

Almir Alihodžić¹
Elman Nadžaković²

JEL: G22, D24, E58
DOI: 10.5937/industrija50-43699
UDC: 005.31:330.142.22
336.71(497.6:497.13)"2016/2021"
Original Scientific Paper

Factors effecting the Capital Adequacy Ratio of banking system of Bosnia and Herzegovina and Croatia

Article history:
Received: 29 March 2023
Sent for revision: 15 April 2023
Received in revised form: 20 April 2023
Accepted: 27 April 2023
Available online: 12 May 2023

Abstract: *The importance of minimum capital adequacy ratios in preventing banks from going bankrupt and losing depositor money is underscored by their ability to absorb a reasonable amount of losses. This work contributes to the literature on bank capital and, in particular, delivers a thorough analysis of bank capital in Bosnia and Herzegovina and Croatia contexts. This analysis refers to the strand of literature on non-performing loans and bank capital that has been of continuous interest to researchers. It is a relevant area of research because it discusses the most important part of the banking business, especially in the context of increasing global competition and crises. In this scientific area, we inquire whether and how leverage rate, gross domestic product rate, and return on equity affect the capital adequacy ratio. In this respect, this study advances the literature of effects on bank capital that have not been analysed by other scholarly contributions, especially as it discusses the impact of leverage rate, gross domestic product rate, and return on equity in the context of the entire banking systems of Bosnia and Herzegovina and Croatia. The study is limited to a six-year period from 2016 to 2021. Empirical evidence based on the application of a model suggests that both countries resulted in different correlations between countries. Modelling was done to determine the relationship between the independent variables LR, GDP Growth, ROE, and effect on CAR. In addition, the capital adequacy ratio proves to be more and more important for banks.*

¹ Faculty of Economics - University of Zenica, Zenica, Bosnia and Herzegovina
almir.dr2@gmail.com

² Tekno export – import doo, Zenica, 72000, Bosnia and Herzegovina

Key words: adequacy of capital, leverage of banks, NPL, Gross domestic product

Faktori koji utiču na stopu adekvatnosti kapitala bankarskog sistema Bosne i Hercegovine i Hrvatske

Rezime: Važnost minimalne stope adekvatnosti kapitala u sprečavanju bankrota banaka i gubitka novca deponenata posebno je naglašena u njihovoj sposobnosti apsorpcije razumnog nivoa gubitaka. Ovaj rad pridonosi literaturi o kapitalu banaka, a posebno daje temeljnu analizu kapitala banaka u kontekstu Bosne i Hercegovine i Hrvatske. Urađena analiza se odnosi na deo literature o nenaplativim kreditima i kapitalu banaka koji se nalazi u stalnom interesu istraživača. Relevantno je područje istraživanja jer se bavi najvažnijim delom bankarskog poslovanja, posebno u kontekstu sve veće globalne konkurencije i kriza. U ovom naučnom području autori istražuju uticaj stope finansijske poluge, stope bruto domaćeg proizvoda i povrata na kapital na stopu adekvatnosti kapitala. U tom smislu, ova studija unapređuje literaturu o efektima uticaja na bankovni kapital koji nisu analizirani u drugim naučnim radovima, posebno jer analizira uticaj stope zaduženosti, stope bruto domaćeg proizvoda i povrata na kapital u kontekstu celokupnog bankarskog sistema Bosne i Hercegovine i Hrvatske. Studija je ograničena na šestogodišnji period od 2016. do 2021. godine. Na temelju primenjenog modela, empirijski dokazi sugerišu da obe zemlje rezultiraju različitim korelacijama među varijablama. Modeliranje je kreirano radi utvrđivanja odnosa između nezavisnih varijabli LR, stopa rasta GDP-a, ROE i njihovog uticaja na CAR. Pored toga, pokazatelj adekvatnosti kapitala postaje sve važniji za banke.

Ključne reči: adekvatnost kapitala, poluga banaka, NPL, bruto domaći proizvod

1. Introduction

Banks operate their businesses in accordance with the regulations because they are one of the key market participants. For bank governance and financial regulators, the capital adequacy requirement is one of the most crucial topics. Therefore, the capital adequacy ratio (CAR), as a suggested indicator of a bank's available capital, reveals banks' capacity to withstand losses. An

increased absorption of losses from non-performing loans is implied by a higher CAR. While reducing risk exposures, CAR is used to safeguard bank depositors.

The Basel Committee on Bank Supervision (BCBS), which establishes a standard for a stronger structure of bank capital to reduce the risk of non-payments, is the most significant regulator. The BCBS establishes a framework for banks to use CAR as the minimum requirement to calculate their capital. Bosnia and Herzegovina's minimal CAR was set by the corresponding bank agencies, while Croatia's minimal CAR was set by the Croatian National Bank. The main objective of this study is to pinpoint the influence of leverage, GDP, and return on equity on the capital sensitivity of Croatian and Bosnian banks.

