

# What drives the profitability of the banking sector? An Empirical evidence from Bosnia & Herzegovina

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**Abstract:** *This paper empirically examines the relationship between the key banks' specific variables of regression models in determination of bank profitability in Bosnia and Herzegovina (B&H). For the purposes of econometric modeling, quarterly indicators of the banking sector based on country's aggregate data over the period 2000q1 to 2014q2, including one macroeconomic indicator (GDP growth rate) were employed.*

*The key findings of this research showed that there was a positive and statistically significant relationship between (ROAA), the three of explanatory variables (LATA, TLTD and CRR) and a negative and statistically significant relationship with CEF and CAR. The results of our study have shown that higher bank's profitability measured by ROAA was possible if the banks increase the employment of capital, effectively manage operating costs, increase the share of deposits in financing loans, and improve non lending operation. More specifically, ROAE was significantly influenced by only two variables: cost efficiency and management of credit risk. Our findings of Model 2 and statistically insignificant relationships of six explanatory variables with ROAE can be explained by the consequences of global financial crisis. This influenced the profitability since more economic factors were affected abnormally during analyzed periods.*

*The paper is structured as follows: Section 2 deals with the literature review; Section 3 contains an explanation of the data and methodology and Section 4 deals with empirical findings. The*

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*findings and discussion presented in previous sections of this paper end with conclusions in section 5.*

*Keywords: profitability, banking sector, Bosnia and Herzegovina, bank's specific variables, ROAA, ROAE*

*JEL Classifications: G21, C33*

## **INTRODUCTION**

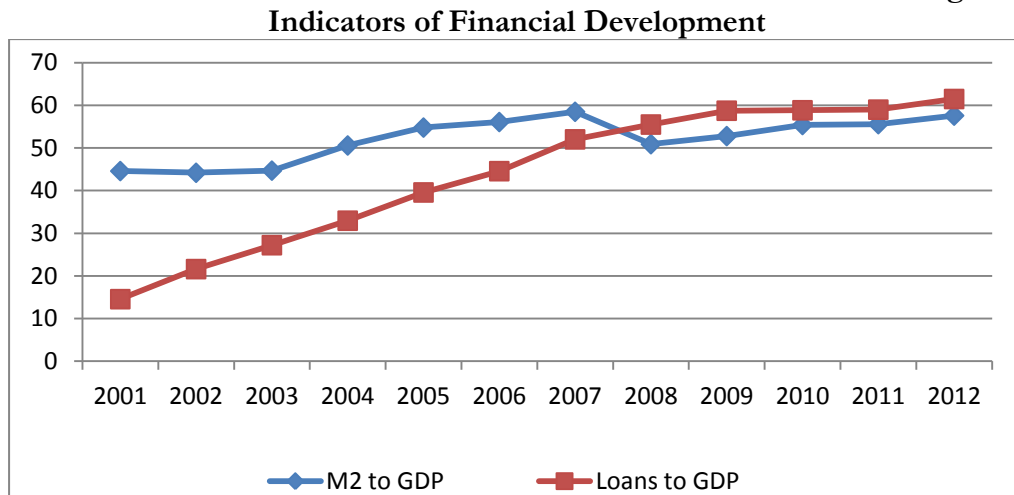
The establishment of a stable market environment for financial institutions in Bosnia and Herzegovina (B&H) has a fundamental importance in terms of the transition of this country from a centrally planned towards market-oriented economy.

The banking reforms undertaken by B&H during the process of transition from a centrally planned to a market oriented economy have been aiming to the transform the commercial banks from passive financing agents of government to proactive financial intermediates supporting the interest of the private sector. Also, in the last decade the banking sector of B&H demonstrated a high degree of its viability and restored the lost confidence of the public. Following the transition process of the early 1990s, it can be concluded that commercial banks were not significantly exposed to the competition of other specialized financial service providers. Furthermore, the commercial banks enjoyed a dominant position in mobilizing of savings because the underdeveloped capital market played a marginal role in channeling savings to productive investment.

