Profitability Analysis of Selected Czech Banks and Their Foreign Owners

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Abstract
The goal of this paper is to establish determinants of profitability for selected European banks and subsequently compose a model of the selected banks' profitability ratios. Czech banks and their international parent companies were selected for the profitability analysis. To represent Czech banks, banks were selected from the category of large banks (using CNB classification according to balance sheet amount). Data from the years 2001–2013 will be analyzed. Two ratios are used for assessing bank profitability - return on assets and return on equity. Ten indicators were selected for the banks' profitability analysis. The subsequent regression analysis proved a positive influence for interest margin and a negative influence for the ratio of high risk loans to assets on both profitability ratios; therefore, we can say that they are very significant determinants of the profitability of the banks studied. Furthermore, the positive influence of central bank taxation rate on return on equity was proved, and the negative influence of both GDP per capita and taxation rate on return on assets was proved.

Keywords: bank, profitability, regression analysis
JEL codes: G21, C1, E44

1. Introduction

Economic analyses are used as a foundation for decision making by bank management. At the same time, economic analyses are used extensively by the body that regulates and oversees the financial market; they are also used when adopting adequate measures for preserving the stability of the banking sector (Vodová, 2013 or Černohorská and Černohorský, 2014). For evaluating bank profitability, financial ratios are used most frequently. The value of a specific financial ratio has limited explanatory power on its own. For qualified analysis, it is necessary to work with a time series of ratios and monitor the trends of their development over past periods of time (Tokarčíková et. al., 2014). However, a time series analysis conducted in this way contains only quantitative aspects of bank performance. For objective qualitative evaluation of bank profitability, it is useful to compare these values with the values of other banks' ratios. Comparative analysis conducted for a group of comparable banks, i.e., peer analysis, makes it possible to judge the relationship between profits and the risk that has been undertaken in comparison with the competition. The goal of this paper is to establish determinants of profitability for selected European banks and subsequently compose a model of the selected banks' profitability ratios. Return on assets and return on equity are among the most frequently used and most important ratios for measuring and evaluating bank profitability.

Czech banks and their international parent companies were selected for the profitability analysis. To represent Czech banks, banks were selected from the category of large banks (using CNB classification according to balance sheet amount). The four banks governed by European financial groups that make up the actual group of large banks are: i) Česká Spořitelna AS and the Austrian Erste Group Bank AG, ii) Československá Obchodní Banka AS and the Belgian KBC Bank NV, iii) Komerční Banka AS and the French Société Générale, iv) UniCredit Bank Czech Republic and Slovakia AS and the Italian UniCredit SpA, via UniCredit Bank Austria AG. However, the two banks mentioned last were eliminated from the analysis during the following stages due to a lack of necessary public information. Data from the years 2001–2013 will be analyzed. Two ratios are used for assessing bank profitability: the return on assets ratio (ROA) and the return on equity ratio (ROE). Both of these ratios are important for other evaluators. The return on assets ratio is primarily important for bank management

as an indicator of bank profitability, whereas the return on equity ratio expresses the performance of invested resources for the bank's owners. The following indicators were selected for the banks' profitability analysis: i) bank size, ii) capital adequacy, iii) the ratio of high risk loans to assets, iv) interest margin, v) the cost/income ratio, vi) market concentration, vii) inflation, viii) GDP per capita, ix) taxation rate and x) the central bank's interest rate.

2. Determinants of Bank Profitability

Many authors have dedicated themselves to the problematic of bank profitability. In the past, many of these have focused on profitability analysis in relationship to a combination of internal and external determinants of bank profitability (e.g., the size of the balance sheet amounts, capital size, risk management, cost management, etc.). The first author linked to profitability analysis is Short (1979), who looked for a relationship between profitability and a bank's economic cycle. Short (1979) additionally stated that bank size and profitability are tightly correlated with a bank's capital adequacy. Large banks tend to rise cheaper, i.e., foreign, capital and, consequently, appear to be more profitable. Subsequent studies from international authors, such as Bourke (1989), Molyneux and Thorton (1992) and Bikker and Hu (2002), also support the relationship between profitability and the bank's economic cycle.

