THE FACTORS EFFECTING ON BANK PROFITABILITY: THE CASE OF BOSNIA AND HERZEGOVINA

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Abstract: *This research includes all banks in Bosnia and Herzegovina and testing internal and external variables on bank profitability indicators. In addition, the profitability of banks in B&H is also influenced by the financial result of operations, which is determined by price and interest rate risk. The primary goal of this paper is to determine, through correlation and regression analysis, the strength and significance of external and internal variables on bank profitability in Bosnia and Herzegovina. The research period covered from 2008: q1 to 2019: q4 on a quarterly database. Also, in this paper, the STATA 13.0 software package will be used. The following dependents variable were used: return on asset (ROA) and return on equity (ROE). The following independent variables were used: the growth rate of net gross/loss (GRNGL), the growth rate of non-performing loans (GRNPL), GDP growth rate (GRGDP), concentration ratio of loans of the largest banks in the system (CR Loans), concentration ratio of deposits of the largest banks in the system (CR Deposits), capital adequacy ratio (CAR) and loan-to-deposit ratio. The total number of observations was 48. The results showed that the significant influence on the dependent variables were the return on equity (ROE) and return on asset (ROA), which has been achieved by the following independent variables, such as the growth rate of net gross/loss, the growth rate of non-performing loans and concentration ratio of loans and deposit of the largest banks.*

Keywords: *Profitability indicators, Non-performing loans, Concentration ratio, Loan-to-deposit ratio.*

1. INTRODUCTION

Generally, the approach to measuring the performance of banks is no different from the approach adopted in measuring the performance of companies. Mostly it is a model of return on equity where decomposition is done in order to identify the sources that influenced the profitability of the company. The behavior of company stock prices is the best indicator of the success of their business. However, with banks, the return on equity is often not a reliable indicator, because usually small and medium-sized banks are not listed on any of the stock exchanges. In this regard, the use of different profitability indicators is a logical choice. Therefore, for banks whose stock is listed on stock exchanges, which is often the case in countries with underdeveloped capital markets, using profitability ratios is the only way to measure their business performance (Đukić, Đ. 2011., p.185). Profitability indicators provide a systematic summary of the significance of information based on the vast amount of data contained in the financial statements. Financial managers use ratios to evaluate their company's performance against competitors and set goals for future business. Financial advisers use indicators to evaluate whether the shares are undervalued or overvalued, and to make possible recommendations to investors (Burns *et al. 2008*).

Both ROE and ROA are very significant indicators of profitability, but more researchers are focusing on ROE, as it shows the profitability of the bank from the point of view of capital in-

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vestment, and is therefore more important in the context of bank shareholders (Mishkin, 2007). In this paper, both ROE and ROA will be used as dependent variables. In the financial system of Bosnia and Herzegovina, banks have the most dominant share in the structure of the total system whose participation in 2018 amounted to 88.5%. The profitability of banking sector remained at a high level, where ROE and ROA had slightly lower values than the previous year. Banks in Bosnia and Herzegovina derive most of their income from loans, where about 60% of total loans relate to loans (The Central Bank of Bosnia and Herzegovina, 2018).

The first analyzed indicator is, return on equity (ROE), followed an identical pattern in moving to higher values. The negative ROE of banks in Bosnia and Herzegovina in 2010 was a direct result of increased costs and increased deductions from current revenues to cover loan losses. After 2010, profits were positive and reach a level of 10%. The highest levels of earnings were recorded in the third quarter of 2018 (19.90%) and the fourth quarter of 2018 (20.40%) respectively. Retention of expansionary monetary policy and low-interest rates by ECB had positive implications for boosting economic growth not only in EU countries but also in Southeast Europe (Banking Agency of the Federation Bosnia and Herzegovina, 2018, p. 38). The zero hypothesis supports the random-effects model. The second analyzed indicator of banks in Bosnia and Herzegovina return on asset (ROA) which had a volatile trend with a decline in value in 2010, as a result of increased costs of loan loss provisions and poor quality of the loan portfolio. In the later period, due to the recovery of economic activity and falling interest rates and write-offs of toxic loans, the ROA was increased slightly to 1% in the last quarter of 2016. In the fourth quarter of 2018, the ROA was recorded a value of 1.2%, and the average value of the observed period it was about 0.48%.
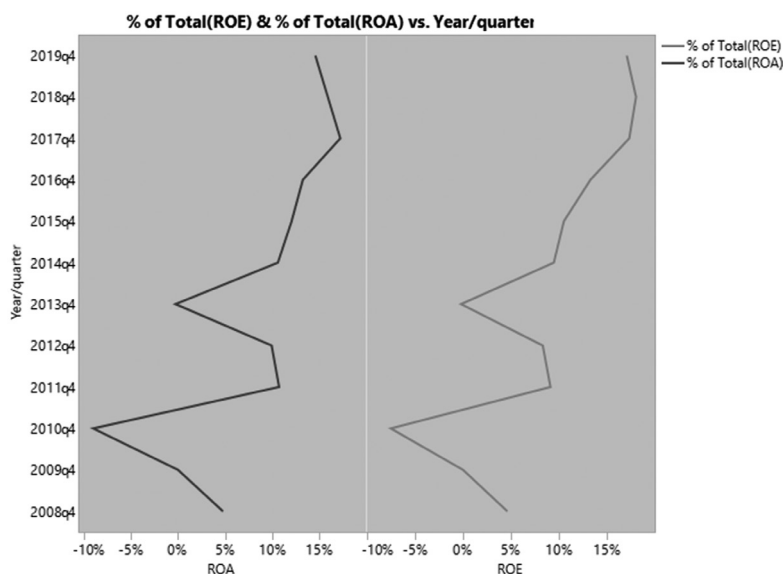

