

ANALYSIS OF THE INFLUENCE OF NON-PERFORMING LOANS ON BANKING PERFORMANCE. CASE STUDY ON THE EXAMPLE OF THE ROMANIAN BANKING SYSTEM

Dumitru Mihai NEDELESCU¹

Oana CIULEI²

Abstract

In the current period, bank loans constitute an important component of the financial-banking systems, both at national and international level, with major implications in economic and social life, as a result of the fact that all economies are deeply concerned with ensuring a sustainable economic development and reducing the negative effects generated by the pandemic on the financial market. This study aims to analyze the relationship of variable NPL with Return on Equity (ROE), Return on Assets (ROA) and Solvency Ratio (SR). We used three linear regressions in order to analyze the influence of NPL on each of the dependent variables mentioned above. The population is represented by quarterly financial indicators reported by National Bank of Romania for the period September 2014 - June 2022. The results of this study indicate that NPL have a negative effect on financial performance (ROE), profitability (ROA) and solvency (SR).

Keywords: NPL, ROA, ROE, Solvency Ratio

JEL Classification: G21, G32.

1. Introduction

Currently, the banking system is in a permanent process of transformation, enough to place it in one of the leading positions in the process of international financial restructuring. Such an evolution is determined by the events that called into question the stability and health of the entire financial system due to the crisis. Economic conditions and market trends, as well as its dynamics, have significantly changed the configuration of banking products and services.

The role of banks is crucial in the economy as they provide a source of finance for businesses or households. Banking institutions carry out many activities to ensure their financial soundness and their continuity in the banking sector. The most well-known activities consist mainly of attracting resources in the form of deposits (passive operations) and placing them with customers in the form of loans (active operations). According to specialists in the field, lending is one of the most important activities carried out by banks,

¹ PhD Lecturer at Romanian-American University, School of Finance and Accounting, e-mail dumitru.mihai.nedelescu@rau.ro

² Student at Romanian-American University, Master of Business Management and Auditing, e-mail ciulei.d.oana21@stud.rau.ro

given the level of the loan portfolio and its share of total assets. Although lending is a main source of income, it can also be a significant source of risk for banks.

The lending activity must be efficient both for the financing institution, because by optimizing and diversifying the loan portfolio, it can obtain an increase in the degree of profitability, and for the client, who, on account of loans as the main source of financing, can develop the activity and obtain profit.

Credit risk expresses the possibility of the borrower's actual failure to meet its contractual obligations to the banking institution. This situation materializes in the inability of the bank's customers to repay loans when due and transform them into non-performing loans, negatively affecting the bank's profit and capital. A loan is considered to be non-performing if the likelihood of repayment by the borrower becomes uncertain or if the period of default exceeds 90 days.

Banks focus on monitoring loan performance during the lending process. Thus, there are many methodologies applied when granting loans to analyze the financial performance of borrowers (credit analysis), debt servicing (the borrower's ability to repay the debt when due) and the grouping of loans according to their quality.

Given the high exposure of banking activity, bank performance is a term that includes a diagnosis of profitability as well as a diagnosis of risk. In the literature, it is considered that one of the important factors reducing profitability is represented by the increase in non-performing loans. As Return on Assets and Return on Equity are the most commonly used indicators to measure a company's profitability, we chose to conduct a study on these indicators.

There is a variety of theoretical and empirical research in the literature on non-performing loans and credit risk. Many of the studies are linked to the profitability of the banks while other studies approach the factors that could determine the NPL. **Adela Socol and Adina Elena Danuletiu (2013)** analyzed the impact of loans on ROA and ROE in the period 2008-2014. Thus, the present study is a continuation of their study by analyzing the evolution of the influence of NPL on ROA and ROE for the period 2014-2022. As an extension, we will also analyze non-performing loans as the main part of a loan portfolio with direct implications for the profitability and solvency of banks.

To expand the implications of NPL on bank performance, we further decided to analyze the solvency of the banks. The solvency ratio is the ratio of total own funds (Tier 1 own funds and Tier 2 own funds) to risk-weighted assets. Solvency is achieved by reducing risk-weighted assets, while the level of own funds is kept constant or by the growth of own funds, which can imply a reduction in loans. On the other hand, the solvency can decrease with the growth in risk-weighted assets while the level of own funds is kept constant.

