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DETERMINANTËT E KREDIVE TË KËQIJA DHE EFEKTI I TYRE AFATGJATË NË STABILITETIN FINANCIAR TË SEKTORIT BANKAR: RASTI I REPUBLIKËS SË MAQEDONISË SË VERIUT

ДЕТЕРМИНАНТИ НА НЕФУНКЦИОНАЛНИТЕ КРЕДИТИ И НИВНИОТ ДОЛГОРОЧЕН ЕФЕКТ ВРЗ ФИНАНСИСКАТА СТАБИЛНОСТ НА БАНКАРСКИОТ СЕКТОР: СЛУЧАЈОТ НА РЕПУБЛИКА СЕВЕРНА МАКЕДОНИЈА

DETERMINANTS OF NPLs AND THEIR LONG-TERM EFFECT ON FINANCIAL STABILITY OF BANKING SEKTOR: THE CASE OF THE REPUBLIC OF NORTH MACEDONIA

Abstract

The financial stability of the banking sector depends on many banking and macroeconomic parameters, but above all it depends on their profitability, liquidity, as well as on successful credit risk management. This paper analyzes the profitability dynamics in the banking sector of North Macedonia over a ten-year period (2015-2024), focusing on the impact of non-performing loans (NPL) as one of the key determinants of banking stability. The Macedonian banking system has traditionally been characterized by stable and satisfactory profitability, sustained liquidity, adequate capital levels, and continuous control of non-performing loans, even in the face of financial, health crises and geopolitics crisis. These characteristics position the sector as relatively resilient to shocks with direct economic consequences.

The main objective of the paper was to determine the significance and extent of the impact of non-performing loans on profitability, using statistical methods and regression analysis. The applied methodology - including a scatter plot, coefficient of determination, and regression line

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- determined that there is an inverse straight-line stochastic relationship between these two variables. The results show that with each increase in the level of non-performing loans by one unit, profitability decreases by 78.86 units. At the same time, the coefficient of determination indicates that only part of the variability in profitability is explained by non-performing loans, while the other part is due to other internal and external factors such as geopolitics crisis, which are not captured in the model.

The findings confirm that the banking sector in North Macedonia remains stable and profitable, with relatively high interest margins maintained, continued growth in non-interest income and a low level of non-performing loans, which together contribute to its sustainable growth.

Keywords: *Financial stability, profitability, non-performing loans, Macedonian banking sector, bank determinants, linear regression.*

1. Introduction

Financial stability and the financial system, as a fundamental part of the economic system, have an important and irreplaceable role in the economic development of a country. Its importance is due to the vital economic functions it performs, without which the functioning of a modern state cannot be imagined. While banks and the banking system as a whole represent the main component for the realization of the financial and economic goals of the country, especially in developing countries such as the Republic of North Macedonia, where the rest of the financial system, unfortunately, is underdeveloped.

The wide range of financial products and services offered by banks in the Republic of North Macedonia contribute and are decisive for the development of the economy. Considering that the competition in the banking sector in North Macedonia is constantly increasing, especially in recent years with the entry into our market of big names of banks from world banking brands, the pressure to participate and occupy as much of the market as possible is increasing. This means that banks, on the one hand, should respect and facilitate their internal procedures for loan disbursement, and on the other hand, they should disburse as large amounts of loans as possible to increase market share and increase their profitability. This automatically contributes to an increase in the credit risk of banks. This credit risk is automatically associated with an increase in the level of non-performing loans, which

not only affect the profitability of banks, but can also lead to the total liquidation and bankruptcy of some banks, as was the case with the global financial crisis of 2007-2008 and the Asian financial crisis in 1997, and especially now in periods of global health and economic developments with COVID-19 and geopolitical security crises. Due to the complex nature of the work, many stakeholders are interested in the flawless functioning of the banking system as a whole, as well as the specific functioning of an individual bank, including: shareholders, investors, supervisors, tax authorities, etc. In order to establish the "rules of the game", as well as prevent the abuse of the financial system by all the aforementioned participants, it is very important to create a supervisor, i.e. a monetary authority, which will design and implement monetary policy and actively supervise the financial system. The National Bank of the Republic of North Macedonia is a central bank that holds monetary authority, whose role and activities are regulated by a special law.