Figure 1. Trend of return on equity (ROE) and return on asset (ROA)
of banks in Bosnia and Herzegovina in the period: 2008q4-2019q4 (in%)
Source: Author's study based on data from the Banking Agency
of the Federation of Bosnia and Herzegovina and Banking Agency of Republika Srpska

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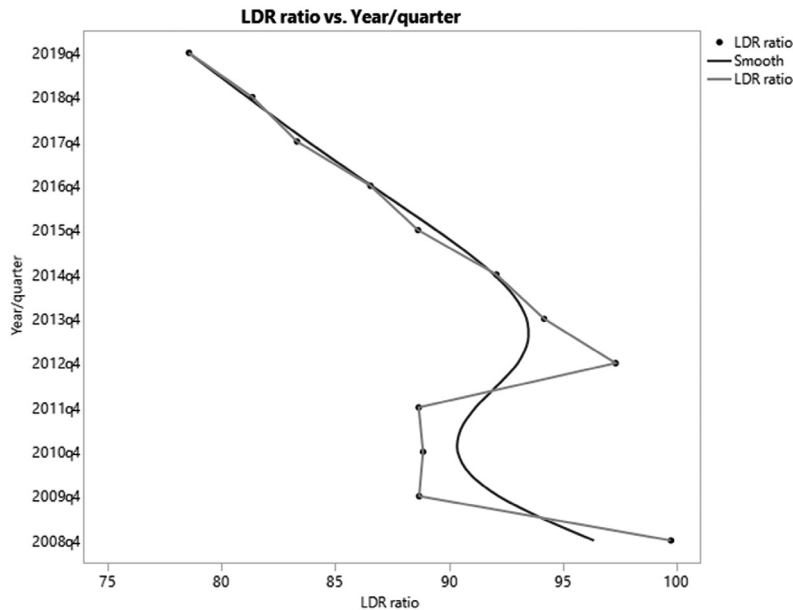

Figure 2. Trend of the loan-to-deposit ratio of banks
in Bosnia and Herzegovina in the period 2008q1-2019q4 (in%)
Source: Author's study based on data from the Banking Agency
of the Federation of Bosnia and Herzegovina and Banking Agency of Republika Srpska

As we can see from the previous figure, the liquidity indicator of bank loans in Bosnia and Herzegovina (i.e. loan-to-deposit ratio) had a very variable trend. At the end of the fourth quarter of 2008, the amount of credit placements was almost equal to the amount of total bank deposits in banks of Bosnia and Herzegovina, which means that only one year after the crisis, banks reduced risk aversion and increased lending activity. However, immediately after 2008, there was a turnaround in their credit policies, where the loan-to-deposit ratio in 2009 was amounted 88.69%, or by 11.31%, total deposits were higher. This is primarily the result of the banks prudence resulting from the impact of the global economic crisis, weakened economic activity, increased credit risk and other factors. Banks prudence and reduced volume of lending activity of banks in Bosnia and Herzegovina lasted until 2012, when there was a slight recovery period of economic activity, where banks slightly increased the amount of credit placements, which is reflected in the credit liquidity indicator, in 2012. The year was amounted to 97.31%. Almost equalized levels between total loans and deposits were recorded only in 2008 and 2012. The amount of deposits in relation to loans from 2016 to 2019 tends to increase, as a result of the absence of alternative forms of savings on the one hand, and on the other, the establishment of a deposit insurance system. Even after the crisis, banks continued to pursue a policy of rationalization of loans, due to the continued high credit risk, which is the basis of financial stability and the inability to find good debtors.

The paper consists of four parts. The first part describes the importance of profitability indicators in measuring the efficiency of B&H bank's operations, as well as internal and external variables that affect profitability indicators such as ROA and ROE. The second part of the paper provides an overview of empirical evidence in terms of the results of the influence of internal and external factors on the profitability of bank operations. The third part describes the chosen research methodology. The four-part deals with the data necessary for the analysis and the results of the research with recommendations.