2. Literature review

In specialized literature, NPL are loans granted to customers with a damaged economic-financial situation, who can no longer ensure the repayment conditions. Lending, even under the conditions of achieving a balance between a prudent and efficient activity, can generate the appearance of certain dysfunctions in the form of NPL. The negative effects generated made it necessary to manage them separately by placing them in a special

portfolio. In order to keep NPL within controllable limits, banks must identify any dysfunctions that may arise in the lending process that could lead to the deterioration of the client's situation and move, as the case may be, to the application of prudential measures to recover the sums owed (amicably, execution of guarantees or initiation of bankruptcy proceedings).

According to **Stuti and Bansal (2013)**, the best indicator of the banking industry's solidity is the level of non-performing loans in the country's financial system.

Gup and Kolari (2011) state that at the time of approval, all credit decisions act as accurate credit decisions but unpredictable conditions in the economic situation and other factors such as: shocks in interest rates, changes in tax laws etc. result in credit problems.

Jolevski, Ljube (2017) studied the influence of the non-performing loans ratio on profitability indicators in the banking system of the Republic of Macedonia for the period 2007- 2015. The results of the study show a moderately high negative correlation between the non-performing loans ratio and rates of return on equity (ROE) and return on assets (ROA). According to their study, an increasing amount of nonperforming loans causes a decrease in the two main bank profitability indicators: ROA and ROE.

Achda Vellanita et al. analyzed the relationship of variable NPL with ROE at PT. BANK CENTRAL ASIA 2014 – 2018. They concluded that there is a strong negative correlation, which means that any increase in the NPL ratio will reduce the ROE ratio.

The results of the empirical study (**Kusmayadi, nd**) show that the NPL has no effect and is not significant on the profitability of Return on Assets (ROA) whereas (**Hantono, 2017**) shows that Non-Performing Loans (NPL) has a negative effect on profitability. **Pirmanta Sebayang** used a multiple regression and concluded that NPL does not affect the Return On Equity (ROE) and the increase or decrease in the ratio of NPL does not have an impact on Return On Equity (ROE).

Aysegul Berrak Koten (2021) studied the effect of non-performing loans on profitability for public and private banks in the Turkish banking system. **In this way, it was found that non-performing loans had a decreasing effect on the return on assets in the Turkish banking system in parallel with many studies in the literature.** The purpose of this study was to determine the effects of Non-Performing Loans/Total Loans and Loan/Deposit Ratio on the Return on Assets for the period 2010.Q1-2020.Q4 for 3 public capitals, 8 private capitals, and 16 foreign capital banks in the banking system with the panel regression analysis as a result of which it was found that when the Non-Performing Loans/Total Loans variable increased 1 unit, the ROA variable decreased 0.230 units, and when the Loan/Deposit Ratio increased 1 unit, the ROA variable increased 0.115 units. That being said, some studies show different relationships between NPL and profitability indicators of the banks.

Petr Jakubík and Thomas Reininger provide a macroeconomic model for nonperforming loans (NPLs) for the Central, Eastern and Southeastern European (CESEE) countries. Their model is based on panel data for Bulgaria, Croatia, the Czech Republic, Hungary, Poland, Romania, Russia, Slovakia and Ukraine. In line with current literature, their empirical analysis confirmed that economic growth is the main driver that is negatively correlated with NPL development.

Other authors determine that increased competition among banks affects increasing banks' exposure to credit risk, i.e. their credit portfolio quality is reduced as a result of relaxation of lending standards and criteria to collect greater credit market share (Jeong and Jung, 2013; Bolt and Tieman, 2004).

As said before, a big part of empirical literature is focused on examining the determinants of non-performing loans. A relevant study that investigates the impact of macroeconomic factors on non-performing loans is the one conducted by Teodor Hada et al. (2019) for Romania. Most studied macroeconomic factors are: gross domestic product growth, inflation rate, unemployment rate, interest rates and the exchange rate.

