

THE INFLUENCE OF THE CONCENTRATION ON THE PERFORMANCE OF FIRMS IN RETAIL INDUSTRY IN THE REPUBLIC OF CROATIA¹

Ivan Kristek

Josip Juraj Strossmayer University of Osijek
Faculty of Economics in Osijek, Croatia
E-mail: ikristek@efos.hr

Mladen Pancić

Josip Juraj Strossmayer University of Osijek
Faculty of Economics in Osijek, Croatia
E-mail: pancic@efos.hr

Hrvoje Serdarušić

Josip Juraj Strossmayer University of Osijek
Faculty of Economics in Osijek, Croatia
E-mail: hserdar@efos.hr

Abstract

According to SCP paradigm (Structure-Conduct-Performance paradigm) the industry structure affects the behaviour of firms in the industry, which affects their performance. The paradigm is consistent with the Neoclassical Theory of the Firm which assumes that there is a direct link between the industry structure, entrepreneurial conduct and performance. The basic principle of this paradigm might be the ability of entrepreneurs to exercise market power in a concentrated industry. High industry concentration is correlated with high profits, especially if the concentration level exceeds a certain critical level under the condition that there are some barriers to entry of new entrepreneurs in the industry. Economic theory supports the view that the industry concentration is in a positive relationship with efficiency, and it can be argued that the growth of industry concentration will increase the efficiency of industry. Current approaches in economic theory and recent empirical studies do not follow the SCP theory, they suggest that the above-average profits, which occur in most concentrated industry's, are results of economic efficiency and effectiveness, and not a consequence of non-competitive behaviour. In this paper we will try to give an answer to the above-mentioned issue present in economic theory. The study will try to demonstrate a statistically significant link between the measure of concentration and measure of efficiency in retail industry in the Republic of Croatia.

Key words: SCP, concentration, efficiency, retail industry

¹ The presented results are the outcome of the project The influence of concentration and competition on the efficiency and stability of firms in the retail sector (IZIP-2016-127) conducted with the support of the Josip Juraj Strossmayer University

1. INTRODUCTION

Branch or industrial structure can be differentiated according to the level of its concentration, apropos of the number and the size of the companies present in the industry. The number of economic operators and the distribution of their size is the indicator of the industrial structure. The indicators of concentration are mainly derived from the achieved revenue, but the usage of other variables, which indicate the size of the company, is also possible. An industry is considered to be concentrated when a company or a small number of companies control the majority of shares in selling of the branch.

Apart from the concentration level, the industrial structure can also be differentiated according to the intensity of its competition. Two fundamental views on competition are distinguished: static and dynamic. In microeconomics, the neo-classical theory of firms is based on the static view on competition, and one of the main issues for research is the long-term balance in four different branch (industrial) structures: perfect competition, monopolistic competition, oligopoly and pure monopoly. Precisely these structures are the main issues for research of branch (industrial) organization. According to Stigler (1968), industrial organization explores the structure of companies, the influence of concentration on the competition, and the influence of competition on prices, investments and innovation. In the branch of perfect competition, a long-term balance is established where participators make normal profit while companies which do not succeed in doing so must exit the branch. Accordingly, in perfect competition, each company which prevails in the branch is equally efficient as their direct competitors. The theory of pure monopoly is developed by Marshall (1890), who was the founder of the neo-classical theory, and Sraffa (1926). A monopolist is in a significantly better position than the perfect competitor since he has the opportunity to lower his approximate cost by increasing production. By doing so, he lowers the price of the product. On the other hand, a monopolist who is exploiting his power of control of the production quantity within the branch negatively, decreases his production, increases the price of the product and damages the consumer and the society as a whole. Edward Chamberlin and Joan Robinson developed a theory of monopolistic competition and oligopoly based on perfect competition and pure monopoly, as extreme cases of the industrial structure. Monopolistic competition implies a large number of small companies within the branch which can influence the forming of the price, but solely in its short range. These companies do not make profit in the long term, but can make profit in the short term. The oligopoly structure entails few companies in its branch which, unlike perfect competition, can influence the price of their product or service. Participators understand that they depend on each other, hence the change in price and quantity of the product or service of one or the other participator will cause a reaction of other firms within the branch. Competitors within the branch of oligopoly operate based on the analysis of behaviour of other competitors, the war of prices, which would harm all participators on the market, is being avoided.

