



TESTING CAPITAL ADEQUACY RATIO IN WESTERN BALKAN  
COUNTRIES AND IT'S COMPLIANCE WITH BASEL ACCORD III

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# **TESTING CAPITAL ADEQUACY RATIO IN WESTERN BALKAN COUNTRIES AND IT'S COMPLIANCE WITH BASEL ACCORD III**

## **ABSTRACT**

The capital adequacy ratio (CAR) is critical for banks' solvency and protection against unforeseen occurrences that may emerge as a result of their operations. The capital adequacy ratio is one of the metrics used to assess a bank's ability to sustain an acceptable amount of loss. Therefore, banks must provide adequate capital to comply with national and international regulatory capital requirements. The research primary objective is designed to examine the relationship between capital adequacy ratio and return on assets, liquidity assets to total assets, total assets, loan to assets ratio, and total equity to total assets as explanatory variables in Western Balkan countries.

The second objective is to assess capital adequacy ratio and its compliance with Basel III requirement. The research covers the years from 2010 to 2020. The theory has neglected research of capital adequacy estimation in Western Balkan region and this research will address shortcomings enabling policy makers to better monitor capital adequacy compliance. The rationale of research consists of financial structure of Western Balkan economies which is bank-based, being economies in transition and aspiring for EU membership, no research on regional Balkan basis, bank obligations is public good, and depositors of bank have least data on capital standing and risks compare to the other stakeholders. More capitalization make bank safer therefore, capital regulation and compliance with CAR requirements became crucial tool.

The econometric methods used are Panel Least Squares and Generalized Method of Moments. Generalized Method of Moments applied in research in banking field reflects new contribution to the existing literature. Novelty of research and contribution in banking

is assessed taking into account the final results and empirical findings. The findings show that the banking sector in Western Balkan countries adheres to strong capital adequacy norms that surpass not only national regulatory requirements but also BIS III standard.

Empirical findings indicate that Return on Assets has positive highly significant impact and Total Assets has positive impact on the capital adequacy ratio considering them as two important factors in determining capital adequacy ratio. Finally, research implications are of importance for financial regulatory authorities and banking institutions.

***Keywords:*** *capital adequacy ratio, regulatory capital, basel accord III, generalized method of moments, Western Balkan countries*

# **TESTIMI I RAPORTIT TË MJAFTUESHMËRISË SË KAPITALIT NË VENDET E BALLKANIT PERËNDIMOR DHE PAJTUESHMËRIA E TIJ SIPAS MARRËVESHJES SË BAZELIT III**

## **ABSTRAKT**

Raporti i mjaftueshmërisë së kapitalit (RMK) është kritik për solvencën e bankës dhe mbrojtjen kundrejt dukurive të paparashikuara që mund të ndodhin si rezultat i operacioneve të tyre. Raporti i mjaftueshmërisë së kapitalit është njëri nga indikatorët që përdoret për të vlerësuar aftësinë e bankës për të mbështetur një shumë të pranueshme të humbjes. Prandaj, bankat duhet të sigurojnë kapital të mjaftueshëm për të përmbush kërkesat vendore dhe ndërkombëtare për kapital rregullator. Qëllimi kryesor i hulumtimit është ekzaminimi i marrëdhënies midis raportit të mjaftueshmërisë së kapitalit dhe kthimit në mjete, mjetet likuide ndaj total mjeteve, mjeteve totale, raportit kredi ndaj asetëve, dhe ekuitetit total ndaj total mjeteve si variabla shpjeguese në vendet e Ballkanit Perëndimor.

Qëllimi i dytë është vlerësimi i raportit të mjaftueshmërisë së kapitalit dhe pajtueshmërisë së tij me kërkesat e Basel III. Hulumtimi përfshin preiudhën nga viti 2010 deri 2020. Teoria ka shpërfill hulumtimin e vlerësimit të mjaftueshmërisë së kapitalit në rajonin e Ballkanit Perëndimor dhe ky hulumtim do të adresojë mangësitë duke ju mundësuar politikëbërësve monitorimin më të mirë në përmbushjen e mjaftueshmërisë së kapitalit. Arsyeshmëria e hulumtimit qëndron në strukturën financiare të ekonomive të Ballkanit Perëndimor e cili është me bazë bankare, duke qenë ekonomi në tranzicion dhe të cilat aspirojnë për anëtarësim në BE, nuk ekziston hulumtim në bazë të Ballkanit si rajon, detyrimet bankare janë të mira publike, dhe depozitorët e bankave kanë më së paku njohuri lidhur me gjendjen e kapitalit dhe rreziqet krahasuar me akterët tjerë. Kapitalizimi më i madh e bën bankën më të sigurt prandaj, rregullimi i kapitalit dhe pajtueshmëria me kërkesat e RMK shndërrohet në instrument qenësor.

Metodat ekonometrike të përdorura janë Paneli me katrorët më të vegjël dhe Metoda e përgjithshme e momenteve. Metoda e përgjithshme e momenteve i aplikuar në hulumtim në fushën bankare pasqyron kontribut të ri për literaturën ekzistuese. Risia në hulumtim dhe kontributi në punët bankare vlerësohet kur të merren parasysh rezultatet përfundimtare dhe të gjeturat empirike. Të gjeturat tregojnë se sektori bankar në vendet e Ballkanit Perëndimor përmban norma të larta të mjaftueshmërisë së kapitalit që tejkalojnë jo vetëm kërkesat rregullatore vendore por poashtu edhe standardet e BIS III. Të gjeturat empirike reflektojnë se Kthimi në Mjete ka impakt të të lartë të rëndësishëm pozitiv dhe Mjetet Totale kanë impakt pozitiv në raportin e mjaftueshmërisë së kapitalit duke i konsideruar ato si dy faktorë të rëndësishëm në përcaktimin e raportit të mjaftueshmërisë së kapitalit. Së fundmi, implikimet e hulumtimit janë të rëndësishme për autoritetet rregullatore financiare dhe institucionet bankare.

***Fjalët kyqe:** raporti i mjaftueshmërisë së kapitalit, kapitali rregullator, akordi basel III, metoda e përgjithësuar e momenteve , vendet e ballkanit perëndimor*



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## **DECLARATION**

I hereby declare that this PhD Thesis, titled “Testing Capital Adequacy Ratio in Western Balkan countries and its compliance with Basel III” is based on my original work except quotations and citations which have been duly acknowledged. I also declare that this thesis has not been previously or concurrently submitted for the award of any degree, at Epoka University, any other university or institution.

Flamur Keqa  
08 February 2023

## TABLE OF CONTENTS

<b>APPROVAL PAGE</b> .....	<b>I</b>
<b>ABSTRACT</b> .....	<b>III</b>
<b>ABSTRAKT</b> .....	<b>V</b>
<b>ACKNOWLEDGMENTS</b> .....	<b>VII</b>
<b>DECLARATION</b> .....	<b>VIII</b>
<b>TABLE OF CONTENTS</b> .....	<b>IX</b>
<b>LIST OF TABLES</b> .....	<b>XII</b>
<b>LIST OF FIGURES</b> .....	<b>XIII</b>
<b>LIST OF APPENDICES</b> .....	<b>XIV</b>
<b>LIST OF ABBREVIATIONS</b> .....	<b>XV</b>

### CHAPTER

<b>1 INTRODUCTION</b> .....	<b>1</b>
1.1 Introduction.....	1
1.2 Banking System .....	2
1.3 CAMEL Rating System .....	3
1.4 BASEL.....	4
1.4.1 Rationale for regulation of banking (Initial phase of Capital Regulation).....	4
1.4.2 Capital Regulation prior Basel .....	6
1.4.3 The Basel Committee .....	7
1.4.4 Basel I.....	7
1.4.5 Basel II .....	9
1.4.6 Basel III.....	11

1.5	Banking in Western Balkan countries .....	15
1.5.1	Albania .....	17
1.5.2	Bosnia & Herzegovina .....	18
1.5.3	Kosovo .....	19
1.5.4	Montenegro .....	20
1.5.5	North Macedonia.....	21
1.5.6	Serbia .....	22
1.6	Research Objectives.....	24
1.7	Significance of the Study .....	24
1.8	Theoretical framework.....	26
1.9	Research Model .....	28
1.10	Conclusion .....	29
<b>2</b>	<b>LITERATURE REVIEW .....</b>	<b>31</b>
2.1	Introduction.....	31
2.2	East Asia and Pacific .....	33
2.3	Europe and Central Asia .....	36
2.4	Middle East and North Africa.....	39
2.5	North America .....	42
2.6	South Asia.....	43
2.7	Sub-Saharan Africa.....	44
2.8	Capital adequacy literature for economies in transition-Western Balkan countries.	45
2.9	Conclusion .....	49
<b>3</b>	<b>DATA AND METHODOLOGY .....</b>	<b>52</b>
3.1	Introduction.....	52
3.2	Research Methods in Literature .....	53
3.3	Data.....	55
3.4	Variables .....	56
3.5	Econometric Methods .....	61
3.5.1	Panel Least Squares estimation method.....	61
3.5.2	Panel Generalized Method of Moments.....	62
3.6	Research Hypothesis.....	64
3.7	Conclusion .....	64

<b>4 EMPIRICAL ANALYSIS.....</b>	<b>65</b>
4.1 Introduction.....	65
4.2 Descriptive Analysis .....	66
4.3 Graphical Representation.....	68
4.4 Correlation Analysis .....	74
4.5 Panel Unit Test.....	74
4.6 Panel Regression Analysis.....	75
4.7 Generalized Method of Moments and 2SLS estimation method.....	78
4.8 Model 2 and Model 3: macroeconomic and financial factors .....	84
4.9 Conclusion .....	85
<b>5 CONCLUSIONS.....</b>	<b>86</b>
5.1 Introduction.....	86
5.2 Summary of the Results .....	87
5.3 Significance of the Results .....	91
5.4 Contribution of the Results .....	92
5.5 Implications .....	93
5.6 Limitation of the Study .....	93
5.7 Further Research .....	94
<b>REFERENCES .....</b>	<b>95</b>
<b>APPENDICES.....</b>	<b>109</b>
Appendix A: Aggregated Data for Period 2010-2020 .....	109
Appendix B: CAR enforced by the six Western Balkan countries.....	112
Appendix C: Capital legislation of WB countries .....	114
Appendix D: Table of Research Findings.....	116
Appendix E: GMM results with macroeconomic factors .....	118
Appendix F: GMM results with financial factors .....	119
<b>CURRICULUM VITAE .....</b>	<b>120</b>

## LIST OF TABLES

Table 1.1 Basel's Classification of risk weights of on-balance-sheet assets (Ong, 1999).....	8
Table 3.1 Number of banks in Western Balkan countries.....	55
Table 3.2 Description of expected relationships between variables with CAR as a dependent variable.....	63
Table 4.1 Mean values of variables .....	66
Table 4.2 Descriptive statistics table .....	67
Table 4.3 Correlation analysis result .....	74
Table 4.4 Panel unit root test result table .....	75
Table 4.5 Panel least square estimation result .....	76
Table 4.6 GMM results.....	79
Table 4.7 Over identification analysis result .....	82
Table 4.8 Estimation of the coefficient of the first lag of residual .....	83

## LIST OF FIGURES

Figure 1.1 Basel II Pillar II Framework. (World Bank, 2018) .....	11
Figure 1.2 Basel III phase-in arrangements. (BIS, 2019).....	15
Figure 1.3 Basel II and Basel III pillars. (IBM, 2020) .....	15
Figure 4.1 Graphical representation of capital adequacy ratio for all countries.....	68
Figure 4.2 Graphical representation of liquid assets to total assets ratio for all countries ..	69
Figure 4.3 Graphical representation of loans to assets ratio for all countries .....	70
Figure 4.4 Graphical representation of return on assets ratio for all countries .....	71
Figure 4.5 Graphical representation of total assets for all countries .....	72
Figure 4.6 Graphical representation of total equity to total assets ratio for all countries....	73

## **LIST OF APPENDICES**

Appendix A: Aggregated Data for Period 2010-2020 .....	109
Appendix B: CAR enforced by the six Western Balkan countries.....	112
Appendix C: Capital legislation of WB countries .....	114
Appendix D: Table of Research Findings.....	116
Appendix E: GMM results with macroeconomic factors .....	118
Appendix F: GMM results with financial factors .....	119



## **LIST OF ABBREVIATIONS**

BCBS	Bank Committee for banking Supervision
BIS	Bank for International Settlement
BNG	Bank Negara Malaysia
CAEL	Capital, Assets, Earnings, Liquidity
CAMELS	Capital, Assets, management, Earnings, Sensitivity
CAR	Capital Adequacy Ratio
CBs	Conventional Banks
CBK	Central Bank of Kosovo
CBM	Central Bank of Montenegro
CEE	Central and Eastern Europe
CET1	Common Equity Tier 1
CRAR	Capital to Risk-weighted Assets Ratio
DEA	Data Envelopment analysis liner programming
DEP	Deposit
EC	European Commission
EIB	European Investment Bank
EM	Equity Multiplier
EU	European Union
FDIC	Federal Deposit Insurance Corporation
FDR	Financing to Deposit Ratio
FSI	Financial Stability Institute
GDP	Gross Domestic Product
GHOS	Group of Central Bank Governors and Heads of Supervision
GMM	Generalized Method of Moments

G-SIBs	Global Systemically Important Banks
HQLA	High-Quality Liquid Assets
IASB	International Accounting Standards Board
IBs	Islamic Banks
ICAAP	Internal Capital Adequacy Assessment Process
IFRS	International Financial Reporting Standards
IMF	International Monetary Fund
IOSCO	International Body of Securities Regulators
IRB	Internal Ratings-Based
LATA	Liquid Assets to Total Assets
LEV	Leverage
LCR	Liquidity Coverage Ratio
LOA	Loans in Total Assets
LLR	Loans Loss Reserves
LS	Least Squares
LTA	Loan to Total Assets
LTD	Loans to Deposit Ratio
LTAR	Loans to Total Assets Ratio
MARS	Multivariate Adaptive Regression Splines
MENA	Middle East and North Africa region
NATO	North Atlantic Treaty Organization
NIM	Net Interest Margin
NPACR	Non-Performing Asset Coverage Ratio
NPL	Non-Performing Loans
NSFR	National Standards for Financial Reporting
OECD	Organization for Economic Co-operation and Development
OLS	Ordinary Least Square
PDG	Policy Development Group
PLS	Panel Least Squares
ROA	Return on Assets
ROAA	Return on Average Assets
ROAE	Return on Average Equity
ROE	Return on Equity
RWA	Risk weighted assets

SEE	South east Europe
SOB	State Owned Banks
SME	Small and Medium Enterprises
SREP	Supervisory Review and Evaluation Process
SRF	Sample Regression Function
TA	Total Assets
TETA	Total Equity to Total Assets
UN	United Nations
VECM	Vector Error Correction Model
WB	Western Balkans
WBC	Western Balkan Countries
US	United States
VaR	Value-at-Risk
WB	Western Balkan
WBC	Western Balkan Countries

# **CHAPTER 1**

## **INTRODUCTION**

### **1.1 Introduction**

The goal of the study is to provide an overview of the capital adequacy and adequacy ratios in respect to capital requirements established by national and international agencies in particular with Basel III requirement; and examine relationship between capital adequacy ratio and return on assets, liquidity assets to total assets, total assets, loan to assets ratio and total equity to total assets in Western Balkan countries. The study generally demonstrates the main elements of the banking system. Therefore, it explains the globally accepted standard for bank rating system known as CAMELS rating system, representing six assessment areas: capital, asset quality, management, earnings, liquidity, and sensitivity to market risk. Bank regulatory authorities consider CAMELS as a useful tool for supervisor authorities in order to estimate the health or soundness of financial institutions.

Moreover, the analysis deals with BASEL accords which introduces general principles dealing with supervisory responsibility for banks' foreign branches, subsidiaries and joint ventures between host and home supervisory institutions (Song, 2004). The principles were revised and supplemented several times while in September 1997 were introduced so-called Core principles for effective banking supervision, setting out 25 basic principles, which principles were increased to 29 principles in September 2012. After laying the framework for international bank regulation, the Basel Committee's principal goal rapidly became capital adequacy. Basel I, Basel II, and Basel III are the Bank for International Settlement (BIS) regulations on capital adequacy criteria (Sironi, 2018).

The implementation of Basel II was a new approach for calculating and assessing capital needs. The Basel II Framework is based on the "Three Pillar Approach," in which total capital needs are determined by a combination of regulatory requirements (Pillar I), internal bank assessments, and supervisory reviews (Pillar II), and stringent bank transparency requirements (Pillar III).

Several flaws in the regulatory framework and global banking system were highlighted during the global financial crises of 2007/2008. The Basel III framework is a central element of the Basel Committee's response to the global financial crisis. It has been revised on an ongoing basis and, the most recent revision takes effect in 2022.

The Western Balkan countries are the focus of the study because they have a bank-based financial system, are seeking EU membership, are considered to be in a state of economic transition by the UN, and have relatively small economies. . Banks dominate the financial sectors of EU candidates and potential candidate nations, with foreign banks owning the bulk of these banks in the Western Balkans. Banking systems remained adequately funded and liquid overall, putting them in a better position to sustain financial intermediation. Capitalization was adequate on an aggregate scale. As of June 2018, regulatory capital accounted for 17.9% of risk-weighted assets in the Western Balkans, with high-quality Tier-1 capital accounting for the bulk.

## **1.2 Banking System**

In the free market functioning as intermediate financial organizations, banks focus is not fixed only on profit maximization but simultaneously taking into consideration the regulatory goal of depositors' safety. The financial sector in Europe and other nations in transition has faced significant challenges during the last two decades. Banks operate in compliance with domestic and international regulatory (credit, capital, and liquidity) requirements. The unstable banking system could impact the financial system negatively and indirectly country economic growth.

The adoption of adequate banking prudential regulations, licensing procedures, and supervisory tasks are the responsibility of central banks or organizations in charge of financial supervision and regulation. Preserving financial stability remains the main goal.

In maintaining financial stability regulators use supervisory tools and adopt various regulatory requirements including capital adequacy norms.

