THE DETERMINANTS OF BANKS' CAPITAL ADEQUACY RATIO: EVIDENCE FROM WESTERN BALKAN COUNTRIES

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Abstract

This research aims to evaluate the impacts of liquidity, profitability, size, loans and capital structure on banks' capital adequacy ratio (CAR) in the Western Balkan region using annual data from 103 commercial banks operated in Western Balkan countries for the period between 2010 and 2018. Panel data fixed effect method is employed. The data comprises of a total 51 observations for panel least squares. The empirical findings obtained panel data regression show that profitability proxies by the return on asset (ROA) have the largest impact on CAR among other financial ratios. In addition, liquidity and size have statistically significant positive effects in determining capital adequacy ratio for the banks in the region, unlike leverage ratio. However, the leverage ratio has a negative impact on the capital adequacy ratio. The policy implications of this study suggest that in order to accomplish requirements for capital adequacy expectations are to have good indicators in regard to performance, liquidity and size.

Keywords: Capital Adequacy Ratio, Banking, Western Balkan, National and International Regulators

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1. INTRODUCTION

Banking institutions (and not only) founded by private capital and functioning in the market as intermediary financial units are oriented toward profit maximization while taking into account the regulatory goal of depositors' protection. Allen and Gale (2003) concluded that a bank is a cooperative enterprise that provides insurance to consumers. In Europe and other states, the financial system has experienced major reforms over the last two decades. Banks must conduct and accomplish their activities in accordance with domestic and international regulatory (credit, cash, and liquidity) criteria when transitioning. The banking system potentially does not have bad repercussions only for the soundness of the financial system, but it has an impact on the economic growth of a country. From this point of view, the importance of a healthy banking system is of high importance in the development of macroeconomic aspects of the real economy.

The banking sector in Western Balkans has undergone the process of structural reforms during the 1990s indicating the start of reform and transformation from socialist ownership type to private ownership and free market economy. Remarkable progress has been undertaken in the course of the privatization of the banking sector compared to Kosovo that started the creation of banking institutions from the scratch and with initial private ownership since 1999. Reforms affected the entire structure of the banks in regard to the ownership and business philosophy. Easy

conditions were set for the entrance of private domestic and foreign capital.

Bank's control the financial markets of the European Union (EU) candidate and prospective candidate nations, with international banks owning the bulk of these banks in the Western Balkans. These are predominantly EU-based banks that, since 2014, have been losing market share to other international banks. While banking systems are well capitalized and liquid, asset quality and indirect credit risk remain issues. Except for Kosovo, banks in EU candidate countries and potential candidates hold 83–98 percent of financial sector assets, with domestically-owned banks holding just 23 percent. Regional financial structures, according to the European Investment Bank (EIB), do not offer a wide range of financial products, limiting the number of financial instruments available. Generally, capital market participation is low, insurance product penetration is low, and non-bank financial institutions are insignificant.

The study is conducted for the Western Balkan countries considering the financial structure of the economies is bank-based. These countries, relatively small size economies, are aspiring the EU membership and belong to the economies in transition, based on the United Nations (UN) country classification. The banking sector in Western Balkans has undergone the process of structural reforms during the 1990s indicating the start of reform and transformation from socialist ownership type to private ownership and a free-market economy.

The Western Balkan is comprised of six countries: Albania, Bosnia and Herzegovina, North Macedonia, Kosovo, Montenegro, and Serbia, with a total population of about €20 million and a combined gross domestic product (GDP) of roughly €80 billion. The Western Balkan countries' per capita GDP is around a quarter of that of the richest EU members in Western Europe. The banking sector in Western Balkans has undergone the process of structural reforms during the 1990s indicating the start of reform and transformation from socialist ownership type to private ownership and a free-market economy.

Generally, banking institutions were well capitalized and solvent, placing them in a strong position to facilitate financial intermediation As of June 2018, regulatory capital-CAR was 17.9% of risk-weighted assets in the Western Balkans, with the majority made up of high-quality Tier 1 capital. In any case, this is well above the regulatory minimum standards. Profitability is improving, even though it remains poor in some situations, as shown by the fact that return on equity ratios ranged from 11 to 21 percent in June 2018. Căpraru and Ihnatov (2014) assessed the key determinants of banks' profitability in five selected Central Eastern Europe (CEE) countries and the result shows that management efficiency and capital adequacy growth influence the bank profitability for all performance proxies noticing that banks with higher capital adequacy are more profitable. In the Western Balkans, liquid assets to total assets (LATA) ratios averaged 28 percent, and loan-to-deposit ratios remained below 100. Nonetheless, a few domestically-owned banks in some countries are vulnerable due to declining liquidity and capitalization ratios or reliance on public sector funding.