A transition to the new era of market oriented commercial banking was marked by the processes of mergers, acquisitions and consolidations of banks where the number of commercial banks has declined from 76 (in 1997) to 28 banks (in 2012).

The analysis of the financial depth (measured as the ratio of M2 to GDP) and intermediation (measured as the ratio of private credits to GDP) ratio over a given time period (shown in figure 1) suggests some positive trends in the banking industry in B&H.

Figure 1

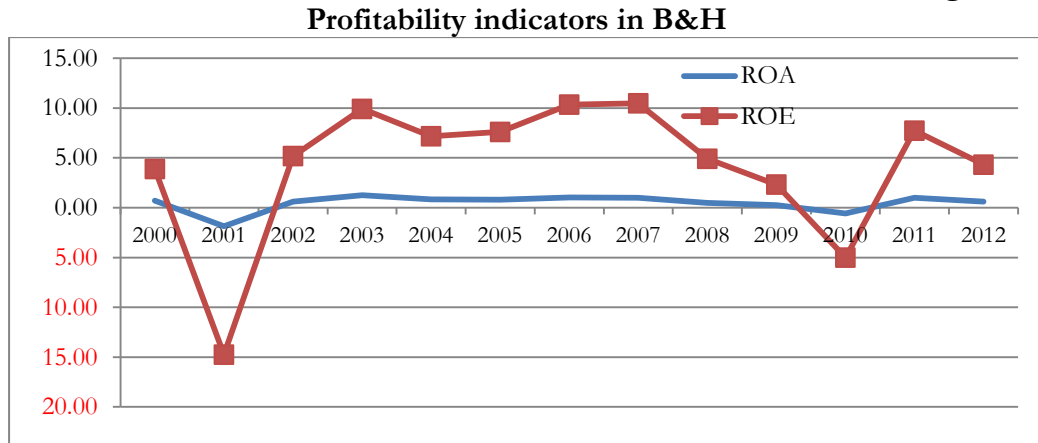


Source: the authors' elaborations on CB of B&H data

As shown in Figure 1, the gap between financial intermediation and the degree of financial deepening in B&H have been significantly reduced due to the significant role of commercial banks in the process of financial intermediation. Accelerated degree of financial deepening in the economy of B&H (increasing of the ratio the ratio of M2 to GDP), was one of the main sources of the growth of assets in the banking sector. The M2-to-GDP ratio increased from 44% to over 57.6% between 2001 and 2012. At the time of credit expansion the M2-to-GDP ratio also expanded from about 44.60 percent of GDP in 2001 to 58.50 percent in 2007.

Figure 2 illustrates some variation in profitability of banking sector of B&H over time. Over the period from 2002 to 2007, ROE indicator increased from 5.18% in 2002 to 10.48% in 2007, while ROA indicator recorded growth from 0.61% (2002) to 0.99% (2007). Equally notable, however, the adverse effects of the global financial crises were transmitted to domestic banks in the first quarter of 2008 and profitability indicators continued to weaken. Over the crisis's period (2008-2012) the average rate of ROA in the banking sector of B&H was 0.35 percent and the average rate of ROE was 3.86 percent.

Figure 2



Source: the authors' elaborations on CB of B&H data

## LITERATURE REVIEW

Most of the previously conducted studies that analyzed the profitability of commercial banks were mainly focused on the stability of individual banks in the United States (Berger, 1995). His research found that ROE was positively influenced by capital-asset ratio (CAR), and the efficiency of management. The research conducted by Brock and Suarez (2000) investigated the determinants of banks' profitability focusing on a sample of seven Latin American countries (i.e. Argentina, Bolivia, Chile, Colombia, Mexico, Peru and Uruguay). The study revealed that the banks' interest margins in the 1990s were influenced by banks' specific variables, individual commercial banks (e.g. liquidity and capital), but also of the general macroeconomic variables (i.e. the volatility of interest rates, inflation and GDP growth). The research conducted by Bourke (1989) and Molyneux and Thornton (1992) has shown that banks' profitability was positively and significantly influenced by capital ratios. Moreover, Athanasoglou et al (2006) examined the profitability behavior of bank-specific, industry related and macroeconomic determinants, using an unbalanced panel data set of seven South Eastern European countries (i.e. Albania, Bosnia and Herzegovina, Bulgaria, Croatia, FYR of Macedonia, Romania and Serbia-Montenegro) over the period 1998-2002.

