# *Determinants of the Profitability in the Czech Banking Industry*

## *Determinanty rentability v českém bankovním sektoru*

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**Abstract**

The aim of this paper is to estimate the banking profitability determinants of the Czech commercial banks during the period 2004-2014. For estimation of banking profitability we used three common measures, namely the Return on Assets, Return on Equity and Net Interest Margin. We estimated twelve determinants of banking performance. The effect of the determinants of banking profitability is estimated using panel data analysis. The data set is consists of seventeen commercial banks in the Czech Republic. The results show that the profitability was positively influenced by the bank's size, capitalization, credit risk, level of concentration, ownership structure and bank's market share. Number of branches of the bank had the negative impact on ROA and ROE. on the other hand, the variables Gross Domestic Product, interest rate, liquidity risk, riskiness of bank's portfolio and affiliation with financial conglomerate have not got the significant influence on profitability of the Czech commercial banks.

**Keywords**

performance, return on assets, return on equity, panel data analysis, bank-specific factors, market-specific factors, banking sector, Czech Republic

**Abstrakt**

Cílem příspěvku je odhadnout determinanty rentability českých komerčních bank v období 2004-2014. Pro odhad rentability bank jsou použity tři ukazatele rentability, kterými jsou návratnost aktiv, návratnost kapitálu a čistá úroková marže. V příspěvku je odhadován vliv dvanácti faktorů ovlivňujících rentabilitu rozděleny do tří základních skupin. K odhadu determinantů rentability je využita analýza panelových dat. Datový soubor se skládá ze 17 českých komerčních bank. Výsledky odhadu ukazují, efektivnost je pozitivně ovlivněna velikostí banky, její kapitalizací, úvěrovým rizikem, stupněm bankovní koncentrace, vlastnickou strukturou banky a podílem banky na trhu. Naopak počet poboček banky má negativní vliv na ROA a ROE. U faktorů hrubý domácí produkt, riziko likvidity, rizikovost bankovního portfolia a příslušnost k finanční skupině nebyl zjištěn statisticky významný vliv na rentabilitu českých bank.

**Klíčová slova**

rentabilita, ROA, ROE, analýza panelových dat, bankovní specifické faktory, tržní specifické faktory, bankovní sektor, Česká republika

**JEL Codes**

G21

## Introduction

The aim of this paper is to estimate the banking profitability determinants of the Czech commercial banks during the period 2004-2014. First we estimate the performance of the Czech commercial banks. Performance refers to how adequately a financial firm meets the needs of its stockholders, employees, depositors and other creditors, and borrowing customers (Rose and Hudgins, 2013). We calculate three profitability indicators, especially Return on Assets, Return on Equity and Net Interest Margin. For estimation of profitability determinants we use panel data analysis. The data sets consist of 17 Czech commercial banks. We simultaneously estimated the influence of twelve bank-specific, industry-specific and macroeconomic factors.

The structure of the paper is following. First section presents the empirical literature regarding the profitability determinants in banking sector. Second section describes using methodology and data. The profitability ratios are presented and brief information about panel data analysis is described. Next part of this section presented selection of variables. Third chapter shows the empirical analysis and results and discussion of findings. Last part of the paper concludes results.

# 1 Literature Review

Several empirical literatures estimated the determinants of banking profitability in selected countries. The previous studies divided the factors influencing the profitability of banks into internal and external factors or bank-specific, industry-specific and macroeconomic determinants. We can mention e.g. Kosmidou et al. (2008) who considered five bank-specific measures and four measures representing the influence of market structure and macroeconomic conditions. the measures used as internal determinants of performance are: cost to income ratio as an indicator of efficiency in expenses management; ratio of liquid assets to customer and short term funding to represent liquidity; ratio of loan loss reserves to gross loans as an indicator of banks' asset quality; ratio of equity to total assets representing capital strength; and the total assets of a bank representing its size. As external determinants they considered two which represent the influence of macroeconomic conditions (the rate of GDP growth and inflation) and the other two of financial market structure (concentration in the banking industry and stock market capitalization).

Naceur and Goaied (2008) used five banks' characteristics indicators as internal determinants of performance: the ratio of overhead to total assets, the ratio of equity capital to total assets, the ratio of banks' loans to total assets, the ratio of noninterest bearing assets to total assets and the log of bank assets. And also they used two macro-economic variables: inflation and GDP per capita growth. Kosmidou et al. (2008) summarized that the main conclusion emerging from previous empirical studies is that internal factors explain a large proportion of banks profitability; nevertheless external factors have also had an impact on their performance. Some recent studies also focus on the impact of regulations on banks performance and profitability (e.g. Barth et al., 2003, 2004), and report only weak evidence to support that bank supervisory structure and regulations affect bank profits.