### **1.3 CAMEL Rating System**

Banking supervisors are responsible to overview and implementing best international practices for bank supervision. According to Christopoulos et al (2011), the Uniform Financial Institutions Rating System (UFIRS) was implemented in US banking institutions in 1979, and numerous regulatory bodies have since adopted this concept.

The approach came to be known as the CAMEL rating, which stands for capital, asset quality, management, earnings, and liquidity. The importance of the CAMEL Rating consists of frequent and periodical oversight of capital adequacy (including other factors) conducted by the supervisory authorities to prevent potential risks arising from the lack of qualitative and quantitative capital. Regulators consider CAMEL as a most useful to estimate the financial standing of financial institutions. In 1995, being more stringent with risks US regulators have added market risk area and the CAMEL rating system became CAMELS where S stands for Sensitivity to Market Risk. All six parameters or rating system for assessment of financial soundness was recommended also by the World Bank and IMF (2005).

A combination of specified financial statistics, on-site bank examinations, and examiner qualitative judgments are used to grade banking organizations. Ratings are not published publicly to avert a potential bank run based on CAMELS rating reduction. Ratings range from 1 as best rating to 5 as worst one. Rating 1 denotes high performance that consistently provides safe and sound operations, or what is known as "well-capitalized" operations. Rating 2 denotes acceptable performance that consistently provides safe and sound operations, or what is known as "adequately capitalized." Rating 3 denotes performance that is faulty in some way and causes supervisory worry, often known as being "undercapitalized." Poor performance that causes substantial supervisory worry, or what is known as "seriously undercapitalized," receives a rating of 4. Risk management procedures are typically unsatisfactory concerning the size, complexity, and risk profile of banks and credit unions. Unsatisfactory performance or "critically undercapitalized," is given a rating of 5. Banks in this group have a high probability of failure and will likely require

liquidation and the payoff of shareholders, or some other form of emergency assistance, merger, or acquisition.

The adequacy of banking capital is examined relying on two most important measures (ratios) such as Capital Adequacy Ratio (CAR) and the ratio of capital to assets.

As Hirtle and Lopez (1999) stated the bank's CAMEL assessment is highly confidential and disclosed only to the senior management of the bank and supervisory staff. The CAMEL rating carried by bank supervisors is of limited transparency because of sensitivity and possible negative consequences for the banking industry. Moreover, Barr et al. (2002) shows that CAMEL rating has grown as an enforceable tool for examiners and regulators. Kiser et al. (2012) examine effects of changes in CAMELS rating of small banks on loan growth and stated that downgraded banks reduced their lending by 5 to 6 %. Bassett et al. (2012) using a measure of supervisory severity (relied on CAMELS ratings) and using a VAR model to estimate effects on aggregate economic activity stated that the VAR results indicate a decline of about 0.4 % after 1 year.

Outcomes of bank rating systems influence supervisory risk assessment and supervisory intensity applied to banking entities.

## **1.4 BASEL**

This section explains the rationale of placing the financial sector within the regulatory framework in order of managing and controlling financial risks; regulations being in force before Basel; establishment of Basel Committee and delegation of responsibilities and duties; and finally, the evolution of Basel regulations starting from Basel I to Basel III pushed by various financial crises and urgency for an update to prevent failure of banking-financial institutions.

### **1.4.1 Rationale for regulation of banking (Initial phase of Capital Regulation)**

Even though there are several reasons in favor of bank regulation, control, and supervision, the question of whether and how much the banking sector should be regulated remains controversial. Dowd (1996) contrasts this problem to widely accept free commerce and

wonders why the laissez-faire method could not be extended to banks as well. Dowd concludes that without the function of lender of last resort or government guarantees, the market would be disciplined and punished by depositors on its own. This model assumes that depositors, aware of the dangers, threaten to close their accounts if the first symptoms of trouble arise. It encourages banks to adopt a conservative lending strategy and make data available to the public. As a result, a sufficient quantity of capital serves as protection against future losses, assuring investors. Dowd contends that, despite its high cost, more capitalization makes a bank safer and more appealing to its depositors. As a result of the rivalry between banks, the best suitable degree of capitalization for the consumers' demand would emerge. Market forces would decide the exact quantity of capital.

Dow (1996), who represents the other viewpoint, makes two main justifications for a controlled financial sector. Dow (1996) believes that free banking is prone to unnecessary cyclicalities and that banks authorities would immediately interfere, making laissez-faire ineffective. The argument is grounded based on the extremely unique economic role of money and the uncertainty involved. Unlike businesses, bank institutions utilize their obligations as money, whereas the goal of the law is to guarantee that the bank assets have adequate liquidity to cover any decrease in redeposit and prevent such a reduction in the first place. Dow (1996) claims that regulation is needed because the moneyness of bank obligations is a public good. The government, in turn, produces moneyness by instilling trust in money ability to hold its value.

Following this line of thought, Santos (2000) recognizes the need to regulate banks in light of their position in financial intermediation, liquidity provision, and monitoring and information services. It was understood that its significance may raise the likelihood of a systemic catastrophe and result in significant social consequences. Banks are sensitive particularly to any form of actual or perceived failure because of their high interconnectivity and possible vulnerability to runs. As a result, the bank insuring system implementation is motivated by the threat of a disastrous chain.

The lack of ability of depositors to supervise banking activity is the next source of worry. According to Dewatripont and Tirole (1994), the explanation for banking regulation is based on agency issues and corporate governance. In banks, the ownership and management structure is separated, which ensures the sustainability and effectiveness of the bank. On the other hand, it may influence moral hazards and adverse selection



problems. In this context monitoring and getting real and understandable information for each depositor could be expensive. Therefore, the regulation becomes a crucial tool by taking over the control and supervision that depositors would exert themselves under these certain conditions (Santos, 2001).

Seeing that the necessity of banking institution regulation is noticeable, however, the importance of bank capital regulation amongst other criteria can be raised. In practice, this can be explained considering that banks have primarily two routes or sources of funding at their disposal. When a bank uses borrowings, it must adhere to its contractual commitments (liabilities), and failure to do so might result in default. When a bank finances its operations using its own money, it is not susceptible to instant collapse if the value of the funds falls. It means that the larger the proportion of own capital in a bank's balance sheet, the more likely the organization is to meet its obligations, even in rough circumstances (FDIC, 2012).

#### **1.4.2 Capital Regulation prior Basel**

The history of banking regulation dates back long before the Basel Accords, and it has gone through many changes, from strict policies to times of liberalization. The first attempts to manage and control bank capital date back to 1863, when the new class of "charter national banks" was established in the United States. The US Civil War had bad consequences on the economy, forcing the government to seek new sources of funding, and as a result, new national banks were permitted to create their currency backed by US equities. These were the first financial firms to confront capital requirements.

Then the world experienced the economic prosperity called the "golden 1960s" followed by the Herstatt bankruptcy when one of the biggest commercial banks in Germany had collapsed. In 1975, the G-10 nations established a standing committee at the Bank for International Settlements, which subsequently became the origin of the Basel agreements, in reaction to the repercussions of the downturn (Balthazar, 2006). The international responsibility and task to set and regulate capital adequacy requirements consulting various interested stakeholders are given to BIS. Capital adequacy standards are adopted primarily for internationally active banks and their members. These standards are adopted by many national banking jurisdictions.

### **1.4.3 The Basel Committee**

Initially called the Committee on Banking Regulations and Supervisory Practices and later on named the Basel Committee was established at the end of 1974 by the Governors of central banks of the Group of 10 countries. Basel Committee was created to strengthen financial stability by enhancing the banking supervision quality internationally and to serve as regulators forum in regard to the banking supervisory issues (Penikas, 2015).

The first paper issued by the Committee in 1975 was known as the “Concordat”. Based on BIS (2021), the BCBS’s mission is to improve bank regulation, supervision, and practices around the world to improve financial stability. There is no official supranational authority for the BCBS (legal status). Its judgments aren't legally binding. Rather, the BCBS relies on the commitments of its members to fulfill its mission (Dumitrescu & Soare, 2013).

The BCBS establishes guidelines for bank prudential regulation and supervision. Guidelines develop norms in areas were deemed beneficial for prudential regulation and supervision of banks, especially globally active banks.

### **1.4.4 Basel I**

The beginning of the Latin American debt crisis in the early 1980s raised the concerns of the Committee about the deterioration of the capital ratios of the core international banks. Committee members decided to stop the erosion of capital standards in the banking industry and to harmonize convergence in the measurement of capital adequacy. It resulted in the general acceptance of a weighted approach to the measurement of risk including off banks’ balance sheets (Goodhart et al, 2004).

The Committee recognized the prime importance of accord to strengthen the stability of the international banking system and to remove unequal competition deriving from differences in national capital requirements. In this regard, the Basel Capital Accord was approved by the G-10 Governors and in July 1998 was released to banks.

The Accord was amended in November 1991, to define provisions which could be included in the capital adequacy calculation.

In 1996, the committee issued the *Amendment to the Capital Accord to incorporate market risks*. The idea was to incorporate a capital requirement for the market risks arising from banks' exposures to foreign exchange, traded debt securities, equities, commodities and options. The main aspect of the Market Risk Amendment was that for the first-time banks were allowed to use internal models (value-at-risk models) as a basis for measuring their market risk capital requirements (Adrian, 2017).

Risk-weighted assets is a banking term for an asset categorization system that determines the minimum capital that banks need to retain as a reserve to decrease the risk of insolvency. Banks face the risk of loan default, and keeping a minimum level of cash on hand can assist minimize such risks. Different risk weights are assigned to different classes of assets owned by banks, and modifying the assets according to their degree of risk allows banks to discount lower-risk assets. When calculating a bank's risk-weighted assets, the assets are classified into several classes depending on their level of risk and potential for loss first. The loan portfolio of a bank, as well as other assets such as cash and investments, are assessed to establish the bank's overall risk rating. Because it incorporates off-balance sheet risks, the Basel Committee uses this technique. It also makes comparing banks from various nations across the world simple (Ferri & Pesic, 2017).

Furthermore, riskier assets, such as unsecured loans, have a larger chance of default and, as a result, have a higher risk weight than cash and Treasury notes. The capital adequacy ratio and capital needs increase as the level of risk in an asset increases. On the other hand, treasury bills are backed by the national government's capacity to collect income and have significantly lower capital requirements than unsecured loans (Bodie & Kane, 2020).

Table 1.1

*Basel's Classification of risk weights of on-balance-sheet assets (Ong, 1999)*

<b>Risk Weight</b>	<b>Asset Class</b>
0%	Cash and gold held in the bank. Obligation on OECD governments and U.S. treasuries
20%	Claims on OECD banks. Securities issued by U.S government agencies. Claims on municipalities.
50%	Residential mortgages.
100%	All other claims such as corporate bonds, less-developed countries' debt, claims on non-OECD banks, equities, real estate, plant and equipment.

Basel I became outdated because it failed to keep up with financial innovation, risk management advancements, supervisory procedures, and bank capital. Financial institutions have seen rapid innovation and are now part of new business models that Basel I could not properly reflect. Because it was not risk sensitive enough, the rapid increase in investor demand for new kinds of credit risk and the interplay of credit derivative markets entailed more adjustments (Aloqab et al, 2018).

#### **1.4.5 Basel II**

For more than a decade, banks and supervisors have faced a significant difficulty in implementing Basel II. The objective was to develop a new method for calculating and analyzing capital requirements. The Committee issued a revised capital framework known as "Basel II" in June 2004 after issuing a proposal for a new capital adequacy agreement to replace the Basel I or 1988 Accord in June 1999. The Basel II Framework proposed an innovative approach for the time, based on the "Three Pillar Approach," in which total capital requirements are determined by a combination of regulatory requirements (Pillar I), internal bank assessments, and supervisory reviews (Pillar II), and strong bank disclosure requirements (Pillar III) (Schoenmaker, 2011).

The Basel II comprised three pillars:

1. Minimum capital requirements, which sought to develop and expand the standardized rules set out in the 1988 Accord
2. Supervisory review of an institution's capital adequacy and internal assessment process
3. Effective use of disclosure as a lever to strengthen market discipline and encourage sound banking practices

Like previous BIS standards, the Basel II standard was designed to be implemented on a consolidated basis to internationally operating banks. Many regulators throughout the world, however, have accepted the norm for local banks as well (BIS, 2021).

Basel II begins with Pillar I implementation, which is the minimum capital requirement. Different jurisdictions use a variety of different methods, allowing Basel II to be flexible. Approaches change depending on whether supervisors have a significant leadership role or

rely on internal procedures and techniques. The supervisory culture, the availability of legal acts, the enforcement of judgments, and the capacity to exercise expert judgment are all key bank determinants utilized in their methods in different countries. Within these determinants are included experience with RBS-risk-based supervision and sound legal framework. The Pillar II of Basel II formalizes the procedure, by which RBS supervisors should assess a bank's capital sufficiency not just to meet regulatory capital requirements, but also to evaluate any major risks they may face (Jones & Zeitz, 2017).

It does, however, require banks to follow the ICAAP-internal capital adequacy assessment process and to have a formal procedure in place for supervisors to examine the bank's capital adequacy assessment SREP (the supervisory review and evaluation process). The implementation of Pillar II is a challenge for both, for institutions and for supervisors.

The Basel II was drafted to improve the manner regulatory capital requirements reflect underlying risks and to address better the newest financial innovation.

Under Basel II the challenge that supervisors worldwide faced was the necessity to approve the use of certain approaches to risk measurement in multiple jurisdictions. Compare to the Market Risk Amendment of 1996 this was not a new concept for the supervisory community, but the Basel II extended the scope of such approvals and requested a greater degree of cooperation between home and host supervisors (Guttman, 2011).

Basel II indicated a new approach to capital regulation. Apart from credit and market risk, the minimum capital need also includes operational risk.

Regarding Pillar III (market discipline), banks should disclose to the public manner of calculation and how do they manage capital needs which transparency is of special importance when banks calculate Pillar I capital using internal approach methodologies (Gatzert & Wesker, 2012).

The duty of banks for determining and maintaining sufficient capital levels for all risks is based on the following four Pillar II principles (BCBS, 2006):

**Principle 1.** Banks should have in place ICAAP a process for assessing their overall capital adequacy in relation to their risk strategy and profile to maintain capital levels.

**Principle 2.** The compliance of regulatory capital ratios should be the responsibility of supervisors who need to review and evaluate internal capital adequacy assessment and strategies. If capital adequacy compliance failed then supervisors should undertake appropriate actions and measures.

**Principle 3.** Supervisors should expect banks to maintain regulatory capital levels beyond the minimal requirements, and if necessary, force them to do so.

**Principle 4.** Supervisors should intervene as soon as possible to prevent capital decline below the minimum levels and require urgent remedial action if capital is not restored.

When the first shocks of the global financial crisis hit most nations, especially globally active banks, the Basel II framework was still in its early stages of implementation or had not even been adopted. In the regulatory framework and global banking system, several flaws were identified during the global financial crises, including excessive leverage, excessive credit growth, a high degree of systemic risk, inadequate capture of the risks posed by new financial instruments and insufficient capital protection, inadequate capital buffers to mitigate procyclicality, insufficient liquidity buffers and high liquidity risk exposure and inadequate measures or market risk (Goldin & Vogel, 2010).

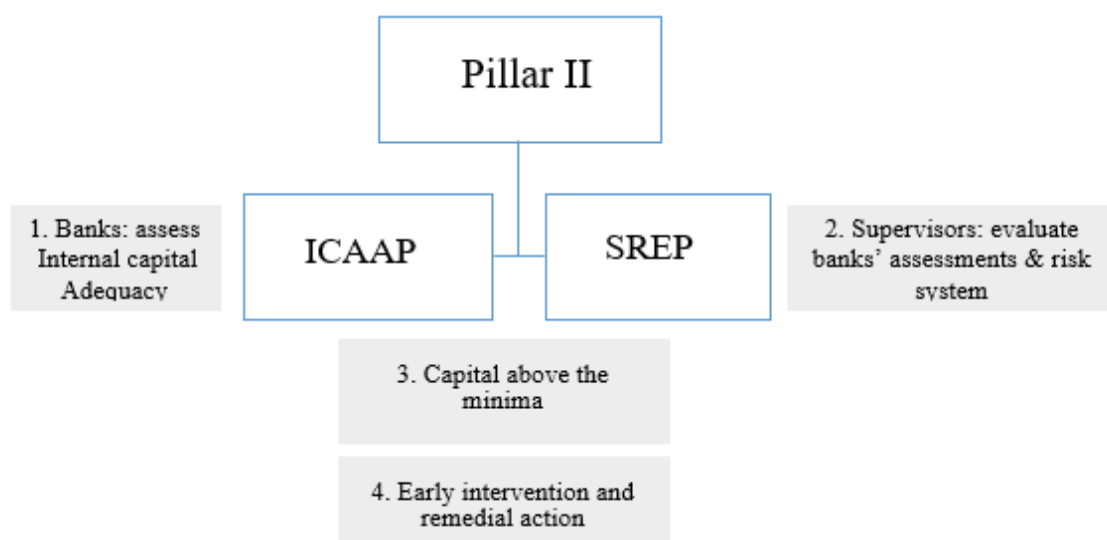


Figure 1.1 Basel II Pillar II Framework. (World Bank, 2018)

### 1.4.6 Basel III

The global financial crisis of 2007–2008 is known as the most catastrophic financial disaster to hit Western countries since the 1929 crash. In some respects, the analogy is

justified, yet there are still significant distinctions. The most significant distinction is that the current crisis has not resulted in a slump as severe as that seen during the Great Depression of the 1930s. Between 1929 and 1935, productivity in industrialized nations fell by a quarter, unemployment rose by the same proportion, and the globe did not fully recover from the Great Depression until World War II. Fortunately, the 2007-2008 financial crisis was far less severe, and it was dubbed the Great Recession (Drezner & McNamara, 2013).

Additionally, Drezner & McNamara (2013) state that the main reason why the 2008 financial crisis did not result in a severe crash like the Great Depression is that the governments and central banks of the developed world decided not to allow the financial system to collapse and instead decided to create the liquidity required to avoid waves of bank failures. The financial system was saved from collapse because to this realistic monetary and financial strategy.