The financing model in Bosnia and Herzegovina is dominated by banks, which own more than 80% of all corporate assets. Commercial banks are primarily owned by foreigners because most of their capital comes from abroad. By the end of 2021, 9,587 people were employed by Bosnia and Herzegovina's banking sector. In parallel, 18,201 people were employed by Croatia's banking sector. At the banking sector level, Bosnia and Herzegovina has a total net asset of \$17.6 billion and a total capital of \$1.89 billion. Additionally, Croatia's total capital is 8.201 trillion euros, while its total net assets total 64.107 billion dollars.

This paper is divided into sections. Following brief introductions, the authors analysed and expanded on the pertinent literature. The section devoted to the impact of non-performing loans on CAR discusses the connection between non-performing loans and CAR. The third section discusses the research's goal, research questions, methodology, and hypotheses. A separate section on data and variables goes over the data and variables that were collected and processed. The central section of this paper contains an analysis and discussion of the research findings and results. The final section contains a summary and research notes.

2. Literature review

The observations of the capital's adequacy serve to illustrate the sensitivity of the capital, which serves as the primary theme of this study. As the foundational element of adequate capital, the capital structure is made up of various funding sources. This influential area of economic theory drew many scientists, and the Modigliani-Miller theorem of 1958 served as the foundation for capital structure.

Following the proof of this theorem, a large number of studies were published that offered opinions on the ideal capital market structure. It is crucial to notice that while some scientists only studied the banking sector, the majority of scientists concentrated on the non-financial sector.

Using a sizable sample of the banks that were observed between 1985 and 2002, Quagliariello (2007) looked into the performance of banks and the riskiness of bank loans in Italy. The findings indicate that non-performing loans and loan loss provisions are typically low during periods of economic growth and rise during those of economic downturn.

Based on a panel analysis of a sample of 16 banks, Vaskov et al. (2012) presented the first empirical analysis of the macroeconomic factors that influence non-performing loans in the Macedonian banking system. According to the findings, the variables with the highest level of explanation are the inflation rate and the REER. In the equations that explain the movement of non-performing loans, both have positive signs. The GDP ratio and the interest rate ratio were challenging for them to explain.

Setiawan and Muchtar (2021) tested banks listed on the Indonesia Stock Exchange. They looked into factors affecting the capital adequacy ratio. Their finding indicated that loan ratios negatively affect CAR. On the contrary, bank size and ROE have a positive impact on CAR. They also concluded that loan loss reserves and liquidity ratios have no impact on the CAR. Their study concluded that CAR plays an important role in bank capital.

Loan and Khue (2021) investigated how the internal factors in the bank and the macroeconomic factors of the economy affect the CAR of banks in Vietnam. Based on GMM estimation in panel data analysis, they concluded that ROA, bank size, and liquidity ratio negatively impact CAR. Macroeconomic factors such as GDP and CPI are statistically significant. They suggested that banks should maintain CAR at an appropriate level to comply with the law. Everything, just to ensure depositor safety and shareholder interest.

Rençber and Bac (2019) looked into the Turkish banking sector. They had the aim of clarifying indicators that affect the CAR of Turkish banks. Research data had a multicollinearity problem, so to resolve this problem, they applied elastic net regression. Result of their research indicated that CAR was best explained by shareholders' equity, fixed assets, total assets, and shareholders' equity/total assets ratios. They also affirmed that the mean return on assets, continuing operations pre-tax profit, total assets, and non-performing loans (net) versus total loans and receivables ratios have strong effects on the CAR.

The research obtained showed that CAR was best explained by equity-related ratios.

To research the sensitivity of banking capital in the Federation of Bosnia and Herzegovina (just part of the Bosnian banking sector), Nadzakovic et al. (2021) explored factors that affect the sensitivity of capital. They researched the period from 2014–2020 quarterly. Based on linear regression, they confirmed a positive correlation between LR and CAR. They also confirmed a negative correlation between the GDP growth rate, ROAA, total income and average assets, and net interest income and average assets with CAR. They concluded that banks must monitor, forecast, and measure non-performing loans in order to reduce their NPL rate.

Ahmad et al. (2008), during the Asian Financial Crisis (period 1995–2002), investigated determinants of bank capital ratios in a small, middle-income developing economy during the crisis period and confirmed a positive correlation between bank capital and risk-taking. They concluded that bank capital and earnings are not strongly related, which is inconsistent with the literature of developed countries.