Černohorská (2015) used the two most common profitability ratios, i.e., return on equity and return on assets as endogenous variables in regression analysis for estimation of factors influencing bank profitability of the Czech banks and their international parent companies. As exogenous variables she selected bank size, the bank's capital adequacy, the ratio of high-risk loans to assets, interest margin, the cost/income ratio, market concentration, inflation, gross domestic product per capita, taxation rate, and the central bank's interest rate. The studied factors' influence on bank profitability was demonstrated only for ČSOB and Société Générale using regression analysis. For ČSOB, it was demonstrated that inflation level and the amount of the central bank's interest rate influenced the return on assets ratio and that capital adequacy and market concentration influenced the return on equity ratio for Société Générale.

Fišerová et al. (2015) analysed the role of the economic fundamentals on the foreign-owned banks. They concluded that the economic fundamentals affect the performance of foreign-owned banks and cannot reject that economic fundamentals of the host country influence the performance of a foreign-owned bank operating in that country. Their analysis hinted that in explaining the determinants of the banks' performance the macroeconomic indicators were not sufficient. They also found evidence of the fact that more capitalized and operationally efficient banks outperform their peers. Furthermore, a low non-performing loans (cost of risk) ratio was another key factor of foreign-owned banks' performance.

Kosmidou et al. (2008) investigated the impact determinants on UK owned commercial banks' profits, measured by return on average assets (ROAA) and net interest margins (NIM). They found that capital strength, represented by the equity to assets ratio, is the main determinant of UK banks' profits providing support to the argument that well capitalized banks face lower costs of external financing, which reduces their costs and enhances profits. They found that the efficiency was negative and significant. That suggested that efficiency in expenses management is a robust determinant of UK bank profits. Kosmidou (2008) and Pasiouras et al. (2006) also confirm this inverse relationship for Malaysia, Greece and Australia.

The findings of Sufian and Habibullah (2009) suggested that bank specific characteristics, in particular loans intensity, credit risk, and cost have positive and significant impacts on bank performance in Bangladesh, while non-interest income exhibits negative relationship with bank profitability in this country. The results suggested that size has negative impact on return on average equity, while the opposite is true for return on average assets and net interest margin. As for the impact of macroeconomic indicators, they found that the variables have no significant impact on bank profitability, except for inflation, which had negative relationship with banks profitability in Bangladesh.

Shehzad et al. (2013) used a dynamic panel model for more than 15 000 banks from 148 countries from 1988 to 2010 and examined the relationship between size, growth and profitability of banks. They did not reject the hypotheses that the variability of bank profitability and the level and variability of bank growth are independent of bank size. They also found that bank growth and bank profitability were independent of each other. Demirgüç-Kunt and Huizinga (1999) used bank-level data for 80 countries in the years 1988-1995 and

confirmed some findings in earlier research, for instance a positive relationship between capitalization and profitability, and a negative relationship between reserves and profitability. The findings of the paper stated that foreign ownership is associated with higher interest margins and bank profitability, especially in developing countries. They also found that a larger ratio of bank assets to gross domestic product and a lower market concentration ratio lead to lower margins and profits, controlling for differences in bank activity, leverage, and the macroeconomic environment.

Ben Naceur and Goaied (2008) estimated the impact of bank characteristics, financial structure, and macroeconomic conditions on performance of Tunisian banks'. They suggested that banks that hold a relatively high amount of capital and higher overhead expenses tent to exhibit higher net-interest margin and profitability levels, while size was negatively related to bank profitability. They also suggested that private banks were relatively more profitable than their state owned counterparts. Macroeconomic conditions had not impact on Tunisian banks' profitability.

Ben Naceur and Omran (2008) examined the impact of bank regulations, concentration, financial and institutional development on Middle East and North Africa countries commercial banks margin and profitability. They found that bank specific characteristics, namely bank capitalization and credit risk, had positive impact on banks' NIM, cost efficiency, and profitability. on the other hand, macroeconomic and financial development indicators had not impact on bank performance. Sufian and Chong (2008) estimated the determinants of banking profitability in Philippine during the period 1990-2005. They found that the bank-specific determinant had a statistically significantly impact on bank profitability. Size, credit risk, and expense preference behaviour were negatively related to banks' profitability, while non-interest income and capitalisation had a positive impact. Their results suggested that inflation has a negative impact on bank profitability of the Philippines banks. Pasiouras and Kosmidou (2007) investigated the performance of domestic and foreign commercial banks in 15 EU countries during the period 1995-2001. They found that profitability of both domestic and foreign banks was affected by bank specific characteristics, financial market structure and macroeconomic conditions. Their results showed that all variables had significant relationship with bank profitability, although their impacts and relation is not always uniform for domestic and foreign banks.