The characteristics of the Western Balkans banking sectors are consisting of middle-sized banks with a traditional business model. These banks are financed mainly by primary deposits, covering on average more than 70% of the banking sector assets and loans to nonfinancial entities represent almost 60% of the total assets of the banking industry in the Western Balkan. Whereas, the loans-to-deposit ratio equals 82%. Regardless of the financial crisis and instability of financial markets, the capital adequacy ratio on average in the banking industry of Western Balkans reflected satisfactory results. That is demonstrated by the fact that the capital to risk-weighted assets ratio was higher than the capital thresholds set by banking regulators in the reference period. Following the conservative and strict prudential policy of the central banks regarding capitalization, the banking system displayed high capital adequacy ratios. Hafez and El-Ansary (2015) examine determinants of CAR prior and after the 2007–2008 global financial crises showing that before 2008 asset quality, size and profitability are the most significant variables while after crises the asset quality, size, liquidity, management quality and credit risk are the most significant variable explaining the variance of Egyptian banks' CAR.

The next sections of the study are structured as the following: Section 2 presents a review of the most relevant studies on the impact of several factors in capital adequacy subject in different banking institutions around the world; Section 3 describes the research question, data and methodology used for data collection analysis; Section 4 provides a description of the main empirical results whereas Section 5 presents the conclusion.

2. LITERATURE REVIEW

Capital adequacy subject has been in focus and raised great interest within both the academic literature and financial stakeholders. However, the existing literature research level of the implementation and adoption of capital adequacy framework by regulators is not satisfactory. In general, there is empirical literature investigating the adequacy of capital and behavior of financial institutions when regulatory institutions set capital requirements particularly in countries which are not belonging to the Western Balkan countries.

Literature review in this paper is represented based on factors which has impacted or have relationship with capital adequacy initially with profitability or return on asset (ROA) and ending with research papers that examined several factors that impact capital adequacy.

In 1988, Basel I was presented by the Basel Committee on Banking Supervision (BCBS) requiring a minimal capital ratio of risk-weighted-assets (RWA) of 8%. Concerning the minimum 8% of RWA, in 1991 the Central Bank of Egypt in agreement with Basel I requirements increased the minimum capital ratio in the banking industry. Additionally, the results of Naceur and Knadil's (2009) research have indicated that capital adequacy, profitability and cost of

intermediation have been increased along with the banks shareholders' curiosity for managing banks' portfolios.

Căpraru and Ihnatov (2014) conducted another analysis in the sense of the key determinants of bank profitability in CEE countries, Romania, Poland, the Czech Republic, Bulgaria, and Hungary, using return on average equity (ROAE), return on average assets (ROAA), and net interest margin (NIM) as proxies for profitability. Management productivity and capital adequacy growth impact bank profitability across all indicators, according to the report, while credit risk and inflation only affect ROAA and ROAE. Banks with a higher degree of capital adequacy are more successful, according to additional information.

Udom and Onyekachi (2018) examined the result of capital adequacy requirements on the performance of banks in Nigeria. In their study, they used the ordinary least squares (OLS) regression method. General variables of capital adequacy of the study show that total qualifying capital, capital to risk-weighted assets and adjusted shareholders capital have a significant impact on ROA, a measure of bank performance. The study also shows that capital adequacy has a positive relationship with the financial performance of banks and that the sufficiency of capital and adequate management could stimulate and improve financial performance. International Monetary Fund supported the financial crisis of 1997 in Asia to help recover and restore assurance and stability globally which maintains financial market development. Interested in bank governance role during the times of Asian financial crisis, banks performance was also examined by Reynolds, Ratanakomut, and Gander (2000). The researchers state that loan preference ratios and capital ratios were greater during the period of financial liberalization implying increased risk. The increasing of the management size also increases capital adequacy, while profitability acts in contrast to diminishing returns.

The effect of Basel Accord regulatory guidance on bank risk control in Vietnamese commercial banks was investigated by Pham and Daly (2020). The study looked at how these banks handle and regulate their risk and capital levels in compliance with Basel Accord guidelines. The findings suggest that the Basel Accord capital adequacy regulations have a significant effect on risk-based capital adequacy requirements in Vietnamese commercial banks, with the goal of improving financial efficiency and reducing risks.

Vu and Dang (2020) published another report on Vietnamese commercial banks. The research uses a panel data survey of Vietnamese commercial banks from 2011 to 2018 to identify the factors that have a significant effect on the CAR. Owing to acquisitions and mergers, the number of banks declined from 41 to 31 over this time period. Loan, liquidity, ROA, return on capital, leverage, and other variables were used to evaluate the impact of capital adequacy ratio on Vietnam commercial banks. Return on investments, loan loss reserves, and debt all have a negative effect on the earnings, while the ROA metric has a positive impact. The CAR of such commercial banks was unaffected by other factors.

Hafez (2018) conducted a research paper on the relationship between bank productivity and capital adequacy ratios in Egypt. The study analyses data from 40 banks, including Islamic, conventional, and conventional banks with Islamic windows, from the pre- and post-global financial crisis years of 2002 to 2015. To measure bank efficiency, the researchers used data envelopment analysis (DEA) linear programming and a panel regression analysis through the EViews software framework to investigate the relationship between capital adequacy ratios and bank efficiency. The results suggest a favorable substantial association between productivity and capital adequacy ratios, credit risk, performance, bank size, and management quality prior to financial crises. On the other hand, liquidity has a strong negative association with productivity. The efficiency of traditional banks was higher than that of Islamic and conventional banks with Islamic screens, according to the analyst. The period following the financial crisis demonstrates that bank efficiency has been altered, especially for traditional banks. Traditional and conventional banks with Islamic windows have a negative significant relationship with capital adequacy ratios, whereas Islamic banks' productivity is higher and reflects a positive significant relationship with capital adequacy ratios. The performance of banks influences the amount of capital and risk carried by banks, according to the report.