Therefore, high concentration branches, oligopoly and pure monopoly, can either fully or partially influence the price of their product, and can thereby also influence the level of gained economic profit, which leads to the conclusion that they

are more efficient than the rest of the branch structures. This view on concentrated branches, which is characteristic for the neo-classical school, has its foundation in the empirical work of Bain (1951). Regression of profitability on business, which is shown in Bain's work, clearly shows that businesses with a higher concentration level achieve a higher profit. In other words, Bain arrives to the conclusion that limiting the concentration by the state's intervention benefits the customers more than it harms the manufacturers, and contributes to a higher level of social welfare and a lower efficiency of the manufacturers.

Efficiency is a broad economic term which has found its use in various areas of action of economic operators. Recent literature entails several terms and various definitions of efficiency. In his book Karić (2006, p.39) mentions how efficiency "as a form of successfulness of the business, maximizes the production or minimizes the spending of deficient resources. It expresses the successfulness in relation to used resources and measures the ratio between results and investments." This term is similarly defined by Mankiw (2006), efficiency is the ability of the society to maximize the output from the available and deficient resources. We can conclude that the efficiency is higher the more favorable the ratio between the accomplished output and input is, in other words it is higher when the same costs achieve a greater result or when the same results are achieved with a lower cost. Thus, the bigger the difference between sales revenue and cost of sold goods is, the more efficient will be the companies, which operate in the retail industry. The two main forms of efficiency are technical efficiency and economic efficiency. Technical efficiency is the ability of the economic operator to manufacture a physical unit of output with the least input of assets and time, while economic efficiency is the ability of the economic operator to produce and sell as valuable output as possible with the least cost. This research will focus on economic efficiency, while technical efficiency will be measured in future research.

As previously stated, we can conclude that the classical economic theory presumes a positive correlation between concentration and efficiency even though there is certain empirical evidence which confirms that it does not always have to be true. Within the scope of this research, we will explore the condition of the sector of retail in the Republic of Croatia.

2. METHODOLOGY

According to the previously stated and presented correlation between the efficiency level, the intensity of the competition and the concentration level, it seems reasonable and scientifically justified to explore the correlation between the efficiency level and the concentration level, which can positively and directly influence the understanding of the correlation between mentioned terms. Within the context of all previously mentioned, a basic hypothesis, which is in accordance with the classical economic theory, has been defined:

H1: The efficiency of companies in the retail industry is in a positive correlation with the concentration level.

This research is based on an unstructured measure. The main advantage of unstructured measures is their behaviouristic approach towards individual subjects which allows the measuring of the branch power and the efficiency for each subject individually. In order to prove the main hypothesis in the research, panel data of the retail industry of the Republic of Croatia is used, which entails twelve largest firms (measured by their achieved revenue). The research covered the period from 2010 until 2015. In the research, we used the data available from the Financial Agency (FINA), thus the research is based on a secondary source of data.

In order to accept or reject the set hypothesis, one of the measures of efficiency will have to be put into correlation with a certain chosen measure of concentration. As a measure of concentration, we will use the Concentration coefficient of the n largest firms within the industry (CR_n). This measure is mostly measured for the four largest companies within the industry, but can also be used for six, eight or more largest companies. The procedure of calculating the concentration coefficient is based on the sum of individual market shares for n of the largest companies within the industry. The concentration coefficient is the percentage of the share of a certain variable (income, assets, capital...) of the n largest companies from the total value of the industry and is determined by the following expression:

$$CR_n = \sum_{i=1}^n s_i \quad (1)$$

where the s_i is percentage share of firm i in the total value of the branch. In this paper authors use income as a variable by which we determine the concentration level. The smaller the concentration coefficient in a given branch the concentration is lower. With this benchmark, the level of concentration and type of market structure can be determined. The biggest disadvantage of this benchmark is that it ignores the impact of small business in the branch because it places the emphasis on the shares of the largest companies. The concentration coefficient value ranges between 0 and 100. By using the coefficient of concentration, we can distinguish four basic market structures:

- perfect competition, $CR_4 \approx 0$
- monopolistic competition, $CR_4 < 50$
- oligopoly, $CR_4 > 50$
- monopoly, $CR_4 \approx 100$