In the study conducted by **Isaiah Oino** it was concluded that efficiency, asset quality, and economic growth have a significant positive effect on the solvency of banks. This paper studies the effect of liquidity and credit risks on banking solvency using a panel dataset of the UK's ten major banks from 2009 to 2018. The results indicate that both credit and liquidity risk are significant in influencing the solvency of banks.

3. Methodology

We developed three regression models (NPL_ROA and NPL_ROE and NPL_SR) to determine if the NPL ratio affects ROA, ROE and SR in the Romanian banking system. The data is collected from the electronic web page of National Bank of Romania during September 2014 to June 2022 on a quarterly basis. The dependent variables are considered ROA, ROE and the Solvency Ratio (SR), while the independent variable is NPL.

4. Conceptual Framework

The specialized literature highlighted a series of quasi-unanimous indicators accepted by banks for the analysis of economic and financial performance. Some of them have imposed themselves in banking practice in the form of requirements promoted by the domestic and international legislation that regulates the activity of banks, while others represent an effective tool for analyzing banking performance.

The analysis of these indicators provides, to the management body of the banks, information of great importance both for the future evolution and for their performance. The purpose of this analysis is to frame the banks' activity in the management body's strategy, focused on financial performance, prudence, legislative and competitive restrictions.

The responsible management of non-performing loans represents an important activity of banking institutions and is an effective way of managing credit risks and regrouping the funds needed for lending.

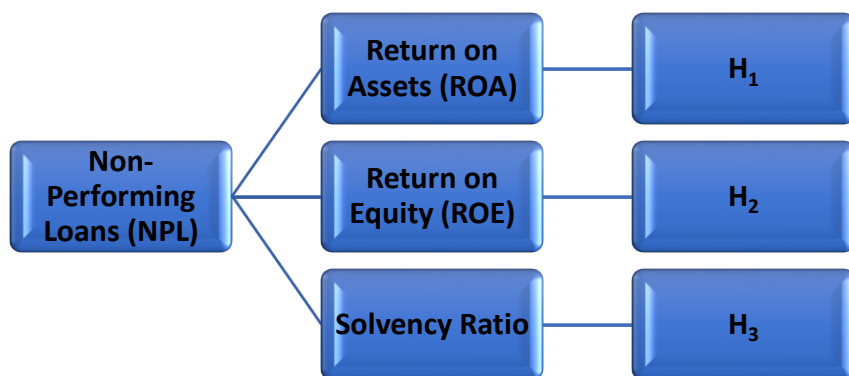


Figure 1: Research Concept Framework

The coefficients of correlation between the non-performing loans ratio and the specific indicators showing the degree and direction of their connection are presented in the following table:

Indicators	Pearson correlation coefficient with the share of non-performing loans to total loans
Return on assets (ROA)	-0.7285
Return on equity (ROE)	-0.72206
Solvency Index	-0.74344

Table 1. Coefficients of correlation

Profitability indicators show a negative correlation with non-performing loans ratio. There is a negative correlation of -0.7285 between the rate of return on assets (ROA) and the non-performing loans ratio (NPL), indicating that the increased amount of non-performing loans has a significant impact on reducing the profitability ratio. As the rate of Return on Assets can reflect the efficiency in generating revenues through company's assets, it can be concluded that a higher indicator of non-performing loans could contribute to reducing the effective management of assets.

The rate of return on equity (ROE) and NPL shows a similar negative correlation of -0.72206. The correlation coefficient indicates that with increasing the non-performing loans ratio, the rate of return on equity is decreased. This result can be explained by the fact that by increasing NPLs, banks are forced to recognize provisions that will further affect the capital structure and profit structure.

We further analyzed the influence of the NPL on the solvency of Romania's banking institutions. In Romania, credit institutions shall be required to maintain at all times the indicator at a level of at least 12%.

The solvency indicator shows a negative correlation with non-performing loans ratio. There is a negative correlation of -0.74344 between the Solvency Ratio (SR) and the non-performing loans ratio (NPL), indicating that the increased amount of non-performing loans has a significant impact on reducing the solvency ratio. As SR measures how well a company's cash flow can cover its long-term debt, it can be concluded that a higher indicator of non-performing loans could contribute to reducing the effective management of cash flow.