Based on data collected from Pakistan, Jordan, Indonesia, the Philippines, Saudi Arabia, and Thailand, Hunjra et al. (2020) analyzed the impact of capital regulation and market discipline on the banks' CAR. They concluded that maintaining capital effectively contributes to improving CAR. The increase in CAR levels and decrease in level of risk can help banks overcome regulatory costs, which helps to avoid bankruptcy and losses.

The existence of a reliable co-integrative relationship between macroeconomic variables and CAR was highlighted by Benazic and Masic (2016). Over time, the projected acceleration of Croatian banks' CAR is caused by the predicted rise in GDP growth. The CAR of Croatian banks rises as a result of both the real-effective currency index of the depreciation and an increase in the interest rate on the credit secured by the currency clause. The CAR of Croatian banks, on the other hand, is positively impacted by short-term improvements in the GDP growth rate and interest rates on credit lines with a currency clause. The CAR of the Croatian banks is negatively impacted by increases in the real effective currency value.

In order to identify factors influencing the Common Equity Tier 1 Ratio, Klepczarek (2015) looked into a particular selection of European Union banks. The capital adequacy ratio is adversely affected by the ratio of risk-weighted assets to total assets and the share of loans in total assets. Prudentiary

standards have been significantly impacted by competitive pressure, as has the anticipated inverse relationship between the CAR1 ratio and bank size. Despite having smaller capital buffers, bigger banks seem safer.

3. Non-performing loans effect on capital adequacy ratio

In the modern world, life is impossible without loans, to the point where a person's progress is determined by their credit score. Through credit ratings, societies and countries are evaluated. Thus, the term "credit" presents an untapped area for future study. A loan is a contractual agreement in which a borrower receives a sum of money or something of value in exchange for agreeing to repay the lender at a later date, usually with interest. (The Investopedia Team, 2023) The Croatian Institute for Financial Education (2023) defined credit as "money that the creditor (creditor) provides for the use of the credit user (debtor), with or without a purpose, and which the credit user is obliged to return with the agreed interest within a certain period and under certain conditions".

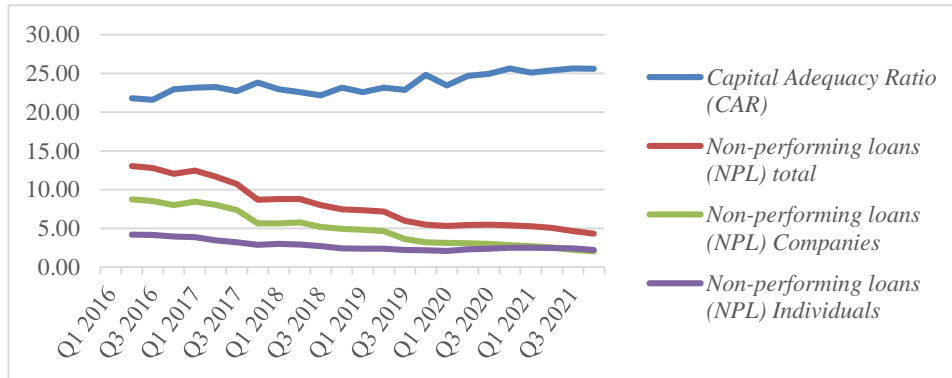
A loan is a type of credit instrument where a certain amount of money is lent to the borrower in exchange for repayment of the value or future principal amount. It is usual that the borrower should pay interest or other financial costs in addition to the principal amount. Loans can be given as a predetermined lump sum of money or as an infinite line of credit up to a predetermined limit. (Kagan, 2023)

A crucial component of banking is asset quality. However, in the absence of a standard international asset classification scheme, it is challenging for banking regulators and investors to evaluate asset quality. As the most significant asset, there is no universal standard for the classification of loans. As a result, there is no universal definition of non-performing loans (NPLs). (Bholat, Lastra, Markose, Miglionico, & Sen, 2016) According to the Basel Committee (2016), non-performing exposures include all situations in which the debtor is 90 days overdue or is unlikely to pay its debts.

The non-performing loans are one of the key hazards because they do not deliver interest or planned payments for a specified period. It can create the problem of economic stagnation. The reduction of non-performing loans is a crucial part of achieving economic growth. Figure 1 shows the trends in the NPL

