

## **EMPIRICAL ANALYSIS OF PROFITABILITY, NON PERFORMING LOANS AND OPERATIONAL EFFICIENCY IN MACEDONIAN BANKING SECTOR**

**Ljube Jolevski, PhD candidate**

University Ss. „Cyril and Methodius” – Skopje

Faculty of Economics – Skopje

[ljubejol@yahoo.com](mailto:ljubejol@yahoo.com)

**Snezana Dicevska, Full professor**

University „ St. Kliment Ohridski” – Bitola

Faculty of Tourism and Hospitality – Ohrid

[sdicevska@yahoo.com](mailto:sdicevska@yahoo.com)

### ABSTRACT

In this paper are examined impact of share of non performing loans and cost to income ratio to banks' profitability measured through rate of return of average assets in macedonian banking sector. For that aim, have been used date on quarter basis from 2010 until Q3 2019 which are grouped according to the size of assets of banks i.e large, medium and small. In the analysis have been used descriptive statistics and models for estimating multiple regression using the method of ordinary least squares.

Results from the analysis show that share of non performing loans and cost to income ratio has significant statistical impact to rate of return on average assets. With increasing the share of non performing loans and with increasing the cost to income ratio, are decreasing the rate of return on average assets in all three groups of banks, and that is predominantly showed in group of large banks in macedonian banking sector.

Thus, in traditional banking model is confirmed that the credit portfolio plays a dominant role in the operation of the banks. Loans are a major source of banks' revenues, but at the same time they are also connected with highest risks. Problems in the credit portfolio are basic generators of problems, also in the other areas of banks' operations and determine the profitable positions of the banks.

**KEY WORDS:** rate of return on average assets, share of non performing loans, cost to income ratio, macedonian banking sector

## INTRODUCTION

Banks are essential for any national economy, on whose success, stability and soundness depend the development and stability of other parts of the national economy. At the same time, banks are businesses with entrepreneurial characteristics. In the search to provide various banking products and services, banks are always and everywhere driven by the desire to maximize profits and increase the value of the bank itself. The bank's performance is of interest not only to the bank's shareholders who have economic and strategic interest in the current results, but also to the bank's future prospects as well as other market participants such as depositors, lenders, regulators, competitors, the state. At the same time, profit is an important prerequisite for the bank's future growth, as it is primarily an internal source for future expansion.

Therefore, the care of the management to achieve positive financial results and permanent analysis of the factors that have an impact on profitable operations is justified.

The quality of the loan portfolio is a basic generator for the achieved results of the banks in which they apply a traditional business model of banking. Both, in the periods of achieving the best, but also in the periods of achieving the worst performance of the banks, the reasons for the success or failure are identified in the changes in the quality of their loan portfolio.

The manifestation of credit risk expressed as an impossibility for the loans placed by the bank to be fully or partially returned by the creditors within the agreed

schedules and under conditions determined in the loan agreements means loss for the bank and the plan of liquid assets, but also the plan of realized profit and potential future profit. Therefore, the basic intention when approving the loans is to minimize this risk, as it can not be completely eliminated. The effective credit risk management process involves not only a detailed and comprehensive credit approval process, but also continuous monitoring of the creditworthiness of customers.

The indicator for the share of non-performing loans in total loans is one of the basic indicators for the quality of the loan portfolio and is a measure for materialization of credit risk. The high share of non-performing loans in banks' loan portfolios causes reduced profitability that can lead to the negative values, liquidity problems, impaired balance sheet structure, reduced solvent position. Therefore, inevitably arises the need to maintain a quality and secure credit portfolio with an appropriate interest rate structure in the bank's balance sheet and minimum operating costs.

The bank's operating efficiency is measured by the cost-to-income ratio, which shows the relationship between operating costs and revenue. Most of the bank's revenues are used to cover operating expenses and then to correct the value for their loan portfolio. An operationally efficient bank, i.e. to cover operating expenses with its regular income is a prerequisite for a profitable and successful bank.

The purpose of this paper is to determine the impact of the non-performing loans indicator, the operating efficiency ratio in the macedonian banking sector on the return on average assets as a basic indicator of bank's profitability. This indicator reflects the ability of the bank's management to generate profits from the bank's assets. In addition, based on the fact that the banks in macedonian banking sector are divided into three groups (large, medium and small), the paper is focused to analyze each group individually, in order to determine the impact of selected indicators on profitability per group of banks. In that way, will be performed a comparative analysis of the obtained results.