Specification of the econometric model describing the link between the two variables

From the Scatter Diagram it can be seen that the distribution of points x_i, y_i can be approximated very well with a straight line (trendline), so it can be assumed that the econometric model describing the relationship between variables is a linear model: $y=E(Y|X)=\alpha+\beta x+\varepsilon$, where α and β -parameters of the model. It is observed that $\beta < 0$ (slope/slope of the line) which confirms the hypothesis that the variables are directly negatively related: increasing x leads to decreasing y .

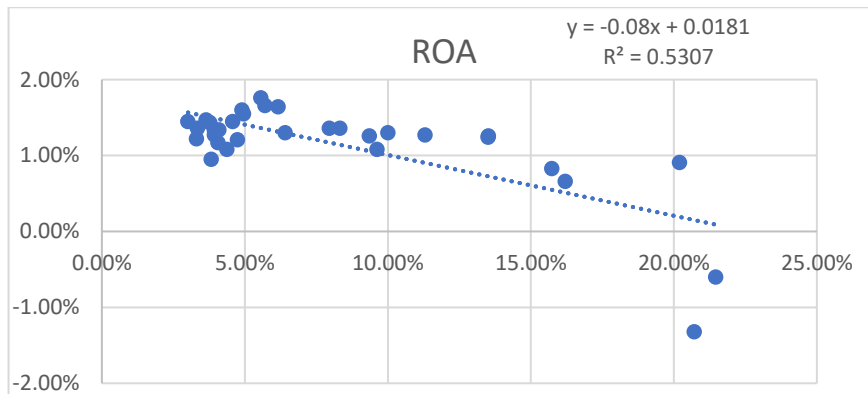


Figure 2: Scatter Diagram ROA

The scatter diagram for ROE shows a similar result, whereas NPL has a more significance on ROE, compared to ROA.

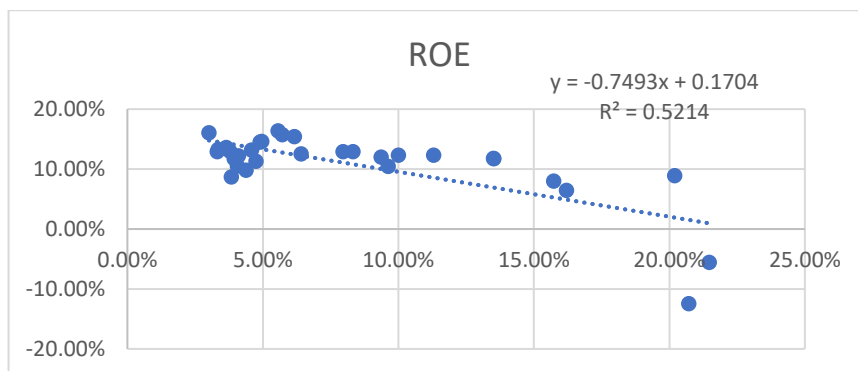


Figure 3: Scatter Diagram ROE

The negative correlation is also proven for the relationship between NPL and Solvency Ratio through the following figure:

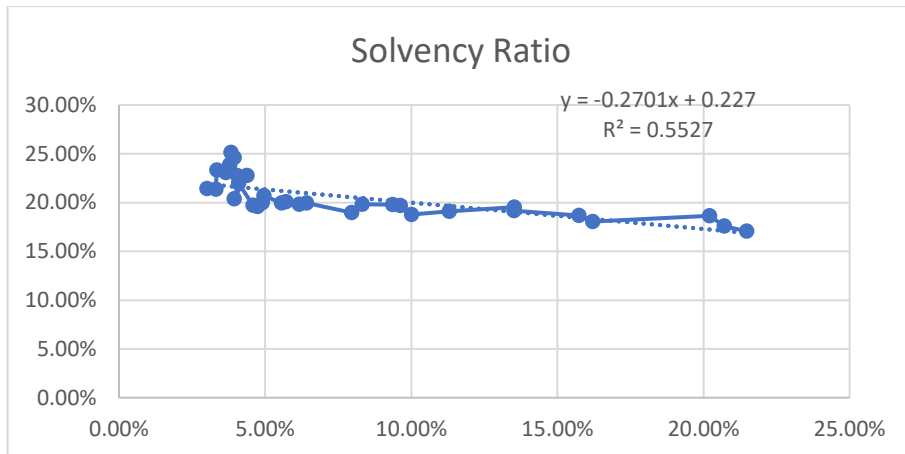


Figure 4: Scatter Diagram Solvency Ratio

We will further conduct the regression analysis on these indicators to determine how the change in the movement of non-performing loans affects the movement of ROA, ROE and SR. Data processing conducts to the following results considering the dependent variable ROA (Return on assets), ROE (Return on equity) and SR (Solvency Ratio).