The realistic reaction to the crisis also served as a reminder to the rest of the globe that central banks aren't only there to twiddle their thumbs and keep inflation under control. Central banks have a critical function as lender of last resort in times of complete financial concern. The pragmatic measures enacted in the aftermath of the 2008 financial crisis prevented the worst-case scenario, but they did not provide a long-term solution to the fundamental issues that allowed the crisis to occur. The 2008 financial crisis was the first of the twenty-first century's worldwide patrimonial capitalism. It will very certainly not be the last (Piketty, 2014).

The banking sectors of many nations had built up excessive on and off-balance sheet leverage, which was one of the major reasons the economic and financial crisis, which began in 2007, got so severe. This was accompanied by a steady deterioration of the capital base level and quality (Acharya et al, 2009). Many banks had insufficient liquidity buffers at the same time. As a result, the banking sector was unable to absorb the ensuing systemic trade and credit losses, as well as the re-intermediation of significant off-balance sheet exposures that had accumulated in the shadow banking system. A procyclical deleveraging process, as well as the interconnectivity of systemic institutions through a variety of complicated transactions, exacerbated the crisis. During the most severe phase of the crisis, the market lost faith in numerous banking institutions' viability and liquidity. The banking sector's vulnerabilities spread quickly across the financial system and into the real

economy, resulting in a huge reduction in liquidity and credit availability. Finally, the government had to step in with unprecedented amounts of cash, capital assistance, and guarantees, putting taxpayers at risk of significant losses (Delimatsis, 2012).

The Committee is introducing several major reforms to the international regulatory system to address the market failings highlighted by the crisis. The changes increase bank-level, or micro prudential, regulation, which will assist individual financial institutions to become more resilient during times of crisis. The changes also have a macro- prudential focus, addressing system-wide risks that can accumulate across the banking sector, as well as their procyclical amplification over time. These micro and macro prudential methods of supervision are intertwined since increased bank resilience decreases the risk of system-wide shocks.

The Basel III framework is a central element of the Basel Committee's response to the global financial crisis. It addresses several shortcomings in the pre-crisis regulatory framework and provides a foundation for a resilient banking system that will help avoid the build-up of systemic vulnerabilities. The framework will allow the banking system to support the real economy through the economic cycle (King & Tarbert, 2011).

“Basel III: A global regulatory framework for more resilient banks and banking systems” represents the first phase of Basel III reforms, which focused on strengthening the following regulatory framework components: increasing the focus on going-concern loss-absorbing capital in the form of Common Equity Tier 1 (CET1) capital to improve the quality of bank regulatory capital; raising capital requirements to guarantee that banks are robust enough to sustain losses during times of stress; improving risk capture by modifying elements of the risk-weighted capital framework that have shown to be severely mis calibrated, such as global market risk, counterparty credit risk, and securitization rules; introducing macroprudential elements to the regulatory framework, such as: (i) capital buffers that are built up in good times and can be drawn down in bad times to limit procyclicality; (ii) establishing a large exposures regime that mitigates systemic risks arising from interconnected financial institutions and concentrated exposures; (iii) establishing a capital buffer to deal with the externalities caused by systemically significant institutions; and Adding a minimum leverage ratio requirement to the risk-weighted capital requirements to limit undue leverage in the banking sector.



The 2017 reforms seek to supplement reforms announced in 2010-2014, to restore credibility in the calculation of RWAs and strengthen the comparability of bank's capital ratios. Risk-weighted assets are a type of risk assessment that determines the minimum level of capital that banks must maintain. They are an important element of the risk-based capital framework. The following weaknesses have been addressed that were reflected by the global financial crises: Assets that are risk-weighted, the 2017 changes are primarily focused on RWA calculation (the denominator);

No IRB approach can be used for equity exposures and where the IRB approach is retained, minimum levels are applied on the probability of default and for other inputs; the 2017 reform will simplify the treatment of operational risk (which caused significant operational losses during crises); the 2017 reforms introduce a leverage ratio buffer for G-SIBs, all globally operating banks are subject to the leverage ratio; the risk-weighted assets calculated by banks' internal models must be less than 72.5 per cent of the risk-weighted assets estimated using standardized techniques in aggregate. The value a bank may get from internal models is limited to 27.5 per cent (Gambacorta & Karmakar, 2016).

The minimum capital requirements for market risk has been updated to address concerns that the Basel Committee discovered when monitoring the framework's implementation and effect. This final standard contains modifications suggested in a March 2018 consultation document, as well as a quantitative effect based on data as of the end of December 2017.

The following significant modifications have been made to the January 2016 framework:

- a standardized, simpler strategy for banks with modest or simple trading portfolios;
- clarifications on the types of exposures that must be covered by market risk capital;
- handling of foreign exchange risk and index instruments using an improved standardized methodology;
- updated standardized approach risk weights for general interest rate risk, foreign currency risk, and some credit spread risk exposures;
- changes to the evaluation process to see if a bank's internal risk management models adequately represent the risks of particular trading desks; and
- Changes to the criteria for identifying risk variables that can be used in internal modeling.

Phases		2013	2014	2015	2016	2017	2018	2019
Capital	Leverage Ratio		Parallel run 1 Jan 2013 – 1 Jan 2017 Disclosure starts 1 Jan 2015				Migration to Pillar 1	
	Minimum Common Equity Capital Ratio	3.5%	4.0%	4.5%				4.5%
	Capital Conservation Buffer				0.625%	1.25%	1.875%	2.5%
	Minimum common equity plus capital conservation buffer	3.5%	4.0%	4.5%	5.125%	5.75%	6.375%	7.0%
	Phase-in of deductions from CET1*		20%	40%	60%	80%	100%	100%
	Minimum Tier 1 Capital	4.5%	5.5%	6.0%				6.0%
	Minimum Total Capital			8.0%				8.0%
	Minimum Total Capital plus conservation buffer		8.0%		8.625%	9.25%	9.875%	10.5%
	Capital instruments that no longer qualify as non-core Tier 1 capital or Tier 2 capital		Phased out over 10 year horizon beginning 2013					
Liquidity	Liquidity coverage ratio – minimum requirement			60%	70%	80%	90%	100%
	Net stable funding ratio						Introduce minimum standard	

Figure 1.2 Basel III phase-in arrangements. (BIS, 2019)

This revised standard comes into effect on 1 January 2022. All international active and members of Basel have to comply gradually with these requirements. While most of countries who do not belong formally to this group are making efforts to include and to adopt in their legislation.

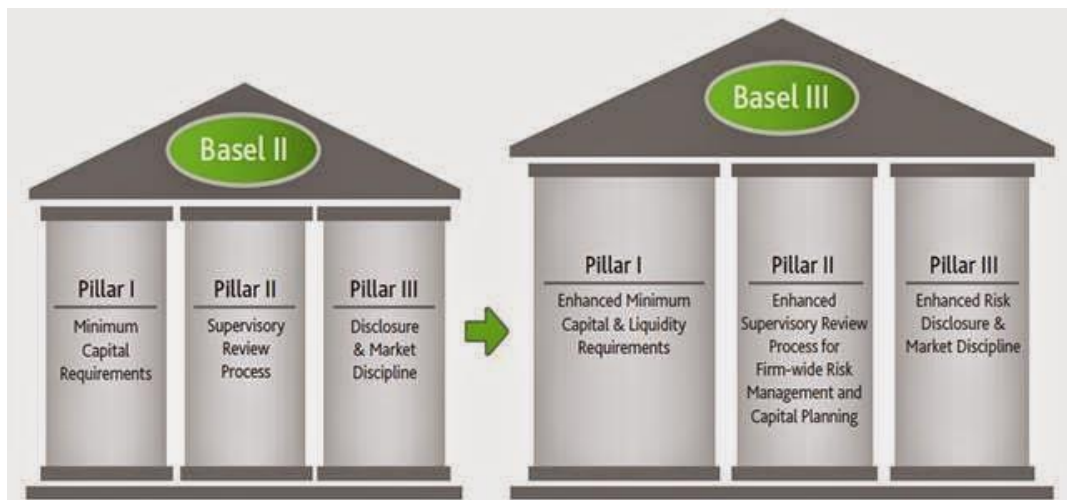


Figure 1.3 Basel II and Basel III pillars. (IBM, 2020)

## 1.5 Banking in Western Balkan countries

Albania, Bosnia and Herzegovina, North Macedonia, Kosovo, Montenegro, and Serbia are the six Western Balkan countries. Together, they have a population of over 20 million

people and a GDP of about €80 billion (Sanfey & Milatovic, 2018). The per capita GDP of the countries in the Western Balkans is roughly one-fourth that of the richest EU members in Western Europe.

This study is conducted for the Western Balkan countries since the financial structure of their economies is bank-based, countries are aspiring the EU membership and belong to the economies in transition.

Except for Kosovo, which began building financial institutions from scratch and with private ownership capital in 1999, remarkable progress has been made in the process of privatizing the banking sector in other Balkan countries. The ownership and business philosophies of the banks' whole structure were changed through reforms. Conditions were made simple for the entry of private local and international capital (Murgasova et al, 2015). Banks dominate the financial sectors of EU candidates and potential candidate nations, with foreign banks owning the bulk of these banks in the Western Balkans. These are mostly EU-based banks that, since 2014, have been losing market share to other international banks. Banks are adequately capitalized and liquid, but there are concerns about asset quality and indirect credit remain. As a percentage of total loans, non-performing loans decreased in all nations, per cent, and provisioning also improved. High unofficial euroization provides a tail risk to financial stability for countries with their own legal money, as lending to unhedged borrowers exposes banks to indirect credit risk in the event of severe currency depreciation. The Western Balkans have a greater percentage of foreign exchange-linked assets and liabilities than non-euro area EU nations, with a notably large differential in household deposits. As a result, authorities should keep working to enhance asset quality and promote the use of local currencies in the financial system (Comunale et al, 2019).

According to the European Investment Bank (EIB), regional financial systems do not offer a wide range of financial products, limiting the number of financial instruments available. In general, capital market activity and insurance product penetration are low, and non-bank financial institutions are minor.

Comunale et al (2019) state that banking systems were adequately capitalized and liquid, putting them in a good position to sustain financial intermediation. Capitalization was adequate on a global scale. As of June 2018, regulatory capital accounted for 17.9% of risk-weighted assets in the Western Balkans, with high-quality Tier-1 capital accounting

for the bulk. This is much above the legal limit. Return on equity ratios was in the range of 11-21 per cent in June 2018, indicating that profitability is improving, even though it remains low in some situations. In the Western Balkans, liquid assets to total assets ratios averaged 28 per cent, while loan-to-deposit ratios remained below 100. Although average reference lending rates have continued to fall, margins appear to remain stable due to decreasing deposit rates.

The banking industries in the Western Balkans are characterized by middle-sized banks with a typical business strategy that are primarily financed by primary deposits. The impact of the international financial crisis has demonstrated certain negative effects on the economy of the Western Balkans. Statistics show that commercial banks' share of total financial assets is over 80%, measured by total assets which indicate the importance of banks as the dominant financial institutions in the economy. The remaining market share was divided among the other financial intermediaries (investment fund, leasing companies, insurance companies, and pension funds). In other words, it confirms a fact that financial systems of the Western Balkan countries are bank-centric while the other financial markets in the Western Balkans, are still shallow, narrow and thin (Ganic, 2012).

The banking system showed strong capital adequacy ratios by adhering to the prudent and stringent capitalization policies of the central banks. The regulatory authorities of Central Banks in the Western Balkan countries adopted new regulations being in compliance with international banking standards.

### **1.5.1 Albania**

After emerged from 50 years of communist rule Albania has transformed from one of the poorest countries in Europe to an upper-middle-income country. The country is implementing important reforms to revitalize growth and job creation while advancing the European Union integration agenda (World Bank, 2021).

Albania's banking industry is well-capitalized and liquid, and the major threats to financial stability are diminishing. The Albanian banking sector's capital and liquidity buffers are substantially above regulatory minimums and have risen in the last two years (Duraj and Moci, 2015).

Albania's financial intermediation is poor, and it's becoming worse. Albania has the lowest loan-to-deposit ratio and the lowest ratio of banking system assets to GDP in the area, with credit growth sluggish or even negative for several years. This has been fueled by a drop in non-financial corporate credit, while household lending has been mainly positive. When you consider the continued economic boom and good financing circumstances, the slow rate of credit expansion stands out even more (Shingjergji & Hyseni, 2015). Credit growth has been sluggish in recent years, even after controlling for NPL write-offs and currency rate impacts. Evidence shows that sluggish credit growth is mostly due to supply constraints, with banks restricting lending to the business sector. According to the Bank of Albania's bank lending survey, corporate lending criteria (including SMEs and big companies) have been tightening nearly continuously since the beginning of 2016, while loan demand has grown in most quarters. Foreign-owned banks gradually deleveraged, which may have resulted in less competition in the banking market.

However, local banks have increased their loan portfolio in recent years, while foreign-owned banks' loan portfolio has decreased due to progressive deleveraging and the transfer of Cr dit Agricole and NBG bank units to domestic shareholders. As a result, the distribution of asset and lending shares moved somewhat, with domestically-owned banks accounting for around a quarter of overall lending. The progressive deleveraging of foreign-owned banks may have harmed competitiveness in the banking industry, limiting access to capital for businesses. Until recently, parent banks operating in Albania showed a limited market potential, which might be due to significant nonperforming loans (NPLs), as well as institutional and regulatory flaws. Until April 2017, the majority of parent banks rated Albania's market potential as poor (in contrast to most other Western Balkan countries). According to the Bank of Albania's bank lending report, the Albanian banking system's relative unattractiveness may be caused by the high proportion of NPLs. Furthermore, weak rule of law and high levels of corruption may make banks more hesitant to lend, since collateral execution may be hindered under such conditions, leading to higher borrowing rates to account for the increased risk as well as high collateral requirements.

### **1.5.2 Bosnia & Herzegovina**

Bosnia and Herzegovina is an upper middle-income country which has accomplished a great deal since the mid-1990s (World Bank, 2021). Today, it is an EU potential candidate

country and is now embarking on a new growth model amid a period of slow growth and the global financial crisis.

Bosnia and Herzegovina (BiH) must continue to implement the robust reform agenda announced in 2015, which is assisting the country's integration into the European Union (EU). The Banking Sector Strengthening Project loan will assist the government in improving bank regulation and supervision, addressing banking sector vulnerabilities, establishing a bank resolution framework, and improving entity development bank governance and operations. The banking industry in Bosnia and Herzegovina is still reeling from the global financial crisis, which damaged the country's financial system and institutions.

Overall, Bosnia and Herzegovina's banking industry looks to be properly capitalized and liquid. The banking sector's overall capitalization was adequate, with a regulatory capital-to-risk-weighted-assets ratio of 15.5 per cent in the second quarter of 2018, far over the required minimum of 12 per cent. The loan-to-deposit ratio progressively fell to 93.4 per cent in the second quarter of 2018, indicating that the system's liquidity has improved (ECB, 2019). Despite this, it continues to be one of the highest in the region. Furthermore, a fragmented market and high regulatory costs have hampered profitability, which has been improving but is still modest, with a return on average equity of 12.1% in the second quarter of 2018. In the second quarter of 2018, the overall number of banks operating in Bosnia and Herzegovina remained notably high in comparison to peer nations, at 23. This, along with the fact that tiny domestically-owned banks are more sensitive to headwinds, indicates that consolidation is possible. Under EU and IMF direction, the regulatory system has improved in recent years, but it is still hindered by a lack of efficient coordination between the country's two independent institutions. Furthermore, despite the adoption in 2017 of banking laws and amendments to banking agency laws, which strengthened banking agencies' supervisory powers and introduced a modern bank resolution framework, amendments to the Law on Deposit Insurance are still pending.

### **1.5.3 Kosovo**

Kosovo is a country with an upper-middle income that has grown steadily over the previous decade. Kosovo is one of just four European countries that have grown every year since the global financial crisis began in 2008.

Kosovo is a possible candidate for EU membership, and in October 2015, it signed a Stabilization Association Agreement with the EU, which has been in effect since April 2016. Although Kosovo's economic growth has outpaced its neighbors in recent years and has been mostly inclusive, it has not been adequate to offer enough formal jobs, particularly for women and youth, or to considerably cut unemployment rates. The growth strategy is primarily reliant on remittances to fuel domestic consumption, although it has lately transitioned to more investment and export-driven growth model (World Bank, 2021).

In the post-global financial crisis period, the Kosovo economy expanded faster than the Western Balkan average, although from a low foundation. From \$1,088 in 2000 to \$4,312 in 2018, the GDP per capita has increased. Despite a threefold increase in per capita income over the last 18 years, Kosovo remains Europe's poorest country in terms of GDP per capita. Between 2009 and 2018, real GDP increased by 3.5 per cent on average. The economy grew at an estimated 4.2 per cent in 2018, owing to increased service exports and private and governmental investment. Despite robust economic development, the recovery in employment in the second half was not enough to compensate for job losses in the first half. The prognosis is good, with average growth of 4.5 per cent expected through 2020. However, political instability, the spread of untargeted social benefits, the new legislation on public pay, and dilatory infrastructure investment implementation pose dangers.

Nonperforming loans (NPLs) were reduced to 2.7 per cent of total loans at the end of the year. Improved market conditions and lower interest rates fueled a 10.8% increase in private borrowing. Household loans increased by 11.2 per cent, while savings increased by 8.7 per cent. Kosovo's financial industry, which is dominated by the banking sector, is solid and healthy. Banks are well-capitalized and profitable, with strong capital adequacy ratios and a low and steadily falling nonperforming loan ratio of 2.5 per cent in February 2019. At the end of August 2019, both credit and deposits continued to expand, with year-on-year increases of 1% and 11.9 per cent, respectively.

#### **1.5.4 Montenegro**

Montenegro is a small, open economy aspiring to join the EU by 2025. It is also an economy vulnerable to external shocks, as it relies heavily on capital inflows from abroad

to stimulate its growth. Montenegro started negotiations with the EU in June 2012 and strives to join by 2025, ahead of the other countries in the Western Balkans.

Credit growth increased by close to 12 per cent in 2017, as household lending surged, amid subdued corporate lending. NPLs declined to 7 per cent of total loans, supported by relaxed voluntary financial restructuring rules. On the basis of public investments and consumer spending, the economy is anticipated to increase by an average of 2.5 per cent yearly in 2018-2020.

