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DETERMINANTS OF BANKS' NET INTEREST INCOME - THE EXAMPLE OF SERBIA

Abstract

Net interest income represents one of the main indicators of banks' profitability. In practice, return on assets (ROA) and return on capital (ROE) indicators are most often used as indicators, but the topic of this study is the investigation of determinants, that have the greatest impact on the net interest income of banks in the Serbian market. The research is based on numerous previous analyzes of factors that have effects on the profitability of banks in many countries. This study covers the period from 2014 to 2021 and includes a total of 22 banks currently operating in the Serbian market. The data used for the purposes of the research were taken from the financial reports of the banks themselves, as well as the World Bank database. In the research, the authors take Net Interest Margin (NIM) as a dependent variable, while as independent variables they take indicators of Net Non-Interest Margin (NNIM), Liquidity (LIQ), Debts (LOAN), Bank Size (SIZE), Non-performing loans (NPL) and Unemployment (UNEM). In the analysis, the authors analyzed the correlation matrix, the Levin, Lin & Chu unit root test, the variance inflation index, as well as the derivation of regression models based on fixed and random effects. The findings showed a negative effect of liquidity and bank size factors on direction of net interest margin, while debt and unemployment indicators showed a positive influence.

Keywords: Banks, Net interest margin, Profitability, the Serbian Banking industry

JEL classification: G20, G21, G33

ДЕТЕРМИНАНТЕ НЕТО КАМАТНОГ ПРИХОДА БАНАКА – ПРИМЕР СРБИЈЕ

Абстракт

Нето приход од камата представља један од главних показатеља профитабилности банака. У пракси се као индикатори најчешће користе индикатори приноса на активу (ROA) и приноса на капитал (ROE), али је тема ове студије истраживање детерминанти, које имају највећи утицај на нето приход од камата банака у 2012. години. српско тржиште. Истраживање се заснива на бројним досадашњим анализама фактора који утичу на профитабилност банака у многим земљама. Ова студија обухвата период

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од 2014. до 2021. године и обухвата укупно 22 банке које тренутно послују на српском тржишту. Подаци коришћени за потребе истраживања преузети су из финансијских извештаја самих банака, као и базе података Светске банке. У истраживању аутори узимају нето каматну маржу (NIM) као зависну варијаблу, док као независне варијабле узимају индикаторе нето некаматне марже (NNIM), ликвидности (LIK), дугова (LOAN), величине банке (SIZE), Ненаплативи кредити (NPL) и Незапосленост (UHEM). У анализи су аутори анализирали матрицу корелације, Левин, Лин & Цху јединични корен тест, индекс инфлације варијансе, као и извођење регресионих модела заснованих на фиксним и случајним ефектима. Налази су показали негативан утицај фактора ликвидности и величине банке на смер нето каматне марже, док су показатељи дуга и незапослености показали позитиван утицај.

Кључне речи: Банке, Нето каматна маржа, Профитабилност, Банкарска индустрија Србије

Introduction

Banks serve as financial intermediaries, transferring money from individuals or businesses with excess capital to those who need the money to perform a specific economic activity. One of the main duties of central banks is to implement monetary policy to bring about price stability and aid in managing economic swings. Monetary policy is the term used to describe the central bank's macroeconomic strategy. Profit is the cheapest type of capital and, on a micro level, is essential for a competitive banking firm. Besides being the result of greater competition in financial markets, it is necessary for efficient banking. The idea of managing and allocating funds in modern times is still evolving as the role of the banking system as a financial intermediary becomes more and more important (Saksonova, 2014). People, companies, and the state are economic actors that appear on both the surplus and deficit sides of the narrative. As the bank pays the deposit, collects the active interest on the placements it issues, and pays the deposit interest. The differential between the active and passive interest rates is where the bank derives the majority of its earnings. (Salem, Baidoun & Walsh, 2019). The development and establishment of financial mechanisms in the domains of production, distribution, exchange, and consumption in all social relationships are made possible by the banking system, which is a distinctive element of a wider economic system. (Andjelic & Vesic, 2017). Finding the elements that influence bank performance is a crucial sign of an unstable economy and can assist shareholders and bank management in presenting expert strategies and moving closer to long-term objectives. Positive shocks are more likely to be withstood by a strong banking sector, ensuring the stability of the financial system. It's vital to recognize the crucial factors that influence bank performance and profitability, among other things, in order to improve internal bank management and implement banking regulations. (Chen & Liao, 2009). The study includes four chapters, in the first part of the study, the authors present a literature review of many pieces of research related to the factors that effect the profitability of the banking sector of many countries. The next chapter includes the methodology in which the authors derive the basic hypotheses as well as the model of

the study itself. The formulas used by the authors in the diagnostic tests performed in the analysis are also presented. The next chapter includes tabular representations of the author's findings as well as the final predictive model as a result of the research. The study aims to better understand the main determinants and their impact on the net interest margin as a representative of banks' profitability.