The National Banks of different countries, in cooperation with their governments, are the most important institutions responsible for creating and implementing an optimal and consolidated fiscal-monetary policy, in order to revive economic activity. The importance, activities and their role have gained increased significance in recent years, as a result of various financial crises, health and pandemic events, as well as various socio-economic and security activities. In the Republic of North Macedonia, the supervision of the National Bank focuses more on the banking sector, due to the high level of mediation, compared to other participants in the financial sector.

2. Literature review

A brief review of various literature and analyses that investigate the same or similar issues, i.e. investigate the determinants of profitability, non-performing loans and liquidity of the banking sector, as well as the statistical methods used, will be explained in this section.

After the financial crisis of 2007-2008, many studies have been conducted that investigated the determinants of profitability and the movement of the NPL level as one of the key parameters, including:

Khemraj and Pasha (2009), investigate the determinants of profitability and non-performing loans and their significance, but only during financial crises. Although the statistical analyses of the studies

differ from ours, there are some common elements, namely that NPLs are usually measured by the ratio of NPLs to total loans, and that their significance is crucial for the survival of banks in both developed and developing countries.

Gotskov and Hristovski (2019) investigated the profitability of banks in North Macedonia, but from the perspective of the connection with liquidity. They assessed that the banking system in the Republic of North Macedonia is characterized by a high level of liquidity and profitability compared to the banking system in the countries of the region. Among other factors, they assessed that the high profitability of banks allows them to have a high degree of liquidity, which means that the level of non-performing loans is also at a low and controlled level.

Petkovski, Kjosevski and Jovanovski (2021) conducted a study and investigated the macroeconomic and banking determinants of non-performing loans of commercial banks in Poland and Central Eastern Europe, which concluded that GDP and lending to households have a negative effect on the level of NPL growth, while public debt and unemployment have a positive effect on the increase in NPL, where then the level of NPL has a significant role in profitability.

Jakubic and Reininger (2013) analyzed the determinants of NPLs in nine Central and Southeastern European countries, using several macro determinants: real GDP, private sector, national stock market index, credit-to-GDP ratio, exchange rate. Empirical results showed that real GDP growth is the main driver that is negatively correlated with NPL dynamics. Erdinzand Abazi (2014) analyzed the determinants of NPLs in 20 emerging European countries, using several methods and annual data from 2000 to 2011. Empirical results showed that real GDP growth, inflation rate and bank profitability have a significant impact on NPLs.

3. Profitability and non-performing loans. Their significance and trend over the years

3.1 Indicators of the profitability of the banking system

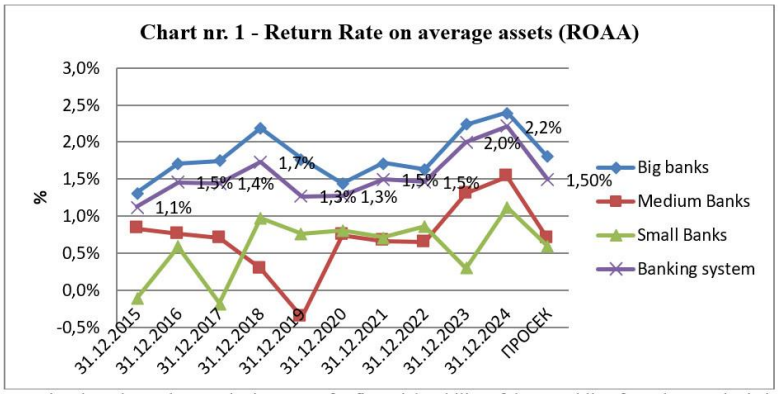
The banking sector in North Macedonia has faced numerous challenges throughout the years, but has always shown adequate readiness and positioning to respond to challenges and risks, thus maintaining and strengthening stability. This stability is based on the public's trust in the banking sector, but it is also based on the positions of the banking sector, which is characterized by strong capital, liquidity and

solvency positions. Here, it is necessary to mention the intervention of the regulator to release the public from paying installments and their prolongation for several months, in order to stimulate the economy and keep credit risk under control[2].