Smirlock (1985) examined the link between profitability and a bank's economic cycle and also the relationship between size and bank profitability, which relates to a bank's capital adequacy. He found a positive and significant relationship between size and bank profitability, large banks have a tendency to grow foreign capital and, therefore, seem to be more profitable. Kosmidou et al. (2008) measured bank's size by its total assets and argued that large bank size might result in scale economies with reduced costs, or scope economies that result in loan and product diversification, thus providing access to markets that a small bank cannot entry. Short (1979) stated that size is closely related to the capital adequacy of a bank since relatively large banks tend to raise less expensive capital and appear more profitable. Also Stavárek and Polouček (2004) confirmed the positive relationship between bank size and profitability. However, other study suggested that little cost saving can be achieved by increasing the size of a banking firm (Berger et al., 1987). Eichengreen and Gibson (2001) suggest that the effect of a growing bank's size on

its profitability may be positive up to a certain limit. Beyond this point, the impact of its size could be negative due to bureaucratic and other factors. Hence, the size-profitability relationship may be expected to be non-linear.

Kosmidou et al. (2008) found that coefficient of the cost to income ratio was negative and significant, suggesting that efficiency in expenses management is a robust determinant of UK bank profits. Guru et al. (1999), Kosmidou (2008) and Pasiouras et al. (2006) also confirm this inverse relationship for Malaysia, Greece and Australia respectively.

The results concerning liquidity are mixed. Kosmidou et al. (2008) confirmed that the liquidity ratio had a positive effect on ROAA. on the contrary, Molyneux and Thorton (1992) and Guru et al. (1999) reveal a negative effect of liquidity on bank profits. Kosmidou (2008) and Pasiouras et al. (2006) also confirm this negative effect of liquidity ratio on net interest margin. In contrast, Bourke (1989) estimated an opposite result, while the effect of credit risk on profitability appears clearly negative (Miller and Noulas, 1997). Athanasoglou et al. (2008) explained this result by taking into account the fact that the more financial institutions are exposed to high-risk loans, the higher is the accumulation of unpaid loans, implying that these loan losses have produced lower returns to many commercial banks.

Kosmidou et al. (2008) found that the impact of loan loss reserves was positive and significant on NIM, suggesting that higher risks result in higher margins for UK banks. Berger (1995) concluded that the relationship between bank concentration and performance in the US depend critically on what other factors are held constant. Bourke (1989) and Molyneux and Thornton (1992) found that ownership status is irrelevant for explaining profitability.

Hoffmann (2011) found a negative link between the capital ratio and the profitability in US banking sector. Other results point to a non-monotonic relationship between the capital ratio and profitability, supporting the efficiency-risk and franchise-value hypotheses. Also Kosmidou (2008) found that profitability is positively associated with well capitalized banks and lower cost to income ratios.

The last group of profitability determinants deals with macroeconomic control variables. Bikker and Hu (2002) suggested that such correlation exists, although the variables used were not direct measures of the business cycle. Sufian (2011) and Davydenko (2011) examined the negative impact of GDP on ROA. But Kosmidou (2008) argued that the growth of gross domestic product (GDP) is positively related to bank profitability, while inflation rate is negatively related to bank profitability. Kanwal and Nadeem (2013) found that GDP had an insignificant positive effect on ROA, but an insignificant negative impact on ROE and equity multiplier.

## 2 Methodology

In this section we describe the banking profitability, namely Return on Assets, Return on Equity and Net Interest Margin. Next, we describe brief information about panel data analysis and panel unit root test which is used for empirical analysis of profitability deter-

minants in the Czech banking sector. Last part of this section presents data and selection of variables.

## 2.1 Banking Profitability

Most of empirical studies measure profitability by two measures which are Return on Assets and Return on Equity. Several studies (e.g. Fišerová et al., 2015; Sufian and Habibullah, 2009; or Alkassim, 2005, among others) add other profitability variable, namely Net Interest Income.

As Palečková (2016) described the profitability is the indicator of management's success or failure in its strategic and leadership activities. Return on Assets (ROA) measures the bank's ability to efficiently employ its assets. As such, it is considered by many analysts to be one of the best single ratios for evaluating the performance of management. ROA equals net income divided by total assets and thus measures net income per currency unit of average assets owned during the period. Table 1 presents the relationship between the value of ROA and Return on Assets.

$$ROA = \frac{net\ income}{total\ assets} \tag{1}$$

Return on Equity (ROE) measures the percentage return on each currency unit of shareholders' equity. It is the aggregate return to shareholders before dividends. The higher the return the better, as banks can add more to retained earnings and pay more in cash dividends when profits are higher (Rose and Hudgins, 2013).

$$ROE = \frac{net\ income}{equity} \tag{2}$$

Each of the ratios looks as a slightly aspect of profitability. Return on Assets indicates how capable management has been in converting assets into net earnings. Return on Equity is a measure of the rate of return flowing to shareholders. It approximates the net benefit that the stockholders have received from investing their capital in the financial firm (Rose and Hudgins, 2013).