The paper is structured in four parts. First, is given an overview of the literature connected with this issue, than is given a brief overview of the situation of the banking groups in the macedonian banking sector. The thirs part explains the

applied methodology, empirical analysis and interpretation of the results. At the end, are final remarks and the literature used.

## LITERATURE REVIEW

There are numerous theoretical and empirical studies in the economic literature on the profitability of banking institutions as well as the factors that affect it, such as: credit risk, liquidity, solvency and operating risk. There are two main indicators of financial performance such as the return on average assets (ROAA) and the return on average equity (ROAE), which are presented to the public through annual financial statements and provide comparative analysis of bank's profitability.

The indicator return on average assets shows the earned profit per unit assets and is a reflection of the ability of the management to use the financial and real investment resources of the bank to make a profit (Hassan and Bashir 2003). This indicator depends on the decisions of the management and the business policy of the bank, as well as on external factors and are related to the economic and state regulation. On the other hand, the basic remark addressed to this measure is that it does not take into account off-balance sheet positions that can make a significant contribution to profit.

Kaaya and Pastory (2013) examine the relationship between credit risk and financial performance of a bank measured through the return on assets indicator. They determine the negative correlation between credit risk and profitability. Similarly, Madishetti and Rwenchugura (2013) who examined the impact on non-performing loans on the profitability of Tanzanian commercial banks, found that increasing non-performing loans negatively affected profitability, a study that supports the initial thesis. Kithinji (2010) and Ombaba (2013) come to the same conclusion in the empirical studies, who believe that the inverse dependence of non-performing loans and profitability stems from the theory of asymmetric information and poor leadership. Therefore, negative selection contributes to high creditworthy borrowers to be replaced with low creditworthy borrowers, which in the long run cause a deterioration in the quality of the total loan portfolio, increase non-performing loans, reduce profitability and make erosion of capital.

Karim et al. (2010) examined the interdependence between non-performing loans and efficiency in the banking systems of Malaysia and Singapore. They concluded that higher levels of non-performing loans reduced banks' spending efficiency and had a negative impact on profitability. The results of their research support the hypothesis of poor management, assumed by Berger and DeJong (1997), who suggested that poor management in banking institutions results in a bad credit portfolio and thus contributes to increasing the non-performing loans and decline the profitability.

The higher values of cost-to-income indicator is a sign of poor credit risk management, i.e. taking, monitoring, measuring and controlling the loan portfolio (Louzis et al. 2010; Vardar and Ozguler 2015; Muratbek 2017).

Roman and Tomuleasa (2013) investigate the impact of internal and external factors on profitability of banks in European Union countries for the period 2003 to 2011 and conclude that the growth of non-performing loans has a negative impact on the profitability of banks.

Kozaric and Zunic (2015) based their research on data from the banking sector of Bosnia and Herzegovina, concluded that there is a strong negative correlation between non-performing loans and the capital adequacy ratio, the return on assets ratio and the return on equity ratio.

Shinjerji (2013) concludes that the increased level of loans affects the increase in the level of non-performing loans in the banking sector of Albania. The high amount of non-performing loans worsens the net interest margin and the rate of return on equity.

## BASIC DATA AND INDICATORS FOR THE MACEDONIAN BANKING SECTOR

Macedonian banking sector on 30.09.2019 is consist of 15 banks and 2 savings houses. The total assets amounts to 528 billions denars<sup>1</sup>. Banks apply a traditional business model of banking, i.e. collecting free cash from households and the corporate sector and directing them to approve loans to entities with a deficit of cash. Modern banking instruments, such as financial derivatives have not been developed yet.

Foreign capital participates with 74,6% in the total share capital. Thus, the banking sector is influenced by both economic and non-economic factors arising from their home entities and the countries of origin. Banks with dominant foreign ownership have a major role to play with a share of over 65% in all major positions of the banking system's balance sheets. Thus, their assets participate with 69,1% in the total assets of the macedonian banking sector, they create deposit base with 69,4%, in the total loans they participate with 74,6% and in the total financial result with 85,2%.

According to the size of the assets, the banks are divided into three groups (large, medium and small)<sup>2</sup>. The group of large banks consists of five banks with assets of more than 34,8 billions denars on 31.12.2019. The group of medium-sized banks consist of seven banks with assets between 8,65 and 34,8 billions denars on 31.12.2019. The group of small banks consists of three banks with assets of less than 8,65 billions denars.