Table 1 – Return rate on average assets ***(ROAA)***

Group	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Average
Big banks	1.3%	1.7%	1.7%	2.2%	1.8%	1.4%	1.7%	1.6%	2.2%	2.4%	1.8%
Medium Banks	0.8%	0.8%	0.7%	0.3%	-0.4%	0.7%	0.7%	0.7%	1.3%	1.5%	0.7%
Small Banks	-0.1%	0.6%	-0.2%	1.0%	0.8%	0.8%	0.7%	0.9%	0.3%	1.1%	0.6%
Banking System	1.1%	1.5%	1.4%	1.7%	1.3%	1.3%	1.5%	1.5%	2%	2.2%	1.5%

Source: National Bank of North Macedonia- Report for financial stability of the Republic of North Macedonia in 2024



Source: National Bank North Macedonia-Report for financial stability of the Republic of North Macedonia in 2024

The profitability of the banking sector in North Macedonia is satisfactory, stable and is constantly growing. The high and existing profitability is due to the relatively high interest margins, income from collected written-off receivables and especially growing income from non-interest items (commissions, etc.). As can be seen from the table, the banking system has been collecting an average of 1.5% annual profit in relation to average assets in the last decade. As can be seen from the table and diagram the largest share of this profit is taken by large banks.

3.2 Non-performin loans

Non-performing loans are among the basic terms used in the analysis of bank operations and banking risks. These are loans where, basically, the repayment by the client is delayed by a certain time. Usually, the regulator precisely defines the time of delay at which the

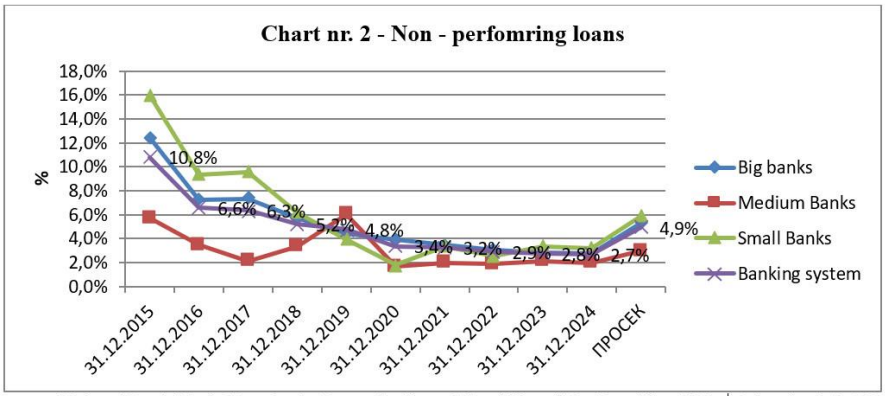
[2] National Bank of North Macedonia- Report for financial stability of the Republic of North Macedonia in 2024

loan is included in the group of non-performing loans. Most often, it is a delay of 90 days or more[3].

According to the regulations and requirements of the regulator, each bank must set aside provisions for these non-performing loans or, simply put, reserves that cover losses from possible non-payment of the loan. Typically, as the delay increases, so do the required provisions. These provisions represent a cost for the bank and affect its profit, and thus ultimately its capital or the estimated need for additional capital[4].

According to the attached graph, we can see that the level of non-performing loans is in constant decline. This decline is primarily due to the regular collection of loans by borrowers, who settle their loan obligations for all types of loans with a standing order, administrative ban or cash payment at the counter. Also, part of the payments is due to forced collection through the sale of collateral or taking over the loan from another person.

Non-performing loans in the banking sector in North Macedonia have been maintained at a relatively low level over the years, compared to the countries in the region. This is the result of a number of factors, of which we can highlight that on the one hand, the banks' internal procedures for credit risk management, as well as the role and rules of the regulator (NBRM), on the other hand, by introducing and respecting the principles of BASEL 3, have yielded exceptional results in maintaining the level of NPLs at low levels and even reducing them over the years.



Source: National Bank North Macedonia-Report for financial stability of the Republic of North Macedonia in 2024

[3] www.nbrm.mk/ns-newsarticle-nefunkcionalni-krediti
[4] ibidem

Through the graphs and the given table, we can clearly see that the average NPL of the banking system in the Republic of North Macedonia has a downward trend. Mostly large banks that have a greater share in the total portfolio of disbursed loans in our country dictate the level and pace of movement of non-performing loans. While, as can be seen, small banks are above the average for the sector in terms of the level of NPL, which indicates poor performance and greater caution when implementing credit placements, through revising internal procedures.