Net interest income (NII) is the difference between interest income and interest expense. It represents the amount by which the interest received from the loan portfolio exceeds the interest paid on deposits or borrowed funds. in interest rate term, it represents the interest spread differential. The net interest margin (NIM) provides a measure of asset productivity. NIM should be higher that 3 %.

$$NIM = \frac{net\ interest\ income}{total\ assets} \tag{3}$$

A good NIM is indicative of good yields on loans, lower cost rates, and effective use of earnings assets and sensible mix of interest-bearing liabilities. Weakness of this indicator is the facts that as banks move toward more fee-generating activities, the NII margin will decline in importance as a measure of asset profitability (Grier, 2012).

## 2.2 Panel Data Analysis

A panel data set is formulated from a sample that contains N cross-sectional units (in this paper commercial banks) that are observed at different T time periods (Asteriou and Hall, 2011). A simple linear model with one explanatory variable, as given by:

$$Y_{it} = \alpha_i + \beta X_{it} + u_{it}, \tag{4}$$

where the variables Y and X have both *i* and *t* subscripts for $i = 1, 2, \ldots, N$ sections and $t = 1, 2, \ldots, T$ time periods. The coefficient $\alpha_i$ can differ for each bank in the sample.

In the fixed effects method the constant is treated as group (section)-specific. This means that the model allows for different constants for each group (section). The fixed effects estimator is also known as the least squares dummy variable estimator because, to allow for different constant for each group, it includes a dummy variable for each group (Asteriou and Hall, 2011).

## 2.3 Data and Selection of Variables

The data set used in this paper was obtained from the annual reports of the Czech commercial banks during the period 2004-2014. All the data is reported on an unconsolidated basis. We analyse only commercial banks that are operating as independent legal entities. We use unbalanced panel data from 17 Czech commercial banks (with regard to mergers and acquisitions of banks). Due to some missing observations we have an unbalanced panel of 137 bank-year observations.

We measure the profitability of banks using three common measures of profitability: Return on Assets, Return on Equity and Net Interest Margin. Following Fišerová et al. (2015) or Alkassim (2005) we used Return on Assets, Return on Equity and Net Interest Margin individually as the dependent variable. Thus, we constructed three models with these three dependent variables (ROA, ROE and NIM). As independent variables we selected several factors which can influence the profitability of the Czech banking sector. We distinguish between bank-specific, industry-specific and macroeconomic factors. As bank-specific factors we included bank size, market share, level of capitalization, efficiency, credit risk and liquidity risk, riskiness of the bank's overall portfolio, number of branches of individual bank, bank ownership structure, interest rate and affiliation with financial conglomerate. An industry-specific factor included market concentration and as a macroeconomic factor we chose Gross Domestic Product (GDP).

Bank size is represented by the amount of total assets. The market share is a percent of total assets of individual banks to total assets of the Czech banking sector. The level of capitalization is the ratio of equity to total assets. Efficiency is estimated using the Data

Envelopment Analysis with variable return to scale. More information about the Data Envelopment Analysis and estimation of banking efficiency is described in Stavárek and Řepková (2012). The ratio of total loans to total assets was used as a proxy for credit risk. Liquidity risk is represented by the ratio of total loans to total deposits. Interest rate is measure as a ratio of interest income to total loans. Riskiness of the bank's overall portfolio is computed as a ratio of loans loss provision to total assets. Branches of individual banks is number of total branches of each bank. For measure the market concentration is used the Herfindahl-Hirschmann index. More information about calculation of Herfindahl-Hirschmann index and concentration is presented in Řepková (2013). GDP presents the gross domestic product that is an aggregate measure of production equal to the sum of the gross values added of all resident institutional units engaged in production per capita in each year. Bank ownership structure is proxy by the market share of foreign-owned banks (% of total assets). An affiliation with financial conglomerate as a dummy variable represents whether the bank belongs to the financial conglomerate. Descriptive statistics of variables is presented in Table 1 and definition of individual variables is described in Table 2.

