The Relationship of Concentration and Profitability in Banking Markets

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Abstract
The aim of this paper is to evaluate the relationship between the degree of concentration and profitability in the banking markets in the Czech Republic, Austria and Belgium. First, the paper presents current scientific research on this topic, which it is based on. Next, the Herfindahl-Hirschman Index is calculated for selected banking markets for the period of 2003 – 2012. The calculation of concentration is made based on three variables - total assets, receivables from clients and client deposits. These concentration values are compared with the development of earnings in selected banking sectors using correlation analysis; the necessary tests for normality were calculated previously. We conclude that there is an inverse relationship between the degree of concentration and the size of the profits of the banking sector in the case of the Czech Republic; correlation was not confirmed for the banking sectors in Austria and Belgium. It is possible to use the paper's results for further scientific research and findings as well as for actual economic policy, which is currently focusing on stricter regulation of the banking sector.

1. Introduction

A functional banking market is an integral and vital part of every market economy. The reason for this is that banks are important entities, which mediate the movement of free financial resources between surplus and deficit spending units. Banks provide loans to households and businesses for their expenses and investments and consequently influence the amount of expenditure, investment and international trade as a fundamental component of economic output.

In this paper, we deal with the concentration of selected banking sectors, i.e., those of the Czech Republic, Belgium and Austria. We selected these countries to compare with the Czech Republic's banking sector for two basic reasons. The first is similar country size as measured by the number of residents – even though the size of the banking sector differs rather considerably in the given countries due to the influence of historical development and the progress of their economies. The second reason lies in the fact that two of the significant banks operating in the Czech Republic – Česká Spořitelna and Československá Obchodní Banka – have their parent banks located in the given countries. For these reasons, it is particularly interesting to compare the relationship between concentration and profitability in the given countries. In the following text, we deal further with the relationship between concentration and profitability, i.e., what influence concentration has on effectiveness in providing banking services, i.e., the profitability of the banking sector.

Thus, the goal of this paper is to assess the relationship between the concentration of the Czech, Austrian and Belgian banking sectors and profitability on the given markets. We have begun with the hypothesis that when the degree of concentration increases, the profitability of the banking sector increases as well. This hypothesis is based on the thought that if a bank had greater competitive strength (i.e., the market was concentrated), it could establish pricing and other conditions for itself with relatively less dependence on other banks or clients and thus achieve greater profit.

2. Theoretical Background

In the following text, we define the fundamental results and thoughts from the major research works dealing with competition in banking and its relationship to profitability.

Bikker and Haaf (2002) present a study that reviews various approaches to measuring concentration and its relationship to the competitive environment. They state that the Herfindahl-Hirschman Index and the degree of concentration are typically used for measuring the degree of concentration. They also introduce the Hall-Tideman Index, the Rosenbluth Index, the Comprehensive Industrial Concentration Index, the Hannan and Kay Index and the Entropy measure. Goldberg and Rai (1996) present research on studies of the relationship between concentration and profit. They conclude that there is not one definitively established relationship between concentration and profitability in professional literature – roughly half the studies list a positive relationship.

Short (1979) examined a sample of 60 banks in the USA, Canada and Japan. He comes to the conclusion that a positive relationship between concentration and profitability is not confirmed over the short term, though it is over the long term. At the same time, he states that relatively large changes in concentration indicate that even though profit will grow, it will do so more and more slowly. Bikker and Haaf (2002) examine the conditions of economic competition (i.e., the configuration of the competitive environment) and the structure of the banking sector in 23 countries worldwide. They conclude that the greatest degree of competition is shown by large banks predominantly on international markets. Conversely, smaller banks on local markets show a lower degree of competition. They further indicate that there is a greater degree of competition in the countries of Europe than in other parts of the developed world. They come to the standard conclusion that the higher the degree of concentration, the lower the competitiveness. Casu and Girardone (2006) state that the relationship between competition and effectiveness is not decidedly positive; nonetheless, they state that increasing competition forces banks to increase their effectiveness.