Literature review

There are much older but also new studies related to the research of the determinants of banks' net interest margins. Some studies cover a larger number of countries, as well as studies that only investigate the banking market of one country. On the other hand, in a large number of studies, the influence of various factors on the net interest margin is investigated through the influence of those same factors on other indicators of the bank's profitability. This study focuses only on the net interest margin as a representative of the success of banks' operations. In one of the older studies, using panel data from the banking industries of 14 OECD countries, Hawtrey and Liang (2008) investigated the factors affecting banks' interest margins and found that market power, operating costs, risk aversion, interest rate volatility, credit risk, the volume of loans, implied interest payments and quality of management have an impact on the interest margins of the national banking industry. In addition, Bitar, Pukthuanthong, and Walker (2017) investigated whether imposing higher capital rates is effective in reducing risk and increasing the efficiency and profitability of banking institutions using a sample of 1,992 banks from 39 OECD countries between 1999 and 2013. It was shown that risk-based capital ratios reduced bank risk while risk-free capital ratios increased bank productivity and profitability. On the other hand, Fungatsova and Poghosian (2011) conducted empirical research using panel data on interest margin factors in Russian banking, with a focus on the ownership structure of banks. While operating expenses and risk aversion have similar effects across bank ownership forms, they discovered that other characteristics, such as market structure, credit risk, liquidity risk, and size of operations, had varied effects on a variety of commonly used metrics.

One of the studies examined factors affecting banks' net interest margins in Bangladesh, India, Nepal, and Pakistan from 1997 to 2012 using panel data from 230 banks. It was found that relative bank size, market dominance, and economic growth had opposite effects on net interest margins, while liquidity and capital position, required reserves, and operating expenses on total assets had a positive effect (Islam and Nishiyama, 2016). One study looked at factors affecting non-traditional banking activities and banking net interest margin between 1997 and 2004 in a group of 28 financially liberalized countries. For the years 1997 to 2002, a negative correlation between net interest margin and non-traditional banking was shown, which was statistically significant. For the following period from 2003 to 2004, an overall favorable but statistically insignificant correlation between net interest margin and non-traditional banking was revealed (Nguyen, 2012). A study by Tarus, Chekol & Mutol (2012) used panel data from 44 Kenyan banks covering the years 2000 to 2009. The results demonstrated that credit risk and operating expenses significantly and favorably impacted Kenyan commercial banks' net interest margins. The study also discovered that market concentration and expansion were detrimental to the net interest margin while inflation and growth were beneficial.

Examining the key factors affecting bank profitability in five selected Central and Eastern European countries, Capraru and Ikhnatov (2014) observed that banks with higher capital adequacy are more profitable and that bank size has a negative correlation with net interest margin, indicating that the bigger the bank, the lower the level of net interest margin. Another research by Horobet, Radulescu, Belescu & Dita (2021), focused on the determinants of bank profitability in selected countries of Central and Eastern Europe. Eleven countries in Central and Eastern Europe were included in the study, which spanned a nine-year period. Profitability indicators such as return on assets, return on equity, and net interest margin were used as proxies, and it was discovered that the unemployment rate, inflation, budget balance, non-state loans, non-performing loan rates, concentration rate, and capitalization rate all have a negative impact on bank profitability in a few Central and Eastern European countries. One of the more recent studies sought to identify the variables affecting the profitability of the banking sector in 13 post-Soviet countries. Panel regression with fixed effects and the GMM technique was used to examine annual data for the period of ten years. According to the definition, the ratio of non-interest income/interest income has a favorable impact on the profitability of banks in post-Soviet countries. It was decided that not relying exclusively or mainly on interest income was the best course of action for post-Soviet banks. It suggested that banks prioritize innovative revenue streams such as commissions and credit card fees (Yuksel, Mukhtarov, Mammadov & Ozsari, 2018). In their study, Topak & Talu (2017) looked into the macroeconomic issues affecting Turkish commercial banks between 2005 and 2015. It was discovered that net interest margin, as measured by total operating expenses, relative size, and the ratio of interest on loans to interest on deposits, had a favorable impact on bank profitability. In addition, Acaravci & Calim (2013), conducted a study of the impact of macroeconomic and bank-specific factors on the profitability of banks in Turkey, where the Net interest margin was taken as one of the representatives of profitability. Javaid (2016) conducted a study on the profitability of the Pakistani banking industry. In the period from 2006 to 2013, he examined the impact of both internal and external factors on bank profitability. The results showed a significant positive relationship between bank size and non-interest income and bank profitability. In one of the articles, the productivity and profitability of Indian public and private sector banks are examined concerning banking and corporate governance-related variables. The findings showed that the productivity and profitability of public sector banks are mainly explained by bank-specific factors, including diversification, net interest spread, and size (Narwal & Pathneja, 2016).