The group of large banks has a dominant share in all indicators of the operation of the overall banking sector. They participate with 74,6% from total assets, 78,9% from total deposits and 74% from gross loans to non-financial entities in macedonian banking sector. The share of foreign capital in the total capital of large banks is 80,4%, the capital participate with 76% in total banks' capital and with 97,4% they almost completely create the financial result of the macedonian

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<sup>1</sup>The data on the individual indicators and sizes in this subheading are taken from the data and indicators for the macedonian banking sector, [http://www.nbrm.mk/podatotsi\\_i\\_pokazatieli\\_za\\_bankarskiot\\_sistiem\\_na\\_riepublika\\_ma\\_kiedonija.nsp](http://www.nbrm.mk/podatotsi_i_pokazatieli_za_bankarskiot_sistiem_na_riepublika_ma_kiedonija.nsp)

<sup>2</sup>The composition of the bank group is determined once a year with data from 31.12.

banking sector. The movement of selected performance indicators of the group large banks is given in chart 1.

The group of medium-sized banks participate with 21,9% in total assets, 17,8% in total deposits and 22,6% in gross loans of non-financial entities in macedonian banking sector. The share of foreign capital in total capital of medium-sized banks is 68,7%, the capital participate 21% from total capital of banks and they have insignificant share of 0,6<sup>3</sup> % in creating the financial result of macedonian banking sector. The movement of selected performance indicators of the group medium-sized banks is given in chart 2.

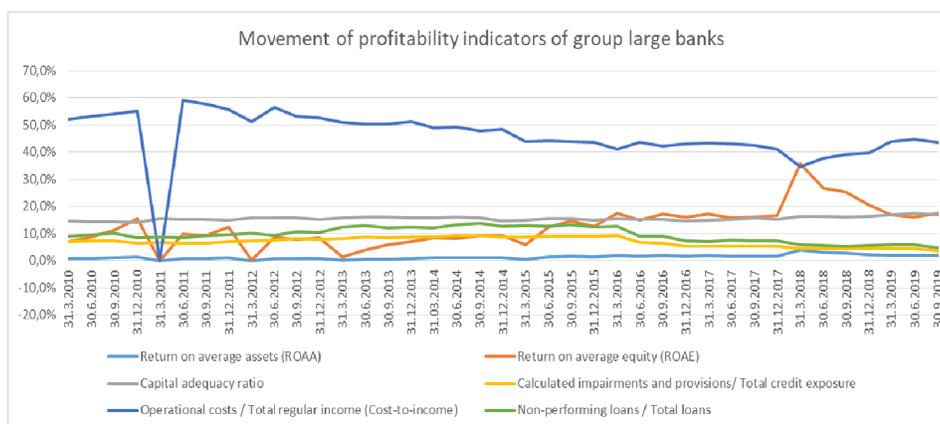


Chart 1. Movement of selected performance indicators of group large banks  
Source: NBRNM data for macedonian banking sector

<sup>3</sup>It is a result that a medium-sized bank on 30.09.2019 has a negative financial result

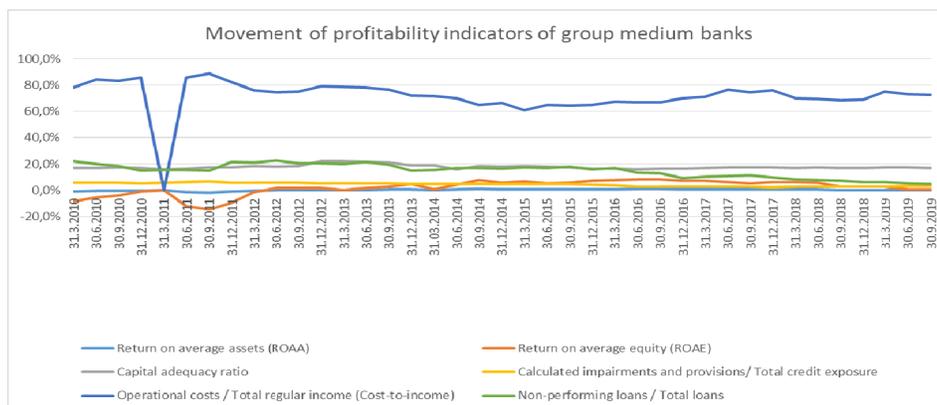


Chart 2. Movement of selected performance indicators of group medium banks  
 Source: NBRNM data for macedonian banking sector

The group of small banks has a insignificant impact in macedonian banking sector with share of 3,4% in total assets, 3,3% in total deposits and 3,4% in gross loans to non-financial entities. The share of foreign capital in total capital in small banks is 57,2%, the capital participate 3% in total banks capital and participate with 1,9% in creating the financial result of macedonian banking sector. The movement of selected performance indicators of the group small banks is given in chart 3.