2.   EMPIRICAL EVIDENCE

Goddard et al. (2004) used panel analysis as well as cross-sectional regression to estimate growth and profitability models in a sample of nearly 600 banks from five European Union countries for the period 1992 to 1998. According to Boubakri et al. (2005), bank privatization to strategic investors plays a significant role in business performance. The authors that newly privatized banks controlled by local industry groups became more exposed to credit and interest rate risk after privatization. On the other hand, privatized banks controlled by foreign investors have become more cost-effective. In many transition countries, control of a large number of privatized banks has shifted from state ownership to foreign ownership. The entry of foreign banks after privatization had a positive impact on the way that domestic banks became much more efficient in terms of overhead costs and interest spread, although it did not always have a positive effect on profitability.

Naceur and Omran (2011) investigated the impact of concentration, bank regulation, institutional and financial development on the margins and profitability of Middle Eastern and North African banks. They came to the conclusion that credit risk and capitalization have a significant impact on the profitability and economy of banks. They also concluded that there was no significant impact of macroeconomic and financial development indicators on the level of net interest margins, except for inflation. Likewise, they found that institutional and regulatory variables have a significant impact on the bank's operations. Ćuraka, Poposkib and Pepura (2012) investigated the bank-level, industry-level and macroeconomic factors that may affect the profitability of the Macedonian banking sector, using a dynamic panel consisting of 16 banks between 2005 and 2010. They concluded that the operating cost is a major determinant of bank profitability. They also concluded that solvency and liquidity risks have an impact on profitability. The findings also indicated that concentration, banking system reform and economic growth have a significant impact on bank profitability.

According to a study by Borio et al (2015), high short-term interest rates can have the effect of reducing bank's profitability. The results of their research show that the effects of short-term interest rates on bank profitability depend on the elasticity of supply and demand for loans. In conditions where the demand for loans is resilient, and when interest rates on deposits are higher, this may have the effect of reducing bank's profitability. According to the results of Căpraru and Ihnatov (2015), bank profitability is negatively affected by the cost / income ratio, bank size, credit risk and market concentration. Ibrahimov (2016) analyzed the impact of banking and macroeconomic variables on the profitability of 41 banks for the period: 2012-2015. Based on the results of the statistical panel, he came to the conclusion that bank size and bank capital have a positive impact on the return on assets, while liquidity risk is negative associated with the return on assets. In the context of macroeconomic variables, such as: the devaluation of the exchange rate and the price of oil, he came to the conclusion that they have both a positive and a negative impact on profitability.

Satria et al. (2018) conducted a survey on a sample of the 10 largest commercial banks in ASEAN over the period from 2012 to 2016. They concluded that equity to asset had a positive impact on profitability, while the following factors had a negative impact on profitability: loan to deposit, investment to asset and GDP.

3.   HYPOTHESES AND RESEARCH GOALS

The following hypotheses will be tested:
- a) The null hypothesis is the reason why the independent variables do not significantly affect the dependent.
- b) The alternative hypothesis is the reason why the independent variables do significantly affect the dependent.

The main objectives of this research are the following:
- *This research attempts to identify the internal and external factors that determine banks' profitability in Bosnia and Herzegovina, by investigating the effect of each one of them on profitability, mainly (the growth rate of net gross/loss, the growth rate of non-performing loans, the growth rate of gross domestic product, the concentration ratio of loans, the concentration ratio of deposits, capital adequacy ratio and loan-to-deposit ratio). Therefore, this research focuses on the determinants of banking sector profitability that can be divided into two groups, namely: internal and external factors (Gul et al. 2011).*

4.   EMPIRICAL METHODOLOGY AND DATA

We want to answer the following question: *Which of the independent variables in the model has the most substantial impact on the bank profitability of Bosnia and Herzegovina on the one hand, and the other hand, which of the variables has the lowest impact?* Based on the above-mentioned research, we will investigate the aggregate effect of the bank profitability in Bosnia and Herzegovina using the following regression model:

$$ROE_{i,t} = \alpha + \alpha_1 GRNGL_{i,t} + \alpha_2 GRNPL_{i,t} + \alpha_3 GRGDP_{i,t} + \alpha_4 CR\ Loans_{i,t} \\ + \alpha_5 CR\ Deposits_{i,t} + \alpha_6 CAR_{i,t} + \alpha_7 LDR_{i,t} + \varepsilon_{i,t} \tag{1}$$

And

$$ROA_{i,t} = \alpha + \alpha_1 GRNGL_{i,t} + \alpha_2 GRNPL_{i,t} + \alpha_3 GRGDP_{i,t} + \alpha_4 CR\ Loans_{i,t} \\ + \alpha_5 CR\ Deposits_{i,t} + \alpha_6 CAR_{i,t} + \alpha_7 LDR_{i,t} + \varepsilon_{i,t} \tag{2}$$

Where:
$GRNGL$ – the growth rate of profit/loss,
$GRNPL$ – the growth rate of non-performing loans,
$GRGDP$ – GDP growth rate,
$CR\ Loans$ – concentration ratio of loans of the largest bank in the system,
$CR\ Deposits$ – concentration ratio of deposits of the largest banks in the system,
CAR – capital adequacy ratio,
LDR – the loan-to-deposit ratio.