Leikun (2016) examined the variables affecting the net interest margins of the Commercial Bank of Ethiopia from 2005 to 2014 when the bank's net interest margin increased. According to this study, the key factors affecting the net interest margins of Ethiopian banks were capital adequacy, credit risk, operating costs, degree of competition and deposit growth rate. The effects of the COVID-19 pandemic on the profitability of the Ugandan banking sector were the subject of a study by Katusiime (2021). As measures of bank profitability, return on assets, return on equity, and net interest margin were utilized. It was discovered that the ratio of non-performing loans, the liquidity ratio, and the risk of market sensitivity had a negative influence on the bank's profitability in the near run, although the interest rate and the borrowing rate in government bills had a noticeably beneficial impact. The investigation came to the conclusion that the COVID-19 pandemic

only significantly harmed bank profitability over the long term. In order to measure and evaluate the factors affecting return on assets, Puspitasari, Sudiatno, Hartoto & Vidati (2021) employed net interest margin as a moderating variable. Their study focused on 27 financial institutions that were listed on the Indonesia Stock Exchange from 2015 to 2018. The moderating variable, net interest margin, was found to have not affected how capital adequacy affects return on assets. The impact of the loan-to-deposit ratio on the return on assets ratio, however, could be mitigated by the net interest margin. It was clear from the findings of the study that banks with high net interest margins have a loan-to-deposit ratio that increases along with the return on assets ratio. One study examined the impacts on commercial banks' net interest margin in Vietnam between 2008 and 2018. According to the findings, operating expenses and credit risk had a positive impact on NIM, while risk aversion, management caliber, trading income, and deposit percentage had a negative impact. (Suu, Luu, Pho & McAleer, 2020). Angori, Aristei, and Gallo (2019) examined the factors that affected net interest margin in the Eurozone between 2008 and 2014. Together with the main factors that affect net interest margin at the bank level, such as market power, capitalization, interest rate risk, and level of efficiency, the authors also took into account the regulatory and institutional context. The results showed that banking margins for conventional activities have decreased, mostly as a result of the rise in non-traditional activities and the various levels of efficiency that distinguish banking systems across the Eurozone. The regulatory environment was also shown to have a significant impact on net interest margins, which remained lower in countries with higher capital requirements and greater supervisory authority.

There are also many studies related to a better understanding of the impact of numerous factors on the banking market of Serbia, based on which the authors base this study. Studies like (Bukvic, 2020; Pekovic, Pavlovic & Zdravkovic, 2020; Spahic & Tomic, 2015; Vesic, Gavrilovic & Petronijevic, 2019; Radojicic, Jemovic & Dragijevic, 2021; Vesic, Ravic & Djekic, 2019; Malenkovic, 2022, Marcikic, Horvat, Milenkovic, Radovanov, Zelenovic & Milic, 2022). There is also a study by Fidanovski, Choudhry, Davidovic & Sergi (2017), who investigated the factors influencing bank profitability of Croatian banks.