Roman and Sargu (2015) in their research for the assessment of the liquidity risk of the banks functioning in Romania and Bulgaria in the context of the EU accession investigated the effect of financial indicators for the capital adequacy, assets quality, management quality and profitability have on the liquidity risk for period 2004–2011. Results highlight that the capital adequacy ratio and the ratio of impaired loans to gross loans have a statistically significant effect on the liquidity risk.

Akhter and Daly (2009) in their study have used panel data investigating potential relation of financial intermediaries across 50 countries resulting in analysis which show strong impact of business cycle, inflation and real effective exchange rates, and size of the industry on capital adequacy as the main indicator of banks' financial soundness.

Bouvatier and Lepetit (2008) analyzed the raise of credit fluctuations in banking behavior in cases of induction of the capital adequacy constraints and the provisioning system. They used a panel of 186 European banks for the period 1992–2004 and the result stated that poorly capitalized banks are constrained to expand credit activities.

To explain how large banking organization manages their capital ratios, Barrios and Blanco (2003) have studied and measured the level of equity capital over assets. Moreover, to support their research analysis the researchers have used multiple models such as the market and regulatory regimes upon the Wall and Peterson (1987) who have defined and proved the presence of an optimal capital ratio for organizations affected by capital adequacy regulation.

Furthermore, referring to the period of 1993–2000, the index of insolvency-risk (IR) to the failure risk in Taiwan banking industry has been applied by Lin, Penm, Gong, and Chan (2005). The index has shown different impacts before and

after the revision of the capital adequacy relation. The capital adequacy and the insolvency risk resulted having a positive correlation. A remarkably positive correlation has been shown between capital adequacy and different other financial performances as well.

Hafez and El-Ansary (2015) examined explanatory variables that impact the CAR of commercial banks in Egypt. The research covers 36 banks and encompasses the years 2004 to 2013. The study looked at the relationship between the dependent variable CAR and the earning assets ratio, profitability, and liquidity, as well as loan loss allowance as a measure of credit risk, net interest margin rise, size, loans assets ratio, and deposits assets ratio as independent variables. Prior to the global financial crisis of 2008, the most important variables were asset quality, scale, and profitability. After 2009, the most important variables that explain the variation in Egyptian banks' CAR are asset quality, scale, liquidity, management quality, and credit risk.

The financial crisis of 2007–2009 showed that many major banks' losses were borne by their states, despite the fact that these banks had met Basel requirements for capital adequacy. The supervisors' faith in book equity metrics was one of the key causes, as accounting reports did not capture the true ability to absorb losses. According to Flannery and Giacomini (2015), the total value of government subsidies issued to the 25 largest European banks between 1997 and 2011 amounts to about 1.4 million EUR, or an estimate of 28.5 percent of the banks stock market prices, and that early regulatory alerts of equity downturn value will greatly mitigate costs associated with bank defaults.

Aktas, Bakin, and Celik (2015) have analyzed 10 different countries in South-East Europe (SEE) region providing annual data from 71 commercial banks for the period of 2007–2012. Economies of the SEE region mostly consist of the "transition economies" which are in ongoing challenging processes of turn-off into capable market economies with high economic potentials. The study's findings indicate that the dimensional explanatory variables scale, ROA, leverage (LEV), liquidity, NIM, and risk have statistically significant effects on CAR for banks in the area. Thoa and Anh (2017) examine how the CAR is impacted by chosen factors: assets of the bank (size), LEV, loans in total assets (LOA), loans loss reserves (LLR), NIM, and cash and precious metals in total assets (LIQ). The study covers a data set for Vietnamese banks in the period 2011–2015. NIM and LIQ tend to have a significant impact on CAR, while size and LEV do not appear to have a significant effect on CAR, according to the results. NIM and LIQ have a positive effect on CAR, while LLR and LOA have a negative effect on CAR.

Following the international financial crisis of 2007–2009, the Basel III capital regulation was debated as a mechanism for maintaining financial stability, despite some opponents arguing that the strict capital requirements would cause banks to boost the cost of banking intermediation. Rahman, Zheng, Ashraf, and Rahman (2018) used a panel data collection of 32 commercial banks in Bangladesh from 2000 to 2014 to examine the effect of capital regulation on intermediation costs and risk-taking actions. According to the research, the CAR had a positive relationship with the intermediation expense and a negative relationship with risk-taking variables. When the equity to total assets ratio was used as a separate measure of bank capital, the study found the same findings.

Hewaidy and Alyousef (2018) in study examine the effect on the bank's CAR by the bank-specific and macroeconomic factors. As specific factors are used bank type, bank size, the profitability of banks (ROA and ROE), asset quality, management quality, liquidity and net interest margin. As macroeconomic factors are used inflation and GDP. Data covered the period from 2009 to 2016 using annual data for all Kuwaiti listed banks. The results show the significant impact on CAR only for bank size, asset quality, management quality and liquidity as bank characteristics. The results suggest that CAR is influenced more depending on the manner how are utilized bank resources than by other bank characteristics or macroeconomic factors.