The significance of the model will be carried out by the calculation of the coefficient of correlation (r), the coefficient of determination and adjusted coefficient of determination

4.1. Data Collection

The data have been collected from the official websites of the Banking Agency of the Federation of Bosnia and Herzegovina and the Banking Agency of the Republika Srpska. This empirical study uses quarterly data for the entire banking system of Bosnia and Herzegovina. The survey period covers the period from the first quarter of 2008 to the fourth quarter of 2019. The dependent variables the return on asset (ROA) and the return on equity (ROE) were used. Seven independent variables as the growth rate of net gross/loss (GRNGL), the growth rate of non-performing loans (GRNPL), the growth rate of the gross domestic product (GRGDP), the concentration ratio for the three to five banks in terms of loan placement (CR Loans), the concentration ratio for the three to five banks in terms of deposits (CR Deposits), capital adequacy ratio (CAR) and loan-to-deposit ratio (LDR) were used. In table 1 the explanatory variables and anticipated effects of dependent and independent variables are given:

Table 1. A brief description of the dependent and independent variables in the model

VARIABLE	MEASURED BY	ANTICIPATED SIGNS
ROE	This ratio is obtained by dividing the bank's net income with equity	-
ROA	The ratio of profit to total assets	-
GRNGL	The growth rate of net gross/loss	Positive (+)
GRNPL	The growth rate of non-performing loans (payment of interest and principal past due date by 90 days or more) to total gross loans	Negative (-)
GRGDP	The growth rate of the gross domestic product	Positive (+)
CR Loans	The ratio of branch offices for the three to five banks to total bank offices for all commercial banks. Therefore, the paper will test the concentration ratio of three to five banks for loan placement	Positive (+)
CR Deposits	The ratio of branch offices for the three to five banks to total bank offices for all commercial banks. Therefore, the paper will test the concentration ratio of three to five banks for deposits	Negative (-)
CAR	Capital adequacy ratio	Negative (-)
LDR ratio	The loan-to-deposit ratio is a measure of a bank's liquidity assessment and is obtained as the ratio between total loans and total deposits.	Negative (-)

Source: Author's own study

Return on equity – (ROE) – expresses how much a bank earns on the book value of its investments. This ratio is obtained by dividing the bank's net income with equity, which reflects the revenue generation, operational efficiency, financial leverage, and tax planning. For some banks, ROE may be high because banks do not have an adequate capital ratio. The capital adequacy ratio in Bosnia and Herzegovina is 12%, which is the legal minimum so that almost all banks maintain a capital adequacy ratio. ROE can also be obtained as a product of ROA and leverage multiplier, where a bank can use this ratio between two ratios to improve ROE ratios. For example, banks with low ROA, can increase their ROE by using additional leverage, that is, by increasing their asset-equity ratio (Koch & MacDonald, 2009).

Return on assets (ROA) – is considered to be the most appropriate measure to evaluate the performance of a bank's business. The ROA is obtained by dividing the bank's income before the interest payable on its assets. Thus, ROA measures the effectiveness of management in using the resources of a bank to make a profit. It also evaluates the efficiency of the bank in using its financial and real investments to earn interest and other fees. This measure of bank profitability is particularly significant when comparing operational efficiency between banks (Sinkey, 1988).

The growth rate of non-performing loans (NPLs) – represents the sum of borrowed money by banks to debtors, where debtors have not made the payment of interest and principal at least 90 days for commercial bank loans and 180 for consumer loans (Đukić, 2011).

The growth rate of the gross domestic product (GRGDP) – is a measure of economic growth as it relates to gross domestic product from one period to another, adjusted for inflation, and presented in real terms as opposed to nominal. Vong and Hoi (2009) argue that there is a general perception where the default values of bank loans are usually lower at a time of favorable economic growth, while they are higher during adverse economic growth, and these situations do affect the profit of banks. According to Ongore and Kusa (2013), the trend of gross domestic product influences bank's assets in the context that as trends move towards a declining GDP, demand for loans decreases, which negatively affects bank's profitability. Conversely, when economic trends move toward increasing magnitude or have positive GDP growth, then such a cycle leads to a high demand for credit.

Concentration ratio (CR) and the Herfindahl-Hirschman index are the main market concentration measures that have been proposed in many books and studies. The concentration ratio shows the share of the total market, especially in the bank market (for example, measured by employment, sales, assets, deposits, and loans). The banking sector of the Republika Srpska uses a concentration rate for the three largest banks in the system (Banking Agency of Republika Srpska, 2019), while the banking sector of the Federation of Bosnia and Herzegovina uses a concentration rate for the five largest banks in the system. In this study, we took the average concentration ratio (Banking Agency of the Federation of Bosnia and Herzegovina, 2018).

The capital adequacy ratio (CAR) is the ratio determined by the regulatory body for supervising banking operations and serves to test the health of the banking system, that is, it represents a safety pill for the absorption of a certain amount of losses (Bokhari & Ali, 2009).