Characteristics of the ROA - Return on assets regression model

<i>Regression Statistics</i>	
Multiple R	0.728502486
R Square	0.530715872
Adjusted R Square	0.515073068
Standard Error	0.004245689
Observations	32

Based on the econometrical model we can estimate the quality on the model using the value of R-squared. That being said, we can appreciate that 53.07% of ROA could be explained by the variation of NPL.

Characteristics of the ROE - Return on equity regression model

<i>Regression Statistics</i>	
Multiple R	0.722058368

R Square	0.521368286
Adjusted R Square	0.505413896
Standard Error	0.040520479
Observations	32

A similar result is obtained for ROE where 52.14% of ROE can be explained by the variation of the NPL. The value of the R-squared shows that the dependent variables are influenced by other factors that weren't considered in the analysis. The residual part of the variation shows that 46,03% of ROA is explained by other factors and 47,86% of ROE is explained by other factors and NPL is not the only determinant variable.

Characteristics of the SR – Solvency Ratio regression model

<i>Regression Statistics</i>	
Multiple R	0.743447
R Square	0.552713
Adjusted R Square	0.537803
Standard Error	0.013713
Observations	32

The regression analysis on these indicators determines how the change in the movement of NPL affects the movement of Solvency Ratio. Based on the econometrical model, we can appreciate that 55.27% of Solvency Ratio could be explained by the variation of NPL. The value of the R-squared shows that the dependent variable is influenced by other factors that weren't considered in the analysis. The results are similar to the previous regression model. Following the same idea, the residual part of the variation shows that 44,13% of movement in the Solvency Ratio can be explained by other factors and NPL is not the only determinant variable.

ROA regression model is represented by the estimation equation:

$$y = - 0.08x + 0.0181$$

The regression equation calculation concludes that if the share of non-performing loans in total loans is increased by 1 percentage point, the indicator of return on assets will be reduced by 0.08 pp.

ROE regression model is represented by the estimation equation:

$$y = - 0.7493x + 0.1704$$

From the regression equation it can be concluded that if the non-performing loans ratio is increased by 1 percentage point, then the rate of return on equity will be reduced by 0.7493 pp.

The results of the analysis confirm that non-performing loans may significantly impact the profitable position of banks for the studied period (Q3 2014 – Q2 2022), however it leaves space to study other variables that may affect the profitability indicators.

Solvency Ratio regression model is represented by the estimation equation:

$$y = - 0.0018x + 0.235$$

The regression equation calculation concludes that if the share of non-performing loans in total loans is increased by 1 percentage point, the indicator of solvency will be reduced by 0.0018 pp. On the other hand, in the specialized literature, it is considered that credit institutions increase their solvency levels through disintermediation, i.e. by decreasing loan balances (thus decreasing the NPL).

The results of the analysis are similar to the previous ones, confirming that non-performing loans may significantly impact the solvency banks for the studied period (Q3 2014 – Q2 2022) and that other variables could affect the solvency ratio of the banks.

Non-performing loans and performance in the banking system in Romania

The pro-cyclical character of banks' operations is perceived not only through the movement of loans, but also through the profitability and efficiency of the banking system (Jolevski, Ljube (2017). Figure 2 shows the movement in the NPLs rate, ROA and ROE from starting with Q3 2014 to Q2 2022.

The deteriorated quality of loan portfolio in 2014 and the fall of ROE can be explained by the initiation of the process of writing-off the unrecoverable NPLs. The process of writing-off the uncollectable nonperforming loans was considered a necessary condition for the sustainability of credit portfolios.