Table 2 – Trend of Non – performing loans
(in %)

Group	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Average
Big Banks	12.5%	7.3%	7.3%	5.7%	4.4%	3.9%	3.5%	3.1%	2.8V	2.8%	5.3%
Medium Banks	5.7%	3.5%	2.1%	3.3%	6.0%	1.6%	2%	1.9%	2.1%	2%	3%
Small Banks	16.0%	9.3%	9.6%	6.2%	3.9%	1.8%	3.3%	2.5%	3.3%	3.2%	5.9%
Banking system	10.8%	6.6%	6.3%	5.2%	4.8%	3.4%	3.2%	2.9%	2.8%	2.7%	4.9%

Source: National Bank of North Macedonia- Report for financial stability of the Republic of North Macedonia in 2024

Also, if we compare this table and this Chart No. 2 for the level of NPL with the previous Chart No. 1 for profitability, we will see that banks that have a higher level above the sector average of non-performing loans, have and are below the sector average in terms of profitability, which clearly shows the negative ratio and effect of non-performing loans on profitability.

4. Methodology, data and analysis

4.1 Methodology and data

In this section, we will conduct empirical research on several macroeconomic indicators for 8 years, with forecasts in accordance with the Fiscal Strategy of the Republic of North Macedonia 2023 - 2026.

According to this empirical research, using the linear regression technique, which is one of the most important and most commonly used statistical methods and has a very wide application in the social sciences. This method allows for the prediction and assessment of one phenomenon based on the value of another phenomenon. With the mathematical formula of Regression Analysis, with the Scatter Diagram, as well as with the coefficient of determination, we will show the connection, i.e. whether the connection is direct or inverse, and the degree of determination.

$$Equation\ of\ a\ straight\ line: \qquad y = \beta_0 + \beta_1 x$$

The line is completely defined by two coefficients: β_0, which shows the intercept of the Y axis, that is, the value of Y when X =0 and β_1, which is called the slope coefficient and shows the tangent of the angle that the line intersects with the positive arm of the x-axis. The coefficient β_1 shows the change in the dependent variable U when the independent variable X increases by one of its units.

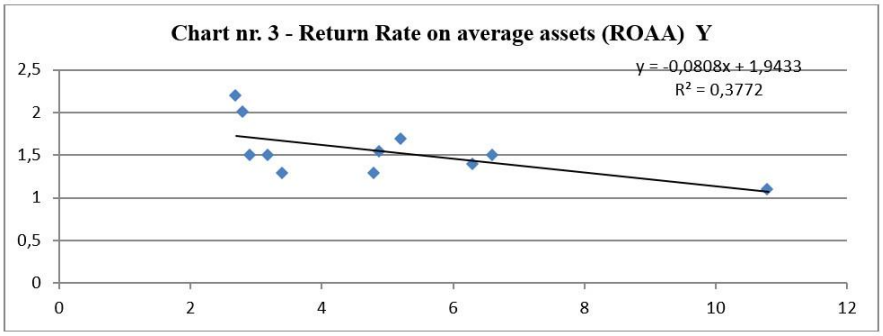
In our context, we need to show what the relationship is between the dependent variable profitability, when the independent variable non-performing loans increases by its unit.

Table 3 – ROAA and NON-Performing loans

Year	Non-Performing loand X	ROAA Y	xy	x^2	y^2
2015	10.8	1.1	11.88	116.64	1.21
2016	6.6	1.5	9.9	43.56	2.25
2017	6.3	1.4	8.82	39.69	1.96
2018	5.2	1.7	8.84	27.04	2.89
2019	4.8	1.3	6.24	23.04	1.69
2020	3.4	1.3	4.42	11.56	1.69
2021	3.2	1.5	4.8	10.24	2.25
2022	2.9	1.5	4.35	8.41	2.25
2023	2.8	2	5.6	7.84	4
2024	2.7	2.2	5.94	7.29	4.84
Average	4.87	1.55			
n = 10			70.79	295.31	25.03

4.2 Analysis and research results

According to the scatter diagram, it can be seen that there is an inverse straight-line stochastic relationship between the variations of the observed phenomena. Namely, with the increase in the level of non-performing loans, the profitability of the bank decreases and vice versa. This can also be seen from the regression line. The points outside the line are points of deviation, which are normal positions in economic phenomena. This also means that the dependent variable U (profitability) is not only affected by the independent variable X (non-performing loans), but also by a large number of other factors, which are not included in our model. The negative sign of β_0 shows us that we have an inverse relationship.