Řepková and Stavárek (2014) investigate the Turkish banking sector, which, according to their measurement, is monopolistically competitive and furthermore shows a trend of increasing concentration in all the aspects that were measured. A decrease in competition is connected with this. According to the authors, the high level of competition on the Turkish banking market already presents a risk for effective financial mediation and economic growth. The same authors also examine the Czech banking sector (Řepková and Stavárek, 2013), which they describe as monopolistically competitive; they find a positive relationship between competition and effectiveness. Černohorský et al. (2012) examine the change in bank competitiveness on the Czech banking market mainly because of the influence of a greater degree of regulation. Bikker and Groeneveld (2000) submit proof of prevalent monopolistic competition on European banking markets. At the same time, they dispute the political opinion that deregulation and the liberalization of the banking sector increases competition. In addition to focusing on analyzing the diversity of the European countries' markets in connection with integration into the monetary union, they submit evidence of the negative correlation between concentration and competition. Černohorská and Honza (2014) investigate concentration and other factors that differentiate the Czech banking sector from the banking sectors of the former Yugoslavia. At the start of the new millennium, a wave of mergers after the creation of the monetary union provoked the question of whether increasing concentration in the banking sector also brings about an increase in competition in that sector. Černohorská (2015) further compares the Czech banking sector with the British one. There, she focuses on profitability and concentration ratios and on setting conditions for stability and competitiveness in the banking sector. Corvoisier and Gropp (2001) tried to find an answer to this question. They began with Cournot's model using specific assumptions and came to the conclusion that concentration level can have markedly different effects according to the type of product offered by banks that is being considered. Considering loans and demand deposits (which are the most significant commercial bank products from the perspective of their value), it was determined that the greater concentration, the higher the margins shown by the banking entities. On the other hand, it was determined that as the markets became more concentrated, the banks showed lower margins for products such as savings accounts or time deposits, for example.

3. Data and Methodology

Data from the Bureau van Dijk – Bankscope database are used in this paper. The data are for all banks operating in the Czech, Belgium and Austrian banking sectors during the ten year period of 2003 – 2012. Invariably, the data used are the asset values (the amount of the balance sheet total), deposits received from non-banking entities (sight deposits) and loans provided to non-banking entities (receivables on behalf of clients), i.e., basic numbers according to which the bank market share and its concentration are assessed. On account of the data's volume, these data will not be listed in detail here.

We first calculated the degree of concentration using the Herfindahl-Hirschman Index (HHI) for the data listed above; this is presented below. Next, we compared the values of the HHI that was calculated with the size of the net profit achieved on the Czech, Belgium and Austrian banking market for individual years with the help of correlation analysis, which is also presented below. We used indicator of net profit in this paper, even knowing his weaknesses, precisely because it is a final profit which banks further use and divide.

The HHI calculation and the principle of this method are explained according to Polouček (2006). The HHI's structure is founded on the hypothesis that the significance of a bank in the banking sector is a function of the square of its market share. This way of conceiving concentration highlights the influence of economically strong banks and, conversely, eliminates the influence of small banks. Analytically, the HHI takes the form of:

$$H = h(q_1, q_2, \dots, q_n) = \sum_{k=1}^{n} \left(\frac{q_k}{Q}\right)^2 = \sum_{k=1}^{n} r_k^2, \tag{1}$$

where h is the real function of the n variable, $h : R^n \rightarrow R$, n is the number of banks in the banking sector, q_k is the production volume of the kth bank $(k = 1, 2, \dots, n)$, Q is the production volume of the banking sector and r_k is the kth bank's share of the production volume the banking sector.

The share of the kth bank on the market is expressed in the following way:

$$r = \frac{q_k}{Q} = \frac{q_k}{\sum_{k=1}^{N} q_k}, \tag{2}$$

where Q is the overall production of the sector and q_k is the production of the firm $k = 1, 2, \dots, N$.

The HHI achieves values within the interval of <0;1>. A zero value means that the market share of each bank is the same. Values equal 1 when there is a monopoly. A value approaching 1 means that a relatively low number of banks is producing a substantial part of the production (assets, deposits and loans in our case) on the given market. If the HHI value is greater than 0.18, the market environment is considered to be concentrated; if the HHI value is within the interval of (0.1;0.18), the market is considered to be slightly concentrated. If the HHI value is less than 0.1, the market is considered to have little concentration. For easier orientation, the resulting value is sometimes multiplied by 10,000.