3. RESEARCH QUESTION, DATA AND METHODOLOGY

Based on the literature review, the guiding research question of this study will be:

RQ: What is the impact of the profitability, liquidity, risk and leverage ratios including bank size on capital adequacy ratios in the Western Balkan Countries banking sector?

Therefore, this study has extracted two hypotheses, as follows:

H1: There is a negative relationship between profitability, liquidity, bank size, and leverage on capital adequacy ratios.

H2: There is a positive relationship between profitability, liquidity, bank size, and leverage on capital adequacy ratios.

Analyzing capital adequacy ratios and compliance with national and international prudential standards is of high importance for the financial stability of each country, banking soundness and performance in the long term, liquidity issues and protection of interests of depositors and bank shareholders. To analyze and examine capital ratios the project has used all available data from the banking institutions and national central banks (or/and international financial institutions as are Bank for International Settlements (BIS), Financial Stability Institute (FSI)). The key data are the most recent data available by the financial institutions and the most recent data which could be provided and collected by the research.

The selected variables are the following: profitability ratio (ROA), liquidity ratio (liquid assets/total assets), liquidity and risk ratio (loans/assets), bank size, and leverage ratio (equity/assets). Data covered the time period from 2010 to 2018 and key data are the most recent data.

CAR is the ratio of a bank's capital to its risk and an indicator to ensure that the bank can absorb a reasonable amount of loss from expected or unexpected risks. It is of high importance to study factors that have an impact on the level of capital adequacy ratio.

In this study we have used data of 103 commercial banks from 6 different countries in the Western Balkan region: Albania, Bosnia and Herzegovina, Kosovo, North Macedonia, Montenegro and Serbia as stated in Table 1.

Table 1. Number of banks in Western Balkan countries

Countries	*Number of banks*
Albania	14
Bosnia and Herzegovina	23
Kosovo	10
North Macedonia	15
Montenegro	14
Serbia	27
Total	103

This empirical study is designed to evaluate the relationship between *CAR* as a dependent variable and independent variables are identified as profitability, bank size, liquidity and return on assets (*ROA*), liquid assets to total assets (*LATA*), total assets (*TA*), loans to total assets (*LTAR*), total equity to total assets (*TETA*) as explanatory variables and residual or error of the panel data, in Western Balkan countries. The study covers annual observations between the period 2010 and 2018.

The software used for this analysis is EViews Package. The method used is panel least squares. The data comprises of a total 51 observations for panel least squares. The tests that are taken: least squares method, F-test, Durbin-Watson, Adjusted R-squared, log-likelihood, etc.

4. EMPIRICAL RESULTS

4.1. Method: Panel least squares

The default method for estimating the parameters of an equation is 'least squares'. It is dependent on selecting the sample regression function (SRF) with the lowest possible number of residuals (Startz, 2009).

Table 2. The descriptive results of the dependent and independent variables

Variable	*Definition*	*Coefficient*	*Std. error*	*t-statistics*	*Probability*
ROA	Net profit/Total assets	0.805917	0.231477	3.481625	0.0013
LATA	Liquid assets × 100/Total assets	0.104777	0.024199	4.329753	0.0001
TA	Net sales or revenue/Average total assets	1.08E-06	1.48E-07	7.290861	0
LTAR	Loans provided to clients/Total assets	-0.034341	0.02425	-1.0416123	0.1651
TETA	Net worth/Total assets	0.073261	0.107845	0.679318	0.5012
Constant		14.09936	0.847331	12.63973	0

The intercept of the equation is 14.09936 and the slope of the equation for *ROA* is 0.805917, 0.104777 (*LATA*), 1.08E-06 (*TA*), -0.034341 (*LTAR*) and 0.073261 (*TETA*). The coefficient of decision, or R-squared, is a calculation of how much of the overall variance in the dependent variable can be explained by the regression test. R^2 is always positive and has a number of values between 1 and 0 ($0 \le R^2 \le 1$). If R^2 is 1, the variables have a perfect relationship, and if it is 0, there is no relationship at all (Kennedy, 1998). The R^2 value in the least squares table is 0.851954, which means that differences in the other variables account for approximately 85 percent of the difference in CAR. Adjusted R^2 offers a more comprehensive description of the model as well as more informative variables. It's 0.799938 in our case, which is a little lower than R^2, but it also shows that the regression model is well-explained.

The following regression equation is formulated to explore cause and effect relationship between selected bank-specific factors and capital adequacy ratio.