Research Tasks and Hypothesis

The methodology chapter presents an overview of the dependent and independent variables used in the analysis, as well as a tabular overview of the used variables. The paper includes a time series from 2014 to 2021, where the authors analyze panel data of 22 commercial banks operating in the Republic of Serbia. The statistical software Eviews was used in the data analysis. Also presented are the main formulas and models used in the research along with the hypotheses that the authors derived. In the following chapter of the paper, the authors present the descriptive statistics of the used variables as well as the correlation matrix. In addition to the correlation matrix, the multicollinearity test was also used in the paper with the help of the variance index factor to satisfy the conditions for performing a valid regression model. In the same section, the common unit root test is presented, which was performed with the help of the Levin-Chu model to establish the stationarity of the data used. At the end of the chapter, the regression model was analyzed with the help of fixed and random effects, as well as the Hausman

test to establish the adequacy of the applied models. The table below shows the used variables as well as their expected impact. In the paper, the authors used the indicator of Net Interest Margin (NIM) as a dependent variable, while the indicators of Net Non-Interest Margin (NNIM), Liquidity (LIQ), Debt (LOAN), Non-performing loans (NPL), Size (SIZE) and unemployment (UNEM) used in the analysis as independent variables.

Table 1: Variables

Symbol	Variable	Proxy	Expected
NIM	Net interest margin	Net interest profit / Assets	
NNIM	Non-interest margin	Net non-interest profit / Assets	+
LIQ	Liquidity	Loans/Deposits	-
LOAN	Loans	Loans/Assets	+
SIZE	Size	Logarithm of assets	+/-
NPL	Non-performing loans	Change of non-performing loans in the banking sector	+/-
UNEM	Unemployment	Yearly unemployment rate	+

Source: World Bank (2022), National bank of Serbia (2022)

Based on the used dependent and independent variables, the authors derive the following regression model:

$$y = \alpha + \beta_1 NNIM_{it} + \beta_2 LIQ_{it} + \beta_3 LOAN_{it} + \beta_4 SIZE_{it} + \beta_5 \Delta NPL_{it} + \beta_6 UNEM_{it} + \varepsilon$$

Where:

- Y stands for the dependent variable NIM
- $NNIM_{it}$ stands for Non interest income i at time t
- LIQ_{it} stands for liquidity of bank i at time t
- $LOAN_{it}$ stands for Loan/assets indicator of bank i at time t
- $SIZE_{it}$ stands for size log changes of bank i at time t
- ΔNPL_{it} stands for Non-performing loans at time t
- $UNEM_{it}$ stands for Unemployment rate at time t

Based on the model, the following assumptions were made:

H0: The independent variables do not affect the net interest margin

H1: The independent variables have an impact on the net interest margin

Panel data are often used for econometric research because they enable the integration of spatial and temporal dimensions. Specifically, panel data consist of numerous independent instances of the same observation unit. One of the requirements on which the econometric analysis of time series is based is stationary data, which is the most important requirement for the econometric approach (Musdak, 2011). It talks about the mean and variance of a time series as constant values. The Levin, Lin & Chu common unit root test is used in this analysis to determine whether the data are stationary. The following assumptions are part of this test:

H0 : The data are not stationary (have a unit root)

H1: The data are stationary

When the data in the analysis has a p-value greater than 0.05, non-stationarity of the data is present. The unit root test is performed to remove non-stationary data because using non-stationary data can result in an unwanted regression model (spurious regression).

In addition, the multicollinearity test, which shows whether there is a high degree of correlation between independent variables, is one of the key tests for determining the validity of the data. In accordance with Lin, Foster, & Ungar (2011), the VIF test was used for the analysis, and the results were calculated as follows:

$$VIF = 1/(1 - R_j^2)$$

Where:

- VIF – Variance inflation factor
- R_j^2 – R square of the regression model

The test includes the following hypotheses:

H0 : Multicollinearity exists

H1: Multicollinearity is not present

Data must be eliminated from the regression model if the variance inflation factor is greater than a threshold value of 10, indicating the presence of multicollinearity.

One of the most important tests in panel analysis is the Hausman test, which allows one to choose between fixed-effects models and labor-effects models that are more appropriate. The Hausman test can be expressed as a formula as shown below (Hahn, Ham, & Moon, 2011):

$$H = (\beta^{FE} - \beta^{RE})' [Var(\beta^{FE}) - Var(\beta^{RE})]^{-1} (\beta^{FE} - \beta^{RE})$$

Where:

- β^{FE} – Fixed effects model estimates
- β^{RE} – Random effects model estimates

The Hausman test includes the following assumptions:

H0: The random model is adequate

H1: The Fixed Effects model is adequate

If the p-value of the Hausman test is greater than the threshold of 0.05, the null hypothesis is accepted; otherwise, a fixed effects model is preferred.