Scatter plot with line of the Regression of the effect of Non-performing lonas on Profitability
Source: Author's calculations

By using the mathematical formulas and data from Table 3 above, we find the value of the regression parameters as follows:

$$\boldsymbol{\beta_1} = \frac{n\sum xy - \sum x \sum y}{n\sum x^2 - (\sum x)^2} = \frac{10 * 70{,}79 - 48{,}7 * 15{,}5}{10 * 295{,}31 - 48{,}7^2} = -0{,}0808$$

$$\boldsymbol{\beta_0} = \overline{y} - \beta_1 \overline{x} = 1{,}55 - (-0{,}0808 * 4{,}87) = 1{,}9433$$

From here our model looks like:

$$Y = -0{,}0808X + 1{,}9433$$

$$\text{Y} = 1{,}9433 - (0{,}0808 * 1.000) = -78{,}86$$

This means that for every increase in non-performing loans by 1,000.00 denars, the bank's profitability will decrease by – 78.86 denars.

4.3 Coefficient of determination

Since we have a stochastic inverse relationship, we need to see what the coefficient of determination of this relationship is. We find the coefficient of determination with the following formula:

$$r^2 = b_1^2 \frac{\sum x^2 - n\overline{x^2}}{\sum y^2 - n\overline{y^2}} = (-0{,}0808)^2 \frac{295{,}31 - 10 * 4{,}87^2}{25{,}03 - 10 * 1{,}55^2} = \mathbf{0{,}377}$$

According to the obtained result of the coefficient of determination, it shows us that 37.7% of the total variability of profitability is explained (deterministically) by the level of non-performing loans. The remaining 62.3% of the total variability is not explained by the regression line and is the result of the influence of other internal and

external factors, which are not the subject of our analysis. Since the coefficient of determination is above 0.5 and is approaching 1, we can conclude that the regression line represents the empirical data very well.

4.4 Testing the hypothesis and the significance of the regression relationship

If we want the application of the regression line and sample analysis in predicting the values of the dependent variable U to be justified, it is necessary to examine whether there is a linear relationship between the variations of the two observed variables. So, we need to test the hypothesis whether the slope coefficient β_1 is equal to zero. If it is confirmed that it is 0.00, then this regression analysis should not be used for predictions.

If X-investment does not affect U-yield, the hypothesis is set to H0: β_1=0, while if X-investment affects U-yield, the hypothesis is set to H1: β_1≠0.

The result is obtained from the following 2 formulas, and the data are taken from table 3, namely:

$$S_{\beta_1} = \frac{S}{\sqrt{\sum x^2 - n\bar{x}^2}} = \frac{0.26371}{\sqrt{295{,}31 - 237{,}17}} = \frac{0.2637}{7{,}625} = 0{,}03458$$

$$t = \frac{\beta_1}{S_{\beta_1}} = \frac{-0{,}0808}{0{,}03458} = -2{,}336$$

The critical value of the significance level *a*=0.05 and the number of degrees of freedom n-2=10-2=8 as, based on the table, are 1.8595.

Since the obtained value t= -2.336 < t0.05=1.8595, we reject H0 and accept H1 that β_1≠0, which means that the slope parameter β_1 differs from zero, and we can conclude that there is an INVERSE linear relationship (due to the "-" sign) of the variations of the observed phenomena and regression analysis can be used for prediction.

Conclusion

One of the main characteristics of the Macedonian banking system is maintaining a stable and satisfactory level of profitability, as well as maintaining the level of liquidity, capital adequacy, as well as maintaining a stable level of non-performing loans, especially in times of financial and health crises, which have a direct economic effect.

The main goal of our seminar paper was to identify the significance and effect of the level of non-performing loans on the profitability of the banking sector in the last 10 years (2015-2024), as one of the many determinants of profitability, using statistical analyses with the Regression Analysis technique.

Our calculations with the mathematical formula of Regression Analysis, with the Scatter Diagram, as well as with the coefficient of determination and the regression line, showed that between these two important banking parameters there is an inverse straight-line stochastic relationship. Namely, with the increase in the level of non-performing loans, the profitability of the bank decreases and vice versa, i.e. for each increase in the level of non-performing loans by 1 unit, the level of profitability decreases by -78.86 units.

The diagram also identified that the level of profitability is not only affected by the level of non-performing loans, but also by a large number of other factors, but according to the result obtained from the coefficient of determination, it shows us that 37.7% of the total variability of profitability is explained by the level of non-performing loans. The remaining 62.3% is the result of the influence of other internal and external factors that are not included in our model such as geopolitics crisis.

Finally, we can conclude that the profitability of the banking sector in North Macedonia is satisfactory, stable and is constantly increasing. The high and ongoing profitability is due to relatively high interest margins, increasing income from non-interest items, as well as maintaining a relatively low level of non-performing loans.

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