The Montenegrin banking system is stable overall with declining risks trends even though challenges remain, especially relating to asset quality and profitability (ECB, 2019). The banking sector's capitalization remains strong, as evidenced by a regulatory capital to risk-weighted assets ratio of 17.2% in the second quarter of 2018, considerably above the statutory minimum of 10%. The aggregate profitability is limited due to competition within the banking industry caused by small banks with poor return on equity. Independently of such competition banks' profitability reflected signs of recovery, with a return on equity at 13% in the third and fourth quarter of 2018. The relatively low growth in credit to corporates (4.8 per cent in the second quarter of 2018 compared to the second quarter of 2017) compared to household loans (nearly 10%) may have an impact on banking profitability, which could be improved by implementing a more efficient legal framework and further NPL decline.

Banking consolidation could be facilitated through limitation of new licenses and increasing minimum capital requirements. In recent years, the NPL percentage has dropped significantly, from 25% in 2011 to 7% of total gross loans in the second quarter of 2018. The shift to bank-owned factoring firms, which impacted greater credit risk and interest rates, resulted in a drop in NPLs. In late 2017, factoring firms were included to the scope of CBM oversight. In Montenegro, the NPL definition also permits banks to categorize assets based on the underlying collateral rather than the borrowers' capacity to repay.

### **1.5.5 North Macedonia**

North Macedonia is an upper-middle-income country that has made great strides in reforming its economy over the past decade. Following strong economic growth during the period 2002–08 averaging 4.3%, average GDP growth has declined to 2.1% per year since



2009. The main drivers of growth since 2009 have been construction, industry, and wholesale and retail trade (The World Bank, 2021).

In the past two decades, its economic growth was the most stable in the Western Balkans, income per capita doubled, and the country moved from low-middle- to upper-middle-income status. Regardless of challenging economic conditions, indices of banking systems' solvency, liquidity, and profitability remained positive, if not better, throughout the study period. Despite this, the capital adequacy ratio remained comfortably over the Basel III standards, at 16.5 per cent of risk-weighted assets in the second quarter of 2018. Liquidity is also abundant, with the loan-to-deposit ratio falling to 87.3 per cent in the second quarter of 2018 and banks holding significant surplus reserves with the central bank. Finally, profitability has improved since the second quarter of 2016, albeit the significant increase in 2018 (raising returns on equity and assets to 21.3 per cent and 2.38 per cent, respectively, by the second quarter of 2018) was mostly due to one-time factors. Simultaneously, the financial system has remained dominated by banks. Banks remain the primary financial intermediary, with assets close to 75 per cent of GDP in the second quarter of 2018, dwarfing market-based sources of business finance (ECB, 2019). Despite the banking system's flexibility, it has made little headway in addressing its main issues, particularly the high degree of euroisation and the settlement of non-performing loans.

Following write-offs for NPLs for which there had been full provisioning for two years and the recovery of a large non-performing claim from a borrower in early 2018, the NPL ratio to total gross loans fell to 4.9 per cent in the second quarter of 2018 (from 7.2 per cent in 2016). Authorities should make more efforts to encourage the use of denars and to facilitate the resolution of non-performing claims in a timely manner. In this regard, the National Bank of the Republic of North Macedonia devised measures in 2018 to promote the native currency and develop a more comprehensive non-performing asset resolution mechanism.

### **1.5.6 Serbia**

Serbia is a candidate country for the European Union membership, reflecting the significant progress made so far in structural and institutional reform (The World Bank, 2021).

Most major measures indicate that the Serbian banking industry is adequately funded and liquid. Both the capitalization and liquidity ratios were substantially over their legal minimums in October 2018. In the second quarter of 2018, the capital ratio was 23 per cent, greater than regional counterparts, against a minimal criterion of 8%. As of 30 June 2018, the liquidity coverage ratio, which Serbian authorities adopted as part of their Basel III implementation plan in 2017, was 218.3 per cent. It was also far more than the legal requirement of 100 per cent. The loan-to-deposit ratio was 89 per cent in the second quarter of 2018, indicating that funding risk is still low. After plummeting in the aftermath of the financial crisis, the banking sector's profitability has risen significantly in the last year, resulting in a return on equity of 11.6 per cent in October 2018. On the other hand, bank margins are pressured by low-interest rates and fierce competition.

Indeed, the Serbian banking industry remains extremely fragmented, with 28 banks operating as of September 2018. The 10 largest banks owned about 78.4 per cent of total assets at the end of 2017, with only six banks owning a stake of more than 5% (ECB, 2019).

In recent quarters, credit growth has accelerated. In yearly terms, lending to the private sector grew by nearly 6% in the third quarter of 2018, with gains in both the household (11.8 per cent) and business sectors (2.1 per cent) (ECB, 2019). Credit growth would be much better if NPL write-offs and currency rate fluctuations were taken into account (12.2 per cent overall in the third quarter of 2018). The current acceleration in corporate credit growth is positive, since it comes after a lengthy period of low growth and against the backdrop of ongoing write-offs and sales of nonperforming loans (NPLs), which have increased since 2017. When NPL write-offs and the influence of currency rate fluctuations are taken out of the equation, credit trends appear to have been exceptionally stable in recent months. The current acceleration in credit growth can be attributed to a number of reasons. Interest rates have fallen as a result of monetary policy easing at the start of 2018. Furthermore, the economic recovery has accelerated, accompanied by improved labor market dynamics. Serbia's risk premium has also dropped to historically low levels, thanks to low and steady inflation, a smaller budget deficit, and a better sovereign credit rating.

## **1.6 Research Objectives**

The global financial crisis affected not only the most developed countries, but also threatened the financial system of the Western Balkan countries to a high extent. The BIS being responsible at the international level to introduce new instruments and set specific limitations to prevent the financial risks has adopted new regulations. Even though the Western Balkan countries are not part of BIS, they are engaged to comply with BIS regulations. The study is of interest for financial sector to analyze the compliance of national regulatory systems with advanced BIS regulations. Moreover, the research intends to examine the relationship between capital adequacy ratios with other explanatory variables. Frequent and in-depth research on the capital adequacy in Western Balkan countries is very useful for banking regulators, the banking industry, bank stakeholders and researchers.

Consequently, the main objectives of this study are:

- Research Objective 1: To examine the determining factors of capital adequacy ratio in Western Balkan countries
- Research Objective 2: To investigate the impact of profitability and leverage ratio on the capital adequacy ratio
- Research Objective 3: To evaluate the compliance of the banking industry in regard to capital adequacy with domestic and the Bank for International Settlement (BIS) requirements.

Hence, the guiding research questions are:

1. Do current capital ratios bring safety and confidence in the banking industry of Western Balkan countries?
2. What are the domestic requirements related to the capital adequacy of banks?
3. Is there any risk inherited about capital adequacy deficiencies?

## **1.7 Significance of the Study**

The capital adequacy ratio is essential from the perspective of bank solvency and protection against unfavorable events that emerge as a result of liquidity risk and credit risk that banks face in the normal course of operations. Bank solvency is not a problem that can

be managed only by the banking sector. The reason is that banks have in disposable whole economy's savings in their accounts. As a result, if the banking system fails, the entire economy will implode in no time. Furthermore, if ordinary people's deposits are lost, the government will be forced to step in and provide deposit insurance.

Due to the significance of the issue regulatory authorities are heavily involved in the adoption and enforcement of capital ratios since the government has a direct stake in the problem.

BCBS considers that the key element of capital on which the main emphasis should be placed is equity capital and disclosed reserves. From a regulatory capital perspective, going-concern capital is the capital that can absorb losses without triggering the bankruptcy of the bank. Gone-concern capital is the capital that will absorb losses only in a situation of liquidation of the bank.

The real purpose of minimum capital ratios appears from several documents released on Basel standards and guidelines that the utility of Capital to Risk-weighted Assets Ratio (CRAR) is nowhere illustrated with a few case studies. However, it is shortly described in BCBS' Discussion Paper on the regulatory framework: balancing risk sensitivity, simplicity and comparability (July 2013) that a bank must have sufficient capital to meet the losses that it might incur. Thus, it is clear that minimum capital ratios are to be maintained to absorb losses. Global Financial Development Report 2019/2020 (World Bank Group) suggests that equity capital is the most secure and liquid form of capital to absorb losses in the event of a financial emergency. BIS which houses BCBS, World Bank, and IMF echo the same voices on the Basel Framework prepared for both member and non-member countries.

Cyclical financial crises have push responsible regulatory authorities to accommodate and adopt new requirements in regard to capital adequacy to absorb potential bank losses, to prevent bank from bankruptcy, protect in particular depositors or liability part of its balances.

The study has examined the level of capital adequacy ratios covering period since 2010 to 2020 for 6 regional countries of Western Balkan, and domestic legislations requirements on capital adequacy and its compliance with Basel III. Another study is conducted on determining how bank size, return on assets, liquidity, loans to assets ratio and leverage influence capital adequacy ratio.

The literature research on capital adequacy for the Western Balkan countries as region or for individual countries is very limited. Taking into consideration that the Western Balkan nations' per capita GDP is around a quarter of that of EU members, that WB countries are relatively small economies and that WB countries are still in process of transition and aspiring for EU membership the study significance deserve higher interest. The financial sectors assets in all WB countries consists mainly of banking assets which shows high dependence of it. The significance level is getting higher if the fragility of their economies and the level of their development is considered.

The research is needed for many stakeholders actively engaged in financial and economic activities. In particular, capital adequacy examination and data results are of primary interest for regulatory authorities in strengthening supervisory tasks in case of non-compliance with prudential regulations and potential insolvency risks. Empirical research on how specific banking factors affect CAR and their significance is a useful tool to recommend potential reforms on risks and lay down regulatory measures to avoid financial uncertainties. The study is of high importance for the interests of bank shareholders and specifically for bank depositors who are not familiar with banking risks and who miss exact information.

## **1.8 Theoretical framework**

The trade-off theory of capital structure and pecking order theories are significant components of economic theory and the leading theories for contemporary capital structure thinking. Banks, compared to other companies, are extremely linked, which can result in a domino effect in difficult time. The bank's structural vulnerability stems from its unique balance sheet, which has a low proportion of cash and capital reserves compared to debt. Banking is a unique business that exists and thrives on the interest differential between receiving and lending money. It makes money by charging high-interest rates on its products and services while also offering low-cost funding. As a result, the structure of finance is determined by its cost. Because equity is often thought to be more expensive than debt, banks attempt to maintain high debt-to-equity ratios in order to boost profitability. In this regard, bank executives frequently voice objections to increased capital requirements, which imply a significant increase in equity.

The challenge of determining the best capital structure is not new. Modigliani and Miller (1959) are the first researchers to begin studying this topic. Leading economists have stated that the financial structure of the company does not influence the company's worth. The worth is determined only by the revenue generated by its assets. This remark is plainly at odds with the behavior of bank management, who create the bank balance sheet based on the pricing of capital resources. However, this is in line with the hypothesis. According to Stiglitz (1972), the Miller and Modigliani (1959) irrelevance theorem, stands under specific assumptions only, such as in a perfect financial market with no transaction or bankruptcy costs, no taxes, symmetric information, or any other arbitrage enabling frictions. In this situation, perfect conditions are conceivable only theoretically. In practice, the most frequent tools used by governments to punish banks are taxes and deposit guarantees. Given the current legal environment, debt has two distinct benefits versus equity. On the one hand, debt provides a tax shelter, but on the other hand, it provides a safety net since the government subsidizes and, as a result, assumes a portion of the risk. As a result, banks may pay investors less and gain more revenue. Equity is understood to be more expensive in this situation. Even if it is correct, it cannot be applied universally.

It is crucial to consider the temporal perspective in this type of reasoning. In the short term, the benefits of low-cost financing may outweigh risk concerns, however, in the long run, the chance of default will rise, making leveraged structures extremely fragile and costly. It is critical to track the history of capital adequacy legislation from its beginnings to the present. The history can help understand how certain rules created the banking entities and their structure, which could be the explanation to identify how the financial markets would come closer to the optimal operating. Capital plays a crucial role in long-term financing, solvency standing and public confidence, even though it accounts for a small percentage of the financial liabilities (resources) of banking institutions. In the crisis periods, if the leverage ratio is lower, the lower is the probability that a bank will fail to pay back its debts. This argument would balance the existence of a capital adequacy regulation to avoid bank failures and risk the financial system. But, having strict regulations may govern banks to reduce their credit activities which will affect negatively productive investments. These and other similar arguments justify studying the capital adequacy regulations (Barth et al, 2001).

Other researchers continued to study the issue of an optimal capital structure under different assumptions thus many finance theories are developed. The trade-off theory and the pecking order hypothesis are two traditional capital structure theories. According to the trade-off theory, an optimal capital structure is gained when the advantages of debt financing are equalized with the cost of bankruptcy, as demonstrated by Frank and Goyal (2005), Kim and Berger (2008), and Octavia & Brown (2009). According to the pecking order hypothesis, companies choose to fund new investment activities using retained earnings as the first choice, debt financing as the second option, and equity financing as the last resort, according to Frank and Goyal (2005) and Fauzi et al (2013).

In addition, the biggest question was raised regarding the optimal level of bank capital. As discussed, bank requirements for a certain level of capital could reflect important costs and benefits. Banking regulators intention for higher capital requirements is based on decreasing the likelihood of potential future financial crises, which based on 2008-2009 global financial crisis proved it as significantly costly not only in destroyed wealth but in households tense by unemployment. There are two dimensions of higher capital legal requirements. While on one side makes it costlier for banking institutions to issue new loans to businesses and households at all times, on the other side it comes out with a decrease in the availability of credit reduction of economic output.

### 1.9 Research Model

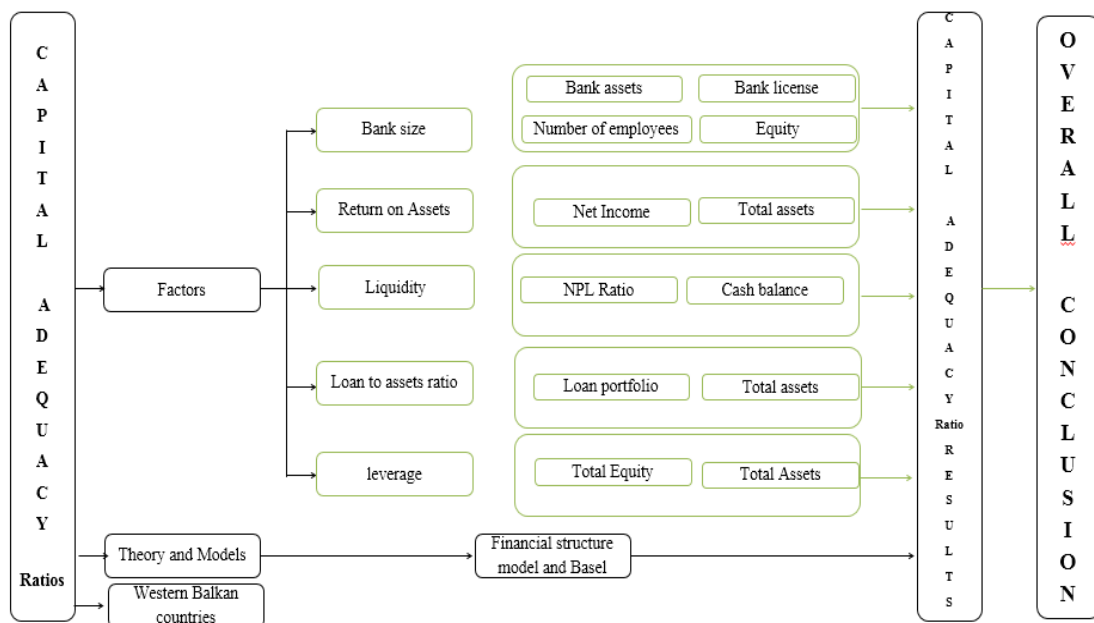


Figure 1.4 Research Model

The conceptual framework shows the research approach and methodology followed to finalize the research. A relationship between different factors that drive and affect selected variables are reflected within the conceptual framework. . A dependent variable was selected capital adequacy ratio while independent variables are bank size, return on assets, liquidity, loans to assets ratio and leverage. Five variables are examined in the research study: bank size, return on assets, liquidity, loans to assets ratio and leverage and they are re driven by the various bank components having a direct impact on functionality and behavior level of examined variables. Bank size is affected by the bank's assets, bank license, number of employees and bank equity. Return on assets is driven by net income and total assets. Liquidity by NPL ratio and cash balance. Loans to assets ratio is impacted by loan portfolio and total assets while leverage is impacted by the total equity and total assets. The period of research covers the years 2010 to 2020. The software used for this analysis is E-views Package. The methods used are Panel Least Squares and GMM (Generalized Method of Moments). The data comprises a total of 51 observations for Panel Least Squares and 21 for the GMM method. Finally, as an overall conclusion capital adequacy ratio is a dependent variable and will be influenced negatively or positively by the explanatory variables.

### **1.10 Conclusion**

At the initial phase of banking operations, various approaches were raised regarding regulation and dominated by the free banking or laissez-faire approach against more restrictive regulations. Cyclical recessions and financial crises pushed responsible international and national authorities to regulate banks in regard to their stand as financial intermediation, liquidity provision, and monitoring services. Moreover, it was understood that regulatory significance may raise even with potential systemic risks and major social consequences. Up to a certain period, there was a lack of synchronization and lack of consensus which created difficulties in drafting an international strategy for capital regulation and capital adequacy. Then international responsibility to set capital adequacy requirements was given to BIS. Capital adequacy very fast became the Basel Committee's major goal is remove unequal competition deriving from differences in national capital requirements.



The emergence appeared when financial institutions faced fast development of capital markets causing changes in behavior of customers, and banks started to increase their risks to maximize profits not respecting bank standards. The change of banking approach has resulted in different worse scenarios in particular reflected the global financial crises in 2007-2008. The main reason why the financial crisis did not result in a severe crash is that the governments and central banks of the developed countries decided to protect the financial system from collapse through the creation of the required liquidity to avoid bank failures. Furthermore, it is stated that the international financial authority has intervened periodically with the improvement of international regulations for capital adequacy. These norms were introduced as Basel I, Basel II and lastly Basel III. Each norm has introduced new elements for capital adequacy trying to enforce regulations with higher quality and quantity capital requirements.