Research results and Discussion

Six independent variables in the study were computed using the financial statements of 22 Serbian banks that operate banks. The study period covers eight years and includes 172 observations. The table below shows a description of the indicators used. Indicators with the highest level of standard deviation are indicators of liquidity and bank size, which means that these two indicators have the largest difference between the minimum and maximum amount of data.

Table 2: Descriptive statistics

Variable	Mean	Median	Maximum	Minimum	Std. Dev	Obs
NIM	0,0357	0,0326	0,1267	0,0002	0,0206	172
NNIM	0,0110	0,0095	0,1694	0,0000	0,0131	172
LIQ	2,4139	2,0600	11,2000	1,1100	1,3743	172
LOAN	0,6323	0,6621	0,9201	0,0118	0,1523	172
SIZE	17,8712	18,2353	20,3162	14,4381	1,3424	172
NPL	10,6621	5,6964	21,5841	3,5741	7,4138	172
UNEM	0,1337	0,1273	0,1922	0,0901	0,0343	172

Source: author's calculation

By deriving the correlation matrix below, the relationship of the variables used is noticeable. As the first test for the presence of multicollinearity, the correlation matrix is used to identify the presence of a large correlation between certain variables used in the analysis. The condition for the presence of excessive correlation, which can result in multicollinearity of the data, is the presence of a correlation that is greater than 0.50. In the analysis, it is noticeable that the highest level of positive correlation exists precisely between the Net Interest Margin (NIM) and the debt indicator (LOAN), which is 0.3308, while it can be concluded that there is no excessive correlation between the variables used. Further analysis of the correlation matrix shows a positive correlation of the dependent variable Net interest margin (NIM) with the independent variables of liquidity (LIQ), debt (LOAN), non-performing loans (NPL), and unemployment rate (UNEM), while with the variables of net non-interest margin (NNIM) and size (SIZE) have a negative correlation.

Table 3: Correlation matrix

Variable	1	2	3	4	5	6	7
NIM	1	-0,1845	0,1614	0,3308	-0,0124	0,0385	0,2774
NNIM	-0,1845	1	-0,1432	-0,2833	-0,1071	-0,0565	0,0566
LIQ	0,1614	-0,1432	1	-0,1947	-0,3023	0,0982	0,0725
LOAN	0,3308	-0,2833	-0,1947	1	0,2188	-0,0864	-0,0905
SIZE	-0,0124	-0,1071	-0,3024	0,2188	1	0,0154	-0,1021
NPL	0,0385	-0,0565	0,0982	-0,0864	0,01541	1	0,282
UNEM	0,2774	0,0566	0,0725	-0,0905	-0,1021	0,282	1

Source: author's calculation

After calculating the correlation matrix, the authors used the variance index factor to run a multicollinearity test to check for the presence of multicollinearity between the independent variables. One of the key reasons why panel regression models are inaccurate is the presence of multicollinearity. Since the cut-off value for multicollinearity is 10, the authors can reject the null hypothesis that multicollinearity exists based on the analysis finding that the average VIF (Variance Index Factor) is 1.1535. As a result, we conclude that

there is no multicollinearity between the independent variables. Descriptive variables are not multicollinear, so the authors in the next section of the study perform the remaining necessary tests before running the regression model.

Table 4: Multicollinearity test

Variable	Coeff. variance	Centered VIF
NNIM	0,0130	1,1607
LIQ	0,0000	1,1945
LOAN	0,0000	1,1890
SIZE	0,0000	1,1105
Δ NPL	0,0000	1,1600
UNEM	0,0018	1,1060
Average VIF		1,1535

Source: author's calculation

The existence of stationarity is another prerequisite for a true regression model. The authors conducted the study using the Common unit root test with the Levin, Lin & Chu panel unit root test to determine whether the stationarity of the given variables was present. We discussed the absence of a unit root as a null hypothesis in the Methodology section. Based on the analysis, the authors determined that no variable contains a unit root, that is, that there is stationarity of the data at the level. The stationarity of the data used allowed the authors to reject the null hypothesis of the non-stationarity of the data.