**Table 1**: Descriptive Statistics of Variables

| Variable | Mean | Median | Maximum | Minimum | St. dev. |
|---|---|---|---|---|---|
| ROA | 0.69954 | 0.768 | 4.1853 | -8.4129 | 1.6406 |
| ROE | 7.83059 | 9.3888 | 24.935 | -34.257 | 11.115 |
| NIM | 0.02517 | 0.0228 | 0.0705 | 0.0006 | 0.0133 |
| BS | 216026 | 70313 | 920524 | 696.4 | 274892 |
| BR | 149.862 | 53.5 | 667 | 1 | 193.4 |
| CAP | 0.12584 | 0.0915 | 0.8234 | 0.02454 | 0.1148 |
| CR | 0.54326 | 0.5444 | 0.8819 | 0.00005 | 0.1882 |
| EFF | 89.0541 | 100 | 100 | 31.5346 | 17.35 |
| GDP | 352706 | 360444 | 404843 | 286979 | 33742 |
| HHI | 1014 | 989 | 1112 | 947 | 63.722 |
| IR | 0.08402 | 0.0746 | 0.8853 | 0.0001 | 0.0858 |
| LR | 0.75576 | 0.7736 | 2.1351 | 0.00045 | 0.2859 |
| OWNSHIP | 88.9209 | 87 | 97.1 | 82 | 5.5455 |
| MS | 0.05323 | 0.0202 | 0.2125 | 0.00017 | 0.0664 |
| RISKASS | 0.01384 | 0.0045 | 0.1419 | 4.1E-06 | 0.0239 |

*Source: author's compilation*

**Table 2**: Definition of Independent Variables

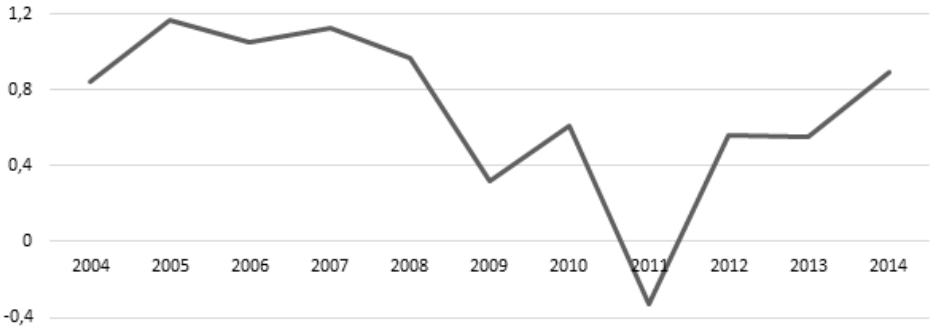
| Variable | Definition of variable | Expected effect |
|---|---|---|
| BR | Number of branches of individual bank | + |
| BS | Bank size | + |
| CAP | Level of capitalization | + |
| CR | Credit risk | - |
| EFF | Efficiency | + |
| GDP | Gross Domestic Product | + |
| HHI | Market concentration | + |
| IR | Interest rate on loans | + |
| LR | Liquidity risk | - |
| OWNSHIP | Bank ownership structure | + |
| MS | Market share | + |
| RISKASS | Riskiness of the bank's overall portfolio | - |
| FC | Affiliation with financial conglomerate | + |
| MS | 0.05323 | 0.0202 |
| RISKASS | 0.01384 | 0.0045 |

*Source: author's compilation*

# 3 Empirical Analysis and Results

First, we calculated the profitability of the Czech commercial banks. We measured simultaneously the Return on Assets and Return on Equity.

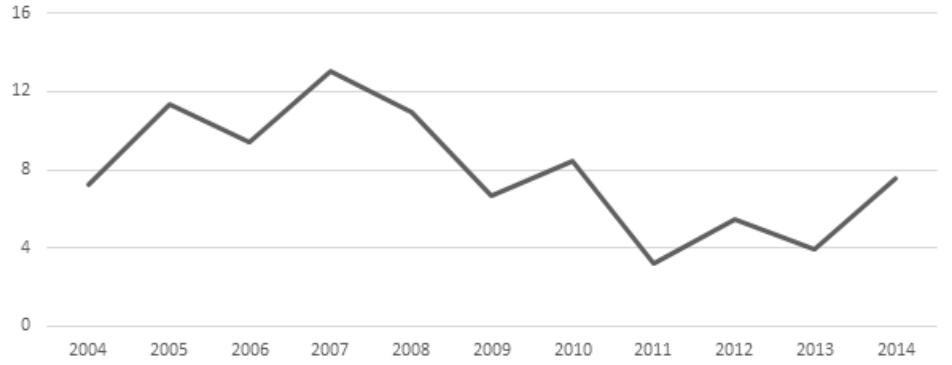
**Figure 1:** Average Value of ROA of the Czech Banking Sector (in %)




*Source: author's calculations*

Figure 1 presents results of average value of Return on Assets of the Czech commercial banks within the period 2004-2014. The average ROA reached the value between -0.33 to 1.17 %. The average ROA in the Czech banking sector is weak. Return on Assets should be higher than 1.75 %.