The research is based on the model which Salinger (1990) applied in his work. Regression models based on postulates from the classical economic theory (SCP theory) often use the profitability (efficiency) for the dependent variable, and some form of concentration is used for the independent variable. So, some models that want to test the Cournot model oligopoly, or equilibrium, use the following equation:

$$L = \frac{HHI}{\delta} \quad (2)$$

where: L is *Lerner index*², H is *Herfindahl-Hirschman index*³, and δ is *Price elasticity of demand*. If we assume that the price-cost margin (PCM) is approximate to the

² The Lerner index measures the relative margin which is an indicator of total power. It is defined by the expression $L = (P - MC) / P$, where P - is the price of the product and the MC - the marginal cost.

³ The Herfindahl-Hirschman Index (HHI) measures the degree of concentration on the market by adding squares of market shares of all companies present on the market. It is defined by the following mathematical expression: $HHI = \sum s^2$ where s is the share of a single enterprise.

Lerner index⁴, and the Herfindahl-Hirschman index (HHI) as a concentration measure is replaced by another concentration measure, for, example Concentration coefficient of the four largest companies (CR4) then the equation (2) can be written as follows:

$$\ln \text{PCM} = \alpha_0 + \alpha_1 \ln \text{CR4} + \alpha_2 \ln \delta + \varepsilon_1 \quad (3)$$

where ε is a stochastic variable representing unsystematic impacts on the dependent variables. By applying the third equation we can reject the Cournot oligopoly by rejecting a common hypothesis where it is $\alpha_0 = 0$, $\alpha_1 = 1/k$, $\alpha_2 = 1$. In the case of not knowing the elasticity of demand Salinger (1990) states that we can use the following statement:

$$\text{PCM} = \beta_0 + \beta_1 \text{CR4} + \varepsilon_2 \quad (4)$$

where β_1 is an average value of $1 / k\delta$, while PCM is the average margin in retail trade. In our research we use this equation to measure the impact of concentration on company efficiency. In order to verify and confirm the results obtained using the regression model shown in equation four (4), we decided to implement another regression model in which the concentration coefficient of the six largest companies in the branch would be used for the concentration measure, and we will quote it below:

$$\text{PCM} = \beta_0 + \beta_1 \text{CR6} + \varepsilon_2 \quad (5)$$

where CR6 is the concentration coefficient of the six largest companies in the branch. Using the previous statements made by Salinger for research purposes, we have constructed the following model:

$$\text{PCM}_{i,t} = \beta_0 + \beta_1 \text{MSI}_{i,t} + \varepsilon_{i,t} \quad (6)$$

where $\text{PCM}_{i,t}$ is company margin i in year t ; $\text{MSI}_{i,t}$ is company share i in year t . The model represented by the equation six (6) was computed using the computer using the econometric program. For the calculation of the model, we used a linear model of fixed effects.

It is necessary to verify the dependent variable. The margin or price difference of goods is in fact the earning of the company which operates in the retail industry for the purpose of covering their sales expenses and achieving profit. Lipczynski et al. (2005) specify five different variables of efficiency. One of the variables is productive and allocative efficiency which, according to them, is the ability of the company to produce given units of output with the least cost of input. In the given context, margin can be treated as a certain measure of company efficiency which operates in the retail industry since its input is the cost of sold goods and its output is the revenue of sold goods. The bigger the difference between sales revenue and costs of sold goods is, the higher the margin will be, which means the company is more efficient. The margin has been calculated in the following way, from the profit and loss account, costs of sold goods have been subtracted from the sales revenue, and then the calculated margin was divided by the sales revenue in order to gain its relative value.

3. RESULTS OF THE RESEARCH

⁴ For the long-term Lerner index, this approximation is based on the implication of the assumption that the average cost is equal to the marginal cost, within a short time that the marginal cost equals the average variable cost.

A logical question has been asked at the beginning of the research: What has been happening to the concentration level in the observed six-year period? The concentration level has been measured by the concentration coefficient of four and six companies within the branch, and the result is shown in table 1. The concentration, which was measured by the concentration coefficient of four largest companies within the industry, points out the trend of concentration growth within the retail industry. Even though during the observed period in 2012 and 2013 a slight stagnation was noted, it was later eliminated. Almost the same result was extracted by the concentration coefficient of six largest companies within the industry. During the observed period, an ascending trend with a slight reduction of concentration in 2012 is noted. Hence, the analysis of presented results clearly states that the retail industry in the Republic of Croatia belongs to the oligopoly market and the concentration coefficient of four and six companies in the industry is always higher than 50%. The industry is extremely concentrated, six largest companies have 85% of revenue of the entire branch at their disposal.