They found that, with the exception of liquidity (the higher liquidity is followed with lower profitability) all selected banks'-specific determinants significantly affected banks' profitability. There is also a debate in the literature about the

relationship between CAR and profitability. The study by Goddard, Molyneux and Wilson (2004) used cross-sectional and dynamic panel estimation to examine determinants of profitability in six major European banking sectors (i.e. Denmark, France, Germany, Italy, Spain and the UK), over the period 1992-1998. They found a positive relationship between CAR and profitability. In addition, Kosmidou and Zopounidis (2005) analyzed the performance and profitability factors of the Greek banking system over the period 1998–2003 and investigated the differences of performance related to the banks' size. Their research suggested that the lower cost of the banks' CAR was followed by higher net interest margin. Their conclusions were in accordance with the interpretation that the capital serves as a signal of bank's solvency. The influence of CAR and quality assets on the profitability of banks was examined by Staikouras and Wood (1999). They explored the profitability of banks in the European Union in the period 1994 - 1998. Trujillo- Ponce (2013) empirically analyzed factors that affected the profitability of Spanish banks for the period 1999-2009 using an unbalanced panel data of 697 observations. This study indicated that better capitalized banks tended to be more profitable when ROA was taken as the measure of profitability. Some other authors, such as, Pasiouras and Kosmidou (2006), considered loan-loss provisions and their influence on profitability. Higher loan-loss provisions indicated the probability of loans to become NPLs, higher provisions were expected to be negatively related to banks' profitability. In economic literature, there is also a debate about the relationship between liquid assets and banks' profitability. Maintaining high liquidity position can very easily lead to the underperformance of banking assets and thus to lower profitability of banking firm.

Košak and Čok (2008) considered liquidity ratio and found that this ratio was negatively related to banks' profitability. In their findings, Molyneux and Thornton (1992) found a negative correlation between liquidity and profitability levels. The ratios of operating expenses to operating income and operating expenses to total assets are commonly used to measure the managerial efficiency of the banks. These indicators are used to measure management's ability to influence bank's performance. Some authors, such as: Indranarain (2009), Bourke (1989) and Molyneux and Thornton (1992) found that higher managerial efficiency was followed by higher bank's profit. Accordingly, a positive relationship was expected between managerial efficiency and profitability of banks. In their research Demirgüç-Kunt and Huizinga (1998) used bank level data for 80 countries in the period 1988-1995, in order to examine how banks' characteristics and the overall banking environment affected the functioning of banks. They concluded that a

larger banks' asset to GDP ratio and a lower market concentration ratio led to lower margins and profits, as well as the government regulations, such as the design of deposit insurance schemes, have an impact on banks' margins. Moreover, their findings showed positive relationship between the ratio of banks' loans to total assets.

A more recent study by Flamini et al (2009) examined the determinants of bank profitability in region of Sub-Saharan Africa and explored the relationship between profits and equity in the region's commercial banking sector over the period 1998 - 2006. It found that the GDP growth was not necessarily positively related with banks' performance. Furthermore, Jonghe and Vennet (2008) examined how stock market investors perceived the impact of market structure and efficiency on the long-run performance potential of European banks using data on 183 banks from 15 European countries, over the period from 1997 to 2004. Their findings revealed that GDP growth increased banks' profitability.