The loan-to deposit ratio (LDR) is a measure of banks' ability to refinance eventual withdrawal of deposits that can be realized by savers relying on credit as a source of financing. If the ratio is high, the bank may face the problem of meeting unforeseen needs for funds. Conversely, if the ratio is too low, the bank will not earn as much as it could be.

4.2. Results

Our main results are shown in this section. Before the hypothesis is tested, primary statistic indicators, correlations are given in Table 2 and 5. The total number of observations taken into consideration is 48 which represents a relatively representative sample both in terms of the company and the view of the timeframe.

Table 2 shows that the growth rate of gross domestic product was recorded the high volatility (980.674%), then the growth rate of non-performing loans (822.698%). GDP growth in the reporting period was recorded in 2007 (6%), so that in 2009 the real GDP growth recorded a negative value of 2.7%. In the period after 2009, there was a tendency of further decline in GDP until 2013, as a result of weak economic activity and weak domestic and foreign demand. From 2014 to 2017, there has been a slight improvement in economic activities measured by GDP as a reflection of economic recovery and increased exports. Also, the growth rates of non-performing loans were highly volatile. The highest value for the analyzed period was recorded in the third

quarter of 2014 (about EUR 1.32 million), while the second lowest was recorded in the third quarter of 2019 (about EUR 801 thousand). The decrease was due to the monitoring of loans from banks, partial write-offs, and an increased volume of credit placements. It is important to mention that the movement of the first volatility measure, i.e. standard deviation and mean, had the same pattern of movement in the context of higher / less volatility of the selected variables.

Table 2. Descriptive statistics of dependent and independent variable variables
of banks in Bosnia and Herzegovina in the period: 2008q1 – 2019q4

Variables	Obs	Mean	Std. Dev.	Min	Max
ROE	48	7,666	6,941	-8,53	20,40
ROA	48	0,514	0,459	-0,68	1,30
GRNGL	48	106,122	92,448	-124,29	255,35
GRNPL	48	1.590.458,0	822.698,40	382,22	2.599.508
GRGDP	48	7.112.134,0	980.674,10	539.820,40	914.403,20
CR Loans	48	73,291	4,219	68,60	82,10
CR Deposits	48	73,945	3,773	70,30	84,10
CAR	48	16,345	0,835	14,90	18,0
LDR ratio	48	90,645	5,891	78,59	99,74

Source: Calculated by the author (STATA 13.0)

Table 3. Correlation matrix between dependent and independent variables
of banks in Bosnia and Herzegovina in the period: 2008q1 – 2019q4

Variables	ROE	ROA	GRNGL	GRNPL	GRGDP	CR Loans	CR Deposits	CAR	LDR ratio
ROE	1.000								
ROA	0.979	1.000							
GRNGL	0.957	0.947	1.000						
GRNPL	-0.393	-0.424	-0.389	1.000					
GRGDP	0.782	0.706	0.739	0.471	1.000				
CRLoans	-0.664	-0.641	-0.636	-0.814	-0.752	1.000			
CRDeposits	-0.583	-0.569	-0.549	-0.863	-0.658	0.944	1.000		
CAR	0.179	0.157	0.203	0.193	0.184	-0.193	-0.194	1.000	
LDR ratio	-0.455	-0.334	-0.385	-0.071	-0.661	0.428	0.387	0.082	1.000

Source: Calculated by the author (STATA 13.0)

The strongest positive causality with return on equity was achieved by the following independent variables: the return on asset (0.979) than the growth rate of net gross/loss (0.957) and the growth rate of gross domestic product (0.782). A number of larger banks, even with low return on asset (ROA), can achieve fairly high return on equity (ROE) with high borrowing or leverage and minimal capital utilization. Also, with an increase in the rate of growth of net profit, the return on equity increases as net profit represents the basis for calculating the return. Also, with an increase in business activity measured by the GDP growth rate, it creates a favorable economic climate for foreign bank migration, which increases banking assets and lending placement, and thus influences the successful conversion of assets into bank earnings. The strongest negative correlation of the dependent variable return on equity (ROE) was recorded with the following independent variables: the concentration ratio of loans (-0.664), then the concentration ratio of deposits (-0.583), the loan-to-deposit ratio (-0.455) and growth rate of non-performing loan (-0.393). Therefore, from three to five banks in the entire banking system of Bosnia and Herzegovina hold an oligopoly position, which affects the increase of its profitability, but not the equal increase in the profitability of other banks in the system, and consequently has a slight decrease

in the total return on assets. The relationship between loan-to-deposit ratio and return on equity is inverse because the relationship between liquidity and profitability is inversely proportional. For illustrative purposes, the share of liquid assets in the total assets in the banking sector of Bosnia and Herzegovina in 2007 was amounted to a high 41.1%, while in the third quarter of 2019 it dropped to about 26.2% (Banking Agency of the Federation of Bosnia and Herzegovina and Herzegovina and Banking Agency of Republika Srpska, 2019). Such high amounts of liquid assets, especially in 2007, are primarily the result of the still present risk of credit placements, and the difficulty in finding good debtors and quality programs.