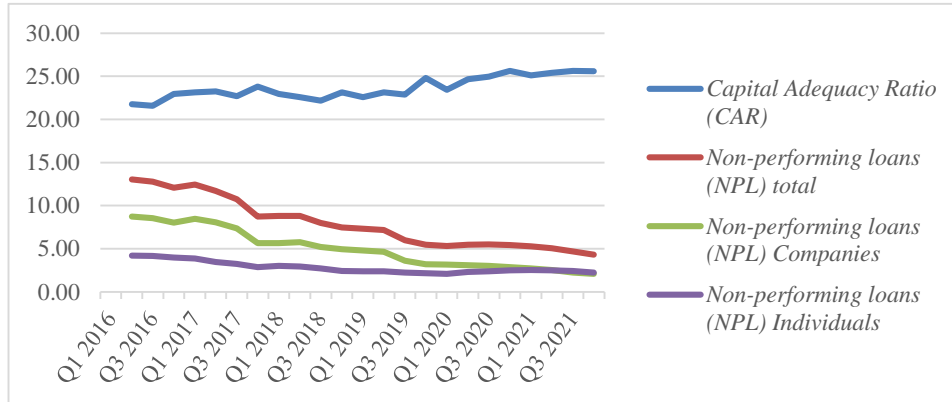
rate and CAR for the banks doing business in Bosnia and Herzegovina and Croatia.

Figure 1. Trends NPL and CAR in the period: 2016 – 2021 (Bosnia and Herzegovina)



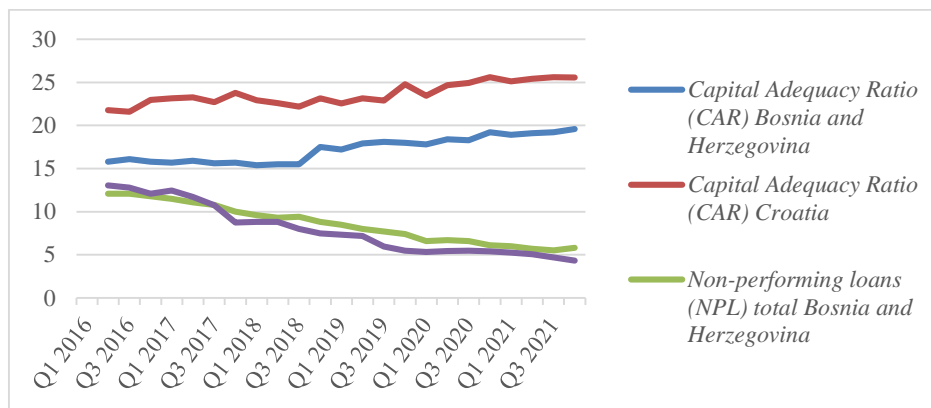
Source: Authors' elaboration using gathered data

Figure 2. Trends NPL and CAR in the period: 2016 – 2021 (Croatia)



Source: Authors' elaboration using gathered data

Figure 3. Comparison of trends NPL and CAR in the period: 2016–2021 (Bosnia and Herzegovina and Croatia)



Source: Authors' elaboration using gathered data

According to Figures 1–3, CAR is increasing in both countries while NPL is decreasing. The same trend is recorded for total, business, and individual NPLs. In Bosnia and Herzegovina, as in Croatia, a similar pattern of negative correlation between CAR and NPL indicates a decline in credit risk. The efforts of the banks to write off non-performing loans and the increasing frequency of credit reprogramming are responsible for the continuous improvement in the quality of the credit portfolio over a certain period of time. Also, the ability to pay out credits via re-programs, as well as the imposition of a moratorium on credit obligations from clients who have difficulty repaying credit dues, all helped to avoid further deterioration of the quality of the credit portfolio. The primary distinction is a higher CAR in Croatia, which indicates that banks there are thought to be above the minimal standards required to suggest solvency. Therefore, there is a higher likelihood that Croatian banks can withstand a financial crisis or other unforeseen losses. Despite a positive trend in the analysed countries, the NPL rate for the European Union at the end of Q2 2022 recorded 1.81% (Statista, 2022), which represents the objective of the studied banking sectors in Bosnia and Herzegovina and Croatia.

4. Methodology and hypotheses

Testing was done to determine whether independent variables could accurately predict the dependent variable, and the research question is: "Is it possible to predict the dependent variable using the independent variable?" For both nations, the following hypothesis was proposed, as well as the influence of external and internal variables on the capital adequacy ratio:

H0: *Independent variables do not significantly affect the dependent variable CAR.*

H1: *Independent variables do significantly affect the dependent variable CAR.*

In order to evaluate and examine the influence of independent variables on the dependent variable CAR, a linear regression model was applied. The parameters of the linear function were chosen because they explained the variables based on the principle of the smallest quadrants. Assumption that the sample came from an approximately normal distribution. To test hypothesis, testing was based on t-statistics and its p-value. The test hypothesis should be rejected if the test result is statistically significant at 5%. If the p-value is higher than 0.05, no effect was observed. The significance of variables is evaluated using the f-test. To identify the variables that affected CAR most, the next regression model is used:

$$Y_i = (b_0 + b_1X_i) + \varepsilon_i \quad (1)$$

Where:

Y_i = i-th dependent variable,
 X_i = i-th the value of independent variable,
 b_0 = constant (free member),
 b_1 = ascent,
 ε_i = random error.