#### RESEARCH METHODOLOGY AND DATA

For the purposes of econometric modeling, quarterly indicators of financial stability of the banking sector, including macroeconomic indicators were employed for the period from 2000q1 to 2014q2. Bank data on specific variables for the empirical analysis has been sourced from the Central Bank of Bosnia and Herzegovina, the Banking Agency of the Federation of Bosnia and Herzegovina and the Republic of Srpska, while data for external determinants of profitability (GDP growth rate) was sourced from the quarterly data of the Agency for Statistics of Bosnia and Herzegovina. Accordingly, for purposes of this paper the following dependent variables and independent (explanatory) variables were employed.

The selection of the above listed variables was based on their influence on bank's profitability as well as on the theoretical and empirical literature reviewed. In testing the relationship between banks' profitability, and banks' – specific and macroeconomic variables, the following regression model will be employed:

$$Y_{i,t} = f(CAR_t, TLTD_t, CEF_t, CRR_t, AQL_t, MGE_t, LATA_t, GDP_t)$$

$$Y_{i,t} = \beta_0 + \beta_1 CAR_t + \beta_2 TLTD_t + \beta_3 CEF_t + \beta_4 CRR_t + \beta_5 AQL_t + \beta_6 MGE_t + \beta_7 LATA_t + \beta_8 GDP_t + u_t$$

$\beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7$  and  $\beta_8$  are parameters (coefficients)

$u_t$  – error term

$Y_{i,t}$  – dependent variable, ROAA(M1), ROEA(M2)

For the evaluation of the model, it is important to examine assumptions as well as multi-co linearity, autocorrelation and heteroscedasticity.

Hypothesis:

The H0 null hypothesis:  $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = \beta_7 = \beta_8 = 0$  (All values of the regression coefficients are equal to zero)

The H1- alternate Hypothesis:  $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = \beta_7 = \beta_8 \neq 0$  (At least one of the significant variables in the regression model explains the variation in the bank's profitability).

**Table 1**

**Variable Definitions**

Variable	Notation	Measurement	Expected sign	Literature
Capital adequacy ratio	CAR	Capital adequacy ratio measured by Net capital to RWA	+/-	Berger (1995), Staikouras and Wood (2004), Demirgüç-Kunt & Huizinga (1998), Hyun & Rhee (2011)
Liquidity	TLTD	It is measured as a ratio between total loans to total deposits	-	Molyneux & Thornton (1992), Kosmidou (2008)
Cost efficiency	CEF	It is measured as a ratio between Non- interest expenses to gross income	-/+	Bourke (1989), Jiang et al.(2003), Gischer & Juttner (2001)
Credit risk	CRR	It is calculated as a ratio between NPLs to total gross loans	-	Miller & Noulas (1997), Alper & Anbar (2011), Bourke (1989)
Managerial efficiency	MGE	It is calculated as a operation expenses to total average assets	+	Indranarain (2009), Bourke (1989),

				Molyneux & Thornton (1992)
Asset quality	AQL	It is calculated as a ratio between total loans to total assets	+	Abreu & Mendes (2000), Demirguc-Kunt & Huizinga, (1998)
GDP growth rate	GDP	The quarterly real gross domestic product (GDP) growth rate	+	Jonghe & Vennet (2008); Bikker & Hu, (2000)
Liquidity	LATA	It is calculated as a ratio between Liquid assets to total assets	-/+	Molyneux & Thornton (1992); Bourke (1989) and Kosmidou and Pasiouras (2005)
Return on Average Assets-	ROAA	ROAA is calculated as the ratio of net income and the average assets		Athanasoglou et al. (2006), Miller & Noulas, 1997), (Alper & Anbar, 2011),
Return on Average Equity	ROAE	ROAE is calculated as the ratio of net income and the average equity		Goddard, Molyneux & Wilson (2004)

#### IV. EMPIRICAL RESULTS

The matrix of interrelations of all explanatory variables is displayed in Table 2. The correlation coefficients between the independent variables take on values ranging from -0.061 to 0.68385 implying a moderate degree of collinearity between the variables. The independent variable RIR has a negative correlation coefficient with all variables, with the exception of GDP. Further, the variable CRR has a positive correlation coefficient with AQL and negative correlation



coefficient with GDP. Accordingly, it can be concluded that there is no significant problem of multicollinearity between independent variables.

