production of cheese	0.108 0.055	0.115 1.204	0.029	37.270
1052	Ice cream production	0.341 0.126	0.433 0.087	0.005	6.773
1061	Manufacture of grinding cereal products	0.098 0.050	0.151 0.851	0.022	20.823
1062	Production of starch and starch products	0.048 0.284	-2.481 -0.161	-	
1071	Production of bakery products, fresh confectionary goods and cakes	0.398 0.086	0.453 0.109	0.010	13.076
1072	Production of crackers and biscuits, preserved confectionary goods and cakes	0.143 0.151	-0.293 -0.645	-	-
1073	Production of noodles, dumplings, couscous and similar floury products	0.101 0.112	-0.593 -0.432	-	-
1081	Sugar production	-0.204 0.092	-	-	-
1082	Production of cocoa, chocolate and confectionery products	0.122 0.076	-0.396 -0.487	-	-
1083	Processing of tea and coffee	0.148 0.046	0.207 0.381	0.006	14.435
1084	Spices production	0.161 0.052	0.083 0.861	-0.011	-5.202
1086	Production of homogenised groceries and dietary food	0.187 0.052	0.113 1.148	0.016	22.620

Branch code	Branch name	$\alpha$ and st. error	Mean and var. coeff.	Trend	Change in p.p.
1089	Production of other groceries not classified elsewhere	0.236 0.043	0.216 0.714	0.005	7.668
109	Production of ready feed for animals and domestic animals	0.157 0.058	0.549 0.146	0.018	21.132
1101	Distilling, rectification and mixing of alcohols	0.208 0.060	0.208 0.622	0.025	22.326
1103	Production of cider and other wines	0.130 0.034	0.159 0.830	-0.025	-23.306
1105	Production of beer	0.696 0.114	0.738 0.023	0.003	2.323
1106	Malt production	0.241 0.087	0.809 0.052	0.009	12.626
1107	Production of non-alcoholic beverages, mineral waters and other bottled waters	0.127 0.309	-3.406 -0.085	-	-
1102+1 104	Production of grape wines and other non-distilled fermented beverages	0.124 0.034	-0.081 -3.909	-	-
1200	Production of tobacco	0.022 0.113	-5,558 -0,288	-	-
10+11+ 12	Food industry	0.218 0.045	0.226 0.342	0.018	22.755

Source: Own elaboration.