Table 5: Levin, Lin & Chu panel unit root test

Variable	t statistic individual intercept	Prob.	Critical values	t statistic individual intercept and trend	Prob.	Critical values
NIM	-2,2114	0,0135	Level	-8,9916	0,0000	Level
NNIM	-4,7651	0,0000	Level	-2,0683	0,0193	Level
LIQ	-8,2840	0,0000	Level	-97,3645	0,0000	Level
LOAN	-15,0105	0,0000	Level	-10,1478	0,0000	Level
SIZE	-84,2106	0,0000	Level	-1,4969	0,0492	Level
Δ NPL	-6,1804	0,0000	Level	-54,1096	0,0000	Level
UNEM	-11,0397	0,0000	Level	-25,1242	0,0395	Level

Source: author's calculation

After the diagnostic tests have been performed, the basis for performing a valid regression model is created. In the analysis, the authors use panel regression with the help of fixed and random effects in order to establish a valid regression model. The table below

shows the results of the analysis showing the impact of certain variables on the net interest margin (NIM). There is a noticeable statistically significant influence of indicators of liquidity (LIQ), debt (LOAN), and unemployment rate (UNEM), while there is also an approximately statistically significant influence of bank size (SIZE). The variables net non-interest margin (NNIM) and non-performing loans (NPL) did not show a statistically significant effect. Also, indicators of liquidity (LIQ) and size of banks (SIZE) showed a negative effect on the net interest margin, while indicators such as debt (LOAN) and unemployment (UNEM) showed a positive effect. Based on the results of the regression model, the authors can conclude that certain variables really have an impact on the net interest margin, so the null hypothesis that the independent variables have no impact can be rejected. The negative liquidity impact (LIQ) can be interpreted as every 1% change in the liquidity ratio causes a decrease in the net interest margin (NIM) ratio by 0.0020%. Similarly, a change in the size of the bank by 1% leads to a decrease in the value of the net interest margin by 0.0019%. A change in the debt and unemployment indicators by 1% leads to an increase in the net interest margin by 0.0169% and 0.1497%. The authors also performed a Hausmann test to establish a more adequate model. In the methodology section, a threshold value of 0.05 is defined, by which it can be concluded that the fixed effects model is more acceptable in this example. The fixed effects model showed an R² of 0.91, which further supports the fact that the fixed effects model is more adequate than the random effects model.

Table 6: Fixed and Random effect

Variable	NIM			
	RE Model	Prob.	FE model	Prob.
NNIM	0,0432	0,4430	0,0421	0,4642
LIQ	-0,0016	0,0169	-0,0020	0,0048
LOAN	0,0195	0,0060	0,0169	0,0210
SIZE	-0,0016	0,0938	-0,0019	0,0800
ΔNPL	-0,0039	0,2125	-0,0039	0,2166
UNEM	0,1521	0,0000	0,1497	0,0000
C	0,0347	0,0773	0,0417	0,0441
R ²	0,42		0,91	
Prob*	0,0000		0,0000	
Observations	172		172	
Hausman test	15,7594		0,0151	

Source: author's calculation

Conclusion

Determinants of bank profitability are one of the most important indicators of the success of bank operations. The net interest margin for the bank is an indicator of the success of the placement of banks in the form of an important element of each bank's assets, namely loans. This study included six determinants in the analysis of the effects

of certain factors on the bank's net interest margin. The study covered all banks operating in Serbia and a period of eight years. The results indicated a statistically significant effect of indicators of liquidity, debt, bank size, and unemployment rate on net interest margin, while indicators such as net non-interest margin and non-performing loans did not show a significant impact. While debt size and the unemployment rate were shown to have a positive impact, bank liquidity and size were shown to have a negative impact on net interest margin. Understanding the determinants of the net interest margin can be of key importance for creating an adequate strategy for the placement of the bank's assets. The limitations of the study are the period covered in the study as well as the use of only six predictable variables, which can be seen through the statistically significant effect of the random factor C. The authors recommend further study in the form of a comparative examination of the regional banking sectors and a comparison of Serbia's banking system with advanced banking systems.