Smirlock (1985) discovered a positive relationship between bank size and profitability. According to him, larger banks generally tend to be more profitable, because they achieve savings on account of their size, as opposed to small banks, which are conversely associated with loss on account of their size. Generally, bank size tends to be measured according to balance sheet amounts. Abreu and Mendes (2002) used the ratio of high risk loans to assets as a substitute for risk in their analysis. A greater accumulation of unpaid loans can lower the profits of banks that are afflicted in this way, which means a negative relationship between risk and bank profitability. They used the ratio of provisions to loans and assets as a substitute indicator of risk. For commercial banks, the basic source of profits is represented by interest income; therefore, interest income is one of the basic explanatory variables in most of the studies on this subject, e.g., Dietrich and Wanzenried (2011). Two ratios, net interest margin and interest spread, are often used for measuring and evaluating the mutual relationship between interest income and costs (for more information see Kucharčíková and Tokarčíková, 2015). It is possible to determine market concentration using the market share of the three largest banks, or, in a more sophisticated way, by using the Herfindahl-Hirschman index, which is regularly used for measuring market concentration. A number of international authors have also specified the concentration of the banking market as a significant determinant of profitability. Molyneux and Thornton (1992) confirm a positive and statistically significant relationship between market concentration and profitability for banks operating in an environment that is not very competitive. Conversely, Staikouras and Wood (2004) show results that point to a negative, but statistically insignificant, relationship between concentration and bank profits.

For the most part, studies on bank profitability focus on external determinants. The relationship between profitability and inflation was addressed by Revell (1979), among others; he observed that the influence of inflation on bank profitability depends on whether the banks' salaries and other operational costs grow more quickly than inflation. Most studies (e.g., Bourke, 1989; Molyneux and Thornton, 1992) have demonstrated a positive relationship between inflation and profitability. Molyneux and Thornton (1992) have also investigated central bank interest rates as a factor that enters into banks' expense items and, thus, influences profitability. Without question, the central bank and the rates it uses to provide resources for financing commercial banks are a bank cost input that influences bank profitability. At the same time, other interest rates on the market and, consequently, the earnings component of net income are derived from these rates. Bikker and Hu (2002) list gross domestic product (GDP) as one of the macroeconomic determinants of profitability. Huizinga (2000) uses GDP per capita in his study. In his studies, Demirgüç-Kunt and Huizinga (1999) also proves that bank taxation lowers bank profitability; in contrast, the study by Albertazzi and Gambacorta (2009) came to the conclusion that the impact of taxation on the profitability of the banking sector is low, because banks can transfer a large part of the tax burden onto their clients.

3. Methods

Czech banking can only draw from a short history, which is linked to the Czech Republic's post-revolution development. The fundamental turning point for Czech banking occurred in 2000 and 2001, when Austrian Erste acquired Česká Spořitelna AS, ČSOB took over Investiční a Poštovní Banka and Société Générale acquired Komerční Banka (see Černohorský, 2014; Fišerová et al., 2015). Therefore, the time series for analysis starts in 2001 and ends with the year 2013, because newer data was not available at the time this article was written. Macroeconomic data for analysis was acquired from the OECD and Eurostat databases; data concerning the management of individual banks was derived from the Bankscope database.

3.1 Correlation Analysis

This method is used to determine the closeness of the correlation between two continuous random variables. For the correlation between two continuous random variables X and Y, the most important and frequently used tool to measure the correlation's strength is Pearson's correlation coefficient, which we use in profitability analysis for analyzing the mutual correlation of explanatory variables. Pearson's correlation coefficient takes the form (Witte and Witte, 2009):

$$\rho = \frac{s_{xy}}{s_x s_y} \tag{1}$$

where: ρ is the correlation coefficient, s_x is the standard deviation of the variable X, s_y is the standard deviation of the variable Y, s_{xy} is the covariance of the variables X and Y.

