Assessment of Profitability of Latvian Commercial Banks Using OLS Evaluation Method

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ABSTRACT

The aim of the present article is to assess the Latvian commercial banks profitability using OLS evaluation method.

In order to achieve the results of the present research, the qualitative overview of the scientific literature on Ordinary Least Squares (OLS) method has been performed. To gain the required data, the authors of the present article have analyzed the work of Latvian commercial banks and the branches/ agencies of the foreign banks, as well as the work of the credit institutions registered in the member states of the European Economic Area (EEA) and their affiliations operating in Latvia in the reporting period of 2006 – 2012.

The authors have concluded that H1, H4, H5 and H6 hypotheses have been completely proven; however, H2 and H3 hypotheses have been rejected as a result of the Pearson correlation since they demonstrated very weak correlation, as well as due to a correlation between bank indicators, which is also confirmed by the results of studies conducted by other scientists.

Keywords: Banks, OLS, Profitability, Latvia

1. INTRODUCTION

The banking system is an important sector influencing economic development of any country. Its practical significance is determined by its payments and settlements function in the national financial system. Banks, operating in accordance with the national monetary policy, exert control over cash flow, which affects their turnover, emissions, including ready cash amounts in circulation. Strategically, investors in the transition economy pay more and more attention to bank profitability and the means to ensure it [2]. In this regard, the issue of bank profitability and its analysis are important both in microeconomic and macroeconomic perspective.

For example, in their research Lensink and Hermes (2004) found out that the entry of foreign banks in the local market, to a great extent, depends on the level of development of the national economy and bank sector as a whole [2]. This fact is also demonstrated by the rapid development of the European banking sector that started after expansion of the European Union.

Ordinary least squares (OLS) or linear least squares method is based on the unknown parameter estimation in a linear regression method, thus forecasting data linear approximation.

Research conducted and the available literature on the assessment of bank profitability indicators mainly focus on the US and Asian banks, less attention is devoted to the European banks, and there are only a few studies concerning the situation in Latvia.

The goal of this article is to evaluate performance efficiency of the Latvian commercial banks in the reporting period of 2006 – 2012.

To achieve the goal, the following research methods were used: qualitative overview of the scientific literature on bank profitability and influenced indicators, including the monographic method and descriptive method, as well as OLS evaluation method.

2. LITERATURE REVIEW

Banking profitability issues are not only an integral part of financial institutions, they become even more topical in the transition period or in case of the financial crisis.

The issue of bank profitability has been widely discussed in the scientific literature, it has also been considered in a number of theoretical and empirical researches of different kind. However, return on average assets (ROAA) and return on average equity (ROAE) have

always been mentioned among the main indicators characterizing bank profitability.

Bourke (1989) was one of the first who discovered that exactly the internal factors of bank profitability, such as net income before and after tax against total assets and capital and reserves factors, have the greatest impact on profitability [3]. Bourke (1989) also stressed that profitability is influenced by internal and external factors [3]. Kosmidou et al (2006) and Goddard et al (2010), hold similar opinion [4; 5].

Studies conducted in the USA and Europe demonstrate that a great concentration of banks and financial institutions surpass profitability [6 – 9]. Ramlall (2009) and Sufian and Habibullah (2009) discovered a positive relationship between the size of the bank and profitability – the larger the bank is, the more profitable it is in comparison with a smaller bank, thus demonstrating the effect of economy of scale [10; 11]. In contrast, Kosmidou (2008) states that a large size of the banks may leave a negative impact on bank profitability [12], and Luo (2003) and Hannan and Prager (2009) note that small banks can earn higher profit because they have lower expenses [13; 14]. But Sayilgan and Yildirim (2009) maintain that bank liquidity declines along with the growth of the number of debtors and interest rate increase [15].

Other researchers, who address banks profitability, discuss positive operational efficiency. Kosmidou (2008) states that profitability grows along with the increase of the operational efficiency [12], in their turn, Berger et al (2010) correlate it with routine practical activities of an enterprise [1].