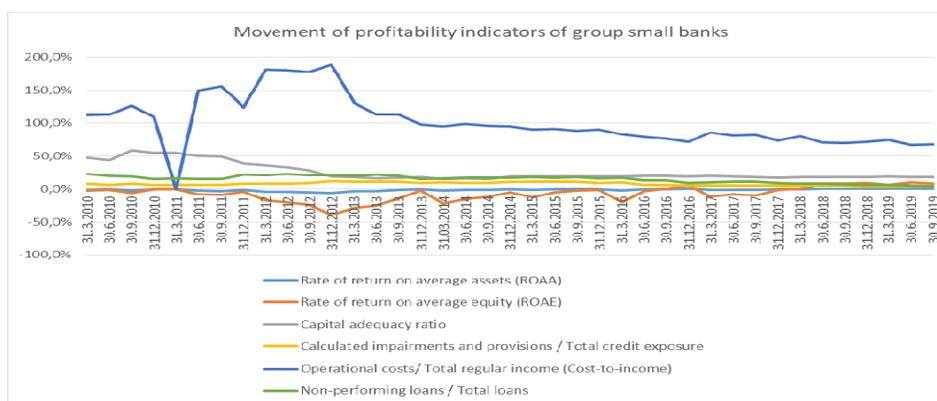


Chart 3. Movement of selected performance indicators of group small banks  
 Source: NBRNM data for macedonian banking sector

Hence, it is unequivocal that the operation of group large banks determines the basic indicators for the overall banking sector.

## RESEARCH AND METHODOLOGY DATA

In the paper are used secondary data for the groups of large, medium and small banks in the macedonian banking sector published in the website of the National Bank of the Republic of North Macedonia. In the paper is tested and analyzed the relationship between the variables specified in the hypotheses in order to find the empirical relationship between the independent variables and dependent variable.

In the paper is used descriptive statistics and the method of multiple regression for data analysis with the method of ordinary least squares. To ensure that the sample confirms the multiple regression method for analysis, the data was tested for heteroskedasticity, linearity, multicollinearity and normality. The results and short explanation from these tests are shown in annex 1.

Dependent variable in the model is the return on average assets (Return on average assets- ROAA), which is an indicator calculated as a ratio between net profit and total assets. This indicator is one of the basic measures for the profitability of banks and indicates how the management is efficient in using the bank's funds to generate profit. A higher value of this indicator indicates a more efficient and more successful use of the bank's fund in generating profit. Independent variables are non-performing loans indicator and indicator for operational efficiency.

The non-performing loans indicator is calculated as a ratio between non-performing loans and total loans of non-financial entities (households and corporate sector). This is a basic indicator of the quality of the loan portfolio and taken credit risk. A higher value of non-performing indicator indicates a lower quality of the loan portfolio and therefore a higher amount of impairment that directly affects the reduction of the financial result and thus the solvent position.

The cost-to-income ratio is an indicator of bank's efficiency and is calculated as the ratio between total operating costs and total regular income. This indicator is inverse, i.e. the higher amount of the indicator indicates a lower efficiency and the lower amount indicates higher efficiency.

In paper are used quarterly data from 2010 to Q3 2019 grouped by bank group, i.e. large, medium and small banks.

Table 1. Review of variables affecting ROAA

<b>Variable</b>	<b>Method of calculation</b>	<b>Expected movement</b>
<u>Dependent variable</u>		
ROAA	Net profit/ Total average assets	
<u>Independent variable</u>		
NPL	Non-performing loans/Total loans	-
Cost-to-income	Operational costs/Total regular income	-

Based on the economic logic of data interdependence, a multiple regression model is used. It is used to examine the impact of non-performing loans and cost-to-income indicator on the profitability of banks reflected in the rate of return on average assets. The model is shown in the following equation:

$$ROAA = \alpha + \beta_1 NPL + \beta_3 \text{Cost to income} + e$$

Where:

$\alpha$  = Constant

$\beta$  = Coefficients of independent variables

„e“ = Residual

ROAA is rate of return on average assets,

NPL is non-performing loans,

Cost to income is indicator for operational efficiency.