The condition for using Pearson's correlation coefficient is that both random variables X and Y must show normal distribution; this condition is met for the data we are investigating. The correlation coefficient can increase in value at an interval of ⟨- 1;+1⟩. The greater the absolute value of Pearson's correlation coefficient, the more closely both variables are correlated.

3.2 Regression Analysis

Regression analysis is a statistical method whose goal is to determine a statistical relationship between one or a number of independent or explanatory quantitative variables x and one dependent quantitative variable y. The principle for conducting regression analysis is to establish the most relevant form for the regressive model (i.e., to specify an appropriate equation to describe the dependence of Y on X); next, to establish its parameters (to establish specific values for the parameters β); to establish the model's statistical significance (i.e., whether the model is essentially successful at specifying the estimate of the dependent variable); and to interpret the results given by the model from the perspective of the assigned task. The regressive model's resulting function is written using a formula that is equivalent to the formula for the function of simple linear regression:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_n X_n + \varepsilon_i \tag{2}$$

where Y is the dependent variable, $\beta_0, \beta_i \quad i = 1,\ldots,n$ are regression coefficients (also partial regression coefficients), Xi $i = 1,\ldots,n$ are the values of the independent variable and ε_i is the error term $i = 1,\ldots,n$.

The regression function's coefficients are established by the least squares method. As such, conducting the regression analysis is conditional upon fulfilling the following prerequisites (Witte and Witte, 2009): i) there is no multicollinearity, ii) there is normality of the error term, iii) the error term is homoscedastic, iv) the relationships between the independent variables and the dependent variable are linear and v) the error terms are uncorrelated.

4. Analysis of the Profitability Determinants for Selected European Banks

The goal of the following analysis is to establish variables that have demonstrable influence on the development of European banks' profitability ratios and to subsequently compose a model of the selected banks' profitability ratios. A total of 78 observations were included in the analysis.

4. 1 Correlation Analysis of the Selected Banks

Using Pearson's correlation coefficient, we will search for a mutual correlation between the explanatory variables in order for us to create the conditions for the subsequent regression analysis. Pearson's correlation coefficients were calculated using correlation analysis in the program Excel; the results are listed in Table 1.

Table 1: Correlation Analysis of the Selected Banks

Data for all monitored banks	Bank size	Capital adequacy	The ratio of high risk loans to assets	Costs/income ratio	Interest margin	Market concentration	Inflation	GDP	Taxation rate	Central bank interest rate
Bank size	1.0000									
Capital adequacy	-0.2083	1.0000								
The ratio of high risk loans to assets	0.3528	0.2931	1.0000							
Costs/income ratio	0.3598	-0.3019	0.1479	1.0000						
Interest margin	-0.6609	0.3013	-0.0013	-0.7061	1.0000					
Market concentration	0.1726	-0.2352	-0.2756	0.1014	-0.1764	1.0000				
Inflation	-0.1412	-0.0637	0.0887	-0.0547	0.2052	0.0708	1.0000			
GDP	**0.8501**	-0.0926	0.3688	0.0099	-0.4309	-0.1101	-0.1336	1.0000		
Taxation rate	0.4822	-0.3058	0.2008	**0.8458**	-0.7664	0.2343	-0.1858	0.1521	1.0000	
Central bank interest rate	-0.0483	-0.4205	-0.1108	0.5818	-0.2837	0.1474	0.3004	-0.3475	0.4095	1.0000

Source: own calculation by Bankscope, Eurostat

Correlation analysis of all the investigated banks' variables does not include any correlation exceeding a value of 0.9 for Pearson's correlation coefficient. We found a correlation exceeding an absolute value of 0.8 for only for two pairs. One of the mutually correlating pairs is bank size and GDP; the second is taxation rate and the cost/income ratio. Therefore, the ratios relating to bank size and the cost/income ratio were left out of the basic set for further analysis.