Within this chapter research objectives for the Western Balkan countries were introduced. Regulatory authorities must be adequately involved knowing that bank solvency as a potential risk could not be left to be resolved only by the banking industry itself.

In addition, a research model to examine the interaction between capital adequacy ratio and certain factors used in the study.

## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

The issue of capital adequacy has taken the interest of many financial stakeholders. The reasons for national regulators' and international bank regulators' acceptance and implementation of capital adequacy have not received the attention they deserve in the literature. Generally, empirical research has been done on the adequacy of capital and the actions of financial institutions when regulatory bodies implement capital requirements, especially in non-Western Balkan countries. For the benefit of banking regulators, the banking sector, and other academics, research is done in this context on the capital adequacy of the banking industry in WB countries.

The results of papers that look at how banks change their balance sheets when their capital levels are limited by legislation are mixed. This is understandable, given that how banks alter capital ratios is likely to be influenced by the business cycle and the bank's financial condition. Nonetheless, there is evidence that undercapitalized banks may attract additional equity capital in some circumstances. There is also evidence that banks with little capital substitute low-risk assets for higher-risk assets and cut back on lending, however, the research examined had a hard time separating the impacts of regulation from market discipline or other variables. The authors of Furlong & Keeley (1989) and Rochet (1992) claimed that capital requirements would reduce risk-taking provided banks had diverse portfolios. Jackson et al (1999) did a comparative examination of the equity and asset volatilities of 219 banks from various G-10 nations from 1987 to 1994 when the Basel rules were implemented. The findings indicate that bank asset volatility increased in the United States and that this was true for both institutions that improved their capital ratios and those that did not.

Hafizi and Bushi (2014) focus on legislation, particularly in capitalization and solvency of banks, showing that Albania makes regulatory changes introduced in late 2011 and is adequately capitalized. Moreover, the global crisis did not affect Albania compared to other countries. Bosnia and Herzegovina stability has been established and further progress is being made to strengthen bank supervision and the crisis resolution framework. The banking sector in Kosovo remains well-capitalized, liquid, and profitable, despite the increase in nonperforming loans that maybe relate to the economic slowdown. The banking sector of Macedonia remains well-capitalized and highly liquid, with stable domestic financing. During 2011 in Montenegro the situation in the banking sector improved significantly where regulation pushed foreign owners to recapitalize their banks and to ensure appropriate liquidity in the system. Banks sold bad loans to parents or factoring companies. While Serbia despite that the banking system remains liquid and well-capitalized intends to continue improving the regulatory and supervisory framework in line with international best practices and plans to adopt the Basel II framework by 2011.

When banks confront a binding regulatory capital restriction, researches by Shrieves and Dahl (1992), Jacques & Nigro (1997), Aggarwal & Jacques (1997), and Rime (2001) show some evidence that banks shift the composition of their assets, substituting away from high risk-weighted assets. These studies examine the influence of lagging capital ratios on banks' long-run objectives for the risk-weighted to total assets ratio using partial adjustment models. When banks' capital ratios are low, they tend to substitute for low risk-weighted asset categories, according to the majority of these publications.

In contrast to Berger and Udell's (1995) findings, Hancock and Wilcox (1994) show that estimated proxies for banks' internal capital objectives explain lending fluctuations better than statutory capital ratios. They contend that regulatory capital requirements may have impacted banks' internal objectives, resulting in an indirect impact on the early 1990s lending slump.

The literature review is structured based on the World Bank's published list of countries belonging to world regions divided into seven regions (Our World in Data, 2021). The divided regions are East Asia and Pacific, Europe and Central Asia, Latin America and the Caribbean, Middle East and North Africa, North America, South Asia and Sub-Saharan Africa, and also adding the Western Balkan region as the main subject of the research. The research literature is also presented based on older to newest research.

## 2.2 East Asia and Pacific

As discussed, the purpose of this study is to see if Basel III's capital requirements are beneficial in improving the banking sector's profitability and efficiency. The FMOLS (Fully Modified OLS) and DOLS (Dynamics OLS) methodologies are used to examine a sample of the top commercial banks in the UK and Australia from 2000 to 2019. The findings show that while a higher capital ratio boosts operating earnings, it does not improve bank profitability or efficiency. The findings raise questions about the efficiency of tax policy in the considered institutions. Further empirical research reveals an ideal capital structure for banks to obtain the best results. Surprisingly, these ideal ratios are nearly identical to the Basel-III minimum common equity ratio. The success of British and Australian banks is similarly influenced by the macroeconomic outlook. Under inflationary pressure and higher policy rates, British banks are found to perform well, whereas Australian banks' performance deteriorates. The findings hold true across a variety of samples, efficiency and profitability metrics, and estimate approaches (Le et al, 2020).

Lin, et al (2004) looked at the index of insolvency risk to failure risk in the Taiwanese banking industry from 1993 to 2000 to see what effects there were before and after the adjustment of capital adequacy regulations (at the end of 1998). The capital adequacy and the insolvency risk index were shown to have a positive connection in the study. It also revealed a strikingly favorable link between capital sufficiency and other financial outcomes.

Banks can raise their capital ratio and fulfil capital adequacy requirements by issuing additional stock or decreasing their loan portfolio. . Due to the high cost of equity, banks usually reduce their assets. In their study, Hyun and Rhee (2011) found that if current shareholders gain, banks may rethink reducing bank loans, even though they may recapitalize by issuing new shares at no cost. The outcome stands when their loan portfolio has a limited number of long-term loans or when the country's economic activity is decreasing.

A bank must keep a minimum capital level requested by regulatory authorities to be protected against unexpected losses or adverse disturbances. . Banking activities and their volume are very much dependent on capital level and adequacy. Karim et al (2014) analyzed Islamic and conventional banks in 14 Organization of Islamic Conference

countries over the period 1999-2009. The study indicated that capital requirements have a remarkable effect on the lending and deposit behaviors and that the capital requirements have a very positive relationship with deposit and loan growth.

This research adds to the discussion over how capital requirements affect cost efficiency. The relationship between capital ratio and cost efficiency for Chinese banks from 2004 to 2009 is examined, taking advantage of the significant regulatory changes in capital requirements that occurred during this time to assess the exogenous impact of a higher capital ratio on a bank's cost efficiency. It is revealed that such an increase has a favorable impact on cost efficiency, the magnitude of which is influenced by the bank's ownership structure. As a result of the findings, it is believed that capital requirements can help to increase cost efficiency (Pessarossi et al, 2015).

How several factors affect the Capital Adequacy Ratio (CAR) including the bank's assets (Size), leverage (LEV), loans in total assets (LOA), loans loss reserves (LLR), net interest margin (NIM), and Cash and Precious Metals in total assets, are examined by Thoa and Anh (2017). The study covers a data set for Vietnamese banks from 2011 to 2015. NIM and LIQ appear to have a significant effect on CAR, whereas Size and LEV do not appear to have a significant effect on CAR, according to the findings. NIM and LIQ have a positive influence on CAR, but LLR and LOA have a negative effect on CAR.

The Malaysia Central Bank has requested to enforce the latest international banking regulation — Basel III. Jheng et al (2018) issued stock price of Malaysia banking institution gathering data from 8 operating commercial banks for period the of 2005 to 2014. The study examines the relationship between capital adequacy ratio and the stock price of banks deployed linear regression analysis. The results demonstrated that the capital adequacy ratio does not have an effect on the bank's stock price.

Regulators are concentrating their efforts on capital control in order to protect the financial system's stability and credibility. However, it is unclear if banks will boost capital and lower risk in response to capital regulations. Capital regulation has a negative effect on bank capital and has no effect on bank risk, according to a study that looked at Asian banks between 2002 and 2016. Stricter capital regulations actually raise the risk of a bank default. This is due to the fact that capital regulation reduces banks' future profits per period, lowering their franchise value. This effect is also caused by Asian banks' relatively high capital ratios in comparison to the minimum requirements (Nguyen et al, 2019).

Mursal et al (2019) examined whether Return on Assets (ROA), Financing to Deposit Ratio (FDR), Size, Net Interest Margin (NIM), and Deposit (DEP) have any impact on the Capital Adequacy Ratio (CAR) of Islamic Commercial Banks in Indonesia for the period of 2015-2017. Multiple Linear Regression was used to analyze the data. The results showed that Return on Assets (ROA) has a negative effect on Capital Adequacy Ratio (CAR). Meanwhile, financing to Deposit Ratio (FDR) has a negative effect on Capital Adequacy Ratio (CAR) and size has a negative effect on Capital Adequacy Ratio (CAR). Net Interest Margin (NIM) has a positive effect on Capital Adequacy Ratio (CAR) and lastly Deposit (DEP) has a negative effect on Capital Adequacy Ratio (CAR).

Ahmad & Albaity (2019) examined the determinants of bank capital ratios in 8 East Asian countries using unbalanced panel data of 278 banks from 2004 to 2014. The results indicate that bank capital decisions are significantly driven by management quality, liquidity, leverage, bank size and bank regulations which indicate consistency with findings for US and European banks. Results show that bank managers in principle react negatively to capital requirements, therefore capital regulations should be accompanied by more rigorous supervisory oversight, to reduce the adverse effects of high capital requirements on bank safety.

Nguyen (2020) study examines the impact of capital adequacy on bank profitability regarding the Basel II Accord implementation in Vietnam. The study used panel data regression analysis for the period of 2010-2018 with a sample of 22 Vietnamese commercial banks. Moreover, the study shows that bank capital adequacy is positively correlated with profitability indicators. It also shows that capital adequacy has a positive relationship with return on assets for small-sized banks and it has no significant impact on profitability for large-sized banks. Finally, the study finds also that the return on assets and return on equity of large-sized banks are not significantly correlated with the Basel II implementation. On the other hand, it is statistically meaningful to the small-sized banks' situation.

Harkati et al. (2020) investigated the influence of capital adequacy ratio (CAR) prescribed in Basel III on the risk-taking behavior of Islamic and conventional commercial banks in Malaysia and the claim that the risk-taking behavior of Islamic banks (IBs) and conventional banks (CBs) managers are identically influenced by CAR. Secondary data are gathered from the Fitch Connect database for the 2011–2017 period, for all CBs operating

in the Malaysian banking sector. The study used dynamic ordinary least squares and a generalized method of moment's techniques to estimate panel data of 43 commercial banks, namely, 17 IBs and 26 CBS. The findings of this study lend support to the favorable influence of CAR set in Basel III accord on the risk-taking behavior of both types of banks. CBs appeared to be remarkably better off in terms of capital buffers. Evidence is established on the identicality of the risk-taking behavior of IBs and CBs managers under CAR influence.

DAO et al, (2020) studied determinant factors that influence the Capital Adequacy Ratio and the performance of banks, as well as the link between the two dependent variables. The study uses 128 observations from 16 Vietnamese commercial banks from 2010 to 2017, with independent variables such as Return on Assets, Tobin Q, Credit Growth, GDP Growth, Equity to Deposits, Loans to Deposits, Bank Size, Cost to Income, Liquidity Risk, Provision for Loan Loss Ratio, Non-Performing Loans, and Inflation. The findings show a statistically significant relationship between capital adequacy ratio and bank performance, as well as substantial effects on two dependent variables from credit growth, GDP growth, equity-to-deposit ratio, and cost-to-income ratio. The outcomes of this study imply that commercial banks should exercise control over the various factors to retain a sufficient amount of capital while also achieving successful results.

### **2.3 Europe and Central Asia**

Barrios and Blanco (2003) study show how banks set their capital ratios, or the proportion of equity capital to assets. Two theoretical models have been constructed to investigate the subject. Both models consider the existence of an ideal capital ratio, first for enterprises that are not subject to capital adequacy regulations and second for those that are. The models were put to the test using data from Spanish savings institutions to estimate a disequilibrium model. It is concluded that regulatory constraints are one of the most important, but not the only, variables influencing capital augmentations in Spanish savings banks. The pressure of market forces has also played a significant role in this process. The study relies on two theoretical models developed by Wall and Peterson (1987) called the market and regulatory regimes; both models claimed the existence of an optimal capital ratio for firms that are not impacted by capital adequacy regulations and for firms that are impacted by capital adequacy regulations.

Lindquist (2004) studied the importance of the risk, the buffer as an insurance, supervisory discipline, the competition effect and economic growth using bank level data from Norway. It was found a negative or non-significant risk effect which show that launching a more risk-sensitive capital regulation – Basel II is likely to impact Norwegian banks. The study argues also that buffer capital serves as provider of insurance against failure to meet capital requirements.

Bouvatier and Lepetit (2008) examined how the introduction of the capital adequacy limitations and the provisioning system affected the rise of credit fluctuations in banking behaviors. The study used a panel of 186 European banks from 1992 to 2004 and finds that capitalized banks are restricted in their ability to increase their credit-related activities. The effects of financial crises during 2007-2009 in developed countries, when the majority of large UK and many US banks failed or pushed to increase capital, have provoked researchers to criticize not only the bankers but Basel II and Federal oversight also. Kretzshmar, McNeil and Krichner (2010) implemented a fully integrated risk analysis based on the balance sheet of a composite European bank using an economic-scenario generation model calibrated to conditions at the end of 2007. The result suggests that using integrated economic-scenario-based models capital adequacy could be improved, the application of Pillar 2 can be a boost and the importance of the Basel framework be restored.

During the financial crisis of 2007-2009, several large banks' losses were absorbed by their governments, even though these banks conformed to Basel criteria for capital adequacy. One of the primary reasons was the supervisors' reliance on book equity measurements, even though accounting data did not accurately reflect the real ability to absorb losses. According to Flannery and Giacomini (2015), the cumulative value of government guarantees extended to the 25 largest European banks from 1997 to 2011 amounts to nearly 1.4 million EUR, or an average of 28.5 per cent of the banks' equity market values, and those early regulatory warnings of equity decline value can significantly reduce costs associated with bank losses.

Roman and Sargu (2014) investigated the effect of financial indicators for the capital adequacy, asset quality, management quality and profitability on the liquidity risk for period 2003-2011. The results highlight that the capital adequacy ratio and the ration of impaired loans to gross loans have a statistically significant effect on the liquidity risk.



Capraru and Ihnatov (2014) conducted another study in the context of the key factors of bank profitability in CEE nations Romania, Poland, Czech Republic, Bulgaria, and Hungary, utilizing return on average equity, return on average assets, and net interest margin as proxy for profitability. The empirical findings of the study are consistent with the predicted outcomes, and management efficiency and capital adequacy growth impact bank profitability for all metrics, but credit risk and inflation only effect ROAA and ROAE. Banks with a greater degree of capital adequacy are more lucrative, according to further research.

In the period from 2009 to 2013 Czech banks and Slovak banks increased for 3% respectively for 4.55% the average capital adequacy. Matejasak's (2015) study used nine of the major Czech and Slovak banks to identify which techniques these banks used to raise their capital ratios. The findings revealed that an increase in average capital adequacy for Czech banks is due to an increase in capital, but an increase in average capital adequacy for Slovak banks is due to a considerable reduction in risk.

The study conducted by Papadeas, Hyz and Kossieri (2017) examine the consequences of International (Accounting) Financial Reporting Standards / IFRS - IASB and deferred taxation for banks in area of Eurozone. Research used data from four systemic Greek banks, controlling 95% of bank assets and 90 per cent of total bank deposits. The study suggests that increasing banks' losses may improve their capital adequacy.

Hadjixenophontos and Christodoulou-Volos (2018) use multiple linear regression to examine the drivers of capital adequacy in Cypriot banks, primarily during the financial crisis. It investigates the impact of bank risk, liquidity, and return on capital adequacy volatility. The analysis found a statistically significant negative link between bank size and risk, as well as a statistically significant positive relationship between the amount of provisions and the percentage of NIM (Net Interest Margin). Increases in credit risk and nonperforming loans, excessive leverage, and higher regulatory requirements for the adoption and completion of the Basel III regulations by 2019 all have an impact on the capital adequacy ratio in Cyprus commercial banks, according to the research.

Agoraki et al (2019) examined the effects that a group of bank-specific and industry-specific determinants along with the regulatory framework developed under the three pillars of Basel II agreement (capital stringency, official disciplinary power and private monitoring) have on the performance of Eurozone banking sector over the period

2007–2016. The study conducted a systematic comparative analysis of the determinants of the performance of the banking sector in periphery Eurozone countries (Greece, Italy, Portugal, Spain) versus banks operating in core Eurozone economies (Germany, France). The study argued that is consistent with the argument that banks financed with short-run capital market funding are more fragile. Another finding of study shows that banks operating in countries with more restrictive regulatory framework on banking operations perform better and that the better-performing banks have more equity. At the end study argue that bank performance is influenced by bank-specific determinants like equity capital and bank size, while the regulatory framework as well as macroeconomic variables play a crucial role.

Toscano (2019) studied European Union banks' Common Equity Tier 1 (CET1) ratio determinants after Sovereign Debt Crisis. The data used from the Bankscope database 137 banks from the 27 countries from 2011 to 2018. Study performed a regression analysis, running several models to identify the significant variables and their impact on the CET1 ratio. The result of study shows that size, risk exposure, leverage and liquidity are factors that affect CET1 ratio and banks solvency.

Kartal (2019) used Multivariate Adaptive Regression Splines (MARS) method, 14 explanatory variables, and quarterly data are used for the period of 2006/Q1-2019/Q1 taking into account that capital adequacy ratio (CAR) of the Turkish Banking Sector which has decreasing trend from 30.9% in 2003 to 17.1% as of 2019 May. The study shows that credits/total assets ratio, legal equities, risk weighted assets, nonperforming loans (NPL), NPL/total credits ratio, and credit/deposit ratio are influential factors on CAR in Turkey.

## **2.4 Middle East and North Africa**

The Basel Committee on Banking Supervision introduced Basel I in 1988, setting the minimum capital requirement at 8% of risk-weighted assets (RWA), and the Central Bank of Egypt increased the minimum capital requirement for the banking industry in compliance with Basel I in 1991, with the exception of other countries. The impact of capital restrictions on the cost of intermediation and profitability were examined by Naceur and Kandil (2009). According to the findings, bank shareholders' interest in portfolio

management has grown, resulting in higher capital adequacy, higher profitability, and higher cost of intermediation.