Table 1: Coefficients of concentration in research period

Year	CR4	CR6
2010	62,87%	74,70%
2011	63,70%	75,12%
2012	63,31%	73,71%
2013	63,29%	74,14%
2014	65,79%	77,30%
2015	71,81%	84,49%

Source: Authors calculation

With the help of the regression model, which was presented in equation four, we have evaluated the correlation between the margin and the concentration coefficient of four largest companies within the industry. By analysing the results which were presented in table 2, we come to the conclusion that there is a positive correlation between the size of the margin and the concentration level within the branch. The value of the coefficient β_1 is 0,27, while its related p-value is 0,033, which indicates a statistically significant result. The constant of the set model is 0,01 with the belonging p-value of 0,85, the result of the constant value was not statistically significant.

Table 2: Research results for linear regression model by margin and concentration coefficient of four largest companies

	Value of coefficient	Standard Error	t- test	p-value	95% confidence interval	
CR4	0,271812	0,085116	3,19	0,033	0,035491	0,508133
constant	0,010626	0,055497	0,19	0,857	0,0518902	0,164713

Source: Authors calculation

The equation four and equation five are closely related, the only difference is that in equation five we use the concentration coefficient of six largest companies within the branch as an independent variable. Hereby we merely wanted to prove and confirm the results gotten by using equation four. The gotten results confirm the previously presented results from table 2. The concentration coefficient of six largest companies within the branch is in a positive correlation with the company's margin ($\beta_1 = 0,23$), but this correlation is slightly weaker than the correlation of margin and the concentration coefficient of four companies within the branch. The p-value for the calculated coefficient is 0,03 which indicates the statistically significant result. Nevertheless, what should be emphasized is that the p-value of the constant is 0,85, similarly with the previous regression from equation four, which indicates a statistically insignificant result.

Table 3: Research results for linear regression model by margin and concentration coefficient of six largest companies

	Value of coefficient	Standard Error	t- test	p-value	95% confidence interval	
CR6	0,231076	0,070045	3,30	0,030	0,036598	0,425553
constant	0,010628	0,053702	0,20	0,852	-0,138403	0,159799

Source: Authors calculation

The equation six was applied to our panel data which entails 72 observations in total, divided in twelve groups. The results of the research indicate a strong correlation between the dependent and independent variable. The coefficient β_1 is 0,9235 which leads to the conclusion that every increase of the market share of one percent influences the growth of margin for 0,92%. Using the p-value we have tested the hypothesis that the coefficient is different than zero. Since its value is less than 0,05 we can conclude that the mentioned hypothesis is rejected on the level of significance of 5%. Furthermore, we have conducted a t-test which tested the hypothesis that the achieved result of the coefficient is different than zero. Since its value is greater than 1,96 (the interval of reliability is 95%) we can also reject the previous hypothesis.

The value of the constant β_0 is 0,114 and we have tested the hypothesis that its value is different than zero by using p-value and t-test. P-value is 0,001, while the value of the t-test is 3,66. Thus, both tests confirm the statistical significance of gotten results for both coefficient β_1 and β_0 . The results of the research are presented in table 4.

Table 4: Research results for linear regression model by efficiency and market share

	Value of coefficient	Standard Error	t- test	p-value	95% confidence interval	
MS	0,9235261	0,3627526	2,35	0,022	0,13763	1,709422
constant	0,1144576	0,0312681	3,66	0,001	0,0518902	0,177025