4.2 Regression Analysis of the Selected Banks

After leaving out the correlated variables, the data set was subjected to multiple regression analysis in the software program Statistica 12. Table 2 includes the multiple regression analysis explaining ROE ratios and Table 3 depicts the outputs of multiple regression analysis for ROA ratios for all the banks studied. For both profitability ratios, it was proved by regression that the ratio of high risk loans to assets and interest margin fundamentally influence the profitability of the banks investigated during the years 2001–2013. In comparison, it was not possible to statistically confirm the influence of capital adequacy, market concentration or inflation rate on any of the profitability ratios examined.

Table 2: Regression Analysis ROE

Results of regression with dependent variable ROE in % R= 0,7443582, R2 = 0,5540691, p-value = 1,171 E-09						
N=78	b*	Standard deviation (from b*)	b	Standard deviation (from b)	t(69)	p-value
Abs. term			7.79776	16.10582	0.48416	0.629807
Capital adequacy	0.139449	0.107255	0.42439	0.32642	1.30016	0.197871
The ratio of high risk loans to assets	**-0.505253**	**0.124560**	**-5.19337**	**1.28032**	**-4.05630**	**0.000129**
Interest margin	**0.417125**	**0.179082**	**4.81338**	**2.06650**	**2.32924**	**0.022781**
Market concentration	-0.080415	0.090409	-0.00139	0.00156	-0.88945	0.376853
Inflation	-0.027896	0.095419	-0.18891	0.64616	-0.29235	0.770895
GDP	-0.131166	0.141568	-0.00016	0.00017	-0.92653	0.357401
Taxation rate	0.056117	0.171687	0.08029	0.24563	0.32686	0.744766
Central bank interest rate	**0.307522**	**0.125244**	**2.22735**	**0.90713**	**2.45538**	**0.016597**

Source: own calculation by Bankscope, Eurostat

According to the regression analysis that was conducted, the return on equity ratio of the banks examined is essentially negatively influenced by the ratio of high risk loans to assets; thus, the growth of these values negatively influences return on equity. Interest margin and the central bank's interest rate have a positive influence on ROE; thus, their growth positively influences the growth of the return on equity ratio. It is possible to interpret the model explaining the selected banks' return on equity mathematically using the following formula:

$$ROE = 4.81338 * X_1 - 5.19337 * X_2 + 2.22735 * X_3 + \varepsilon_i \quad (3)$$

where: X_1 is interest margin, X_2 is the ratio of high risk loans to assets, X_3 is the central bank interest rate and ε_i is the error term $i = 1, \ldots, n$.

The presented model was evaluated by statistical analysis as having 91% relevance for the choice of model and explains 84% of the problem of explaining the ROE ratio.

Table 3: Regression Analysis ROA

Results of regression with dependent variable ROA in % R = 0.91746866 R2 = 0.84174874, p-value = 1.17042 E-24						
N=78	b*	Standard deviation (from b*)	b	Standard deviation (from b)	t(69)	p-value
Abs. term			**2.512499**	**0.666709**	**3.76851**	**0.000343**
Capital adequacy	0.042270	0.063894	0.008939	0.013512	0.66156	0.510456
The ratio of high risk loans to assets	**-0.277639**	**0.074203**	**-0.198305**	**0.053000**	**-3.74165**	**0.000374**
Interest margin	**0.281078**	**0.106682**	**0.225385**	**0.085544**	**2.63473**	**0.010389**
Market concentration	0.050950	0.053858	0.000061	0.000065	0.94599	0.347455
Inflation	0.055549	0.056843	0.026140	0.026748	0.97725	0.331860
GDP	**-0.429796**	**0.084334**	**-0.000037**	**0.000007**	**-5.09634**	**0.000003**
Taxation rate	**-0.281730**	**0.102277**	**-0.028009**	**0.010168**	**-2.75459**	**0.007508**
Central bank interest rate	-0.065646	0.074610	-0.033040	0.037551	-0.87986	0.381989