Table 2

## Correlation matrix

	LATA	MGE	CEF	TLTD	CAR	CRR	AQL	GDP
LATA	1							
MGE	0.01385	1						
CEF	0.29526	-	1					
TLTD	-0.1023	0.0972	0.4248	1				
CAR	0.23628	0.3375	-0.061	-0.1729	1			
CRR	-0.4285	0.2596	0.3299	0.57068	-0.0532	1		
AQL	-0.6157	0.0866	0.1829	0.48823	-0.3778	0.68385	1	
GDP	0.42756	0.0786	0.179	0.00807	0.59589	-0.1071	-	1

Source: Authors' calculations

Before we conduct the regression analysis, each variable should be tested for stationarity. If the time series is not stationary, the traditional regression analysis will provide spurious results. So, the unit root test is conducted firstly in our analysis.

Table 3

## Augmented Dickey-Fuller Test of Stationary

UNIT ROOT TEST RESULTS		
LEVEL	ADF	PP
	K=5	k=8
ROAA	-5.1434***	-4.2639***
	K=4	k=44
ROAE	-2.6412*	-3.0053***
	K=3	k=5
CRR	-0.7865	-0.4388
	K=0	k=5
CAR	-2.2349	-2.1850
	K=0	k=2

LATA	-1.4266	-1.8413
	K=0	k=0
MGE	-4.7165***	-4.6165***
	K=0	k=4
CEF	-2.5610	-2.3635
	K=0	k=1
AQL	-1.6837	-1.7588
	K=	k=5
TLTD	-3.5885***	-3.5706***
	K=0	k=4
GDP	-2.8668	-2.7039
1ST DIFFERENCES	ADF	PP
	K=2	k=4
CRR	-3.5146**	-9.8553***
	K=1	k=15
CAR	-6.4055***	-8.6310***
	K=0	k=1
LATA	-7.0126***	-7.0140***
	K=0	k=9
CEF	-8.9637***	-9.6253***
	K=0	k=2
AQL	-7.0208***	-7.0137
	K=0	k=16
GDP	-8.8655***	-9.8028

**Notes:** \*, \*\*, \*\*\* stars refer respectively to 10 %, 5 % and 1 % significance.

Source: Authors' calculations

In time series analysis, if a series does not have a stochastic trend and is stationary, it is said to be integrated of order zero or  $I(0)$ . If a series has random walk trend, it is said to be integrated of order one or  $I(1)$  (Stock & Watson, 2007). The null hypothesis for the non-stationarity is tested by ADF and Philips-Perron tests in our analysis and results are presented in Table 3. We applied these tests to the levels and the first differences of the series. The findings reveal that some variables, such as: CRR, CAR, LATA, CEF and AQL can be considered as stationary after first differences, so these variables are:  $I(1)$ . ROAA, ROAE, MGE and TLTD variables are observed as stationary at a level, which means they are  $I(0)$ .

(0). In order to examine the validity and reliability of the model, the effects of heteroscedasticity, model specifications and autocorrelation are examined by running several diagnostic tests. The results of these diagnostic tests are displayed in Table 4. The examination of autocorrelation in our models was used by applying DW test and Breusch- Godfrey LM test. The findings of the DW statistics in our models (e.g. M1=2.091994, M2=1.823097) suggest that there is no problem of serial correlation, in the long run. Also, the presence of serial correlation was rejected by the Breusch-Godfrey test and it indicates that no serial correlation up to first lag.