The purpose of this study is to give empirical evidence to explain various internal bank characteristics that influence the capital adequacy ratio (CAR) of Saudi Arabia's listed banks (KSA). For the Saudi Arabian Banks that are listed on the Saudi Arabian Stock Market, Tadawul, the data from 2008 to 2012 was used. It is revealed that other than non-performing loans, other variables have a substantial effect on CAR by employing panel data and modeling through fixed effect, robust estimation, generalized least square (GLS), and feasible GLS. The outcomes differ depending on the model type. The findings of the fixed effect, robust estimation, and least squared dummy regression (LSDR) demonstrate that the loans to assets ratio have a negative impact on CAR, although leverage and bank size have a favorable impact. In addition to the preceding model results, the loan to deposit ratio has a negative impact on CAR and the return on assets has a favorable impact. The analysis also reveals that in panel data structure, there are large bank specific impacts, but no time effect (Polat et al, 2014).

The explanatory factors that affect the capital adequacy ratio (CAR) of Egyptian commercial banks were examined by El-Ansary and Hafez in 2015. The study covers the years 2004 through 2013 and includes 36 banks. The study examined the relationship between the ratio of earning assets and profitability, liquidity, and loan loss provision as a measure of credit risk, as well as the size, growth, loans assets ratio, and deposits assets ratio. The most crucial factors prior to the global financial crisis of 2008 were asset quality, size, and profitability. After 2009, asset quality, size, liquidity, management caliber, and credit risk are the key factors that explain the variance in the CAR of Egyptian banks.

Hafez (2018) conducted a research paper on the link between bank efficiency and capital adequacy levels in Egypt. It examines data from 40 banks, including Islamic, conventional, and conventional with Islamic windows, from the pre-and post-global financial crisis years of 2002 to 2015. The study used data envelopment analysis linear programming (DEA) to calculate the efficiency of banks and a panel regression analysis through Views software application to research the relationship between the capital adequacy ratios and efficiency of banks. The results reveal a positive significant link between efficiency and capital adequacy ratios, credit risk, profitability, bank size, and management quality prior to financial crises. Liquidity has a substantial negative link with it. The efficiency indicator

for conventional banks was greater than that of Islamic and conventional banks with Islami status. The efficiency of banks has been impacted in the aftermath of the financial crisis, particularly for traditional banks. Traditional and conventional banks with Islamic windows have a negative significant association with capital adequacy ratios, but Islamic banks' efficiency is better and has a positive significant relationship with capital adequacy ratios. The efficiency of banks determines the degree of capital and risk carried, according to the study.

Hewaidy and Alyousef (2018) investigate the effects of macroeconomic and bank-specific factors on banks' CARs (capital adequacy ratios). Bank type, bank size, bank profitability (ROA & ROE), asset quality, management quality, liquidity, and net interest margin are employed as specific criteria. Gross domestic product and inflation are employed as macroeconomic factors. The information used annual data for all Kuwaiti listed banks and spanned the years 2009 to 2016. Only the bank attributes of bank size, asset quality, management quality, and liquidity have a substantial impact on CAR, according to the data. According to the findings, bank resource usage has a greater impact on CAR than any other bank attribute or macroeconomic condition.

The goal of this study is to compare the factors of CAR between Islamic and conventional banks. During 2009-2013, GMM was used to analyze annual data from 38 Islamic banks (IBs) and 75 conventional banks (CBs) in ten MENA countries. The Basel framework measures CAR, which is utilized as a dependent variable. Profitability, liquidity risk, credit risk, bank size, deposits to assets, operational efficiency, portfolio risk, and two macroeconomic factors are the independent variables (GDP growth rate and average world governance indicators for each country). The findings reveal that there is a significant relationship between CAR and (bank size, operational efficiency, and GDP growth rate) for both IBs and CBs, and that CAR is affected retrospectively in the long run. In IBs, the results show a strong link between CAR and the deposit-to-asset ratio. CBs findings, on the other hand, reveal a link between CAR and profitability, credit risk, and portfolio risk (El-Ansary et al, 2019).

Smaoui et al (2020) studied the drivers of capital ratios in contemporary Islamic banking using a sample of 122 Islamic banks (IBs) from 2000 to 2014. The capital-to-total-assets ratio, the capital adequacy ratio, and the tier 1 capital ratio are all used to assess IB capital holdings. To deal with any difficulties of endogeneity or omitted variable bias, the system

Generalized Method of Moments estimator is employed. The findings suggest that IB capital ratios remain stable over time, indicating that short-term adjustment costs exist. Furthermore, shareholder rights protection appears to have a positive and robust influence on IB capital holdings, but bank size, deposit structure, and bank competitiveness are all significantly negatively connected to IB capital ratios, confirming the "too-big-to-fail" effect. It is also shown that deposit insurance regimes with generous coverage correspond to lower IB capital ratios.

## **2.5 North America**

After many years of extensive discussions about how and whether a portfolio management approach could assist banks to improve risk capital management and increase shareholder value, Hammes and Shapiro (2001) argue that in process of managing credit assets exist four main drivers which require movement of banks from transactional to a more portfolio management approach. It covers proposed changes for capital adequacy, structural changes in the credit markets, ballooning debt levels in the US and inefficiencies of risk transfer in lending markets. The proposed changes in capital adequacy are assumed more as an initial step toward full convergence between risk capital and regulatory capital for credit risk but not as a one-time change in capital adequacy rules.

Using stock market data and quarterly financial statements for period of 1982 – 2010 for the six largest Canadian banks (Guidara et al, 2013) studied relationship between capital buffer and business cycles. The study argues positive co-movement between capital buffer and business cycle and that the Basel Accords adoption, and the leverage cap imposed by Canadian regulator did not change cyclical behavior of bank capital.

Cyclical, massive bank failures and the financial crises push researchers to investigate factors affecting the failure. Abou-El-Sood et al (2015) examined whether CAR requirements are related with bank failure. Study used sample of 560 US bank holding companies for the period 2003-2009 and results disclose if the bank holding company has a Tier 1 capital ratio of less than 6% than the association between Tier 1 capital ratio or core capital and bank failure becomes remarkable. The ratio level of 6% US bank regulators do not treat as well capitalized bank.

Chernykh and Cole (2015) explained how bank capital adequacy for triggering prompt corrective action should be measured, to identify U.S. bank failures during the crisis period. Findings proved that the non-performing asset coverage ratio (NPACR) performs better than the Basel based ratios including Total Capital Ratio, Tier I ratio and the leverage ratio during the crisis period. The results prove that NPACR performs better than other ratios at some aspects as are: a combination of capital and credit risks in one measure, easing calculation than the Tier I and Total capital ratios, it lets to account for different periods and cross-country provisioning rules and it performs better than all other frequently used capital ratios in forecasting bank failures.

Bitar et al (2018) stated that an evaluation on whether imposing higher capital ratios in lowering risk and enhancing the efficiency and profitability of banking institutions is valuable, using a sample of 1992 banks from 39 OECD countries from 1999 to 2013. While risk- and non-risk-based capital ratios both increase bank efficiency and profitability, risk-based capital ratios do not reduce bank risk. The legitimacy of the weighting procedures used to calculate risk-based capital ratios, as well as the usefulness of regulatory oversight, is called into question by the findings. The new Basel III capital requirements expect to increase the ineffectiveness of risk-based capital ratios when it comes to bank risk. While Basel III mandates banks to have higher liquidity ratios in addition to higher capital ratios, the findings imply that imposing higher capital ratios on highly liquid banks may have a negative impact on their efficiency and profitability. The findings hold true across a variety of subsamples, risk, efficiency, and profitability measures, as well as a variety of estimating methodologies.

## **2.6 South Asia**

The International Monetary Fund responded to the Asian crisis in 1997 by promoting global financial and national market stability. Reynolds, Ratanakomut, and Gander (2000) used the years 1987-1997 to study the financial structure and bank performance in eight East and Southeast Asian nations in search of evidence on the impact of bank governance in the 1997 financial crisis. Suggesting increased risk, loan preference ratios and capital ratios were both higher during financial deregulation. As management size grows, capital adequacy declines, then rises, but profitability declines, highlighting falling returns. Lin, et al (2004) looked at the index of insolvency risk to failure risk in the Taiwanese banking

industry from 1993 to 2000 to see what effects there were before and after the adjustment of capital adequacy regulations (at the end of 1998). The capital adequacy and the insolvency risk index were shown to have a positive connection in the study. It also revealed a strikingly favorable link between capital sufficiency and other financial outcomes.

The Basel III capital regulation was discussed as a means of promoting financial stability after the global financial crisis of 2007–2009, despite the claims of some opponents that the stringent capital requirements would compel banks to raise the cost of banking intermediation. Rahman et al. (2018) examined the effects of capital regulation on intermediation costs and risk-taking behavior using a panel data set of 32 commercial banks in Bangladesh from 2000 to 2014. The capital adequacy ratio was found to have a positive correlation with the cost of intermediation and a negative correlation with risk-taking characteristics. The research discovered the same results when the equity to total assets ratio was used as an alternative measure of bank capital.

## **2.7 Sub-Saharan Africa**

Abdul (2017) studied the impact of total assets, owners' funds, customers' deposits and loans and advances on banks' performance in Nigeria. Data was collected using the cross panel methodology from nine deposit money banks with significant foreign operations. The results of the OLS (ordinary least square) regression prove that 76 per cent of the variations in profit after tax were affected by independent variables. Analysis shows further that a unit change in total assets, loans and advances, customer deposits and owner's capital led to changes of 4.1%, 1.6%, 3.7% and 1.7% change in profit after tax.

Malimi (2017) studied compliance of capital adequacy and non-performing loan ratios prudential requirement and analysis on the influence posed by Capital Adequacy, Profitability, and Loan Growth on Non-Performing Loans. The data of banking sector ratios are collected from the Bank of Tanzania (supervisory authority) and covered the period from 2005 to 2014. The banking sector ratios reflected a high capital adequacy ratio, greater for 10% compared to requirements of regulatory authority. The study shows that capital adequacy and profitability posed an insignificant impact on non-performing loans while the loan to asset ratio and interest margin had a significant impact.

Udom and Onyekachi (2018) evaluated how capital adequacy standards affected the performance of Nigerian banks. The Ordinary Least Squares (OLS) regression technique was employed in the investigation. In summary, the study's capital adequacy variables demonstrate that the Return on Asset (ROA), a metric of bank performance, is significantly influenced by total qualifying capital, capital to risk-weighted assets, and adjusted shareholders capital. The study also shows that capital adequacy is positively correlated with banks' financial performance and that proper management and sufficient capital can boost and enhance financial performance.

Kablay & Gumbo (2021) considered the Capital Adequacy Ratio (CAR) as a key factor in a bank's financial success, considering that it works as a buffer to prevent and absorb any unexpected losses. For nine banks in Botswana, this study looks at explanatory variables that influence CAR. The analysis was conducted using multiple linear regression, using CAR as the dependent variable and thirteen financial ratios as the independent factors. The research period is from 2015 to 2019. Based on the data for this period, four financial ratios only were found to have a significant impact on the CAR of the nine banks under study: Asset to Equity Ratio (A E), Return on Equity (ROE), Non-Performing Loans Ratio (NPL RATIO), and the Cost-to-IncomeRatio (C I). For the banks studied, the A E Ratio was shown to be the most influential driver of the CAR, while the NPL Ratio was found to be the least influential driver of the CAR.

## **2.8 Capital adequacy literature for economies in transition-Western Balkan countries**

This section of the research paper focuses directly on Western Balkan countries, as economies in transition which have endured transformation processes. It will research papers that have examined and demonstrated capital adequacy relation with various factors which are of importance in this study. Research papers focusing on capital adequacy and capital regulations in the Western Balkan countries remain very low. Aktas et al. (2015) examined ten distinct SEE countries using annual data from 71 commercial banks between 2007 and 2012. The majority of the economies in the SEE region are "transition economies," which are undergoing difficult transitions towards strong market economies with significant economic potential. The results show that for banks in the region, the dimensional explanatory variables size, ROA, leverage, liquidity, net interest margin, and risk have a statistically significant impact on CAR. .



Kubiszewska (2019) evaluated the level of banking stability all over the transformation process in the Western Balkan countries and considered the determinants of banking stability. The study shows that in most of the researched countries, the most common determinates of banking stability are market concentration and market competition.

Jolevska & Andovski (2013) examined how the new Basel III capital position criteria would affect Macedonian banks and their operations even though Basel III is still not in force. Each bank's CAR which includes the capital conservation buffer and the countercyclical buffer exceeds the minimal Basel III CAR. Because of the lower credit activity of Macedonian banks, the calculations demonstrate that there is no need for extra capital in the countercyclical buffer. The banking system in Macedonia also satisfies the leverage ratio criteria.

Eliskovski (2014) studied factors that determine the movement of capital buffers in Macedonian banks. The econometric analysis in this work is based on the application of the Johansen co-integration technique (Vector Error Correction Model - VECM) to quarterly time series in the banking industry from 2003Q2 to 2013Q3. The conclusions of this study reveal that credit risk, market risk, and profitability all influence the banking sector's capital buffer in the Republic of Macedonia. According to the paper's suggestions, prudent actions to maintain the country's banking stability should be made.

Shingjergji & Hyseni (2015) studied the main banking determinants of capital adequacy ratio in the Albanian banking sector following the global financial crises. The study used quarterly data from the first trimester of 2007 through the third trimester of 2014 with a total of 31 observations to examine the association between the dependent and independent variables using a regression model similar to ordinary least squares analysis. The capital adequacy ratio (CAR) is employed as a dependent variable, with the following independent variables: return on assets (ROA), return on equity (ROE), nonperforming loans (NPL), bank size (Total Assets), equity multiplier (EM), and loan to deposit ratio as independent variables (LTD). According to the findings, profitability metrics such as ROA and ROE have no impact on CAR in the Albanian banking system, however, NPL, LTD, and EM have a negative and significant impact on CAR. CAR is positively correlated with bank size, therefore large banks have a larger CAR.

Kufo (2015) studied how the regulator affects the banking system's monitoring and supervision, as well as how banks respond to these needs. Based on past theoretical and

empirical techniques, this paper finds a largely positive and simultaneous link between risk and capital in the Albanian banking sector.

The purpose of Kubiszewska (2018) study is to introduce a brand-new instrument for determining how stable the banking industry as a whole is. Despite the fact that the tool may be used to evaluate the level of stability for all countries, it has been proven that the relationships and dependency of the ratios employed in the tool vary depending on the nations being surveyed. The Western Balkans and the Baltic Sea republics, which are both undergoing or have recently finished their transformations, are the two locations on which the study is based. The poll is based on quarterly data from the first quarter of 2010 to the first quarter of 2016. In these countries, high positive or strong negative correlations are the norm. Only twice were the relationships found to be true in the Baltic Sea nations and one Western Balkan nation: in Macedonia, where capital adequacy and asset quality were strongly positively correlated, and in Bosnia and Hercegovina, where liquidity and asset quality were strongly negatively correlated.

Shabani et al (2019) examined several theoretical and empirical arguments about capital adequacy and its impact on asset return. The empirical results for the variables were successful while analyzing the influence of independent variables on the dependent variables, using ROA as a dependent variable and capital adequacy, loans, deposits, loan interest rates, and non-performing loans as independent variables (NPL). The data for this empirical study came from the CBK's Audited Reports of Banks in Kosovo and the CBK's Audited Reports of Banks in Kosovo for the years 2008 to 2017. Using the GMM model resulted that all five examined variables are significant, three of them have a positive impact on asset return, and two others have a negative impact on asset return. The study concluded that capital adequacy has a positive impact on asset returns based on the literature study and empirical results of the hypotheses outlined in the research.

The focus of Vytev & Gashi (2019) study is on the strength and direction of the new Basel III regulatory framework's influence on their overall financial results. The research goal is to show how modern regulatory requirements affect the profitability of the country's banking industry including observations on banking industry developments from 2007 to 2018. A coefficient of analysis is calculated using a collection of chosen indicators, including the cost/income ratio, return on assets, asset yield, earnings margin, unit expenses, and net earnings per share unit cost of staff efficiency factor. The initial

hypothesis, that the new Basel III regulatory framework, with its tougher standards of regulation, will have a negative or stagnant effect on bank profitability in the Republic of Northern Macedonia, has not been substantiated. The findings of the empirical data analysis support the second hypothesis: the increased capital adequacy and liquidity criteria do not have a detrimental influence on banks' financial performance, but rather a trend toward strengthening their key financial metrics.

Barisitz & Hildebrandt (2020) study examines the recent evolution of macro prudential policy instruments in the Western Balkan economies (since 2015). Given that they all aspire to join the European Union, all of the countries under study have a macro prudential policy orientation toward the EU. However, each country has a different rate at which the necessary policy frameworks are being implemented. While Serbia and North Macedonia have previously had some experience with deploying comparable instruments, Kosovo and Montenegro are still engaged in preparatory work for the construction of substantial portions or whole macro prudential and prudential toolkits (including capital buffers, reserve requirements, risk weights, etc.). In terms of the scope and timing of the actions implemented, Bosnia and Herzegovina and Albania fall halfway between these two categories of economies. Following the COVID-19 crisis, several macroprudential controls and regulatory requirements were immediately loosened. However, the majority of COVID-19 response measures are located outside the macro prudential sphere and consist of provisioning restrictions, loan classification changes, and moratoria on loan repayments, which in turn could (temporarily) weaken the economic viability of capital buffers.

Alihodžić (2021) tested the relationship between the dependent variables return on assets (ROA), credit worthiness indicator (Zscore), and return on equity (ROE) for selected countries of Western Balkan banks. The independent variables were capital adequacy ratio (CAR), liquid assets to total assets (LATA), and bank size (BS). Using panel data methodologies based on the fixed and random effect assumptions chosen by the Hausman's test, the given model was estimated. The findings demonstrated that while variable liquid assets to total assets (LATA) and the capital adequacy ratio (CAR) had an adverse effect on bank asset returns in the Western Balkan countries, respectively, variable bank size (BS) does not. The other finding is variable return on equity (ROE), which along with the independent variable of bank size had the most favorable effects.