The regression model is:

$$ln(CAR_{ij}) = \beta_0 + \beta_1 ROA_{ij} + \beta_2 LATA_{ij} + \beta_3 TA_{ij} + \beta_4 LTAR_{ij} + \beta_5 TETA_{ij} + u_{ij} \quad (1)$$

where,

- β_0: the intercept coefficient,
- β_1, β_2, β_3, β_4, β_5: the slope coefficients;
- u_i: the disturbance term (substitutes all the omitted variables);
- *CAR*: capital adequacy ratio;
- *ROA*: returns on assets;
- *LATA*: liquid assets to total assets ratio;
- *TA*: total assets;
- *LTAR*: loan to total asset ratio;
- *TETA*: total equity to total asset ratio.

$$ln(CAR) = 2.68 + 0.046ROA + 0.006LATA + 0.00000006TA - 0.0026LTAR + 0.005TETA$$
$$(0.047) \quad (0.013) \quad (0.0013) \quad (0.000000008) \quad (0.00137) \quad (0.006)$$

The t-test is a hypothesis-testing tool. The t-value must be compared to the t-critical value, and if t > tc, H_0 (null hypothesis) must be refused. The significance standard is set at 0.05. The t-test determines how far the coefficient estimate is from zero in terms of standard deviations.

The standard error specifies how much deviation or reason there is from accurately estimating the slope coefficient.

The smallest proof we have to dismiss the null hypothesis as seen by the likelihood value (p-value) of the t-statistics. Values between 0.0 and 0.05 are found for a model to be statistically important. So, if the value is less than 5% there exists enough evidence against the null hypothesis at 5% significance level. Therefore, observing the data from the Table 2, *ROA*, *LATA* and *TA* are less than 0.05 which means that are statistically significant at 5% significance level, whereas *LTAR* and *TETA* p-values are greater than 0.05, not statistically significant, showing weak evidence against the null hypothesis, thus retain the null hypothesis.

Table 3. The definition and descriptive results of the variables

Variable	*Mean*	*Standard deviation*
ROA	0.958757	0.760499
LATA	26.09753	9.567567
TA	843084.2	1219724
LTAR	65.72438	13.6232
TETA	12.40611	3.103478

4.2. Return on assets

One of the simplest and most used measures of bank profitability is ROA. ROA is a financial ratio that reflects how capable or efficient a bank to earn profits from its total assets is. It helps analyze the performance of a company or business unit and compare the financial performance to others (Molyneux & Thornton, 1992; Golin, 2001; Claessens & Laeven, 2004; Mamatzakis & Bermpei, 2016). ROA links together evidence or data from 2/3 financial statements, by considering the net profit after all exemptions from the income statement and assets from the balance sheet.

The estimated coefficient on ROA shows that a one percent point increase in profitability will lead to an increase in CAR by 4.6 percent after controlling the other explanatory variables in the model. ROA is a significant determinant of CAR therefore this indicates that capital adequacy ratio is a factor of earnings in commercial banks when measured with respect to ROA (Bourke, 1989).

Many researchers found a strong positive relationship between capital and profitability (Berger, 1995; Kleff & Weber, 2008). This relation was explained by appreciating the fact that different companies choose to finance their operations depending on retained earnings rather than external and more exclusive financial supporting methods. However, there are other researchers that have explored a negative relationship between the two variables, such as Goddard, Liu, Molyneux, and Wilson (2013).

Because higher profits can lead to an increase in capital, the relationship between equity capital and profitability is considered systemic and positive (Athanasoglou, Delis, & Staikouras, 2006; Berger, 1995). However, if capital requirements are necessary, the relationship between profitability and controlled capital will not be meaningful or positive, so banks will retain more economic capital and be less profitable. As a result, the predicted sign of this variable's coefficient can be either positive or negative. The ROA of the bank is factored into the equity capital equation with a positive estimated coefficient and the regulatory capital equation with an ambiguous coefficient.

4.3. Liquid assets to total assets (*LATA*)

Liquidity is the ability of the business or company to satisfy its short-term obligations, get to pay the current liabilities, as they come due. Generally, liquidity is all about the ease of the cash flow. As a crucial class of financial metrics, liquidity ratios determine the debtor's capability to pay debt obligations without raising external capital.

A bank's primary function in the economy is to generate liquidity (Berger & Bowman, 2009). Indeed, as the last crisis showed, bank failures were largely triggered by illiquidity and poor asset quality. Despite the value of bank liquidity, there is debate about how to calculate it in the literature. Surprisingly few empirical researches on the impact of liquidity on capital and risk exist.

Moreover, the coefficient on the *LATA* is 0.006 which is highly significant. It means that one percent increase in liquid assets to total assets ratio reflects a 0.6 percent increase in capital adequacy ratio which is in line with the findings of Berger and Bowman (2009) and Athanasoglou (2011) unlike Jokipii and Milne (2011) and Allen and Gale (2003). Our result indicates a significant and positive and influence of liquidity on regulatory capital high levels of liquidity reflect to increase CAR to control for risk.

4.4. Total assets (*TA*)

Next, another independent variable included in the analysis is *TA*, also mentioned above. *TA* are the sum of all tangible and intangible, current and long-term assets owned or controlled by a company. Total assets are important in creating value and having positive economic value. Such assets if possessed by a bank or due to the bank are considered as bank assets. Therefore, the increase of the bank size indicates the increase of the bank's ability to raise external financing at lower costs via numerous branches which in turn will result in CAR decrease. Also, as Büyükşalvarcı and Abdioğlu (2011) stated, this correspondingly is an indicator of a more effective change that marks a reduction of risk exposure.