The method of correlation analysis is explained according to Kubanová (2008). Correlation expresses the closeness, size and strength of the mutual relationship of the random samples' variables. Correlation coefficients equal values within the interval of <-1; 1>. The concept of a random sample means an n-tuple of independent random variables $(X_1, X_2,\dots,X_n)$ having the same probability distribution as the random variable X. In order for us to conduct correlation analysis and determine whether the variables of concentration and profit are dependent on each other, we must conduct a normality test. A number of tests exist for verifying whether the random sample has a normal probability distribution. We selected the Shapiro-Wilk test for conducting this test. The test has the following formula:

$$SW = \frac{\left(\sum_{i=1}^{m} a_i(n)\left(X_{(n-i+1)} - X_i\right)\right)^2}{\sum_{i=1}^{n}\left(X_i - \acute{X}\right)^2}. \tag{3}$$

The principle of the test lies in the fact that it will estimate the parameter σ using the random variable $S^* = \sum_{i=1}^{n} a_i X_i$ and its estimation is compared with the estimate based on the random variable

$\sum_{i=1}^{n} (X_i - \bar{X})^2$. We thus test the null hypothesis H_0 (the random sample has normal probability distribution) against the alternative H_1 (the random sample does not have normal probability distribution). The important output of this analysis is the resulting *p*-value, which determines whether the null hypothesis is accepted or rejected and which expresses the lowest possible level of significance α for rejecting H_0 for the given realization of the random sample. If the *p*-value is less than or equal to αα, H_0 is rejected; if the *p*-value is greater than *α*, H_0 is not rejected. We selected a standard value for the level of significance, i.e., 0.05. For the calculating correlation, we used Pearson's correlation coefficient. For pairs of values (X_1, Y_1), (X_2, Y_2), …. (X_n, Y_n), the formula for Pearson's correlation coefficient is the following:

$$r = \frac{\sum_{i=1}^{n}(X_i - \bar{X})(Y_i - \overline{Y})}{\sqrt{\sum_{i=1}^{n}(X_i - \bar{X})^2} \sqrt{\sum_{i=1}^{n}(Y_i - \bar{Y})^2}} \tag{4}$$

where $\bar{X} = \frac{1}{n}\sum_{i=1}^{n} X_i$ is the mathematical average of the first measurements and $\overline{Y}$ is the mathematical average of the second measurements.

4. Empirical Results

The first step was to calculate the HHI for the three selected values – the size of the balance sheet totals, loans provided and deposits received. The HHI values in the Czech Republic for all the ratios observed declined during the given period. It was never an even decline for any of the cases – for the ratio of balance sheet total, the HHI value always declined with the exception of the year 2005. According to loans provided, the HHI indicates a slightly uneven development – first, in the first five years analyzed, it fluctuates between values of 0.135 and 0.128; as of 2008, it declines to a value around 0.118 where it remains for the last three years that were analyzed. For the HHI according to client deposits, a declining trend is apparent with the exception of only two years (2006 and 2008), where the HHI rose slightly. All calculated HHI values are listed in the following table; the values for net profit, which can be further used for analysis on their own, are also listed here.

Table 1: HHI and Profit Values in the Czech Republic's Banking Sector

Year	HHI_assets	HHI_loans	HHI_deposits	Net profit of the entire sector (in mil. CZK)
2003	0.154	0.135	0.172	30,200
2004	0.146	0.128	0.160	32,852
2005	0.153	0.131	0.157	39,426
2006	0.150	0.130	0.161	37,925
2007	0.149	0.135	0.153	46,987
2008	0.145	0.131	0.156	45,705
2009	0.141	0.123	0.154	59,976
2010	0.140	0.116	0.153	55,656
2011	0.137	0.118	0.150	53,337
2012	0.129	0.119	0.141	64,344

Source: calculations by the author according to the Bureau van Dijk Bankscope database

On the basis of all the HHI values listed above, we can state that the Czech Republic's banking sector was slightly concentrated, because the HHI values ranged within the interval of (0.1;0.18). There is a clear declining trend for the level of concentration as measured by the HHI. The share of three largest banks in terms of total assets was in 2003 65%, share of five largest banks was 72% in the Czech Republic. It decreased slightly to 59% (for three largest banks), respectively 70% (for five largest banks)

by year 2012. The share of the largest banks in terms of receivables is slightly lower, in terms of deposits is higher. The degree of concentration of the Czech banking sector slightly decreased in the analyzed period - this is due to the entry of small banks and their aggressive price policy and due to increasing influence of medium-sized banks.

In the case of Austria, the HHI for assets declined to a value of 0.093 up to the year 2006; it then rose to 0.113. After this, it held around a value of 0.1 and then increased slightly during the last four years analyzed. The calculated HHI values for loans and deposits also show a similar trend. In comparison with the Czech Republic's banking sector, it is interesting to note that the Austrian banking sector was more concentrated (except for deposits) at the beginning of the period examined; at the end of the given period, it was distinctly less concentrated. At the very end, it was slightly concentrated (0.1). Austrian banking market is less concentrated in comparison with the Czech banking market. It is due to a number of banks operating in the Austrian banking market despite the fact that these banks are interconnected to each other by property. The significant downward trend in the concentration associated with an increase in the influence of small and medium-sized banks can be seen here as well as in the Czech Republic.