Based on previous empirical research, the expectation is that there is a negative relationship between the non-performing loans indicator and the operational efficiency indicator on the return on average assets.

Hence, the following hypothesis are set:

H1: Higher values of non-performing loans cause lower rate of return on average bank's assets

H2: Higher values of operating efficiency indicator causes lower rate of return on average bank's assets.

## RESEARCH RESULTS

### Correlation analysis and descriptive statistics by group of banks

According to the data in Table 2, in the analyzed period the average value of the rate of return on average assets for the group of large banks is 1,34% and its lowest is 0%, the highest value is 3,94%.The average value of NPL indicator is 9,5%, and ranges from 4,73% to maximum 13,86%.

The indicator of operational efficiency ranges from the lowest value of 34,46%, the maximum value is 60,7% and average value is 47,63%.There by, the standard deviation from the average value is most pronounced in this indicator compared to the other indicators.

Table 2. Descriptive analysis for group of large banks

	ROA	NPL	COST
Mean	0.013432	0.095197	0.476321
Median	0.012000	0.093348	0.478818
Maximum	0.039403	0.138627	0.607000
Minimum	0.000165	0.047265	0.344572
Std. Dev.	0.007811	0.026985	0.063501
Skewness	1.063049	-0.069126	0.163530
Kurtosis	4.738635	1.765975	2.220301

Source: Own calculations of the authors

Pearson's coefficient of the correlation, calculated to show whether there is a statistically significant correlation between non-performing loan indicator, the operational efficiency indicator and rate of return on average assets.The calculation show that in the group of large banks there is moderately significant negative correlation between the non-performing loan indicator and the operational efficiency indicator with the rate of return on average assets.

The negative correlation of 0,65 between the rate of return on average assets and the non-performing loan indicator indicates that the increased amount of non-performing loans significantly reduces the profitability. Given that is an indicator of how effective management is in managing assets and generating revenue, could be concluded that a higher indicator of non-performing loan contribute to reducing effective assets management.

Also, the negative correlation of 0,76 between the rate of return on average assets and the operational efficiency indicator indicates how the value of the operational efficiency increase, indicating that management is more inefficient in managing the bank's operating income and expenses, this also reduces effective assets management. This confirms the existence of dependence between profitability and efficiency. Calculations of correlation are given in table 3.

Table 3. Correlation between variables of group large banks

	ROA	NPL	COST
ROA	1.000000	-0.652071	-0.763609
NPL	-0.652071	1.000000	0.319132
COST	-0.763609	0.319132	1.000000

Source: Own calculations of authors

According to the data in Table 4, in analyzed period, the average value of the rate of return on average assets for the group of medium-sized banks is 0,19%, and its lowest value is with a negative value of -0,17% due to a negative financial result with one bank, and the highest value is 0,93%. The average value of the NPL indicator is 6,95% and ranges from 2,12% to a maximum of 11,75%.

The operational efficiency indicator ranges from the lowest value of 60,95%, the maximum value of 89%, while the average value is 73,85%. In the case of the group of medium-sized banks, the standard deviation has the highest value in this indicator.

Table 4. Descriptive analysis of group medium banks

	ROA	NPL	COST
Mean	0.001883	0.069471	0.738532
Median	0.003058	0.071957	0.730812
Maximum	0.009311	0.117556	0.890000
Minimum	-0.017000	0.021168	0.609467
Std. Dev.	0.007031	0.031252	0.070471
Skewness	-1.217603	-0.115613	0.368290
Kurtosis	3.575311	1.603133	2.324947

Source: Own calculations of authors

The calculations of correlation for the group of medium-sized banks are given in Table 5. It can be concluded that in the group of medium-sized banks there is a significant negative correlation of the indicator for operational efficiency and non-performing loan indicator with the rate of return on average assets.

Table 5. Correlation between variables for group of medium banks

	ROA	NPL	COST
ROA	1.000000	-0.701743	-0.847331
NPL	-0.701743	1.000000	0.606130
COST	-0.847331	0.606130	1.000000

Source: Own calculations of authors

According to the data in Table 6, in the analyzed period the average value of the rate of return on average assets for the group of small banks has a negative value (-1,13%) and its lowest value has a negative value (-5,59%) and the highest value is 1,07%.The negative financial result of two small banks over a long period of time contributes to the negative values of this indicator.