References

- Acaravcı, S. K. & Çalım, A. E. (2013). Turkish Banking Sector's Profitability Factors . *International Journal of Economics and Financial Issues* , 3 (1) , 27-41 . Retrieved from <https://dergipark.org.tr/en/pub/ijefi/issue/31956/351875>
- Angori, G., Aristei, D., & Gallo, M. (2019). Determinants of banks' net interest margin: Evidence from the Euro area during the crisis and post-crisis period. *Sustainability*, 11(14), 3785. DOI: <https://doi.org/10.3390/su11143785>
- Andjelic S., Vesic T. (2017). The importance of financial analysis for business decision making. Finance, banking and insurance - Book of proceedings from The Sixth International Scientific Conference „Employment, Education and Entrepreneurship“. Belgrade: Faculty of Business Economy and Entrepreneurship: pp. 9-25.
- Bitar, M., Pukthuanthong, K., & Walker, T. (2018). The effect of capital ratios on the risk, efficiency and profitability of banks: Evidence from OECD countries. *Journal of international financial Markets, Institutions and Money*, 53, 227-262. DOI: <https://doi.org/10.1016/j.intfin.2017.12.002>
- Bukvic, R. (2020). Concentration and Competition in Serbian Banking Sector in the Period 2016–2018. *Ekonomika*, 66(2), 17-35. Available at SSRN: <https://ssrn.com/abstract=3710170>
- Chen, S. H., & Liao, C. C. (2011). Are foreign banks more profitable than domestic banks? Home-and host-country effects of banking market structure, governance, and supervision. *Journal of Banking & Finance*, 35(4), 819-839. DOI: <https://doi.org/10.1016/j.jbankfin.2010.11.006>
- Căpraru, B., & Ilnatov, I. (2014). Banks' profitability in selected Central and Eastern European countries. *Procedia Economics and Finance*, 16, 587-591. DOI: [https://doi.org/10.1016/S2212-5671\(14\)00844-2](https://doi.org/10.1016/S2212-5671(14)00844-2)
- Fungáčová, Z., & Poghosyan, T. (2011). Determinants of bank interest margins in Russia: Does bank ownership matter?. *Economic systems*, 35(4), 481-495. DOI: <https://doi.org/10.1016/j.ecosys.2010.11.007>
- Fidanoski, F., Choudhry, M., Davidović, M., & Sergi, B. S. (2018). What does affect profitability of banks in Croatia?. *Competitiveness Review: An International Business Journal*. DOI: <https://doi.org/10.1108/CR-09-2016-0058>

- Hawtrey, K., & Liang, H. (2008). Bank interest margins in OECD countries. *The North American Journal of Economics and Finance*, 19(3), 249-260. DOI: <https://doi.org/10.1016/j.najef.2008.07.003>
- Hahn, J., Ham, J. C., & Moon, H. R. (2011). The Hausman test and weak instruments. *Journal of Econometrics*, 160(2), 289-299, DOI: <https://doi.org/10.1016/j.jeconom.2010.09.009>
- Horobet, A., Radulescu, M., Belascu, L., & Dita, S. M. (2021). Determinants of bank profitability in CEE countries: Evidence from GMM panel data estimates. *Journal of Risk and Financial Management*, 14(7), 307. DOI: <https://doi.org/10.3390/jrfm14070307>
- Islam, M. S., & Nishiyama, S. I. (2016). The determinants of bank net interest margins: A panel evidence from South Asian countries. *Research in International Business and Finance*, 37, 501-514. DOI: <https://doi.org/10.1016/j.ribaf.2016.01.024>
- Javaid, M. E. (2016). Bank specific and macroeconomic determinants of bank profitability. *Journal of Management*, 10(1), 38-54. DOI: <http://dx.doi.org/10.31580/jmi.v10i1.46>
- Katusiime, L. (2021). COVID 19 and bank profitability in low income countries: the case of Uganda. *Journal of Risk and Financial Management*, 14(12), 588. DOI: <https://doi.org/10.3390/jrfm14120588>
- Leykun, F. (2016). Factors affecting the net interest margin of commercial bank of Ethiopia. *International Journal of Scientific and Research Publications*, 6(6), 150-161.
- Marcikić Horvat, A., Milenković, N., Radovanov, B., Zelenović, V., & Milić, D. (2022). DEA efficiency of Serbian banks - comparison of three approaches. *Anali Ekonomskog fakulteta u Subotici*, (00). <https://doi.org/10.5937/AnEkSub2200011M>
- Malenković, N. (2023). Effects of the NPL on the banks' profitability during the pandemic COVID-19: the case of the Republic of Serbia. *Anali Ekonomskog fakulteta u Subotici*, (00). <https://doi.org/10.5937/AnEkSub2300018M>
- Mushtaq, R. (2011). Augmented dickey fuller test. DOI: <https://dx.doi.org/10.2139/ssrn.1911068>
- Narwal, K. P., & Pathneja, S. (2016). Effect of bank-specific and governance-specific variables on the productivity and profitability of banks. *International Journal of Productivity and Performance Management*. DOI: <https://doi.org/10.1108/IJPPM-09-2015-0130>
- National bank of Serbia (2022), Retrieved from (Date of access 05.09.2022) <https://nbs.rs/sr/finansijske-institucije/banke/bilans-stanja/>
- Nguyen, J. (2012). The relationship between net interest margin and noninterest income using a system estimation approach. *Journal of Banking & Finance*, 36(9), 2429-2437. DOI: <https://doi.org/10.1016/j.jbankfin.2012.04.017>
- Peković, J., Pavlović, G., & Zdravković, S. (2020). The influence of intellectual capital on financial performance of commercial banks in the Republic of Serbia. *Ekonomika*, 66(2), 103-111. DOI: <https://doi.org/10.5937/ekonomika2002103P>
- Puspitasari, E., Sudiyatno, B., Hartoto, W. E., & Widati, L. W. (2021). Net interest margin and return on assets: A Case Study in Indonesia. *The Journal of Asian*