The following model was created by incorporating all independent and dependent variables into the formula:

$$\text{CAR} = b_0 + b_1\text{LR} + b_2\text{GDP Growth} + b_3\text{ROE} + \varepsilon \quad (2)$$

Where:

CAR = dependent variable Capital Adequacy Ratio,
 b_0 = constant,
 b_1 LR = Independent variable Leverage rate,
 b_2 GDP Growth = Independent variable GDP Growth,
 b_3 ROE = Independent variable ROE,
 ε = random error.

5. Data and variables

The banking systems of Bosnia and Herzegovina and Croatia are the focus of the research. A banking system was observed within the population. The base for the data is a whole banking system sample of 22 Bosnian banking institutions and 20 Croatian banks. The data are collected from official reports issued by banking and statistical institutions in Bosnia and Herzegovina and Croatia.

Research analysed banking sectors data for 2014-2021 quarterly. The capital adequacy ratio was investigated as a dependent variable. To test the impact of independent variables on the dependent variable, the influence of leverage rate, GDP growth rate, and ROE on CAR was tested. The expected effects of independent variables on the dependent variable (CAR) are displayed in the table below.

Table 1. Summary of the Model's Dependent and Independent Variables

| Variable | Short definition | Variables Type | Expected sign B&H | Expected sign Cro |
|----------|------------------------|----------------|-------------------|-------------------|
| CAR | Capital Adequacy Ratio | Dependent | * | * |
| LR | Leverage Rate | Independent | + | - |
| GDP | GDP Growth Rate | Independent | + | + |
| ROE | Return on Equity | Independent | - | - |

Source: Authors' calculation using gathered data

The leverage rate, which is the first independent variable, draws attention to questions like whether it is advantageous to finance the banking business model with nonperforming loans as long as lending activity results in a higher lending rate than the lending interest rate. When comparing performance changes between the capital structure and financial debt, the profitability

sensitivity indicator is particularly helpful. The measure of the total product on the accounts of national revenue is represented by the GDP growth rate, the second independent variable. It serves as a gauge of a state's or nations overall economic might and is the most frequently used macroeconomic variable when examining its effects on a dependent variable.

The annual profit-loss ratio to the average equity of the credit institutions is known as the return on equity (ROE). According to CNB (2022), the average equity is calculated as the average of the equity balances at the end and beginning of the year.

6. Findings and discussion

The model included elements like the LR rate, GDP growth rate, and ROE in order to calculate the impact of external and internal factors on the dependent variable, CAR. The STATA 12 program is used to perform all calculations. Prior to testing the hypotheses, the summary and descriptive statistics and regression results are shown in Tables 2-3.

Table 2. Summary and descriptive statistics

| Variable | Bosnia and Herzegovina | | | | | Croatia | | | | |
|------------|------------------------|----------|----------|------|------|---------|----------|----------|-----------|----------|
| | Obs | Mean | Std.Dev | Min | Max | Obs | Mean | Std.Dev | Min | Max |
| CAR | 24 | 17.12917 | 1.523291 | 14.9 | 19.6 | 23 | 23.64696 | 1.287808 | 21.58 | 25.62 |
| LR | 24 | 9.875 | .5309958 | 8.1 | 10.5 | 22 | 11.95348 | .3959064 | 11 | 12.57 |
| GDP Growth | 24 | 2.737771 | 3.755667 | -7.9 | 11.6 | 23 | 2.584503 | 6.740667 | -14.46594 | 16.47209 |
| ROE | 24 | 9.875 | 1.983245 | 5.6 | 13.1 | 23 | 7.897826 | 2.442955 | 3.08 | 11.2 |

Source: Authors' calculation using gathered data

Important: The CAR increased from 14.9% to 19.6% within an observable time frame, exceeding the minimum 12% legal requirement in the case of Bosnia and Herzegovina. Similar circumstances exist in Croatia, where the CAR has increased from 21.58 to 26.62, substantially exceeding the minimum 10% required by law. As a measure of variation or dispersion of a set of values, the standard deviation shows that variables perform differently in the two nations. The GDP growth rate significantly decreased in 2020, leading to a high standard deviation. Due to the weakened economic activity brought on by the effects of COVID-19, a very volatile trend in GDP growth was observed during the observation period. Because of COVID-19, the continuous decline in ROE

came to an end, and in 2020, there was no discernible downward trend in NPL. The other variables didn't exhibit significant oscillations over a given period, in contrast to GDP growth and ROE. Only CAR recorded steady and gentle growth, as confirmed by the standard deviation of the trend.