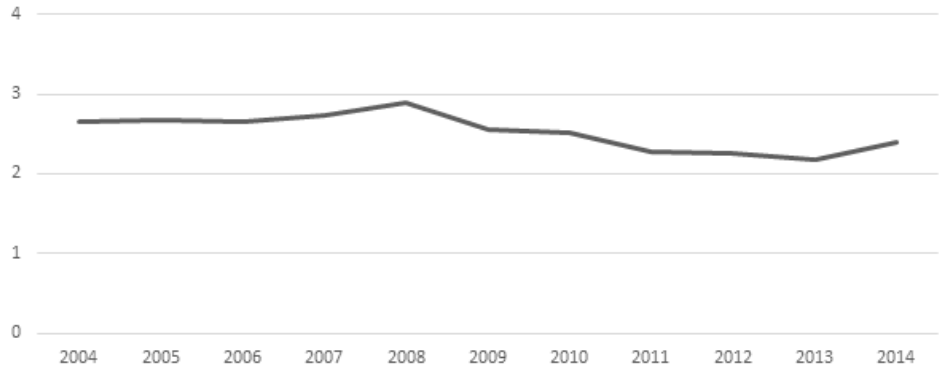
**Figure 2:** The Average Value of ROE of the Czech Banking Sector (in %)




*Source: author's calculations*

Figure 2 presents the average value of Return on Equity of the Czech commercial banks during the period 2004-2014. The ROE should be in range between 15 to 20 %. The average values of ROE were in the range of 3.91 to 13.07 % in the Czech banking sector. The ROE was very low in the Czech banking sector.

**Figure 3:** The Average Value of NIM of the Czech Banking Sector (in %)




*Source: author's calculations*

Figure 3 represents the average value of Net interest income of the Czech commercial banks during the period 2004-2014. The average value of NIM reached 2.19-2.9 %. It also shows very low profitability of the Czech commercial banks.

Next, we estimated the determinants influencing the profitability of the Czech banking sector. For estimation of the determinants of banking profitability we used the panel data

analysis. We employed econometrics software EViews 9. Before estimating the model it is necessary to test the time series for the stationarity. We used Levin, Lin and Chu test to test the individual variables for the existence of the unit roots. The result of the test indicates that the variables are stationary on the values. So that the null hypothesis of a unit root can be rejected for any of the time series. All times series are stationary and can be used in panel regression analysis. We estimate Equation (4) using Ordinary Least Squares (OLS) method. OLS method has several prerequisites. First, for correction of heteroscedasticity is used White (1980) test. Using this test the heteroscedasticity was rejected and the error term is homoscedastic. For detecting multicollinearity we used correlation coefficient. From the correlation matrix (in Appendix) it is obvious that any variables are not correlated together. We also found normality of the error term, thus the prerequisite that the residual must have normal probability distribution. The absence of autocorrelation of the error term is determined by the Durbin-Watson test. The Durbin-Watson statistic (DW) is used for testing autocorrelation in the residuals and takes the following form:

$$DW = \frac{\sum_{i=2}^{n}(e_i - e_{i-1})^2}{\sum_{i=1}^{n}(e_i)^2}. \quad (6)$$

To allow for heterogeneity across the banks, we use an error-component model, with the bank and market-specific error components estimated as fixed effects. The regression results of Equation (4) where we chose as a depend variable the ROA, then ROE and finally NIM are presented in Table 3 and Table 4. We presented only final estimations with statistical significant variables in individual results. These final models were selected according to the Akaike information criterion. in the final models are not included variables that are not statistically significant impact on dependent variables. For this paper it is not necessary to find the impact of all variables but we examined which variables have statistically significant impact on profitability. These final models were also tested for assumption of OLS methods (residuals were tested for normality distribution, heteroscedasticity and autocorrelation).

Table 3 presents the results of empirical analysis of profitability determinants in the Czech banking sector during the period 2004-2014. From this table is clearly visible that the effect is very similar on each dependent variable. The empirical analysis shows that the effect of number of bank's branches is not uniform. Number of bank's branches has negative impact on ROA and ROE, but this variable has positive impact on Net Interest Margin. The bank size shows the positive impact on profitability. It means that large banks are more profitable than small banks. Capitalization has a positive impact on NIM. Next we found positive impact of credit risk on ROA, we remind that we calculate credit risk as ratio of total loans to total assets. Efficiency positive influences the ROE and NIM in the Czech Republic. Effective banks are more profitable. The level of concentration has also positive impact on ROA. Ownership structure positively influences ROE and market share of bank has a positive impact on ROA and ROE. Banks with higher market share and foreign owner banks are more profitable than others in the Czech banking sector. Impact of other variables on profitability was not statistical significant, thus we are not able to confirm the impact of other variables on banking profitability in the Czech Republic.