The preceding VIF cutoffs were considered to be multi collinear, which were set at industry level. Each variable that has a higher VIF than 3 was considered as multi collinear and was dropped from the model. In case of multi-collinearity, coefficients of the variables became un-stable and standard errors were inflated.

Table 4. Multicollinear analysis via variance inflation factor (VIF)

Variable	VIF	1/VIF
GRNGL	2.50	0.400430
GRNPL	2.78	0.35971
GRGDP	2.85	0.350877
CRLoans	2.57	0.389105
CRDeposits	2.69	0.371747
CAR	1.14	0.877691
LDRratio	2.87	0.348432
Mean VIF	2.48	

Source: Calculated by the author (STATA 13.0)

As you can see in the previous table, each individual independent variable has a value of VIF coefficient less than 3, then it is clear that there is no multicollinearity between the variables and that the set model is valid. The total number of observations taken into consideration is 48 which represents the significance of the model. The coefficient of determination between the return on equity and the independent variables is 93.22%, while the adjusted determination coefficient is 92.03%, which means that there is a 92% change in the independent variables to the dependent relation. These 92% refers to the deviation or the smaller impact of independent variables in relation to the dependent variable.

In terms of testing the zero and alternative hypotheses through the empirical and the theoretical value of the F test, we came to the next conclusion: The empirical value of the F test for 8 degrees of freedom in the numeration and 40 in the denomination was 78,57; The obtained empirical value of the F test is 78,57, which is more than the theoretical value (2,18), which rejects the zero hypotheses and confirms the alternative hypothesis, and also confirms the individual influence of independent variables on the dependent variable.

There is a negative link between the concentration ratio of deposits (CRDeposits) and the return on equity (ROE) (-0.244). Increase the concentration ratio of deposits by one unit, ceteris paribus, leads to a decrease of return on equity (ROE) by 0.24 units. At the end of the first half of 2019, 54.7% of savings were concentrated in two banks in the Federation of B&H, while the other five banks had individual participation of less than 2.0%. Also, of the total amount of savings, 46.9% refers to savings deposits in domestic and 53.1% in foreign currency. The given concentration consequently leads to three to four banks having significant financial result in the

structure of the total financial result. For illustration, at the end of the first quarter of 2019, the following banks had the largest share in the financial result structure: UniCredit bank Mostar (34.86%), Raiffeisen bank, Sarajevo (29.81%), Intesa Sanpaolo bank (11.05%) and NLB bank (6.55%) (Banking Agency of the Federation of Bosnia and Herzegovina, 2019, p. 23).

Table 5. The basic analysis between the dependent variable (ROE)
of banks in Bosnia and Herzegovina in the period: 2008q1 – 2019q4

Source	SS	df	MS	Number of observations	48
Model	2.111,28	8	301,61	F (8,40)	78,57
Residual	153,55	40	3,838	Prob >F	0.000
Total	2.264,83	48	305,448	R-squared	0.932
				Adj R-squared	0.9203
				Root MSE	1.959

ROE (dependent)	Coef.	Std. Err.	t	P>[t]	[95% Conf. Interval]	
GRNGL	0.06256	0.0048	12.81	0.000	0.05269	0.07243
GRNPL	-7.84e-07	8.62e-07	-0.91	0.368	-2.53e-06	9.58e-07
GRGDP	9.38e-07	6.58e-07	1.43	0.162	-3.91e-07	2.27e-06
CRLoans	0.02387	0.24970	0.10	0.924	-0.48081	0.52855
CRDeposits	-0.2443	0.28528	-0.86	0.397	-0.82098	0.33219
CAR	-0.1560	0.36505	-0.43	0.671	-0.89381	0.58180
LDR ratio	-0.0072	0.08214	-0.09	0.930	-0.17332	0.15872
_cons	15.1374	17.877	0.85	0.402	-20.993	51.268

Source: author's own calculations (STATA 13.0).

The same results were obtained for the second dependent variable (ROA) in the context of the comparison of the empirical and theoretical F test. The empirical value of the F test for 8 degrees of freedom in the numeration and 40 in the denomination was 55.13. The obtained empirical value of the F test is 55.13, which is more than the theoretical value (2,18), which rejects the zero hypotheses and confirms the alternative hypothesis, and also confirms the individual influence of independent variables on the dependent variable.