Thus, there was a more distinct decline in the level of concentration here than in the Czech Republic. The specific values for HHI and net profit are listed in the following table.

Table 2: HHI and Profit Values in the Austrian Banking Sector

Year	HHI_assets	HHI_loans	HHI_deposits	Net profit of the entire sector (in mil. CZK)
2003	0.200	0.190	0.161	43,269
2004	0.148	0.142	0.122	61,923
2005	0.131	0.127	0.113	87,118
2006	0.093	0.090	0.079	191,372
2007	0.113	0.114	0.116	147,510
2008	0.109	0.120	0.115	69,036
2009	0.091	0.107	0.111	33,568
2010	0.094	0.109	0.112	111,293
2011	0.098	0.114	0.117	26,879
2012	0.102	0.116	0.122	68,999

Source: calculations by the author according to the Bureau van Dijk Bankscope database

The development of concentration is somewhat different in Belgium. The first two of the years analyzed held to relatively low values; in 2005, the HHI value rose markedly for all ratios to a value near or over 0.3. After this, it fell, and, at the end of the period analyzed, it fluctuated around 0.18 – specifically, it came to 0.195 for loans. The Belgian banking sector is thus the most markedly concentrated of the sectors that were compared – the HHI values fluctuate around the upper limit of slight concentration (0.18), or slightly over it. In the Belgian banking sector operates about 80 banks, of which four are most important and hold more than 2/3 of the market share. A significant increase in concentration and profit was between years 2004 and 2005. It was a period of outstanding growth of the Belgian banking sector and the largest banks played a substantial role in it. Furthermore, there was a noticeable outflow of clients to non-banks, increasing competition among banks-saving products and other products. Again, the largest banks benefited most from these processes. An important change, (this time the decline in the concentration) occurred between years 2007 and 2009. This was a consequence of the financial crisis. This affected primarily the large banks which reduced their market share. This trend of deconcentration of the banking sector continued in the following years.

All the values calculated for the Belgian banking sector's HHI and net profit are listed in the following table.

Table 3: HHI and Profit Values in the Belgian Banking Sector

Year	HHI_assets	HHI_loans	HHI_deposits	Net profit of the entire sector (in mil. CZK)
2003	0.114	0.163	0.159	9,778
2004	0.118	0.161	0.153	8,134
2005	0.294	0.328	0.281	202,037
2006	0.288	0.301	0.266	270,470
2007	0.298	0.304	0.267	188,954
2008	0.257	0.237	0.239	-572,055
2009	0.220	0.221	0.211	-30,455
2010	0.198	0.208	0.194	150,827
2011	0.187	0.201	0.185	14,331
2012	0.172	0.195	0.179	50,551

Source: calculations by the author according to the Bureau van Dijk Bankscope database

Now we can begin analyzing the correlation between the development of the individual ratios measuring concentration on the banking markets and net profit during the years examined.

4.1 Results for the Czech Republic's Banking Sector

A precondition for the calculation of correlation using Pearson's correlation coefficient is conducting a normality test using the Shapiro-Wilk test. Its results are listed in the following table.

Table 4: Results of the Shapiro-Wilk Normality Test for the Variables

Variable	p-value	Comments
HHI_balance sheet total	0.7729	not rejected
HHI_loans	0.1716	not rejected
HHI_client deposits	0.7376	not rejected
Net profit of the Czech banking sector	0.8082	not rejected

Source: calculations by the author according to the Bureau van Dijk Bankscope database

All the p-values are greater than the level of significance $\alpha = 0.05$; therefore, we do not reject the hypothesis H_0, i.e., all the values' samples have normal distribution, and we can thus proceed to calculating correlation using Pearson's correlation coefficient. The results are listed in the following table.