The average value of the NPL indicator is 14,8% and ranges from 4,76% to maximum of 22,42%. The indicator for operational efficiency ranges from the lowest value 66,29%, the maximum value 189,5%, while the average value is 105,32%.

Table 6. Descriptive analysis of group small banks

	ROA	NPL	COST
Mean	-0.012791	0.148083	1.053243
Median	-0.009438	0.155320	0.946489
Maximum	0.010672	0.224211	1.894927
Minimum	-0.055870	0.047633	0.662871
Std. Dev.	0.017156	0.052177	0.356199
Skewness	-0.696163	-0.424097	1.047917
Kurtosis	2.709012	2.037708	2.989994

Sources: Own calculations of authors

The calculations of correlation for the group of small banks are given in Table 7. The calculation shows that in the group of small banks there is a significant negative correlation of the indicator for operational efficiency and the indicator for non-performing loans with the rate of return on average assets.

Table 7. Correlation between variables for group small banks

	ROA	NPL	COST
ROA	1.000000	-0.705912	-0.892052
NPL	-0.705912	1.000000	0.706665
COST	-0.892052	0.706665	1.000000

Sources: Own calculations of authors

Comparative analysis by group of banks shows that the group of large banks achieves the highest efficiency in operation, the lower group of medium banks and the group of small banks achieves high value of cost-to-income indicator, which indicates the need to take measures to both restructure and improve their operations. The largest profitability measured by the rate of return on average assets is achieved by large banks and unprofitable operations are characteristics of small banks. The group of medium-sized banks have the best credit portfolio measured through the indicator for non-performing loans, followed by the group of small banks which has the weakest quality of the credit portfolio. These conclusions are in line with the explained correlations between the selected indicators.

### Regression analysis by group of banks

The moderately high negative correlation imposed the need to expand the analysis of these two indicators, i.e. the impact of the non-performing loans indicator and the indicator for operational efficiency on rate of return on average assets using the regression analysis technique. Regression analysis is a statistical method of determining the impact of changes in one independent variable on changes on another dependent variable.

The research methodology follows the method of ordinary least squares (OLS Least Squares). The analysis uses the multiple regression model using several independent variables (the non-performing loans indicator, and the cost-to-income indicator) that affect the dependent variable (the rate of return on average assets). The purpose of regression analysis is to evaluate the regression coefficients and to give an interpretation of how variations in the rate of return on average assets are explained by the independent variables in the model.

Table 8. Comparative overview of separate coefficients in the regression by group of banks

Variables	Large banks	Medium banks	Small banks
C	0,062197	0,055683	0,0344
Non-performing loans indicator	-0,131603	-0,066914	-0,049609
Cost-to-income indicator	-0,076076	-0,066553	-0,037831
Number of observations (n)	39	39	39
Coefficient of determination (R - squared)	0,7687	0,7739	0,8071
F - stat	59,84	61,62	75,33
Durbin - Watson	1,74	0,8	1,52

Source: Own calculations of authors

The regression analysis by group of banks allows several conclusions to be drawn from the results in the model. In all groups of banks, the increase in non-performing loans indicator and the indicator of operational efficiency causes a decrease in the rate of return on average assets. At the same time, the decrease is most remarkable in large banks. Thus, in the group of large banks, the model shows that a percentage point increase in the non-performing loans indicator and

the indicator of operational efficiency leads to a decline in the rate of return on average assets by 13,16pp and 7,6pp respectively.

In the group of medium-sized banks, the non-performing loans indicator and the indicator for operational efficiency increased by one percentage point leads to a decline in the indicator rate of return on average assets by 6,69pp.

Regarding the group of small banks, the results show that one percentage point increase in non-performing loans indicator and indicator of operational efficiency leads to decline in rate of return on average assets by 4,9pp.

This dependence explains that when the bank fails to collect a certain receivable within the agreed terms and amounts under the loan agreement, the bank is obliged to transfer that receivable to the accounts of non-performing loans, which affects both the balance sheet and profit and loss statement. The increased amount of impairments for a non-performing loans (minimum 30%) directly reduces the financial result.