Finance, Economics and Business, 8(4), 727-734. DOI: <https://doi.org/10.13106/jafeb.2021.vol8.no4.0727>

- Radojičić, J., Jemović, M., & Dragijević, D. (2021). An Analysis of Concentration and Competition in the Banking Sector of the Republic of Serbia. *Economic Themes*, 59(4), 427-444. DOI: <https://doi.org/10.2478/ethemes-2021-0024>
- Saksonova, S. (2014). The role of net interest margin in improving banks' asset structure and assessing the stability and efficiency of their operations. *Procedia - Social and Behavioral Sciences*, 150, 132-141. <https://doi.org/10.1016/j.sbspro.2014.09.017>
- Salem, M. Z., Baidoun, S., & Walsh, G. (2019). Factors affecting Palestinian customers' use of online banking services. *International Journal of Bank Marketing*. DOI: <https://doi.org/10.1108/IJBM-08-2018-0210>
- Suu, N. D., Luu, T. Q., Pho, K. H., & McAleer, M. (2020). Net interest margin of commercial banks in Vietnam. *Advances in Decision Sciences*, 24(1), 1-27.
- Tarus, D. K., Chekol, Y. B., & Mutwol, M. (2012). Determinants of net interest margins of commercial banks in Kenya: A panel study. *Procedia economics and finance*, 2, 199-208. DOI: [https://doi.org/10.1016/S2212-5671\(12\)00080-9](https://doi.org/10.1016/S2212-5671(12)00080-9)
- Tomić, P. (2015). Profitability of the Serbian banking sector - before and during the crisis (Profitabilnost bankarskog sektora Srbije—pre i tokom krize). In *Synthesis 2015-International Scientific Conference of IT and Business-Related Research* (pp. 400-404). Singidunum University. DOI: <https://doi.org/10.15308/Synthesis-2015-400-404>
- Topak, M. S., & TALU, N. H. (2017). Bank specific and macroeconomic determinants of bank profitability: Evidence from Turkey. *International Journal of Economics and Financial Issues*, 7(2), 574-584. Retrieved from <https://dergipark.org.tr/en/pub/ijefi/issue/32035/354531>
- Vesić, T., Gavrilović, M., & Petronijević, J. (2019). The influence of liquidity and profitability on the banking sector performances: The example of Serbia. *International Review*, (1-2), 75-81. DOI: <https://doi.org/10.5937/intrev1901075V>
- Vesić, T., Ravić, N., & Đekić, M. (2019). Comparative analysis of the liquidity ratios of the largest banks of Serbia: Indicator of performance measurement. *Anali Ekonomskog fakulteta u Subotici*, (42), 3-15. DOI: <https://10.5937/AnEkSub1942003V>
- World bank (2022), Retrieved from (Date of access 07.09.2022) <https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?locations=RS>
- Yüksel, S., Mukhtarov, S., Mammadov, E., & Özsarı, M. (2018). Determinants of profitability in the banking sector: an analysis of post-soviet countries. *Economies*, 6(3), 41. DOI: <https://doi.org/10.3390/economies6030041>