Table 4

Model - diagnostic test results

Diagnostic Tests	M1: P-Values- $\chi^2$	M2: P-Values- $\chi^2$
Breusch-Godfrey LM test for autocorrelation	0.5901	0.5207
ARCH Test	0.8920	0.0615
White Heteroskedasticity Test	0.2922	0.6106
Jarque Bera Normality Test	0.4572	0.9109

Source: Authors' calculations

The probability of the F statistic (13.31; p value=0.0000) for the overall regression relationship is < then 0.05. It implies that Model 1 represents a good fit. Adjusted R Square (which is more suitable for comparing models with different numbers of independent variables) for M1 reveals that 63.34% of the variation of the ROAA is explained by the explanatory variables present in the first model. No significant relationship was found between ROAA and GDP growth rate, AQL and MGE. When assessing the impact of independent variables on profitability (ROAA), the variable LATA has the most influence whose regression standardized coefficient (beta) is 0.820, followed by a variable CRR (beta = 0.492), TLTD (beta= 0.444), CEF (beta= -0.353) and CAR (beta = -0.274). It reveals, also, that all other regression coefficients were not statistically significant because the p-value is > 0.05. Furthermore, positive and the strong relation are found between ROAA and the three of explanatory variables (LATA, TLTD and CRR). This implies that when each of these variables increases, it leads to a higher profitability. ROAA is significantly influenced by liquidity ratio, measured as the one between liquid to total assets. Furthermore, we found significant relationship between ROAA and TLTD. This result follows from the fact that TLTD ratio is present as an inverse proxy for the liquidity and it implies that the higher LTTD ratio means the higher

banks' profitability. It confirms that significance of this variable is in accordance with previous literature of Kosmidou (2008). Our findings are confirmed by a study conducted by Molyneux and Thornton (1992) and Kosmidou and Pasiouras (2005) for the first two variables with the exception of CRR. Credit risk, as measured by NPLs to total loans has an inverse relationship with ROAA and it is not proven to be in line with other banking studies (Miller and Noulas, 1997), (Alper and Anbar, 2011), (Bourke, 1989).

Table 5.

## Estimation results

dependent variable	Model 1: ROAA	Model 2: ROEA
Variable	Coefficient/p value	Coefficient/p value
C	-.8961359 (0.505)	40.30711 (0.001)
LATA	.0749658 (0.000)	-.1571747 (0.135)
MGE	.0907297 (0.265)	.6924714 (0.323)
CEF	-.0158752 (0.001)	-.2193844 (0.000)
TLTD	1.320087 (0.000)	-4.505835 (0.135)
CAR	-.1219683 (0.006)	-.0151467 (0.967)
CRR	.045571 (0.001)	-.3462756 (0.003)
AQL	.3230882 (0.824)	-11.32858 (0.367)
GDP	.0050391 (0.802)	-.0812 (0.640)
R Square	0.6848	0.7744
Adjusted R Square	0.6334	0.7376
F statistic	13.31	21.03
Prob (F-stat)	0.0000	0.0000

DW test	2.091994	1.823097
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\*Source: Authors' calculations

The last one is in contrast with some of the previous researches conducted by Miller and Noulas (1997), Alper & Anbar (2011), etc. Also, the regression output shows that ROAA is a statistically significantly and negatively influenced by CEF (-0.0158752) and CAR (-0.1219683) and they have an inverse relationship with the ROAA. It means that when each of these variables increases, it leads to a lower ROAA. The CAR, as measured by Net capital to RWA is estimated to have an inverse and statistically significant relation with the profitability indicating that high CAR reduces ROAA. The higher CAR means lower leverage multiplier and consequently a lower return on equity (ROEA). Our results are consistent with findings of the research by Miller and Noulas (1997). Moreover, negative relationship is proven between CEF and profitability of the commercial banks as measured by ROAA and ROAE. This result is consistent with the previous study conducted by Bourke (1989) and Jiang et al. (2003). The expected value of the ROAA, when the value of the independent variables is equal to zero shows: that when CRR ratio increases by 1%, then the ROAA will increase by 0.45%; increase of the CEF ratio by 1% the ROAA will decrease by 0.15%; when TLTA ratio increases by 1%, then the ROAA will increase by 13.2%, when the CAR ratio increases by 1% then the ROAA will decrease by 1.2%; when LATA ratio increases by 1% then the ROAA will increase by 0.74%.