Using the following formulas, the forecasting model is displayed:

$$CAR_{Bosnia\ and\ Herzegovina}$$

$$= -1.199626 + 2.079265_{LR} + 0.1294444_{GDP\ Growth} - 0.2590719_{ROE}$$

$$CAR_{Croatia} = 32.69273 - 0.5899793_{LR} + 0.0208726_{GDP\ Growth} - 0.2592374_{ROE}$$

Table 3. Regression analysis findings

| Independent Variable | Bosnia and Herzegovina | | | Croatia | | |
|----------------------|------------------------|---------|-----------------------|-----------|---------|---------|
| | Coef. | t-value | p-value | Coef. | t-value | p-value |
| LR | 2.079265 | 5.21 | 0.000 | -.5899793 | -0.78 | 0.445 |
| GDP Growth | .1294444 | 2.06 | 0.052 | .0208726 | 0.49 | 0.631 |
| ROE | -.2590719 | -2.19 | 0.041 | -.2592374 | -2.07 | 0.052 |
| _cons | -1.199626 | -0.28 | 0.780 | 32.69273 | 3.45 | 0.003 |
| F (3, 20) = 11.65 | | | F (3, 19) = 1.43 | | | |
| F-value = 0.0001 | | | F-value = 0.2659 | | | |
| R2 = 0.6361 | | | R2 = 0.1839 | | | |
| Adjusted R2 = 0.5815 | | | Adjusted R2 = -0.0550 | | | |

Source: Authors' calculation using gathered data

After the hypothesis testing is complete, the Bosnia and Herzegovina case's empirical F-test result (p-value = 0.0001) demonstrates that hypothesis 0 is rejected; as a result, all tested variables in Bosnia and Herzegovina have a significant impact on CAR as the dependent variable, proving that the model is

significantly more accurate at forecasting the dependent variable. In contrast, testing hypothesis 0 in the case of Croatia based on the empirical F-test result (p-value = 0.2659) does not significantly affect CAR.

In the case of Bosnia and Herzegovina, the analysis of variance (ANOVA) findings are significant ($F(3, 20) = 11.65, p < .001$). This means that the model is significantly better at predicting the value of the dependent variable. As the p-value is 0.0001, it is reasonable to conclude that independent variables reliably forecast the dependent variable CAR. These findings lead to a rejection of the null hypothesis. The variability of the dependent variable (CAR) is explained at the level of 63.61 percent. This means that 63.61% of the variance is explained by independent variables.

In the case of Croatia, the analysis of variance (ANOVA) reveals that $F(3, 19) = 1.43, p > .001$, is not significantly more accurate at predicting the value of the dependent variable. Given that the p-value is 0.2659, it is reasonable to draw the conclusion that the dependent variables LR, GDP growth, and ROE rates do not accurately predict the dependent CAR variable.

It is important to look for a possible explanation for this discrepancy between Bosnia and Herzegovina and Croatia. During the observed period, Croatia's GDP growth underwent a significant oscillation from -14.46594 to 16.47209 in the period between Q2 2020 and Q2 2021. According to the research studies done for the Croatian banking system, the CAR rate declines over time as a result of the GDP growth rate. (Benazić & Mašić, 2016) It is crucial to comprehend how a macroeconomic issue affects people's daily lives, particularly in cases like this study's (on GDP growth). The study demonstrates that a negative GDP growth value causes an increase in CAR, which means that a decline in GDP growth causes an increase in interest rates, lending rates, etc. As a result, the rate of NPLs increases and CAR trends rise over time. Although the model is based on the entire population rather than a sample, a nearly identical explanation would apply to the variance of the dependent variable. Based on results, the model is significant for Bosnia and Herzegovina but not for Croatia. Additional interpretation of the gathered data is continued.

Interpretation of data for Bosnia and Herzegovina: According to the coefficient b_1 linked to the LR variable, if LR rises by 1%, an average increase in CAR of 2.079265% points is expected. The GDP Growth variable's associated coefficient, b_2 , informs us that for every 1% increase in GDP Growth, there is an expected increase in CAR of 0.1294444% points. The ROE variable's associated coefficient, b_3 , informs us that if ROE declines by 1%, it is

anticipated that CAR will fall by 0.2590719% points. With regard to Bosnia and Herzegovina, it is reasonable to conclude that all coefficients are statistically significant, but not with regard to Croatia in light of these findings. Based on the positive correlation between GDP growth and CAR, Bosnia and Herzegovina's CAR decreases as GDP grows and vice versa. According to the positive correlation and higher CAR than the required minimum level of regulation, banks raise CAR as a result of NPLs, which reduces GDP growth. Given that the p-values are equal to or less than 0.05 in the case of Bosnia and Herzegovina, all coefficients are significant.