Source: own calculation by Bankscope, Eurostat

The return on assets ratio for the banks examined is positively influenced by interest margin; thus, an increase in interest margin leads to an increase in the ROA ratio. ROA is negatively influenced by the ratio of high risk loans to assets, GDP per capita and the taxation rate for calculating tax from the earnings of financial companies. The growth of these factors leads to a decrease in the return on assets ratio for the banks studied. It is possible to interpret the model mathematically using the following equation:

$$ROA = 0.225385 * X_1 - 0.198305 * X_2 - 0.000037 * X_3 - 0.028009 * X_4 + \varepsilon_i \quad (4)$$

where: X_1 is interest margin, X_2 is the ratio of high risk loans to assets, X_3 is GDP per capita, X_4 is the taxation rate and ε_i is the error term $i = 1, \ldots, n$. The presented model was evaluated by statistical analysis with 91% relevancy for the choice of model and explains 84% of the problem of explaining the ROA ratio.

5. Discussion

The analysis of profitability ratios (ROA and ROE) that was conducted for all the investigated banks confirmed the statistically significant influence of the following variables on the selected European banks' profitability ratios:

- Interest margin – a positive influence was confirmed on the return on equity ratio as well as on the return on assets ratio. Therefore, it is possible to consider interest margin very important for bank profitability.
- The ratio of high risk loans to assets – a negative influence was confirmed on both the ratios examined, i.e., on ROE and ROA. The ratio of high risk loans to assets is used in scientific studies (e.g., Andreu and Mendes, 2002) as a substitute for risk. Therefore, it is possible to say that risk is an important determinant of bank profitability.
- GDP per capita – a negative influence was confirmed on return on assets. The influence on return on equity was not found to be statistically significant.

- Taxation rate – a negative influence was confirmed for taxation rate on the ROA ratio. However, no statistically significant influence was shown on the ROE ratio. These conclusions are consistent with international scientific studies, with Demirgüç-Kunt and Huizinga (1999) showing the influence of bank taxation on profitability.
- Central bank interest rate – a positive influence was confirmed on return on equity, though not for return on overall assets.

When interpreting the analysis results, it is necessary to take into consideration that the analysis was derived from a very short time series. Therefore, it would be good to conduct an analysis in a few years' time when it would be possible to attain a high quality data set with more observations. Then, the conclusions will be certainly more relevant and will have greater explanatory power.

6. Conclusion

Two of the most common profitability ratios, i.e., return on equity and return on overall assets, were selected as endogenous variables. The ambition of the subsequent analysis was to specify which of the determinants we could confirm as a ratio with significant influence on the profitability of selected European banks. The exogenous factors chosen for the analysis were the bank's size, its capital adequacy, the ratio of high risk loans to assets, interest margin, cost/income ratio, market concentration, inflation, gross domestic product per capita, taxation rate and central bank interest rate. The time series analyzed contains data for the years 2001–2013.

The relevancy of this step was confirmed by correlation analysis, which did not specify any variables that showed more than 90% correspondence for the trend. A correspondence of greater than 80% for the trend was achieved by only two pairs of variables. The results of the mutual correlation were that values having to do with bank size and the cost/income ratio were eliminated from subsequent analysis.

The subsequent regression analysis proved a positive influence for interest margin and a negative influence for the ratio of high risk loans to assets on both profitability ratios; therefore, we can say that they are very significant determinants of the profitability of the banks studied. Furthermore, the positive influence of central bank taxation rate on return on equity was proved, and the negative influence of both GDP per capita and taxation rate on return on assets was proved.

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