**Table 3**: Estimation Results

| **Dependent variable** | | | | | | |
|---|---|---|---|---|---|---|
| | ROA | | ROE | | NIM | |
| | Coefficient | t-statistics | Coefficient | t-statistics | Coefficient | t-statistics |
| Constant | -6.571034a | -2.930444 | -42.122300a | -2.787086 | 0.000419 | 0.103545 |
| BR | -0.012328b | -2.463202 | -0.114976a | -3.771149 | 0.000032c | 1.759930 |
| BS | 0.000004b | 2.279409 | 0.000032a | 2.660728 | 0.000000a | -2.915147 |
| CAP | | | | | 0.028852a | 5.365552 |
| CR | 3.353560 a | 3.402296 | | | 0.015657a | 3.301611 |
| EFF | | | 0.184369a | 3.441205 | 0.000144a | 3.664508 |
| GDP | | | | | | |
| HHI | 0.004352b | 2.437246 | | | | |
| IR | | | | | | |
| LR | | | | | | |
| OWNSHIP | | | 0.296679a | 2.076558 | | |
| MS | 33.660010b | 2.552457 | 304.257800b | 3.804407 | | |
| RISKASS | | | | | | |
| FC | | | | | | |
| Estimation diagnostics | | | | | | |
| Number of observation | 137 | | 137 | | 137 | |
| Adjusted R-squared | 0.648661 | | 0.704041 | | 0.698759 | |
| F-statistic | 12.95667 | | 16.40586 | | 58.91445 | |
| Prob (F-statistic) | 0 | | 0 | | 0 | |
| DW statistics | 1.853602 | | 1.995868 | | 1.936947 | |

*Note: a denotes significance at 1 % level, b denotes significance at 5 % level, c denotes significance at 10 % level*
*Source: author's calculation*

Table 4 summarizes the effect of individual variable on the banking profitability. We can assume that negative impact of number of bank's branches on ROE and ROE is caused the fact that the operations of branches decreased revenue of banks. Banks size is positive related to profitability. This result is in line with the conclusion of e.g. Smirlock (1985), Kosmidou et al. (2008), Stavárek and Polouček (2004), Eichengreen and Gibson (2001). Also Sufian and Habibullah (2009) found that size has positive impact on ROA and NIM.

**Table 4**: Effect of Individual Determinant on Dependent Variables

| Variable | ROA | ROE | NIM |
|---|---|---|---|
| BR | - | - | + |
| BS | + | + | + |
| CAP | 0 | 0 | + |
| CR | + | 0 | + |
| EFF | 0 | + | + |
| GDP | 0 | 0 | 0 |
| HHI | + | 0 | 0 |
| IR | 0 | 0 | 0 |
| LR | 0 | 0 | 0 |
| OWNSHIP | 0 | + | 0 |
| MS | + | + | 0 |
| RISKASS | 0 | 0 | 0 |
| FC | 0 | 0 | 0 |
| MS | 0.05323 | 0.0202 | 0.2125 |
| RISKASS | 0.01384 | 0.0045 | 0.1419 |
| FC | 0 | 0 | 0 |

*Source: author's calculation*

The findings that capitalization has a positive impact on NIM is confirmed in the studies of Ben Naceur and Omran (2008), Sufian and Chong (2008) or Kosmidou (2008). Our result that credit risk has positive impact on ROA and NIM confirm the findings of Sufian and Habibullah (2009) Ben Naceur and Omran (2008) who found that credit risk has positive impact on bank performance. We found the positive impact of efficiency on ROE and NIM. We estimated the positive impact of efficiency on profitability. But on the other hand, Kosmidou et al. (2008), Kosmidou (2008) and Pasiouras et al. (2006) found the efficiency negative influence profitability. the results of panel data analysis show that the impact of GDP on profitability was not confirm but in empirical literature most of studies e.g. Ben Naceur and Goaied (2008), Ben Naceur and Omran (2008) Shehzad et al. (2013), Sufian and Habibullah (2009) or Kanwal and Nadeem (2013) estimated that GDP had not impact on banks' profitability, on contrary, Sufian (2011) and Davydenko (2011) examined the negative impact of GDP on ROA. on the other hand, Kosmidou (2008) found the positive impact of GDP on bank profitability.

This paper do not confirm the result of empirical studies that found a positive (e.g. Kosmidou et al., 2008 or Bourke, 1989) or negative (Kosmidou, 2008; Pasiouras et al., 2006 or Guru et al., 1999) because we do not confirm the impact of liquidity risk on performance of banks. We found that ownership structure has a positive impact on ROE, but we do not found the impact of this factor on ROA and NIM. Also Bourke (1989) and Molyneux and Thornton (1992) stated that ownership is irrelevant determinant of profitability. The riskiness of overbank's portfolio and affiliation with financial conglomerate were not statisti-

cal significant variables influencing the banking profitability in the Czech banking sector during analysed period.