Despite difference of opinion, all researchers agree that external and internal factors can influence bank profitability. For example, Rasiah et al (2010) in his research mentions asset portfolio mix, loans and interest income, investments, non-interest income earning assets, total expenses, operating expenses, personnel expenses, liability composition, deposit composition, liquidity ratios, capital structure as internal factors influencing bank profitability [16]. In turn, Ramlall (2009) mentions bank size, operating efficiency, capital, credit risk, portfolio composition and asset management [10]. These rates are variable and controllable. For example, asset quality provides loans to total assets, which can affect profitability [17], so the higher the ratio is, the higher is portfolio risk. Loans to total assets and total loans are usually used as asset quality indicators. Asset size, i.e. total assets, is used to determine the size of the bank [18].

In turn, external factors comprise regulations, inflation, interest rates, short and long terms effects of interest rates on assets, market share, market growth, bank size. Gul et al (2011) mention size, capital, loans, and deposits as internal factors influencing profitability of the bank, and gross domestic product (GDP) and inflation (INF) as external factors [19].

Researchers, who have performed bank profitability assessment on the basis of the OLS method, have applied both internal and external indicators. For example, Gul et al. (2011) assessed bank profitability using such indicators as bank loans to total assets; equity capital to total assets; natural log of total assets and total deposits to total assets with return on asset; return on equity; return on capital employed and net interest margin [19]. Wasiuzzaman and Tarmiz (2010), in their turn, used such indicators as asset quality, liquidity, operations, capital and bank size, based on previous variables in their research, they found that there is negative relationship to asset quality, but loans to total assets show positive relationships [20]. It has to be noted that other scientists have used similar indicators to assess bank profitability on the basis the OLS method [21 – 23].

The Development of the Commercial Banking Sector in Latvia

The development of the financial system in Latvia started in 1988, when the banking sector was reorganized [24]. A new dual financial system and the re-establishment of Latvia's independence promoted rapid development of the banking sector. Starting with 1992 till 1993, 61 banks in Latvia received a license for provision of financial services [25].

According to the data of the ACBL, in the 4th quarter of 2012 in Latvia banking services were provided by 20 banks and 9 branches of foreign banks, as well as lending institutions or their branches registered in the countries of the European Economic Area, which submitted a respective application to FCMC [25]. The majority of banks operating in Latvia are commercial banks, which offer their customers a wide range of banking services.

3. METHODOLOGY

Based on content analysis of scientific literature [26 – 28; 11; 30; 31], in order to assess bank profitability using OLS evaluation method of banking sector in Latvia, the authors used some of the most popular and important indicators as:

1) Return on average assets (ROAA) – one of the main indicators that characterizes bank profitability.

Return on average assets = net profits before taxes/ assets.

2) Return on average equity (ROAE) is also one of the main indicators that characterize bank profitability.

Return on average equity = net profits before taxes/ equity.

3) Capital (CA) shows the capital adequacy as well as the bank's ability to perform its obligations immediately.

Capital = equity/ total assets.

4) Credit risk (CR) show that there is a possibility that the bank's customers not repay they funds.

Credit risk = loan loss provisions/ net interest revenue

5) Total loans (TL) provide banking income in the form of deposits and liquidity attracted by the loans.

Total loans = net loans/ total assets.

6) Net interest margin (NIM) is a performance metric that show how successful the bank decisions are based on the investment.

Net interest margin = net interest revenue/ total assets.

7) Growth of annual gross domestic product (GDP) - GDP (in comparable prices)/ GDP, %. GDP growth shows the total economic activity, as determined by demand and supply of bank loans and deposits, as well as the financial services system profitability [32].

8) Annual inflation (INF) – changes in consumer prices in 12 months on average compared to the previous 12 months period. Based on increase of the overall rate of annual inflation in relation to all the products and services can have both positive and negative effects on the profitability indicators of commercial banks [33].

Based on the selected indicators affecting bank profitability and the content analysis of scientific literature, the authors put forward several hypotheses:

H1: NIM can positively influence bank profitability.