Table 6. The basic analysis between the dependent variable (ROA)
of banks in Bosnia and Herzegovina in the period: 2008q1 – 2019q4

Source	SS	df	MS	Number of observations	48
Model	8,979	8	1,2827	F (8,40)	55,13
Residual	0,9307	40	0,023	Prob >F	0,000
Total	9,9097	48	1,3057	R-squared	9,9061
				Adj R-squared	0,8896
				Root MSE	0,15254

ROE (dependent)	Coef.	Std. Err.	t	P>[t]	[95% Conf. Interval]	
GRNGL	0.00454	0.00038	11.94	0.000	0.00377	0.00531
GRNPL	-1.55e-08	6.71e-08	-0.23	0.818	-1.51e-07	1.20e-07
GRGDP	2.48e-08	5.12e-08	0.48	0.631	-7.87e-08	1.28e-07
CRLoans	0.004036	0.01944	0.21	0.837	-0.03525	0.0433
CRDeposits	-0.0169	0.0221	-0.76	0.451	-0.0618	0.0279
CAR	-0.0332	0.0284	-1.17	0.248	-0.0907	0.0241
LDR ratio	0.0073	0.0063	1.15	0.257	-0.0055	0.0202
_cons	0.7140	1.3918	0.51	0.611	-2.0988	3.5270

Source: author's own calculations (STATA 13.0).

Almost similar movements were recorded in the second dependent variable, i.e. return on assets in the context of the impact of individual independent variables. Table 6 shows the results of the ANOVA test between the dependent variables, i.e. return on asset (ROA) and the independent variables in the model. The most significant positive effects on the dependent variable (ROA) were recorded by the following independent variables: the growth rate of gross domestic product, the growth rate of net gross/loss (0.004), the concentration ratio of loans (0.004), and loan-to deposit ratio (0.007). The gross domestic product is one of the most common measures of economic activity in the country. GDP growth has a significant positive impact on the profitability of the financial sector, such that if economic activity grows at a faster pace than defined, it requires a higher amount of loans and capital and higher credit placements, which in turn affects improved banking activity. On the other hand, the strongest negative causality with the second dependent variable in the model (ROA) was recorded by the following independent variables: CRdeposits (-0.017), then the growth rate of non-performing loans and capital adequacy ratio (-0.03). Also, a high inverse relationship was observed between toxic credits and return on equity, which is quite logical. Non-performing loans increased the cost of provisioning, have the effect of reducing the bank's capital, making the bank unable to grow and expand its operations, and the result may be bank insolvency or liquidation (Babouček and Jančar, 2005). Also, banks with a high amount of non-performing loans in their investment portfolio are sure to achieve a reduction in their earnings (Bessis, 2006). In the banking sector of B&H at the end of 2018, the share of non-performing loans in total loans was amounted to only 6.5%, as a result of permanent write-offs by individual banks. Also, reprogramming and better monitoring, as well as interest rate reductions, had a greater impact on reducing toxic loans (The Central Bank of Bosnia and Herzegovina, 2018, p. 35).

According to Flannery and Rangan (2008), banks with low capital and higher levels of risk can increase profits by increasing the equity multiplier. According to our results, there is an inverse relationship between the dependent variable (ROA) and CAR. Increase the capital adequacy rate of one unit, ceteris paribus, leads to a decrease of return on asset (ROA) by 0.03 units. Banks in Bosnia and Herzegovina had regulatory capital above 12% of the time horizon required by law. For the observed period, CAR recorded its highest value in the third and fourth quarters of 2019, 18% respectively. The lowest value was recorded in the third and fourth quarters of 2015, 14.90% respectively.

5. CONCLUSION

Bank profitability is a very important determinant of both the bank and the entire financial system. Further lending to the economy depends on bank profitability. In this regard, bank profitability depends primarily on the amount of lending and credit risk associated with the lending, as well as other risks arising from the macroeconomic environment. In this paper, we investigated the internal and external factors that determine the profitability of banks in Bosnia and Herzegovina. For this purpose, in this study investigated took place for the banking sector of Bosnia and Herzegovina on period of 2008: q1-2019: q4 in the research part of the paper through the underlying correlation analysis, comparison of empirical and theoretical F-test in terms of testing null and alternative hypothesis. The results showed that a zero hypothesis were rejected and an alternative hypothesis accepted in terms of some independent variables that have a significant influence on the ROE and ROA. The results showed that the most significant (positive) influence on the dependent variables were the return on equity (ROE) and return on asset (ROA), which has been achieved by the following independent variables, such as the growth rate of net gross/

loss, the growth rate of gross domestic product and concentration ratio of loans. On the other hand, the most significant negative link on the dependent variables were the return on equity (ROE) and return on asset (ROA), which has been achieved by the following independent variables: the growth rate of non-performing loans, concentration ratio of deposits and loan-to-deposit ratio for the dependent variable ROE.

Improving the performance of banks in Bosnia and Herzegovina over the next few years will be a major challenge due to the influence of external factors such as slower economic growth, competitiveness, saturation of economy and population with credit, slow growth of employment and income, etc. In this regard, a successful response to a turbulent environment is certainly to forecast the bank's performance. Therefore, a larger data set of B&H banks could help to incorporate more determinants into the model and better understand the long-term and short-term relationships to the bank's profitability. This issue should be further explored.

REFERENCES

Babouček, I., Jančar, M. (2005). Effects of Macroeconomic Shock to the Quality of the Aggregate Loan Portfolio. Czech National Bank, *Working Paper Series,* No. 1, pp.1–62.