The option beta, which is used to calculate the standardized regression coefficient (z-score), was included in the model of the banking sector of Bosnia and Herzegovina in order to compare the relative strengths of various predictors. All beta coefficients' values are standardized because they are all expressed as standard deviations. This made it possible to compare the forecasts based on the relative potency of each predictor. According to a comparison of the achieved standardized values, the relative importance of LR (z-score = .7247995) within a model is higher than that of the GDP growth rate (z-score = .3191445). As a result, every feature was examined, and every regression analysis assumption was verified.

While Bosnia and Herzegovina's banking sector recorded a positive correlation of LR on CAR, at the same time, Croatia's banking sector recorded a negative correlation. The main reason lies in the fact that CAR recorded different growth in both countries. Bosnia and Herzegovina recorded growth from 14.9% to 19.6%, which is an increase of 4.7%. During the same period, Croatia recorded growth from 21.58% to 25.62%, which is an increase of 4.06%. In the same period, Bosnia and Herzegovina recorded bigger growth, which means that 0.64% was enough to record a positive correlation in the case of Croatia and a negative correlation in the case of Bosnia and Herzegovina.

Bank capital is frequently cited as one of the most important policy instruments in bank policy. The financial system and the real economy are both safeguarded by this instrument from monetary shocks. Increased capital requirements for banks could hurt the economy and the availability of credit. Rising funding costs may result in higher interest rates on loans.

By increasing bank capital, one can make sure that banks are able to withstand financial shocks and prevent further banking crises. Therefore, the financial industry and overall economic activity are at risk due to insufficient capital. This is the reason why it is important to know not only the minimum level of capital

adequacy but also the optimal level. In order to determine the best capital adequacy ratios, it is necessary to weigh the advantages of less frequent and less expensive banking crises against the economic costs of more expensive credit. Based on that, from a socioeconomic standpoint, Andersen and Juelsrud (2022) examined the ideal capital adequacy ratio for Norwegian banks. According to their findings, Norwegian banks should maintain a Common Equity Tier 1 (CET1) ratio of 12 to 19 percent. This is supported by the CET1 ratio of Norwegian banks, which is about 18%. They concluded that their estimates are in line with the findings of other studies conducted around the world.

The optimal capital requirement for banks in the euro area was estimated by Soederhuizen et al. (2021). Baseline data indicates that a risk-weighted capital ratio of about 22% is optimal. A range of optimal ratios between 15% and 30% is produced by alternative estimates based on various assumptions. Across member states, there is significant heterogeneity. This suggests that the resilience of national economies and the ease with which banks in various member states can raise capital are likely inversely related to optimal ratios. Around 88.2% of Taiwan's commercial banks had a capital adequacy ratio that was optimally higher than the Basel III-required 10.5% between 2007 and 2009. (Li, Chen, Chien, Sheng, & Hsu, 2016) A bank's capacity to manage losses, take risks, and maintain robust operations can all be improved by more stringent capital requirements. (Berger, 1995) Although they might restrict a bank's ability to profit from loans and thereby worsen its performance. (Barth, Caprio, & Levine, 2004)

7. Conclusions

The unified rules were developed in accordance with the Basel III Accord to organize capital requests for banks operating in Bosnia and Herzegovina and Croatia. It is crucial to recognize that the stability of the banking system serves as a base for preventing potential economic shocks. The capacity to absorb losses is generally indicated by capital adequacy, so the higher the capital adequacy, the greater the potential to absorb losses from non-performing loans. As a result, choosing between having a higher or lower CAR is very difficult. Although the profitability perspective suggests that having a lower CAR is preferable, the stability perspective advises having a higher CAR.

This study focused on the years 2016–2021 and examined factors affecting capital sensitivity. Leverage rate, GDP growth, return on equity as independent variables, and capital adequacy ratio as a dependent variable are being tested.

In order to maintain the ideal CAR, banks must manage and track non-performing loans using appropriate credit forecasting and measuring that would help lower the NPL rate. Therefore, banks must concentrate their efforts on regulating and observing the NPL rate if they are to be prepared for new challenges.

Given the appeal and importance of banks' capital adequacy for the entire state and society, future research models should take into account banks operating in various global regions as well as some other determinants that would better explain the impact of constantly changing factors on the sensitivity of the capital. Finding the ideal capital requirements for banks operating in Croatia and Bosnia and Herzegovina would also be interesting for future research.