H2: INF can positively influence bank profitability.

H3: GDP can positively influence bank profitability.

H4: CR can negatively influence bank profitability.

H5: CA can negatively influence bank profitability.

H6: TL can negatively influence bank profitability.

To calculate bank profitability of Latvian commercial banks, the authors used the data from the data base Banscope and Central Statistical Bureau of Latvia for the time period from 2006 till 2012, 101 observations in total.

Bank profitability indicators and the hypotheses formulated (H1–H6) have been tested using the OLS evaluation method.

4. RESEARCH RESULTS

Mean arithmetic values of descriptive statistics, minimal and maximal values, and sample error are summarized and presented in Table 1. As it can be seen from Table 1, mean arithmetic value of ROAE of the Latvian commercial banks in the research period is (-)6.42%, ROAA is also negative (-)0.83%. In the authors' opinion, one of the main reasons for such results can be the fact that the crisis in the Latvian financial system of 2008 has had its consequences. Average capital adequacy ratio is 12.06%, the average credit risk – 60.46%, total loans – 49.87%, net interest margin – 2.68%, inflation rate – 5.91% and GDP – (-)0.04.

Table 1

Profitability Indicators of Latvian Banking Sector According to Descriptive Statistics

Variable	ROAE	ROAA	CA	CR	TL	NIM	INF	GDP
1	2	3	4	5	6	7	8	9
Mean	-6.42	-0.83	12.06	60.46	49.87	2.68	5.91	-0.04
Min.	-131.67	-43.68	4.12	-838.46	0.01	-1.01	-1.10	-17.70
Max.	67.11	5.80	93.33	718.18	87.53	6.32	15.40	10.00
Std. dev.	35.00	5.23	11.78	154.26	22.24	1.53	5.46	8.92

To determine the factors that influence bank profitability, the correlation analysis has been performed.

The obtained Pearson correlation data show that the correlation coefficient between ROAA and NIM is 0.671 (medium correlation, Sig.=0.000), the correlation coefficient between CA and TL is (-)0.346 (weak correlation, Sig.=0.000), between CR and NIM is 0.204 (weak correlation, Sig.=0.041), suggesting that the correlative relationships between the correlation coefficients are significant. In turn, the correlation coefficient CA and GDP is 0.043 (very weak correlation, Sig.=0.667), and between CR and GDP is 0.091 (very weak correlation, Sig.=0.367) indicating that the correlative relationships between these indicators are not significant. Therefore, the authors conclude that the most

appropriate indicators for inclusion in the regression model are ROAA, NIM, CA, CR and TL.

The data summarized show that correlation coefficient between ROAE and CA is (-)0.235 (weak correlation, Sig.=0.018), and between ROAE and CR is (-)0.242 (weak correlation, Sig.=0.015). Considering the correlation results obtained, it can be concluded that all indicators can be used in the regression model.

Other authors in their research, for example, Goddard et al (2004), performing correlation analysis discovered that there is a positive correlation between TL, INF and GDP [5], Sufian and Chong (2008) maintained the same about CA, TL, GDP and INF [34]. Also the scientists performing correlation analysis of bank profitability indicators found out that there are weak or very weak correlations between bank profitability and internal and

external indicators , as well they created regression [35; 36; 11].

On the basis of the previous research by other scholars, descriptive statistics and correlation data, the authors developed two types of regression analysis models.

Regression models comprise bank indicators that are shown as functions (see functions 1 and 2):

$$ROAA= f (NIM,CA,CR,TL) \tag{1}$$

$$ROAE=f(CA,CR,TL,NIM,INF,GDP) \tag{2}$$

The established statistical data in Table 2 of ROAA model demonstrate that the model explains 53.6% (R square) of the total variance, while the Durbin-Watson statistical coefficient is 1.153.