Source: Authors calculation

4. DISCUSSION

The presented empirical evidence points out the existence of a positive correlation between the level of efficiency and the branch concentration. Therefore, the hypothesis of this research can be accepted. Furthermore, the SCP paradigm assumes a positive correlation between the concentration and efficiency, this research affirmed this thesis. Certain authors do not agree with this statement, such as Demirguc-Kunt and Levine (2000). They believe that the correlation between concentration and efficiency does not show statistically significant, positive nor negative, correlation. Apart from the positive correlation between the concentration and efficiency, it has been proven that the growth of efficiency is possible within the conditions of competition growth, and the achieved results are in accordance with the research conducted by Schaeck and Čihak (2008, p.20). Hence, the empirical evidence from this research indicates the conclusion that the efficiency of the branch is in a positive correlation with the concentration, which is in accordance with the set hypothesis (H1). The reason for this condition within the branch can be seen from the fact that with the increase of the intensity of competition, less efficient companies are forced to abandon the branch, while more efficient companies which remained in the branch are increasing their level of efficiency on account of inefficient companies which abandoned that branch. In addition, it is more likely that the more efficient companies are taking over less efficient companies. In the last couple of years, we have witnessed the consolidation and takeover within the retail industry in the Republic of Croatia. Moreover, the increase of concentration level in the retail industry causes, apart from the exit of less efficient companies from the branch, the rejection of other companies to enter the branch, which leads to the reduction of companies within the branch and to the increase of general concentration level.

While interpreting the results of the research we should be careful since the model entails certain imperfections and deficiencies. Firstly, we would like to point out the margin as a form of company efficiency. The margin can also be connected to the intensity of market position of a certain company. Companies that have monopoly power can influence the price of their product. It corresponds to the fact that companies, which operate in the retail industry in that case, have the opportunity to increase the difference between sales revenue and the cost of sold goods. In other words, they can calculate a higher price for the products that they are selling. Even though the advantage of the margin as company efficiency, which operates in the retail industry, is the fact that most of the revenues and costs are brought forth by the goods they sell, it should not be forgotten that companies which can reduce other costs (for example costs of financing, capital investment costs...) can be more efficient than companies which have a higher margin.

5. CONCLUSION

By analysing the results of the research presented in this paper we conclude that the efficiency and level of concentration are positive related. We compared the relationship between these two variables using three models. The two models were

based on data for the entire retail branch, while one model was based on individual data, separately for each company. Thus, aggregated and individual data results in a similar outcome. As the branch is more concentrated, companies operate more efficiently, this research result is in line with neoclassical theory. Hence, larger companies are more efficient because they can better use the benefits of economies of scale. The purpose of this research was not to overcome the generally accepted economic postulates, but to remove the doubts that have arisen in some previous research.

The research, that is carried out in this paper, has its own limitations, which is primarily reflected in the interpretation of the margin as a kind of efficiency measure. In future studies, it is necessary to measure efficiency with unconventional methods such as *Stochastic Frontier Analysis* (SFA). The application of this method poses some other problems, which are primarily manifested in the lack of necessary data. This method starts from the company's revenue function and measures its (non)efficiency. The authors hope that they will be able to carry out the research in the future, whose results could better explain the results of the research presented in this paper.

6. REFERENCES

Bain, J. S. (1951). Relation of Profit Rate to Industry Concentration: American Manufacturing, 1936-1940, *The Quarterly Journal of Economics*, 65 (3), pp. 293-324.

Bresnahan, T. F. (1989). Empirical studies of industries with market power, ur: Schmalensee, R. & Willig, R., *Handbook of Industrial Organization*, Volume 2, Amsterdam: North-Holland, 1011-1057.

Demirguc-Kunt, A. & Levine, R. (2000). Bank concentration: Cross-Country Evidence, *World Bank*, 32.

Karić, M. (2006). *Mikroekonomika*, Osijek: Ekonomski fakultet u Osijeku

Lipczynski, J., Wilson, J. & Goddard, J. (2005). *Industrial Organization: Competition, Strategy, Policy*, 2, Harlow: Pearson Education Limited.

Mankiw, G. N. (2006). *Principles of Microeconomics*: Thompson South-Western.

Marshall, A. (1890). *Principles of Economics*, London: Macmillan.

Salinger, M. (1990). The Concentration-Margins Relationship Reconsidered [available at: https://www.brookings.edu/wp-content/uploads/1990/01/1990_bpeamicro_salinger.pdf]

Schaeck, K. & Čihak, M. (2008). How does competition affect efficiency and soundness in banking?, *Working paper Series*, 932, Frankfurt am Main: European Central Bank.

Sraffa, P. (1926). The laws of returns under competitive conditions, *Economic Journal*, 36 (144), pp. 535-550.

Stigler, G. J. (1968). *The Organisation of Industry*, Homewood: Irwin.