Different viewpoints on the relationship between total assets and capital adequacy ratio can be found in the literature. Yahaya, Mansor, and Okazaki (2016) study reported a negative relationship between the two variables. On the other side, when the *TA* are high this indicates that banks take higher risks. Thus, there should be a positive relationship between this variable and the capital adequacy ratio (Almazari, 2013; Bateni, Vakilifard, & Asghari, 2014). Our estimation results also show that total assets have a significant positive impact on the capital adequacy ratio. However, the impact is very low.

4.5. Loan to assets ratio (*LTAR*)

The *LTAR* is a metric that measures the relation of total loans outstanding as a percentage of total assets. This ratio specifically helps investors to gain a whole analysis of a bank's portfolio. Banks with a moderately higher *LTAR* get more of their income from loans and investments, whereas those with lower *LTAR* level derive more of their income from asset management, noninterest-earning sources or trading. These banks with lower *LTAR* are also considered to achieve better throughout any economic downturns.

Our findings indicate that *LTAR* has a significant positive impact on the capital adequacy ratio. One percent point increase in *LTAR* decreases the capital adequacy rate by 0.26 percent which is consistent with the literature.

4.6. Total equity to total assets (*TETA*)

There are several different ratios to use in order to assess the leverage of a company or bank. Leverage ratios are important, particularly for banks, since they equate core capital to total assets. The Tier 1 capital ratio is used to calculate how leveraged a bank is in relation to its merged assets. Tier 1 assets involve assets that are easily liquidated if, in time of financial crisis, the bank needs capital. Thus, the financial strength of the bank is measured.

The BCBS proposed a leverage ratio as part of the Basel III reform package in 2010. The Basel III leverage ratio is calculated by dividing the capital measure by the exposure measure. The capital measure is known as Tier 1 capital, which has a leverage ratio requirement of at least 3%.

$$Leverage\ ratio = Capital\ measure\ (Tier\ 1\ Capital)/Exposure\ measure \quad (2)$$

When a bank's Tier 1 leverage ratio is higher, it's more likely to withstand negative shocks to its balance sheet.

Our empirical findings show that the leverage ratio (*TETA*) has no significant impact on the capital adequacy ratio.

5. CONCLUSION

National bank regulators or central banks in their course of regulatory activities are formulating minimum capital requirements known as capital adequacy ratios. Capital adequacy ratio is required as bank prevention against expected and unexpected risks or losses. Various public data and studies in regard to the Western Balkan countries showed that commercial banks hold higher capital levels than levels required and set by the regulatory authorities.

The objective of this study considering the high importance and weight of capital adequacy ratio for soundness of the banking sector was to examine the impact of selected explanatory variables in determining capital adequacy ratio for the banks in the Western Balkan region. The explanatory variables used in our model are profitability, liquidity, and size, loan to asset ratio and leverage or total equity to total assets.

The data are analyzed with the panel least squares. The panel least squares results indicate that among selected bank explanatory variables ROA, liquidity to total assets and size or total assets are statistically significant whereas loan to asset ratio and total equity to total assets are not statistically significant in determining CAR for the banks in the Western Balkan region.

Study findings have various implications particularly for banking institutions (management and bank shareholders) and for policymakers or regulatory authorities who are in charge of adopting prudential capital requirements in a way of providing safety for bank depositors, creditors and maintaining financial stability.

Knowing that the per capita GDP of Western Balkan countries is on average ¼ of the EU members, that Western Balkan countries are relatively small economies, still in process of transition and aspiring for the EU membership the study is conducted specifically for this group of countries to examine soundness of banking industry in relation to the capital adequacy as an instrument for protection against risks of losses or even bankruptcy.

The importance of the study is oriented mainly toward bank regulators who are in charge to apply various legal measures and blocking erosion of capital level or quality of capital. Banking supervision plays a key role in getting initial red flags of capital risk and providing information to the regulator for intervention. The importance of the study is focused as well in regard to the public confidence in healthiness of the banking sector. Current levels of capital adequacy ratios reduce regulators' concern but since the banking sector in Western Balkan countries is the main component of the financial industry it asks for continuous oversee by regulators in particular if economies of Western Balkan countries and their businesses are considered are very dependent on this sector.

As with most studies, this research might be subject to possible limitations. A noticeable limitation of this study is the lack of prior research studies regarding the topic of bank capital adequacy for Western Balkan countries. The lack of literature made it difficult to understand the development and compare it with other developed and developing countries. Another limitation in certain cases is lack of professional direct communication with central bank officials in providing easier information and data.

The paper contributes for further researchers taking into consideration the lack of studies within the scope of research on bank capital adequacy for Western Balkan countries, on aggregate or on individual basis. In the future, being part of the EU market new riskier and more sophisticated products and services are going to be introduced in this market therefore this study is an important base for future research.

New research studies could examine capital adequacy disclosing to regulatory authorities potential challenges and increasing their awareness in sense of deeper supervisory activities and prompt amendments of prudential regulations.