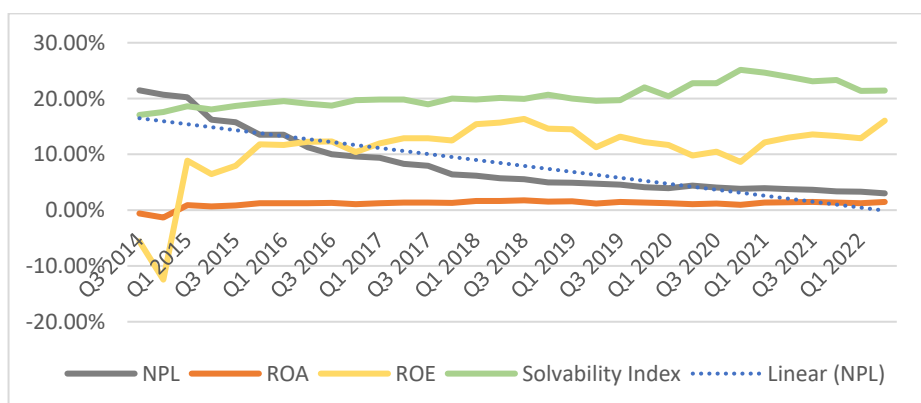


Figure 5. Quarterly Evolution of the Basic performance indicators and NPL ratio between 2014 –2022 (Source: National Bank of Romania)

Thus, starting with 2014 the NPL rate registered a continuous decrease in the balance sheet of the banks operating in Romania. This is a result of the recommendation made by the National Bank of Romania – to register adjustments for depreciation.

The results of this initiative cause a decrease in the NPL rate from 21.47% in September 2014 to 3.01% in June 2022. ROE started with a minimum of -12.45% in December 2014 and registered 16.02% in June 2022. On the other hand, ROA registered more constant values with a minimum of -1.32% in December 2014 to a maximum of 1.76% in September 2018. Out of the three indicators, the Solvency Ratio had the most constant evolution, starting from the base point of 17.06% in December 2014 to 21.43% in June 2022.

On a historical basis, when the global financial crisis effects were felt by the Romanian economy, non-performing loans started to increase. However, for the period 2019-2021, non-performing loans did not record significant increases amid the COVID-19 crisis. These results show sound governance which requires constant supervision and measures to control non-performing loans. We should consider that the effects of crises are known with a delay. According to GEO 37/2020 as amended by GEO 227/2020, Suspension of payment consists of suspending, at the client's request, the obligation to pay the instalments (representing capital instalments, interest and credit fees) for up to 9 months. Variations may occur after the end of the suspension period if the customer is still in difficulty.

The risk picture for Romania's banking sector shows solid capitalization, while asset quality and solvability has improved, with banks reporting a lower rate of non-performing loans.

According to Romanian banks, the risk of default on loans contracted by the non-governmental sector represents a high/difficult to manage systemic risk. Credit risk remains important for the banking sector, although developments in have led to a decline in non-performing loan (NPL) ratios. As the average interest rates on new and existing term loans have accelerated considerably in recent months so it is of interest to monitor the evolution of NPLs in the future.

5. Conclusions

The results of the analysis are in accordance with the literature review, showing that NPL has a negative influence on ROA, ROE and Solvability Ratio. An increase in NPL causes reduction of 0.08 pp in ROA, 0.7493 pp in ROE and 0.0018 pp in solvability ratio. Thus, the highest impact of NPL growth is reflected towards ROE and ROA. This conclusion can be explained by the fact that banks are recognizing provisions to cover the NPL, affecting the result and equity structure. Also, the increase in NPL affects the quality of asset portfolio.

We have highlighted the importance of lending in economy and the role of banks as intermediaries. As companies and households are facing difficulties to grant their loans, banks are also faced with the risk of uncollectable loans and interests. To cover this credit risk, banks must analyze borrower's creditworthiness and tighten credit standards in case of high NPL growth. This practice could further slowdown the growth in loan portfolio but could stabilize the solvency of the bank institutions. Other specialists also say that credit

institutions increase their solvency levels through disintermediation which means a decreasing in loan balances.