Table 5: Pearson's Correlation Coefficient for Individual HHI Values and Net Profit in the Czech Banking Sector

Variable	Pearson's correlation coefficient	p-value	Comments
HHI_balance sheet total	-0.8564	0.0016	rejected
HHI_loans	-0.7868	0.0069	rejected
HHI_client deposits	-0.8772	0.0012	rejected

Source: calculations by the author according to the Bureau van Dijk Bankscope database

When calculating Pearson's correlation coefficient, we test the hypothesis H_0 for whether the correlation coefficient equals zero, i.e., that a correlational relationship does not exist between the two

variables. Because the *p*-value for all the HHIs equaled less than 0.05, we reject this hypothesis. In other words, the correlation coefficient is not zero, i.e., a correlational relationship does exist between all the HHI values and net profit. All the values for Pearson's correlation coefficient equal negative numbers, which means that there is an inversely proportional relationship, i.e., a lower degree of profit is associated with a greater degree of concentration in the banking sector. We can explain this result mainly that the degree of concentration of the Czech banking sector is decreasing due to the entry of new small banks and as well as due to increase of the influence of medium-sized banks. Simultaneously, the Czech banking sector was successful in generating profits that increased over time. It is due to the fact that the Czech banking sector solved its serious problems already in the 90s of the 20th century and in recent times it is without serious problems.

4.2 The Results for the Austrian Banking Sector

The results of the Shapiro-Wilk test, the fundamental prerequisite for calculating correlation using Pearson's correlation coefficient, are listed in the following table.

Table 6: The Results of the Shapiro-Wilk Normality Test for the Variables in the Austrian Banking Sector

Variable	Normality – *p*-value	Comments
HHI_balance sheet total	0.008385	rejected
HHI_loans	0.024391	rejected
HHI_client deposits	0.017075	rejected
Net profit of the banking sector	0.245778	not rejected

Source: calculations by the author according to the Bureau van Dijk Bankscope database

The *p*-value is lower than the level of significance for all concentration values, which means that we reject the null hypothesis, and we can say that these random samples do not have normal probability distribution. This is primarily because of the year 2003, when individual concentrations deviate from the concentrations of other years. The only case where we do not reject H0 is the random sample for net profit. Here, the *p*-value is greater than the level of significance, and this sample has normal probability. Even though we do not reject H_0 here, the conditions for using Pearson's correlation coefficient are not fulfilled for the other samples when we measure the level of concentration; therefore, we must use Spearman's correlation coefficient, for which the conditions are fulfilled.

Table 7: Spearman's Correlation Coefficient and the p-Value for Individual Concentrations and Net Profit in the Austrian Banking Sector

Variable	Spearman's correlation coefficient	*p*-value	Comments
HHI_balance sheet total	-0.0788	0.8287	not rejected
HHI_loans	-0.2606	0.4671	not rejected
HHI_client deposits	-0.4667	0.1739	not rejected

Source: calculations by the author according to the Bureau van Dijk Bankscope database

Spearman's correlation coefficient has the same formula for comparing hypotheses as Pearson's correlation coefficient. Thus, we will be comparing two hypotheses to each other, which we can write in this way:

$$H_0 \ldots \rho=0 \text{ against } H_1 \quad \ldots \rho \neq 0.$$

The formula depicted above means that the null hypothesis assumes that the correlation coefficient equals zero, in contrast to the alternative hypothesis that it is not zero and thus amounts to values between -1 and 1. As we can see the in the *p*-value column, all values are greater than the level of significance, which means that the correlation coefficient equals 0 and, thus, that a dependency does not exist between concentration and profit in the case of the Austrian banking sector. In case of the results of the banking sector in Austria is, in our opinion, an appreciable effect of a number of other factors affecting the development of earnings, such as time aspect, changing tax conditions, implementation of new technologies carrying costs with them. Surely we must also mention the impact of the financial crisis which caused significant drops in profit in the analyzed period.

4.3 Results for the Belgian Banking Sector

The results of the Shapiro-Wilk test, a necessary prerequisite for calculating correlation using Pearson's correlation coefficient, are listed in the following table.

Table 8: Results of the Shapiro-Wilk Normality Test for the Variables in the Belgian Banking Sector

Variable	Normality – *p*-value	Comments
HHI_balance sheet total	0.3155	not rejected
HHI_loans	0.2286	not rejected
HHI_client deposits	0.3501	not rejected
Net profit of the banking sector	0.0063	Rejected

Source: calculations by the author according to the Bureau van Dijk Bankscope database

We do not reject the H_0 hypothesis for the individual HHI ratios, i.e., these samples have normal probability distribution. Naturally, in order to use Pearson's correlation coefficient, it is necessary that all samples included in the calculation have normal probability distribution. The net profit ratio does not fulfill this condition; in this case, we had to reject the null hypothesis. The reason was primarily on account of high losses in the Belgian banking sector in 2008, which came to roughly 572 bn CZK. Therefore, we used Spearman's correlation coefficient again to measure the dependence between concentration and profit values. The results are listed in the following table.