REFERENCES

1. Akhter, S., & Daly, K. J. (2009). Finance and poverty: Evidence from fixed effect vector decomposition. *Emerging Markets Review*, *10*(3), 191–206. https://doi.org/10.1016/j.ememar.2009.02.005
2. Aktas, R., Bakin, B., & Celik, G. (2015). The determinants of banksâЄ™ capital adequacy ratio: Some evidence from South Eastern European countries. *Journal of Economics and Behavioral Studies*, *7*(1), 79–88. https://doi.org/10.22610/jebs.v7i1(J).565
3. Allen, F., & Gale, D. (2003). Capital adequacy regulation: In search of a rationale. In R. Arnott, B. Greenwald, R. Kanbur, & B. Nalebuff (Eds.), *Economics for an imperfect world: Essays in honor of Joseph Stiglitz* (pp. 83–109). Cambridge, MA: MIT Press. Retrieved from https://books.google.com.ua/books?hl=en&lr=&id=MHJq2CKDyeUC&oi=fnd&pg=PA83&ots=HPrCyV7qb1&sig=wRSGcWKsNFovdZmHqJ0tHDQnM_Q&redir_esc=y#v=onepage&q&f=false

4. Almazari, A. A. (2013). The relationship between working capital management and profitability: Evidence from Saudi cement companies. *British Journal of Economics, Management & Trade*, *4*(1), 146–157. https://doi.org/10.9734/BJEMT/2014/5427
5. Athanasoglou, P. P. (2011). *Bank capital and risk in the South Eastern European region.* https://doi.org/10.2139/ssrn.1774585
6. Athanasoglou, P. P., Delis, M. D., & Staikouras, C. (2006). *Determinants of bank profitability in the South Eastern European region* (MPRA Paper). Retrieved from https://mpra.ub.uni-muenchen.de/10274/
7. Barrios, V. E., & Blanco, J. M. (2003). The effectiveness of bank capital adequacy regulation: A theoretical and empirical approach. *Journal of Banking & Finance*, *27*(10), 1935–1958. https://doi.org/10.1016/S0378-4266(02)00311-4
8. Bateni, L., Vakilifard, H., & Asghari, F. (2014). The influential factors on capital adequacy ratio in Iranian banks. *International Journal of Economics and Finance*, *6*(11), 108–116. https://doi.org/10.5539/ijef.v6n11p108
9. Berger, A. N. (1995). The relationship between capital and earnings in banking. *Journal of Money, Credit and Banking*, *27*(2), 432–456. https://doi.org/10.2307/2077877
10. Berger, A. N., & Bouwman, C. H. S. (2009). *Bank capital, survival, and performance around financial crises.* Retrieved from https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.453.527&rep=rep1&type=pdf
11. Berger, A. N., & DeYoung, R. (1997). Problem loans and cost efficiency in commercial banks. *Journal of Banking & Finance, 21*(6), 849–870. https://doi.org/10.1016/S0378-4266(97)00003-4
12. Bourke, P. (1989). Concentration and other determinants of bank profitability in Europe, North America and Australia. *Journal of Banking & Finance, 13*(1), 65–79. https://doi.org/10.1016/0378-4266(89)90020-4
13. Bouvatier, V., & Lepetit, L. (2008). Banks' procyclical behavior: Does provisioning matter? *Journal of International Financial Markets, Institutions and Money*, *18*(5), 513–526. https://doi.org/10.1016/j.intfin.2007.07.004
14. Büyükşalvarcı, A., & Abdioğlu, H. (2011). Testing the weak form efficiency of the Turkish stock market. *African Journal of Business Management, 5*(34), 13044–13056. https://doi.org/10.5897/AJBM11.2089
15. Căpraru, B., & Ihnatov, I. (2014). Banks' profitability in selected Central and Eastern European countries. *Procedia Economics and Finance*, *16*, 587–591. https://doi.org/10.1016/S2212-5671(14)00844-2
16. Claessens, S., & Laeven, L. (2004). Competition in the financial sector and growth: A cross-country perspective. In C. A. E. Goodhart (Ed.), *Financial development and economic growth* (pp. 66–105). https://doi.org/10.1057/9780230374270_3
17. Flannery, M. J., & Giacomini, E. (2015). Maintaining adequate bank capital: An empirical analysis of the supervision of European banks. *Journal of Banking & Finance*, *59*, 236–249. https://doi.org/10.1016/j.jbankfin.2015.06.008
18. Goddard, J., Liu, H., Molyneux, P., & Wilson, J. O. S. (2013). Do bank profits converge? *European Financial Management*, *19*(2), 345–365. https://doi.org/10.1111/j.1468-036X.2010.00578.x
19. Golin, J. (2001). *The bank credit analysis handbook: A guide for analysts, bankers and investors.* Singapore: John Wiley & Sons (Asia) Pre. Ltd.
20. Golin, J., & Delhaise, P. (2013). *The bank credit analysis handbook: A guide for analysts, bankers and investors* (2nd ed.). Hoboken, NJ: John Wiley & Sons.
21. Hafez, H. M. M. (2018). Examining the relationship between efficiency and capital adequacy ratio: Islamic versus conventional banks — An empirical evidence on Egyptian banks. *Accounting and Finance Research, 7*(2), 232–247. https://doi.org/10.5430/afr.v7n2p232
22. Hafez, H. M., & El-Ansary, O. (2015). Determinants of capital adequacy ratio: An empirical study on Egyptian banks. *Corporate Ownership & Control, 13*(1–10), 1166–1176. https://doi.org/10.22495/cocv13i1c10p4
23. Hewaidy, A. M., & Alyousef, H. Y. (2018). Bank-specific and macroeconomic determinants of capital adequacy ratio: Evidence from Kuwaiti banks. *European Journal of Economics, Finance and Administrative Sciences, 99*, 5–20. Retrieved from http://www.europeanjournalofeconomicsfinanceandadministrativesciences.com/issues/PDF/EJEFAS_99_01.pdf
24. Jokipii, T., & Milne, A. (2011). Bank capital buffer and risk adjustment decisions. *Journal of Financial Stability*, *7*(3), 165–178. https://doi.org/10.1016/j.jfs.2010.02.002
25. Kennedy, P. E. (1998). *A guide to econometrics* (4th ed.). Cambridge, MA: MIT Press.
26. Kleff, V., & Weber, M. (2008). How do banks determine capital? Evidence from Germany. *German Economic Review*, *9*(3), 354–372. https://doi.org/10.1111/j.1468-0475.2008.00437.x
27. Lin, S. L., Penm, J. H. W., Gong, S.-C., & Chang, C.-S. (2005). Risk-based capital adequacy in assessing on insolvency-risk and financial performances in Taiwan's banking industry. *Research in International Business and Finance*, *19*(1), 111–153. https://doi.org/10.1016/j.ribaf.2004.10.006
28. Mamatzakis, E., & Bermpei, T. (2016). What is the effect of unconventional monetary policy on bank performance? *Journal of International Money and Finance, 67*, 239–263. https://doi.org/10.1016/j.jimonfin.2016.05.005
29. Molyneux, P., & Thornton, J. (1992). Determinants of European bank profitability: A note. *Journal of Banking & Finance*, *16*(6), 1173–1178. https://doi.org/10.1016/0378-4266(92)90065-8
30. Naceur, S. B., & Kandil, M. (2009). The impact of capital requirements on banks' cost of intermediation and performance: The case of Egypt. *Journal of Economics and Business*, *61*(1), 70–89. https://doi.org/10.1016/j.jeconbus.2007.12.001
31. Pham, H. L., & Daly, K. J. (2020). The impact of BASEL Accords on the management of Vietnamese commercial banks. *Journal of Risk and Financial Management, 13*(10), 228. https://doi.org/10.3390/jrfm13100228
32. Rahman, M. M., Zheng, C., Ashraf, B. N., & Rahman, M. M. (2018). Capital requirements, the cost of financial intermediation and bank risk-taking: Empirical evidence from Bangladesh. *Research in International Business and Finance, 44*, 488–503. https://doi.org/10.1016/j.ribaf.2017.07.119
33. Reynolds, S. E., Ratanakomut, S., & Gander, J. (2000). Bank financial structure in pre-crisis East and Southeast Asia. *Journal of Asian Economics*, *11*(3), 319–331. https://doi.org/10.1016/S1049-0078(00)00062-2
34. Roman, A., & Sargu, A. C. (2015). The impact of bank-specific factors on the commercial banks liquidity: Empirical evidence from CEE countries. *Procedia Economics and Finance*, *20*, 571–579. https://doi.org/10.1016/S2212-5671(15)00110-0