References

- Ahmad, R., Ariff, M., & Skully, M. J. (2008). The Determinants of Bank Capital Ratios in a Developing Economy. *Asia-Pacific Financial Markets*, 255-272.
- Andersen, H., & Juelsrud, R. E. (2022). *Optimal capital adequacy ratio for Norwegian banks*. Norges Bank.
- ASBIH. (2022). *Agency for Statistics of Bosnia and Herzegovina*. Retrieved from <https://bhas.gov.ba/?lang=en>
- BARS. (2022). *Banking agency of Republic of Srpska - publikacije*. Retrieved from <https://www.abrs.ba/sr/izvjestaji/c3>
- Barth, J. R., Caprio, G., & Levine, R. (2004). Bank regulation and supervision: what works best? *Journal of Financial Intermediation*, 205-248.
- Basel Committee on Banking Supervision. (2016). *Prudential treatment of problem assets – definitions of non-performing exposures and forbearance*. Bank for international settlements.
- Benazić, M., & Mašić, A. (2016). The impact of selected macroeconomic variables on the capital adequacy ratio of Croatian banks. *EFZG Occasional Publications (Department of Finance)*, 63-80.
- Berger, A. N. (1995). The Profit-Structure Relationship in Banking--Tests of Market-Power and Efficient Structure Hypotheses. *Journal of Money, Credit and Banking*, 404-431.
- Bholat, D., Lastra, R., Markose, S., Miglionico, A., & Sen, K. (2016). Non-performing loans: regulatory and accounting treatments of assets. *Bank of England: Staff Working Paper No. 594*, 1-72.
- CBBiH. (2022). *CBBiH - Statistički web portal*. Retrieved from http://statistics.cbbh.ba/Panorama/novaview/SimpleLogin_bs_html.aspx
- CNB. (2022). Retrieved from Croatian National Bank: <https://www.hnb.hr/en/statistics/statistical-data/financial-sector/other->

- monetary-financial-institutions/credit-institutions/supervisory-indicators/indicators-of-credit-institution-operations
- CNB. (2022). *Croatian national bank - Statistics*. Retrieved from <https://www.hnb.hr/en/statistics>
- Croatian Institute for Financial Education. (2023). *ŠTO JE KREDIT?* Retrieved from <https://www.hife.hr/abeceda-odgovornosti/sto-je-kredit-6>
- FBA. (2017). *Banking Agency of the FBiH*. Retrieved 06 05, 2021, from Information on entities of the banking system of the Federation of Bosnia and Herzegovina with the balance as of 12/31/2017. years: https://www.fba.ba/images/Publikacije_Banke/
- FBA. (2020). *Banking Agency of the FBiH*. Retrieved 05 13, 2021, from Information on entities of the banking system of the Federation of BiH with the balance as of December 31, 2020: <https://www.fba.ba/bs/>
- Hunjra, A., Zureigat, Q., Mehmood, R. (2020). Impact of Capital Regulation and Market Discipline on Capital Ratio Selection: A Cross Country Study. *International Journal of Financial Studies*, 1-13.
- Kagan, J. (2023). Retrieved from What Is a Loan, How Does It Work, Types, and Tips on Getting One: <https://www.investopedia.com/terms/l/loan.asp>
- Klepczarek, E. (2015). Determinants of European banks' capital adequacy. *Comparative Economic Research. Central and Eastern Europe*, 81-98.
- Li, Y., Chen, Y.-K., Chien, F., Sheng, F., Hsu, Y. (2016). Study of optimal capital adequacy ratios. *Journal of Productivity Analysis*, 261-274.
- Loan, M., Khue, T. (2021). Internal and macroeconomic factors affecting the capital adequacy ratio of commercial banks in Vietnam. *Academy of Strategic Management Journal*, 1-10.
- Nadzakovic, E., Dupovac, S., Hromić, B. (2021). Sensitivity of banks 'capital in the Federation of Bosnia and Herzegovina to changes in exogenous and endogenous factors. *BH Economic forum*, 53-68.
- Quagliariello, M. (2007). Banks' riskiness over the business cycle: a panel analysis on Italian intermediaries. *Applied Financial Economics*, pp. 119-138.
- Rençber, Ö., Bağcı, H. (2019). Determination of Factors Affecting Capital Adequacy Using the Elastic Net Regression Method. *OPUS International Journal of Society Research*, 1828-1844.
- Setiawan, A., Muchtar, S. (2021). Factor Affecting the Capital Adequacy Ratio of Banks Listed in Indonesia Stock Exchange. *Jurnal Ekonomi*, 153-169.
- Soederhuizen, B., Kramer, B., van Heuvelen, G., Luginbuhl, R. (2021). *Optimal capital ratios for banks in the euro area*. CPB Netherlands Bureau for Economic Policy Analysis.
- Statista. (2022, 11 23). *Statista*. Retrieved from <https://www.statista.com/statistics/896038/non-performing-bank-loans-in-western-europe/>

- The Investopedia Team. (2023). *Investopedia*. Retrieved 03 2023, from <https://www.investopedia.com/terms/c/credit.asp>
- Vaskov, M., Ilievska, M., Debnikov, P. (2012, April). Macroeconomic determinants of Non-performing loans in Macedonian banking system, panel data analysis, presentation. *National bank of the Republic of Macedonia*.