Eliskovski & Delova-Jolevska (2021) examine how the danger of single-name concentration affects the capital surplus in the banking industry of Macedonia. Vector Error Correction Model was used for the analysis on quarterly data from 2006 to 2018. The findings imply that the banking sector in Macedonia is conservative and raises the capital surplus from 0.65 percentage points (p.p.) to 2.20 p.p. as the danger of single-name concentration grows by 1 p.p. For example, if the total gross loans and the minimum capital requirement remain unchanged compared to 2018, an increase in the banking sector's large exposures of 53.7 million euros (1 percentage point of the total gross loans as of 2018 Q4) would necessitate an increase in the capital surplus of at least 3.1 million euros (0.65 percentage point of the minimum capital requirement as of 2018).

Summary table of empirical results for literature review determining authors, country/regions/groups, methodologies, independent variables, and research findings has been developed (see Annex 4: Table of Research Findings)

## **2.9 Conclusion**

This chapter reviewed a large number of papers that examine the impact of capital adequacy requirements (Annex 4 Table of Research Findings). The main purpose was to observe the trends in studies and understand different findings which are different and are still changing. This field of inquiry is of high importance taking into consideration that the main focus of BASEL is related to capital adequacy requirements. Many researchers agree that capital adequacy regulatory theory has advantages, but the topic of how much capital banks should be obliged to maintain remains complex.

The researches in regard to capital adequacy have been initiated years ago, raising many interests on risks inherited. As a research area, most interests are linked specifically with financial entities and in particular for bank regulators in charge legally to adopt and monitor its implementation trying to minimize risks from losses and bank failures.

Furthermore, the literature review is structured into regional or geographical basis. Consequently, it is observed that there is more existence of empirical literature in developed and developing countries regarding the capital adequacy and behavior of financial institutions compared to the Western Balkan region.

Most research in developed and developing countries, have examined different relationships of capital adequacy using various variables and research methods. According to evidence from research, undercapitalized banks sometimes raise additional equity capital, and weakly capitalized institutions sometimes substitute away from high risk-weighted assets and limit lending. The impact of capital requirements would be a reduction in risk-taking if banks had diverse portfolios.

There are findings where banks faced a binding regulatory capital limitation, then banks modified the composition of their assets, and some banks substitute low risk-weighted asset categories when their capital ratios are low. Some researchers conclude that poorly capitalized banks are constrained to expand credit activities or ownership concentration affects the capital adequacy ratio positively conditional on shareholders protection. In other research, if the bank holding company has a Tier 1 capital ratio of less than 6% then the association between Tier 1 capital ratio or core capital and bank failure becomes remarkable.

Another study shows that banks increase of average capital adequacy has a source in the capital increase (Czech) while banks average capital adequacy was influenced by decreasing their risk significantly (Slovak).

Increased regulatory requirements for the implementation of the Basel III rules by 2019 have an impact on capital adequacy ratio, according to research with Cyprus commercial banks. Increased credit risk and nonperforming loans, excessive leverage, and increased regulatory requirements for the implementation and fulfillment of the Basel III rules by 2019 have an impact on the capital adequacy ratio. A study examining influence in banks operating in countries with more restrictive regulatory framework show better performance and that the better-performing banks have more equity and bank performance is influenced by bank-specific determinants like equity capital and bank size, while the regulatory framework, as well as macroeconomic variables, play a crucial role.

Based on other research studies it is concluded that size, leverage and liquidity are factors that affect CET1 ratio and banks solvency. Also, a positive relationship between the capital adequacy and the insolvency risk index is shown, and a remarkable positive relationship existence between the capital adequacy and different financial performances. Capital adequacy standards with higher reserve requirements, deposit insurance, and capital adequacy requirements might shorten crisis length while increasing financial stability.

Merger and acquisition of banks contribute to increasing new loans and strengthen capital adequacy; the financial performance of banks is positively correlated with capital adequacy, and proper management and sufficient capital could boost and enhance financial performance.

## CHAPTER 3

### DATA AND METHODOLOGY

#### 3.1 Introduction

Recent decades show interest increase in the capital adequacy of banking institutions to strengthen their financial stability and the stability of the entire financial system. Capital Adequacy Ratio (CAR) also known as Capital to Risk (Weighted) Assets Ratio (CRAR), is the ratio of a bank's capital to its risk. National regulators track a bank's CAR to ensure that it can absorb a reasonable amount of loss and complies with statutory Capital requirements. The percentage ratio of a financial institution's primary capital to its assets (loans and investments) is used as a measure of its financial strength and stability. According to the Capital Adequacy Standard set by BIS (BIS), banks must have a primary capital base equal to at least eight per cent of their assets: a bank that lends 12 euros for every euro of its capital is within the prescribed limits. The CAR is important to shareholders because it is an important measure of the financial soundness of a bank. Two types of capital are measured with the CAR. The first, tier 1 capital, can absorb a reasonable amount of loss without forcing the bank to cease its trading. The second type, tier 2 capital, can sustain a loss in the event of liquidation. Tier 2 capital provides less protection to its depositors.

This chapter gives information about the data and empirical method approach used within the study. According to Wooldridge (2001), the GMM estimator behaves well in terms of bias and it often delivers nontrivial efficiency gains-even when the working second-moment assumptions fail. There are several advantages and rationales in using this method. The most important advantage of this method is that it treats the number of periods fixed, and it allows the cross-section dimension,  $N$ , to increase without bound.

This research differs from the previous literature because is the first study in the Western Balkan countries which uses Generalized Methods of Moments (GMM) technique in banking research. GMM has several advantages over normal regression methods such as: eliminates the effect of omitted variables bias problem in the regressions, eliminates the endogeneity and it eliminates the possible stationarity by including the lags of the dependent variable.

Therefore, the research may serve as a complementary reference for researchers but does not aspire to substitute other methodological guides. Consequently, contribution to the literature consists in the application of GMM method in banking and contribution to the banking is assessed based on the final findings.

### **3.2 Research Methods in Literature**

Different researchers used various models to analyze banks capital adequacy and relationship between capital adequacy requirements and correlated factors. Teply and Matejasak (2009) assess and compare how European and American banks adjust their level of capital and whether and how they react to limitations and requirements set by the regulators. The study used a modified version of the simultaneous equation model developed by Shrieves and Dahl (1992) analyzing adjustments in capital and risk at banks in cases when banks are approaching the regulatory minimum of capital. Results show that when American and European banks are close to minimum requirements simultaneously increase their capital and US banks supplementary decrease their portfolio risk-taking.

In analyzing the impact of banking regulations on banks' cost and profit efficiency Pasiouras, Tanna and Zopounidis (2009) use stochastic frontier analysis where data consists of 615 publicly quoted commercial banks with 2853 observations in 74 countries. The research examines the impact of regulations regarding the Basel II pillars and restrictions on bank activities, cost and profit efficiency. Results state that regulations strengthen market discipline and allow the supervisory power to increase cost and profit efficiency. More stringent capital requirements improve cost efficiency but decrease profit efficiency.



Acharya, Engle and Pierret (2014) compared the capital shortfall measured by regulatory stress tests to the “V-Lab stress test” using public market data. The study shows that when capital shortfalls are measured relative to RWA (risk-weighted assets) the bank ranking is not well correlated to the ranking of the V-Lab stress test while ranking correlations increase the capitalization is reflected as a function of total assets. In addition, the banks that seem to be more capitalized relative to RWA were no better than the others when the economy in Europe deteriorated into the sovereign debt crisis in 2011.

Toumi, Viviani and Chayeh (2019) develop an internal model (quantitative finance technique) based on the Value-at-risk (VaR) and the alpha coefficient  $\alpha$ CAR–VaR in the capital adequacy ratio of Islamic banks to quantify the displaced commercial risk.

Shaw, Chang and Chen (2013) develop an analytically tractable dynamic general-equilibrium model to examine the macroeconomic impact of capital adequacy requirements. It states that strengthening bank capital requirements does not necessarily decrease the equilibrium quantity of loans in the case where banks could react to the capital requirements by increasing their equity instead of decreasing lending activities.

Using a fixed effect panel regression model and split population survival time model Lin and Yang (2016) researched the influence of bank fundamentals and economic conditions on bank failures and survival time for the period 1999-2011 in the 11 countries of East Asia. The empirical results indicate that strong capital adequacy, asset quality, management, profitability, and liquidity as well as desirable economic conditions, decrease the probability of failure of banks in East Asia.

Song and Ryu (2016), banks’ target capital ratios are estimated and compared with actual capital ratios to identify capital gaps, and the responses to the gaps are then analyzed using a panel model. The study results show that the expansion of the credit-to-GDP gap increases the target capital, consequently reducing the capital gap.

Considering that the research represents the relationship between theory and research and then tests its implications with data, the deductive reasoning will be used. Accordingly, the researcher will be able to test if there is a relationship between variables and their impact on the Capital Adequacy Ratio. Therefore, the observations or findings are the outcomes of theories (Bryman and Bell, 2015). The deductive reasoning starts with generally having a level of focus in theories throughout years, the analysis and testing hypothesis.

The deductive reasoning or approach is also known to be categorized as quantitative research. Quantitative methodological research employs empirical methods and statements. As Saunders et al (2019) stated this research methodology is used to explain phenomena by collecting and analyzing a range of data using econometrical or mathematical methods, mainly statistics. The main goal of the research is to examine and state the relationship among capital adequacy ratio and other variables and then examine how much the banking sector of WBC's has complied with international capital requirements. Thus, this is possible by using data collection and data analysis (techniques and procedures). There are numerous advantages of using quantitative research, such as it generates results that can be compressed to statistics; it is accurate, standardized and conclusive; it enables statistical comparison among different variables; it estimates occurrence level etc. (Goertzen, 2017).

### 3.3 Data

The institutions in charge of the adoption of prudential regulations, supervision and surveillance of banking institutions are BIS, Central banks, IMF, FSI which at the same time regularly or periodically monitor compliance with current and/or newly enforced regulations. Therefore, to analyze and examine capital adequacy ratios and relationship with selected variables as profitability ratio (ROA), liquidity ratio (liquid assets/total assets), liquidity and risk ratio (loans/assets), bank size, and leverage ratio (equity/assets) the data from IMF/FSI (FSIs and underlying series) and data from web pages of Central banks of WBC is used.

Table 3.1

*Number of banks in Western Balkan countries*

Countries	Number of banks	Foreign owned	Local private owned	State owned
Albania	14	9	5	0
B & H	23	14	7	2
Kosovo	10	8	2	0
N. Macedonia	15	10	4	1
Montenegro	14	12	2	0
Serbia	27	20	3	4
Total	103	73	23	7

The study covers the period 2010-2020 and annual data are used. The dependent variable is the capital adequacy ratio, which is used to explore the determinants of bank capital adequacy in the Western Balkan area (CAR). Bank size, profitability or return on assets, loan to asset ratio, liquidity, and leverage are the independent variables and the study will focus on finding their impact and relationship with CAR.

The other objective is to test capital adequacy ratio and domestic capital requirements and check their compliance with BIS III. The capital adequacy ratios ensure the efficiency and stability of a nation's financial system by lowering the risk of banks becoming insolvent. Analyzing capital adequacy and compliance with national and international prudential requirements is critical for each country's financial stability, banking soundness and long-term performance, liquidity concerns, and the protection of depositors' and bank shareholders' interests.

To conduct empirical analysis, analyze prudential requirements for capital adequacy and capital ratios study will use data from the IMF/FSI and national central banks. The research will analyze activities undertaken by the national authorities in setting and amending their regulations and requirements laid down by the BIS. The key data are the most recent data of the International Monetary Fund (IMF) and web pages of the Central bank of Montenegro and Serbia because of the lack of IMF data.

### **3.4 Variables**

In the Western Balkan countries, the study aims to assess the relationship between return on assets (ROA), liquid assets to total assets (LATA), total assets or size (TA), loans to total assets ratio (LTAR), and total equity to total assets (TETA) as explanatory variables and the capital adequacy ratio (CAR) as a response variable. Return on Assets is the most widely used indicator of bank profitability (ROA). An indicator of a bank's ability or efficiency to generate profits from its total assets is the ROA ratio. The capacity of a business or company to meet its immediate liabilities and short-term obligations when they become due is known as liquidity. Liquidity is primarily concerned with how smoothly cash flows. Liquidity ratios are a significant class of financial measurements that reveal a company's ability to meet its debt obligations without having to raise outside money. The analysis also takes into account Total Assets, which was previously noted. The loan to assets ratio is a metric that assesses the proportion of total assets to outstanding loans. This

particular ratio aids investors in gaining a comprehensive understanding of a bank's portfolio. While banks with lower LTA ratio levels receive more of their income from asset management, noninterest-earning sources, or trading, those with moderately higher LTA ratio levels derive more of their income from loans and investments. To evaluate a company's or bank's leverage, one can utilize a variety of different ratios. For banks in particular, leverage ratios are crucial since they compare the bank's core capital to its overall assets. The ratio measures a bank's leverage in relation to its combined assets using tier 1 capital. If the bank needs funds during a financial crisis, Tier 1 assets can be quickly liquidated. As a result, the bank's financial health is assessed.

### ***Return on Assets (ROA)***

One of the most commonly used measures of bank profitability is Return on Assets (ROA). ROA helps analyze the performance of a company or business unit and compare the financial performance to others (eg Molyneux and Thornton (1992), Golin (2013), Claessens and Laeven (2004) and Mamatzakis and 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. ROA is well-defined as net operating income divided by total assets, simply put, the net profit which the company has achieved during a year divided by the book value of the assets that the company owns on the balance sheet date. Consequently, ROA is an imperative pointer of company success.

$$\text{Return on Average Assets} = \text{Net Operating Income} / \text{Total Assets}$$

If the company wants to recover the ROA performance, there are several ways to do it. Firstly, it can either work by increasing the numerator of profitability or by reducing the amount in the denominator of assets. Profit can be increased in several ways, by improving the product or service, realizing productivity and efficiency, achieving sourcing benefits or reducing the interest or tax charges. Whereas, assets can be reduced by shortening credit terms to customers and improved receivables collections, plant and equipment etc. therefore, this indicates that capital adequacy ratio is a factor of earnings in commercial banks when measured with respect to Return on Assets (Bourke, 1989).

Similar to this, numerous studies have discovered a significant positive association between capital and profitability (Berger, 1995; Kleff & Weber, 2003; Bitan et al., 2018; Bertrand et al (2000). Understanding that different businesses prefer to finance their operations through retained earnings rather than external and more exclusive financial supporting ways helped to explain this relationship. However, other studies, including Goodard et al., have investigated a negative association between the two variables (2010).

The relationship between equity capital and profitability is considered as systemic and advantageous because rising earnings can result in an increase in capital (Athanasoglou, et al. (2006), Berger) (1995). The relationship between profitability and regulated capital, however, may not be significant or beneficial if capital requirements are necessary because banks will store more economic capital and be less profitable. Therefore, the projected sign of the coefficient for this variable might be either positive or negative. The equity capital equation includes the bank's returns on assets (ROA) with a positive projected coefficient. The regulatory capital equation, however, has a murky coefficient.

#### ***Liquid Assets to Total Assets (LATA):***

The capacity of a business or company to meet its immediate liabilities and short-term obligations when they become due is known as liquidity. Liquidity is primarily concerned with how efficiently cash flows. Liquidity ratios are a significant class of financial measurements that reveal a company's ability to meet its debt obligations without having to raise outside money. Metrics including the current ratio, quick ratio, and operating cash flow ratio are used to calculate this (Panigrahi, 2013). The following is another interpretation of the ability to quickly and affordably turn assets into cash:

$$\text{Liquid Assets Ratio} = \text{Liquid Assets} \times 100 / \text{Total Assets}$$

Liquid assets are either in the form of cash or cash equivalents or can be converted into cash within a very short period used to pay for goods, services or pay off liabilities; how close to cash is a particular asset. Moreover, liquid assets can be considered in terms of degrees of liquidity, cash being the most liquid asset that being something that can generally spend for goods, services or liabilities very easily. Other types of assets have other liquidity degrees such as accounts receivable as usually are considered being quite liquid (Hayes, 2018).

In order to proceed, total assets (TA) is the total of all current and long-term, tangible and intangible assets that a corporation owns or controls. In order to create value and have a positive economic worth, total assets are crucial. If a bank has such assets, they are regarded as bank assets. Since the bank's ability to raise external financing at reduced costs through a large number of branches will increase as its size does as well, the CAR will fall. Additionally, as mentioned by Büyüksalvarc & Abdiolu (2011), this is an indication of a more effective shift that reduces risk exposure.

An important role of a bank in the economy is to create liquidity (Berger and Bowman, 2009). Indeed, as the last crisis shows, illiquidity and poor asset quality were the main causes of bank failures. Despite the importance of bank liquidity, there is disagreement in the literature about its measurement. Surprisingly little empirical research on the impact of liquidity on capital and risk are found. According to Jokipii and Milne (2011), banks with more liquidity might reduce their capital while increasing their risk. Banks may, however, maintain liquidity as a form of self-insurance against liquidity shocks.

On the other hand, high levels of liquidity, expose banks, particularly small ones, to risk-taking (Allen and Gale, 2003), necessitating an increase in capital to limit risk-taking. Liquidity requirements might be just as effective as capital restrictions in some circumstances. As a result, the effect of liquidity on capital will be positive in this scenario, whereas the effect on risk will be unclear. Athanasoglou et al., (2008) indicated a significant and positive (negative) influence of liquidity (liquidity risk) on regulatory capital in the whole sample of banks and in the four sub-samples with the exception of banks with a low CAR, indicating that high levels of liquidity lead to increasing CAR in order to control for risk

### **Total Assets (TA)**

There are different views regarding the relationship between total assets and capital adequacy ratio. Yahaya et al (2016) study reported a negative relationship between the two variables. However, when the Total Assets are high, it indicates that banks take higher risks. Thus, there should be a positive relationship between this variable and the capital adequacy ratio (Almazari, 2013; Abba et al, 2013; Bateni et al, 2014). However, for larger banks, the effect of size could be negative for bureaucratic and other reasons (diseconomies of scale). Hence, the size-capital and risk relationship may be expected to be non-linear (Athanasoglou et al., 2008). Many studies have proven a positive relationship

between bank size and CAR (Al-Sabbagh, 2004) considering that the larger size will guide to better operations and activities that may reveal banks to more risks. Accordingly, depositors will need a guarantee by increasing the CAR of the bank. Yet, some other studies have proven a negative relationship among these two variables (Bitar et al, 2018; Kleff and Weber, 2003; Stolz and Wedow , 2005), which means that large banks have lower supervisory control on their capital adequacy ratio (CAR) compared to small size banks.