Table 2

ROAA Statistical Indicators (Latvian Commercial Banks)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	2	3	4	5	6
1	0.732[a]	0.536	0.517	2.60261	1.153

a. Predictors: (Constant), TL, NIM, CR, CA
b. Dependent Variable: ROAA

Anova analysis of variance shows that this model is statistically significant (Sig.=0.000). In order to determine the optimal regression equation model, the authors also tested model coefficients for statistical significance. Table 2 presents the summarized data on regression equation coefficients for the first regression equation model.

The data summarized in Table 3 show that the following coefficients are statistically significant: NIM (Sig.=0.000<0.05), CR (Sig.=0.025<0.05), TL (Sig.=0.001<0.05), while the coefficient CA (Sig.=0.104>0.05) is not statistically significant, thus, it can be concluded that NIM (positively), CR and TL (negatively) can affect ROAA indicator. Thus, it may be concluded that NIM can (positively) affect ROAA, which testifies to the fact that banks are able to balance their interest expenses and the amount of deposits [20]. At the same time, CR and TL can (negatively) affect ROAA, which indicates that the supervision of the lending risks at the banks is weak [37], and/or there is a large weight of bad debts [38].

Table 3

Regression Equation Model (ROAA – Latvian Commercial Banks)

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1		2	3	4	5	6
1	(Constant)	-2.270	0.903		-2.513	0.014
	NIM	1.680	0.164	0.734	10.244	0.000
	CA	-0.047	0.029	-0.123	-1.640	0.104
	CR	-0.003	0.001	-0.162	-2.274	0.025
	TL	-0.044	0.013	-0.249	-3.336	0.001
Dependent variable: ROAA						

In turn, the statistical data in Table 4 of ROAE model show that the model explains the 19.4% (R Square) of the total variance, but Durbin-Watson statistical indicator is 1.364.

Table 4

ROAE Statistical Indicators (Latvian Commercial Banks)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	2	3	4	5	6
1	0.441[a]	0.194	0.143	43.90262	1.364

a. Predictors: (Constant), GDP, TL, CR, INF, NIM, CA
b. Dependent Variable: ROAE

Anova analysis of variance also shows that this model is statistically significant (Sig.=0.002) and in its turn the authors tested the model coefficients for statistical significance, as it is seen in Table 5.

Table 5

Regression Equation Model (ROAE – Latvian Commercial Banks)

Model		Unstandardized Coefficientss		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1		**2**	**3**	**4**	**5**	**6**
1	(Constant)	0.162	16.686		0.010	0.992
	CA	-1.313	0.486	-0.272	-2.703	0.008
	CR	-0.065	0.024	-0.259	-2.725	0.008
	TL	-0.270	0.225	-0.120	-1.203	0.232
	NIM	6.936	2.781	0.239	2.494	0.014
Dependent variable: ROAE						

Considering the regression coefficients of statistical indicators (Table 5), they show that the statistically significant factors are the following: CA (0.008<Sig=0.05), CR (0.008<Sig.=0.05), NIM (Sig.=0.014<0.05), while the coefficients of TL, INF and GDP are not statistically significant, based on that it can be concluded that CA, CR (negatively) and NIM (positively) can affect bank ROAE indicator. Negative CA value testifies to the fact that bank capital management structure is inefficient [38].

5. CONCLUSIONS

Based on the hypotheses put forward by the authors in the methodological part of the article, hypotheses H1, H4, H5 and H6 have been completely proven, but hypotheses H2 and H3, as a result of the Pearson correlation, were excluded from further analysis, since they demonstrated a very weak correlation.

The studies conducted on the issue and the research by the authors on bank profitability demonstrate that there is correlation among the indicators, however, bank profitability can also be affected by various factors, for example, lending policies of each particular state and concentration of banks. For example, Alexiou and Sofoklis (2009) found the correlation between ROAE and GDP and also discovered when these data together can ensure profitability [39]. The same can be said about ROAA and external indicators of bank performance. In the literature it has also been discussed that internal indicators such as credit risk can influence ROAE. Researchers from Tunisia suggest that when there is a positive autocorrelation between ROAA and internal and external indicators, there is the same correlation with ROAE, and they can influence bank profitability.

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