35. Startz, R. (2009). *EViews Illustrated for Version 8*. Santa Barbara, CA: IHS Global Inc. Retrieved from https://ua1lib.org/book/3040824/d156d6?id=3040824&secret=d156d6
36. Thoa, P. T. X., & Anh, N. N. (2017). The determinants of capital adequacy ratio: The case of the Vietnamese banking system in the period 2011–2015. *VNU Journal of Science: Economics and Business*, *33*(2), 49–58. https://doi.org/10.25073/2588-1108/vnueab.4070
37. Udom, I. S., & Onyekachi, R. E. (2018). Effect of capital adequacy requirements on the profitability of commercial banks in Nigeria. *International Research Journal of Finance and Economics*, *165*, 79–89. Retrieved from http://www.internationalresearchjournaloffinanceandeconomics.com/ISSUES/IRJFE_165_08.pdf
38. Vu, H. P., & Dang, N. D. (2020). Determinants influencing capital adequacy ratio of Vietnamese commercial banks. *Accounting, 6*(5), 871–878. https://doi.org/10.5267/j.ac.2020.5.007
39. Wall, L. D., & Peterson, D. R. (1987). The effect of capital adequacy guidelines on large bank holding companies. *Journal of Banking & Finance, 11*(4), 581–600. https://doi.org/10.1016/0378-4266(87)90004-5
40. Yahaya, S. N., Mansor, N., & Okazaki, K. (2016). Financial performance and economic impact on capital adequacy ratio in Japan. *International Journal of Business and Management*, *11*(4), 14–21. https://doi.org/10.5539/ijbm.v11n4p14