Banking Agency of Republika Srpska (2018). Report on Condition of the Banking System of Republika Srpska. Retrieved from: https://abrs.ba/public/data/documents/1245/Report-BankingSystem31122018.pdf.

Banking Agency of the Federation of Bosnia and Herzegovina (2018). Information on the Banking System Entities of the Federation of Bosnia and Herzegovina. Retrieved from: https://www.fba.ba/upload/docs/informacija_o_subjektima_bankarskog_sistema_31122018_eng_5_tXo.pdf.

Banking Agency of the Federation of Bosnia and Herzegovina (2019). Information on the Banking System Entities of the Federation of Bosnia and Herzegovina. Retrieved from: https://www.fba.ba/upload/docs/informacija_o_bankarskom_sistemu_30092019_eng_fra.pdf.

Bessis, J. (2006). *Risk Management in Banking.* 4th edition. London, UK: John Wiley & Sons Ltd.

Bikker, J.A., Bos, J.W.B. (2008), *Bank Performance: A Theoretical and Empirical Framework for the Analysis of Profitability, Competition and Efficiency.* New York, U.S.A: Routledge.

Bokhari, I.H., Ali, S. M. (2009). Determinants of capital adequacy ratio in banking sector: An empirical analysis from Pakistan, *Academy of Contemporary Research Journal*, Vol. 1 No. 1, pp.1-9.

Borio, C., Gambacorta, L., Hofmann, B. (2015). The influence of monetary policy on bank profitability, *BIS Working Papers*, No 514, October.

Boubakri, N., Cosset, J., Fischer, K., Guedhami, O. (2005). Privatization and bank performance in developing countries. *Journal of Banking and Finance*, No.29, pp.2015–2041.

Căpraru, B. and Ihnatov, I. (2015). Determinants of bank's profitability in EU15, *Scientific Annals of the AlexandruIoanCuza*, 62 (1), pp. 93-101.

Ćuraka, M., Poposkib, K., & Pepura, S. (2012). Profitability Determinants of the Macedonian Banking Sector in Changing Environment. *Procedia-Social and Behavioral Sciences, No. 44*, pp. 406-416.

Dietrich, A., Wanzenried, G. (2011). Determinants of bank profitability before and during the crisis: evidence from Switzerland, *Journal of International Financial Markets, Institutions and Money*, No.21(3), pp. 307–327.

Đukić, Đ. (2011). *Upravljanje rizicima i kapitalom u bankama,* Centar za izdavačku delatnost Ekonomskog fakulteta u Beogradu, Beograd.

Flannery, M. J., Rangan, K. P. (2008). What caused the bank capital build-up of the 1990s?, *Review of Finance,* 12, p. 391.

Goddard, J., Molyneux, P., Wilson, J. (2004). Dynamics of Growth and Profitability in Banking, *Journal of Money, Credit and Banking 36(3),* pp.1069-1090.

Gorton, F., Winton, A. (2005). *Financial Intermediation.* Harrysburg, PA, University of Pennsylvania Press.

Gul, S., Irshad, F., Zaman, K. (2011). Factors affecting bank profitability in Pakistan, *The Romanian Economic Journal* No.39, pp.61–87.

Ibrahimov, A. (2016). The Impact of Devaluation and Oil Price on the Banking Sector of Azerbaijan. Master's dissertation, Porto University, Porto, Portugal, July. Available online: https://sigarra.up.pt/fep/pt/pub_geral.show_file?pi_gdoc_id=779998 (accessed on 12 April 2020).

Koch, T.W., MacDonald, S.S. (2009). *Bank Management.* Cengage Learning.

Mishkin, F.S. (2007). The Economics of Money, Banking, and Financial Markets (eight edition). The Addison-Wesley series in economics.

Naceur, S. B., & Omran, M. (2011). The effects of bank regulations, competition, and financial reforms on banks' performance. *Emerging Markets Review, No. 12*, pp. 1-20.

Ongore, V. O., Kusa, G. B. (2013), Determinants of Financial Performance of Commercial Banks in Kenya, *International Journal of Economics and Financial* Issues, 3(1), pp.237-252.

Satria, I., Supriyadi, E., Irfani, A., Djamil, A. (2018). The most important factors affecting profitability of the top 10 commercial banks in Asian. *The International Journal of Social Sciences and Humanities Invention* 5(05), pp.4742-4753.

Sinkey, J.F. (1998). *Commercial bank financial management.* Macmillan.

The Central Bank of Bosnia and Herzegovina (2018). Financial Stability Report. Retrieved from: https://www.cbbh.ba/Content/Archive/575?lang=bs

Trujillo-Ponce, A. (2013). What determines the profitability of banks? Evidence from Spain, *Journal of Accounting and Finance*, No.53, pp. 561 – 586.

Vong, A. P. I., Hoi, S. C. (2009). Determinants of Bank Profitability in Macao, pp. 93-113.