Table 9: Spearman's Correlation Coefficient and the p-Value for Individual Concentrations and Net Profit in the Belgian Banking Sector

Variable	Spearman's correlation coefficient	*p*-value	Comments
HHI_balance sheet total	0.4909	0.1497	not rejected
HHI_loans	0.5152	0.1275	not rejected
HHI_client deposits	0.5152	0.1275	not rejected

Source: Calculations by the author according to the Bureau van Dijk Bankscope database

In this case as well, we test the null hypothesis for whether the correlation coefficient equals zero against the alternative hypothesis that it is not zero and thus amounts to values between -1 and 1. If we focus on the numbers in the *p*-value column, we can see that we do not reject H_0 for any of the individual variables measuring HHI, which means that the correlation coefficient equals zero; therefore, we can say that, the same as in Austria, dependence between concentration and profit does not exist. We expect the same explanation also in the banking sector in Belgium as in the banking sector in Austria. In the case of Belgium it is also the effect of the impact of the financial crisis greatly higher because the entire banking sector in years 2008-2009 came to a significant loss.

5. Results and Discussion

In the correlation analysis that was conducted, the hypothesis we set out – that the profitability of the banking sector increases as the level of concentration increases – was not confirmed. In the case of the Czech banking sector, the opposite relationship actually emerged, i.e., inversely proportional – the banking sector's profitability decreases with an increasing degree of concentration. In the case of the Austrian and Belgian banking sectors, the correlation coefficient was zero, i.e., a correlational relationship was missing here.

The relationship we have proven does not tend to be seen in the literature. According to Goldberg and Rai (1996), roughly half of studies demonstrate a positive relationship between concentration and profitability; for example, in our research, this is represented by Short (1979), but only in the long term. Conversely, Casu and Girardona (2006) and Řepková and Stavárek (2013) conclude that there is a positive relationship between competition and effectiveness. This means that, if we proceed from a negative relationship between concentration and competition, then the resulting relationship between concentration and profitability (effectiveness) is also negative. Other work tends to deals with aspects other than purely with the relationship between concentration and profitability, e.g., the influence of regulation, the political environment, the probability of the occurrence of a crisis, etc.

Concerning the results, it is necessary to note that, in reality, a whole range of economic and noneconomic factors are in effect that influence the development of profit in the banking environment. Primarily, there is the temporal aspect – each banking sector (excluding distinctly critical periods) grows over an extended period of time; it manages more assets, provides more loans and accepts more deposits. When respecting a positive interest rate differential, this also means the growth of profit over the long term. Next, there are tax conditions – in market economies, the trend of lowering the rate of taxation for direct taxes and increasing it for indirect taxes has been gaining ground in recent years. Furthermore, in the Czech banking sector specifically, there has recently been a more conspicuous entry of new banks that want to establish themselves more firmly on the market. Their market share has not yet grown in a pronounced way; nonetheless, they create pressure on the other banks with their products. Their reaction increases their costs or, more precisely, it lowers revenues (e.g., in the form of lowering or disrupting the fees that have been being used until then, lowering interest rates for loan products, etc.). On the other hand, this increase in the competitive environment should lead to increasing the banks' effectiveness in the long run. When comparing selected banking sectors, the higher percentage of profit from fees for banks operating in the Czech Republic than for banks in Austria and Belgium also plays a definite role.

From the above, it follows that it is necessary to further investigate the relationship between concentration and profitability in the banking sector, possibly including other factors. This appears to be important even in connection with the administration of new licenses by central banks, because new banks can influence concentration, competitive environment and the banking sector's profitability.

6. Conclusion

The goal of this paper was fulfilled; however, the hypothesis that was established – that bank profitability increases as the degree of concentration increases – was not confirmed.

We conducted the calculations using Pearson's correlation coefficient if the samples had values with normal probability distribution or using Spearman's correlation coefficient for samples which did not have normal probability distribution. In the case of the Austrian and Belgian banking sectors, there is no correlational relationship between concentration and profitability that can be described by the methods used. In the case of the Czech Republic, we even arrived at an inverse relationship – that the banks' profitability decreases as concentration increases. We understand the reason to be that there exists a whole range of factors in economic and banking reality that influences the relationship we investigated; we have discussed these above.

According to our results, comments and recommendations, it is necessary to further investigate the given relationship – primarily, by using a wider spectrum of banking sectors and taking into account more factors that could influence the given relationship.

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