The findings of multiple regressions in Model 2 reveal that 77.44% of the variation of the ROAE is described by the explanatory variables of the commercial banks in B&H. The remaining nearly 22.56 % of the variation in ROEA can be explained by factors that are not included in Model 2. As shown by the obtained findings in Model 2, all explanatory variables with the exception of MGE (0.6924714) have a negative relationship with ROEA. These findings further suggest that only two variables (CEF and CRR) are statistically significant with the level of significance of 0.05, while all other explanatory variables do not prove to be statistically significant in determining the profitability of commercial banks in B&H. Accordingly, we are unable to find a statistically significant relationship between six explanatory variables and ROEA.

Along with the above findings the following conclusions can be drawn: (see table 6).

**Table 6**

**Nature and Strength of the impact of determinants on profitability the banking sector**

Explanatory variable	Model 1	Model 2
LATA	Positive and Significant <b>Reject H0: yes</b>	Negative and Non-Significant <b>Reject H0: no</b>
MGE	Positive and Not Significant <b>Reject H0: no</b>	Positive and Not Significant <b>Reject H0: no</b>
CEF	Negative and Significant <b>Reject H0: yes</b>	Negative and Significant <b>Reject H0: yes</b>
TLTD	Positive and Significant <b>Reject H0: yes</b>	Negative and Non-Significant <b>Reject H0: no</b>
CAR	Negative and Significant <b>Reject H0: yes</b>	Negative and Non-Significant <b>Reject H0: no</b>
CRR	Positive and Significant <b>Reject H0: yes</b>	Negative and Significant <b>Reject H0: yes</b>
AQL	Positive and Not Significant <b>Reject H0: no</b>	Negative and Non-Significant <b>Reject H0: no</b>
GDP	Positive and Not Significant <b>Reject H0: no</b>	Negative and Non-Significant <b>Reject H0: no</b>

## V. CONCLUSION

In accordance with the results of the study, it can be concluded that the usual assumptions of independence of observations and their impact on the profitability on the banking sector in B&H are correct. The influence of certain independent variables on the profitability of the banking sector in B&H can be assessed in accordance with their influence in the banking systems of developed countries, and as confirmed by earlier findings in the empirical studies. Some variance in the individual variables is the result of economic and financial crisis of 2008 that adversely affected lending operation and banks' profitability to the middle of 2010.

The results of our study have shown that higher ROAA could be possible if: the banks increase the employment of capital, effectively manage operating costs, increase the share of deposits in financing loans and improve non lending operation.

In M1, the empirical study shows that the profitability of the banking sector in B&H measured by ROAA is significantly influenced by variables, such as: LATA, CEF, TLTD, CAR and CRR. In addition, it is interested that the profitability of the banking sector in B&H is more influenced by non lending operations (i.e. fees and commissions) than their lending operations, because the variable AQL has an insignificant impact. The higher share of deposits to loans is linked with improved profitability because it translates to lower borrowed financing resources (e.g. cost efficiency) and higher profitability. The findings further suggest that negative relationship between CAR and profitability shows that banking capital is not utilized by the commercial banks in B&H in an efficient and effective manner. The same result has been found by the Hyun and Rhee (2011) and it is explained by the fact that if the commercial banks maintain a higher CAR, the banks will restrict their activities, which could be adversely affecting banks' expansion and profitability. In the Model 1, it is determined that liquidity, expressed as a ratio between total loans to total deposits, as well as a ratio between total loans to total assets has positive and statistically significant impact on the profitability as measured by ROAA.

Indicators that significantly affect the ROAE are not identical indicators that significantly affect the ROAA. More specifically, ROAE is significantly influenced by only two variables: cost efficiency and management of credit risk. By analyzing other statistical results of multiple regressions in Model 2, we also found that the ROAE is not significantly influenced by other explanatory variables. Accordingly, our findings of the determinants of banks' profitability as measured by ROAE are not in line with other banking studies. Our findings of Model 2 and statistically insignificant relationships of six explanatory variables with ROAE can be explained by the detrimental consequences of the global financial crisis. It influenced the profitability, since more economic factors were abnormally affected during analyzed periods.

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