In this way, our study proved that credit risk - manifested through growth of NPL, is one of the most important factors affecting the soundness of the bank institutions in Romania banking system. We found that Romania banking system successfully controlled the variation of NPL by constantly decreasing this indicator for the period Q3 2014 – Q2 2022. This positive result (decreasing of NPL) is obtained thanks to a sound regulation and supervision implemented by National Bank of Romania. The implication of NBR shows significant results on the Solvability Ratio as Romanian commercial banks have undertaken not to lower this indicator below 10%. This has been successfully achieved with the lowest solvency ratio of 17.06% being registered in 2014.

This study can be the basis for further research on another NPL implications. Such research can include the influence of macroeconomic factors on non-performing loans ratio in the banking system of Romania. A similar study has been conducted before; however it would be relevant to further analyze the impact of external factors on NPL in an inflationary economy shadowed by the military conflict as can be seen in 2022.

The limitations of this study were represented by data collection as NBR publishes the information for the key performance indicators only, such as ROA, ROE, NPL, or Solvency Ratio. Thus, we were limited to analyzing a tighter spectrum of indicators. However, these limitations make room for another study that could focus on NPL's influence on other profitability indicators for the top-ranked banks in Romania. The performance indicators are presented in the Financial Reports published by the banks.

References

1. Achda Vellanita, I Gede Arimbawa, Elok Damayanti (2019) “*Relationship between non-performing loans (NPL), capital adequacy ratio (CAR), loan to deposit ratio (LDR) towards return on equity (ROE) at pt. bank central asia 2014 – 2018*” in Journal of World Conference Vol.1 No.2 (2019), pp.211-216
2. Gup, B. and Kolari, G. (2005) „*Commercial banking - Risk management*“, Skopje, Ars Lamina
3. Jolevski, Ljube (2017): *Non-performing loans and profitability indicators: The case of the Republic of Macedonia*, Journal of Contemporary Economic and Business Issues, ISSN 1857-9108, Ss. Cyril and Methodius University in Skopje, Faculty of Economics, Skopje, Vol. 4, Iss. 2, pp. 5-20
4. Hada, Teodor, Nicoleta Bărbuță-Mișu, Iulia Cristina Iuga, and Dorin Wainberg, 2020, "Macroeconomic Determinants of Nonperforming Loans of Romanian Banks", Sustainability 12, no.18: 7533. <https://doi.org/10.3390/su12187533>
5. Hantono. (2017). *Effect of capital adequacy ratio (CAR), loan to deposit ratio (LDR) and non-performing loan (NPL) to return on assets (ROA) listed in banking in Indonesia stock exchange*, 5(1), 69–80.

6. Isaiah Oino (2021). *Bank solvency: The role of credit and liquidity risks, regulatory capital and economic stability*. *Banks and Bank Systems*, 16(4), 84-100. doi: 10.21511/bbs.16(4).2021.08
7. Jakubík P. and Reininger T. 2014. *What are the Key Determinants of Nonperforming Loans in CESEE?*
8. Jeong, S. and Jung, H. (2013) “*Bank Wholesale Funding and Credit Procyclicality: Evidence from Korea*”, *Panoeconomicus*, pp. 615-631 available at: https://www.researchgate.net/publication/254444639_Bank_Wholesale_Funding_and_Credit_Procyclicality_Evidence_from_Korea (accessed 13 November 2022)
9. Kusmayadi, D. (2018). *Analysis of Effect of Capital Adequacy Ratio, Loan to Deposit Ratio, NonPerforming Loan, BOPO, and Size On Return On Assets In Rural Bank at Indonesia*, *Saudi Journal of Business and Management Studies*, 3(7), 786-795
10. Koten, A.B., (2021). *Determination of the relationship between non-performing loans and profitability in the Turkish banking system with panel regression analysis*, *PressAcademia Procedia (PAP)*, 14, 14-19.
11. Sebayang P (2020), *The Impact of the Capital Adequacy Ratio, Non-Performing Loan Against to Return on Equity (Case Study PrivateBank in Indonesia)*. SHS Web of Conf 76:01035. (PDF) *The impact of green lending on credit risk: evidence from UAE's banks*. Available from: https://www.researchgate.net/publication/358075063_The_impact_of_green_lending_on_credit_risk_evidence_from_UAE's_banks [accessed Nov 20 2022].