## Conclusions

The aim of the paper was to estimate the banking profitability determinants of the Czech commercial banks during the period 2004-2014. First we calculate the profitability ratios, namely Return on Assets, Return on Equity and Net Interest Margin. We found that average values of ROA were in range -0.33 to 1.17 %. The average ROE were reached the value of 3.91-13.07 % and the average net interest income was 2.19-2.9 %. The level of average profitability of the Czech banking sector was very low. The highest level of profitability reached the largest banks.

We estimated the impact of bank size, market share, level of capitalization, efficiency, credit risk and liquidity risk, interest rate, riskiness of the bank's overall portfolio, number of branches of individual bank, market concentration, bank ownership structure, Gross Domestic Product and affiliation with financial conglomerate on banking profitability. We estimated three models where we chose Return on Assets, Return on Equity and Net Interest Income as dependent variables.

When we summarize the results of analysis, profitability was positively influenced by the bank's size. Number of branches of the bank had the negative impact on ROA and ROE. Number of bank's branches and capitalization has a positive impact on NIM. The results show the positive impact of credit risk and level of concentration on ROA. Then we found that efficiency positive influenced ROE and NIM. Ownership structure positive influences ROE and market share of bank has a positive impact on ROA and ROE. Concentration of banking sector had a positive impact on ROA. We found that GDP, interest rate, liquidity risk, riskiness of bank's portfolio have not the statistically significant influence on profitability of the Czech commercial banks. Also affiliation bank with the financial conglomerate was not statistical significant impact on banking profitability in the Czech Republic.

We can conclude that large, well-capitalized and foreign owners' banks are more profitable. Also efficient banks with higher market share are more profitable than other banks in the Czech banking industry. The highest impact on profitability (namely on ROA and ROE) had market share. It means that if market share of bank increase, the profitability of bank increase too. But only marginal change in market share significantly influenced the banking profitability. It was also found that especially bank-specific factors determined the profitability of the Czech commercial banks.

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## Appendix

Correlation matrix of independent variabless

| | BR | BS | CAP | CR | EFF | GDP | HHI | IR | LR | OWN | MS | RISK |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BR | 1 | 0.78 | -0.10 | -0.14 | 0.20 | 0.09 | -0.10 | 0.18 | -0.11 | -0.09 | 0.80 | 0.07 |
| BS | 0.78 | 1 | -0.20 | -0.30 | 0.10 | 0.21 | -0.19 | 0.15 | -0.23 | -0.20 | 0.80 | -0.03 |
| CAP | -0.10 | -0.20 | 1 | 0.03 | 0.23 | -0.08 | 0.07 | 0.17 | 0.29 | 0.08 | -0.23 | 0.27 |
| CR | -0.14 | -0.30 | 0.03 | 1 | 0.39 | 0.21 | -0.19 | -0.15 | 0.78 | -0.15 | -0.36 | 0.21 |
| EFF | 0.20 | 0.10 | 0.23 | 0.39 | 1 | 0.20 | -0.18 | 0.08 | 0.46 | -0.16 | 0.08 | 0.16 |
| GDP | 0.09 | 0.21 | -0.08 | 0.21 | 0.20 | 1 | -0.75 | 0.10 | 0.24 | -0.76 | 0.04 | 0.21 |
| HHI | -0.10 | -0.19 | 0.07 | -0.19 | -0.18 | -0.75 | 1 | -0.03 | -0.22 | 0.77 | -0.05 | -0.31 |
| IR | 0.18 | 0.15 | 0.17 | -0.15 | 0.08 | 0.10 | -0.03 | 1 | -0.10 | -0.04 | 0.14 | 0.04 |
| LR | -0.11 | -0.23 | 0.29 | 0.78 | 0.46 | 0.24 | -0.22 | -0.10 | 1 | -0.19 | -0.28 | 0.25 |
| OWN | -0.09 | -0.20 | 0.08 | -0.15 | -0.16 | -0.76 | 0.77 | -0.04 | -0.19 | 1 | -0.04 | -0.38 |
| MS | 0.80 | 0.80 | -0.23 | -0.36 | 0.08 | 0.04 | -0.05 | 0.14 | -0.28 | -0.04 | 1 | -0.09 |
| RISK | 0.07 | -0.03 | 0.27 | 0.21 | 0.16 | 0.21 | -0.31 | 0.04 | 0.25 | -0.38 | -0.09 | 1 |

*Source: author's calculation*