The inability to collect interest on that receivable also reduces the interest income, which has a negative impact on operational efficiency and financial results. This also confirms reasearch that poor management of the bank reduces its operational efficiency, which in the long run leads to a reduction in its profitability.

The regression analysis confirmed the two hypotheses set during the reasearch that the higher non-performing loans indicator and the higher operational efficiency indicator cause a lower rate of return on average assets of banks.

In the group of large banks, the coefficient of determination is 76,87% which shows that such a percentage of the variations in the rate of return on average assets are explained by the independent variables in the model. F-statistics shows that the model is statistically significant, while Durbin-Watson which is below 2, indicates that the model has no problem with autocorrelation.

Regarding the coefficient of determination , in the group of medium banks it has second highest value compared to other groups of banks and is 77,39%. Also, the F-statistics has a value of 61,6 with a statistically significant probability and

Durbin-Watson is below 2, which indicates that the model in the group of medium-sized banks has no autocorrelation.

The coefficient of determination in small banks indicates that 80,71% of the variations in the rate of return on average assets are explained by independent variables. F-statistics and Durbin-Watson have similar values to those of medium-sized banks.

### CONCLUSION

In conditions of developed financial markets, strong competition and dynamic changes in the economy, increases the need for more detailed analysis of bank results. In bank's performances are interested not only the shareholders, but also other market participants such as depositors, lenders, regulators, competitors, the state. Hence, the management concern for the active comprehensive management of risks to which banks are exposed in their operations and their impact on the core performance of banks is justified.

The regression analysis confirmed the first hypothesis that the non-performing loans indicator has a statistically significant impact on the rate of return on average assets. Increasing the non-performing loans indicator reduces the rate of return on average assets in all three groups of banks, being the most remarkable in group of large banks. This suggests that problems with non-performing loans could significantly affect the profitable position of banks. Credit activity has a dominant influence in the operations of banks given the application of traditional banking in all banks. Therefore, the loan portfolio is the dominant source of revenues, but at the same time it can be the main generator of bank losses.

The analysis confirms the second hypothesis that a higher amount of the indicator for operational efficiency causes a lower rate of return on average assets of banks, which is most remarkable in large banks. This confirms the dependence between profitability and efficiency. In the context of low and declining interest rates, one of the major challenges for banks in terms of profitability is their capacity to further maintain growing net interest income.

The paper suggests certain findings and directions that every banking institution should strive for, but also the creators of banking regulations. Also, the results

of this study are useful for improving the risk management process. Better management of risks, primarily credit risk, costs and capital should lead to better banking performance as a whole. Only a stable, sound and efficient banking sector that enjoys the trust of economic entities can provide them with adequate financial support and be an effective mediator of the national economy resources in order to intensify economic development.

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### **Annex 1. Tests for evaluation of residuals and stability of the model**

In the process of analysis was made evaluation of residuals and tests for stability of the model in order to check the assumptions of the multiple regression model.

#### **Review of the results for tests for evaluation of residuals in the model**

Type of test	Breusch-Pagan-Godfrey		Breusch-Godfrey Serial correlation LM test		Jarque-berra test	
	Obs*R-squared	Prob. Chi-Square(2)	Obs*R-squared	Prob. Chi-Square(1)	Jarque-berra	Probability
Large banks	1,6703	0,4338	0,4108	0,5215	2,3130	0,3145
Medium banks	14,6689	0,0007	12,1961	0,0005	0,3145	0,4364
Small banks	5,4499	0,0655	1,9097	0,1670	1,2671	0,5306

Source: own calculations of authors

- a) The **Breusch-Pagan-Godfrey test** is used to assess whether the model has heteroskedasticity or homoskedasticity. In the model the p-value is higher than 5%, i.e. in the model has homoskedasticity.
- b) The **Breusch-Godfrey Serial correlation LM test** is used to assess whether there is a serial correlation in the model.
- c) The **Jarque-Berra test** shows if there is a normal residual layout. In the model all group of banks has a normal residual layout.

**Review of the results for stability of the model**

Type of test	Ramsey reset test	
	F-statistic	Probability
Large banks	12,7589	0,0011
Medium banks	8,1953	0,0070
Small banks	0,0384	0,8458

Source: own calculations of authors

**Ramsey reset test** is one of the largely used tests for assessing whether a model is specified correctly, i.e. whether there are errors in the model, the general specifications assessment test in the linear regression model.