### **Loan to Assets Ratio (LTAR)**

The loan to assets ratio is a metric that measures the relation of total loans outstanding as a percentage of total assets. This ratio helps investors to gain a whole analysis of a bank's portfolio specifically (Simpson and Kohers, 2002). The link between corporate social and financial performance: Evidence from the banking industry. *Journal of business ethics*, 35(2), 97-109. While banks with lower LTA ratio levels receive more of their income from asset management, noninterest-earning sources, or trading, those with moderately higher LTA ratio levels derive more of their income from loans and investments. These banks are also thought to perform better during any economic downturns since they have lower LTA ratios.

$$\text{Loan to Asset Ratio} = \frac{\text{Loans to Assets}}{\text{Total Assets}}$$

### **Total Equity to Total Assets (TE/TA)**

There are several different ratios used to assess the leverage of a company or bank. Leverage ratios are very important especially for banks since they measure the core capital to its total assets. The ratio uses tier 1 capital to evaluate how leveraged a bank is concerning its merged assets. Tier 1 assets involve assets that are easily liquidated if in time of financial crisis, the bank needs capital (Gambacorta and Shin, 2018). Thus, the financial strength of the bank is measured.

In 2010 the Basel Committee on Banking Supervision presented a leverage ratio, Basel III package of reforms. Basel's III leverage ratio represents the capital measure divided by the exposure measure (Blundell-Wignall, & Atkinson, 2010). The capital measure is well-defined as Tier 1 capital which has a minimum of 3% requirement for leverage ratio.

$$\text{Leverage ratio} = \frac{\text{Capital measure (Tier 1 Capital)}}{\text{Exposure measure}}$$

The likelihood of a bank resisting negative shocks to its balance sheet increases when the Tier 1 leverage ratio is higher. The capital measure includes retained earnings, bank's common equity and other instruments with no maturity, while the exposure measure represents total consolidated assets, on-balance sheet exposures, and derivative exposure.

## **CAR**

The capital adequacy ratio (CAR) is a calculation that compares a bank's available capital to its risk-weighted credit exposures (Mili et al, 2017). The capital adequacy ratio, commonly known as the capital-to-risk weighted assets ratio (CRAR), is used to protect depositors and promote global financial system stability and efficiency. Tier-1 capital, which can absorb losses without requiring a bank to discontinue operations, and tier-2 capital, which can absorb losses in the event of a winding-up and so provides a lower level of protection to depositors, are the two categories of capital that are measured.

$$CAR = (Tier\ Capital + Tier\ Capital) / (Risk\ Weighted\ Assets)$$

## **3.5 Econometric Methods**

In this section two main applied econometric methods are discussed: the Panel Least Square model and the Generalized Method of Moments technique. To forecast the performance, behavior or relationship of dependent variables Least Square regression method is used, whereas the Generalized Method of Moments is a popular technique for estimating certain kinds of panel models that can also be applied to a context other than panel studies.

### **3.5.1 Panel Least Squares estimation method**

A panel data model approach combines time series and cross-section data. 'Least squares' is a defaulting method to estimate the parameters of an equation. This method uses simple calculations and linear algebra and is built on choosing the sample regression function (SRF) to have the sum of residuals as small as possible (Startz, 2009).

The least-squares method is a standard method in regression analysis to estimate the solution of systems which are sets of equations. Data fitting is the most imperative



application. Two categories which least-squares problems classify into are known: linear and nonlinear least squares. The linear least square is a closed formula in statistical regression analysis. The nonlinear problem is generally answered by the iterative technique, a technique that enhances computed solutions.

Any regression model has the following format: Y the dependent variable and X the independent or explanatory variable. A typical regression would usually comprise of the dependent variable, C the intercept which can be Beta 0 or Alpha 0, plus the curves or independent variables. The way that beta coefficients are found is by minimizing the errors. It is important to stress that least-squares regression has some limitations. Firstly, the redundant information in the explanatory variables, which can be measured by their linearity, can lead to a misinterpretation of the model and the beta coefficients. Then, it is necessary to have more observations than a number of X variables. Finally, only one response variable can be modelled.

### **3.5.2 Panel Generalized Method of Moments**

The Generalized Method of Moments is a convenient statistical method used to for estimating and observing the model parameters with the information in population moment conditions. Moreover, GMM is well suited to deal with potential endogeneity issues. The concept or the term “moment” is a distance, where the first moment is mean which is the average distance from zero. The second moment of a variable is their R square average, the squared distance from the means, the variance. In this context, moments refer to variances and covariance’s.

The method of moments is developed by Hansen (1982) and well-studied by several other authors in the literature such as White (1982), Stigler (1986), Wooldridge (2001), Hall (2005), Okui (2009), Donald et al. (2009), Canay (2010), DiTraglia (2016), and Caner et al. (2018). In a study, Teritlak (2016) used GMM method to investigate determinants of innovation in developing countries with data spanning from 2000 to 2010. Mostly, Generalized Method of Moments is applied more often in the case of exogenous independent variable even after deal with an unobserved effect. Generalized method of moments is highly efficient with panel data if the model has one or more lagged dependent variable together with unobserved effect as mentioned by Anderson and Hsiao (1982): Chamberlain (1984), Wooldridge (2001). GMM eliminate the effects of unobservable

heterogeneity, simultaneity and endogeneity as mentioned Arellano and Bond (1991), Van Reenen (1996), Blundell and Bond (1998) and Sølvssten (2020).

Sample countries have several specific factors and it is not easy to incorporate these country-specific differences in a single panel data model. GMM eliminates these country specific effects, the endogeneity and serial correlation in the error term. To mitigate the impact of endogeneity problem, Arrelano and Bond (1991) recommend using lagged regressor as an instrument variable. It was suggested a two-step procedure. Moreover, it is assumed that the error terms are independent and homoscedastic. The errors are used to estimate a consistent variance-covariance matrix. Wooldridge (2015) also suggests using the GMM method and they highlight that GMM produces better nontrivial efficiency than other methods. The model includes both OLS and 2SLS. 2LS is a special case of GMM. The motivation for GMM is basically for the case where the distribution of the dependent variable is not known. The GMM estimation is applicable in some settings when the likelihood analysis is problematic. In particular when there is only a partial specification of the model. This may occur for instance in the models where rational expectations are present. Furthermore, GMM estimation typically accounts for heteroscedasticity and/or serial correlation.

$$CAR = \beta_0 + \beta_1 ROA + \beta_2 LATA + \beta_3 TA + \beta_4 LTAR + \beta_5 TETA + U_i$$

The dependent variable is CAR while ROA, LATA, TA, LTAR, TETA are the explanatory variables.

Table 3.2

*Description of expected relationships between variables with CAR as a dependent variable*

<i>Symbol</i>	<i>Variables</i>	<i>Expected relations</i>	<i>Source of data</i>
ROA	Return on Asset	Positive	Shabani et al (2019)
LATA	Liquid Assets/ Total Assets	Positive	Thoa et al (2020)
TA	Total Assets	Negative	Aktas et al (2015)
LTAR	Loans / Total Assets Ratio	Postive	Batani et al (2014)
TETA	Total Equity/ Total Assets	Negative	Büyükşalvarcı & Abdiolgu (2011)

### **3.6 Research Hypothesis**

- a-) H1: LATA has significant positive impact on CAR
- b-) H2: TA has significant positive impact on CAR
- c-) H3: LTAR has significant positive impact on CAR
- d-) H4: TETA has significant positive impact on CAR

### **3.7 Conclusion**

Generalized Methods of Moments has several advantages mentioned above over classical least square, two-stage least square estimation method. It eliminates the serial correlation in residual and mitigates the endogeneity problem by including lags dependent variable in the regression suggested by Wooldridge (2001). GMM also works more efficient in case of specific differences in the samples highlighted by Arellano and Bond (1991), Van Reenen (1996), Blundell and Bond (1998) and Sølvssten (2020). In the sample, countries have significant differences and GMM is the most efficient model incorporating these differences to obtain unbiased results. GMM works well with the data. In the literature. GMM estimation method is not often employed in banking. So, this study produces very good insights to other future studies in banking in using the GMM method and helps to improve the application of GMM to banking.

## **CHAPTER 4**

### **EMPIRICAL ANALYSIS**

The empirical analysis chapter includes classification of key data based on analysis is structured into 6 sections: descriptive analysis, graphical representation, correlation analysis, panel least squares, 2 SLS method and finally a conclusion of the section will be provided. This empirical study is designed to evaluate the relationship between CAR as a response variable and ROA, LATA, TA, LTAR, TETA as explanatory variables and residual with the panel data, in Western Balkan countries.

#### **4.1 Introduction**

Compliance with national and international prudential norms is critical for any country's financial stability, banking soundness, long-term performance, liquidity issues and protection of interests of depositors and bank shareholders.

To analyze and examine prudential requirements, all available data from the banking institutions, national central banks and the data taken by the BIS are undertaken in the research. The research will analyze activities undertaken by the national authorities in setting and amending their regulations and requirements laid down by the BIS.

The data analysis covers a 10 years, from 2011 to 2020. The econometric methods used are: Panel Least Squares and GMM (Generalized Method of Moments). The data comprises a total of 57 observations for Panel Least Squares and 48 for the 2SLS method/GMM.

## 4.2 Descriptive Analysis

In this section, a descriptive analysis of the mean values of variables will be interpreted. Before interpreting the results, it is important to highlight that the table comprises of mean values of variables for 6 Balkan countries, included in the research paper: Albania, BiH, Kosovo, North Macedonia, Montenegro and Serbia.

Numerous descriptive analyses use the mean as a basic measure of the center of the distribution of the data. The mean measures the average value of the series, the central tendency.

The descriptive statistics in table 4.1 for Albania shows CAR results with a mean of 16.85, ROA has scored a mean of 93.5%. The mean value of ROE is 913.4%, while TETA has a value of 980% etc.

Table 4.1

*Mean values of variables*

Countries	CAR	RCAR	ROA	ROE	LATA	TA	LTAR	TETA
Albania	16.849	15.143	0.935	9.134	11.794	1351051.82	44.522	9.804
BiH	16.790	14.972	0.687	4.856	27.588	27810.708	62.297	12.972
Kosovo	17.564	15.079	1.698	15.586	31.673	3415.485	63.145	10.992
North Macedonia	16.233	14.312	0.938	8.555	24.836	420277.049	63.089	11.099
Montenegro	16.329	15.315	0.630	4.839	19.67	3543.066	72.603	12.362
Serbia	21.157	19.473	0.921	4.769	39.089	3449037.21	81.881	18.144

If a comparison of values among countries is made, it is observed that Serbia has the highest mean value of CAR with 21.157, while the lowest value of 16.233 has scored North Macedonia. The highest mean value of RCAR is 19.473, which comes from Serbia; while the lowest value has scored North Macedonia. The mean value of Return on Assets of Kosovo remains the highest with 169%, whereas the lowest percentage of 63% has scored Montenegro.

Overall, Albania has the lowest mean values of LATA, LTAR and TETA, and does not have high mean values in any variables compared to other countries. On the other hand,

Kosovo has the highest mean values of ROA and ROE, while it also has the lowest mean values for TA. Serbia has the highest mean values among countries in the majority of variables, including CAR, RCAR, LATA, TA, LTAR and TETA. However, in regards to ROE, Serbia stands with the lowest mean value with 4.769. BiH, North Macedonia and Montenegro have relatively the same mean values of variables, and they stand in between the countries with no impressive results.

Table 4.2

*Descriptive statistics table*

	CAR	LATA	LTAR	RCA		ROE	TA	TETA
				R	ROA			
Mean	17.56	26.51	63.90	15.78	1.03	8.44	924589.8	12.70
Median	16.96	26.78	63.20	14.99	1.00	7.60	331176.2	12.16
Max.	23.40	43.68	89.16	22.40	2.81	23.66	4369198.0	19.64
Minimum	14.44	8.48	37.60	12.64	-0.60	-5.49	2455.1	8.56
Std. Dev.	2.06	8.96	12.79	2.31	0.72	6.13	1298392.0	2.97
Skewness	1.09	-0.19	0.29	1.20	0.36	0.33	1.34	0.91
Kurtosis	3.60	2.51	3.01	3.68	2.85	2.83	3.45	3.02
Jarque- Bera	13.32	0.98	0.90	16.41	1.39	1.22	19.47	8.62
Probab.	0.00	0.61	0.64	0.00	0.50	0.54	0.00	0.01
Sum	1106.4	1670.0	4025.6	993.8		531.9	58249155.0	799.9
	3	7	3	9	65.13	4	0	6

Jarque Bera test statistics in the Table 4.2 show that CAR, RCAR, TA and TETA are not normally distributed unlike LATA, LTAR, ROA and ROE.

Skewness and Kurtosis indicates that;

- CAR has right skewed bel shape distribution.
- LATA has bell shape distribution, symmetric and normal peak
- LTAR has bell shape distribution, symmetric and normal peak
- RCAR has right skewed distribution
- ROA and ROE have bell shape distribution, symmetric and normal peak
- TA right skewed and high peak distribution
- TETA has right skewed bel shape distribution.

### 4.3 Graphical Representation

Figure 4.1 shows a high performance of all Western Balkan countries regarding compliance with capital adequacy ratio. These countries are not only complying with the capital regulatory requirements, but they are exceeding noticeably capital adequacy ratios. Throughout the entire examining period, they are above legal requirements starting from 15% of capital adequacy ratio to around 23%. Figure 4.1 does show the small variability of the level of capital adequacy ratio but always in excess of national legal requirements of specific countries. It is important to notice that the capital adequacy level exceeds international standards set by the BIS.

Banking systems in Western Balkan countries are very conservative in applying high capital standards, being cushions for any unexpected risks and absorbing eventual losses in a very correct manner.

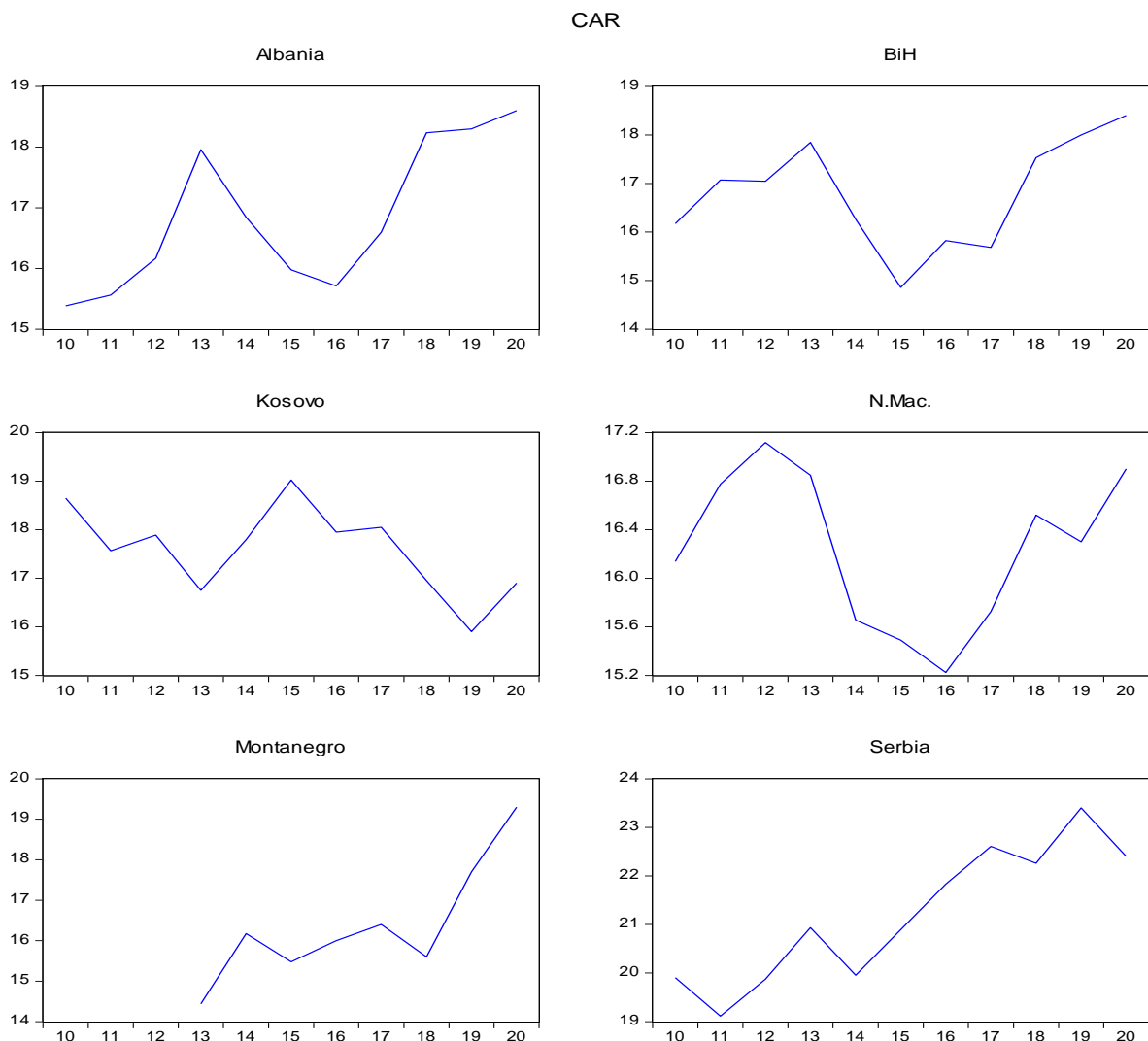
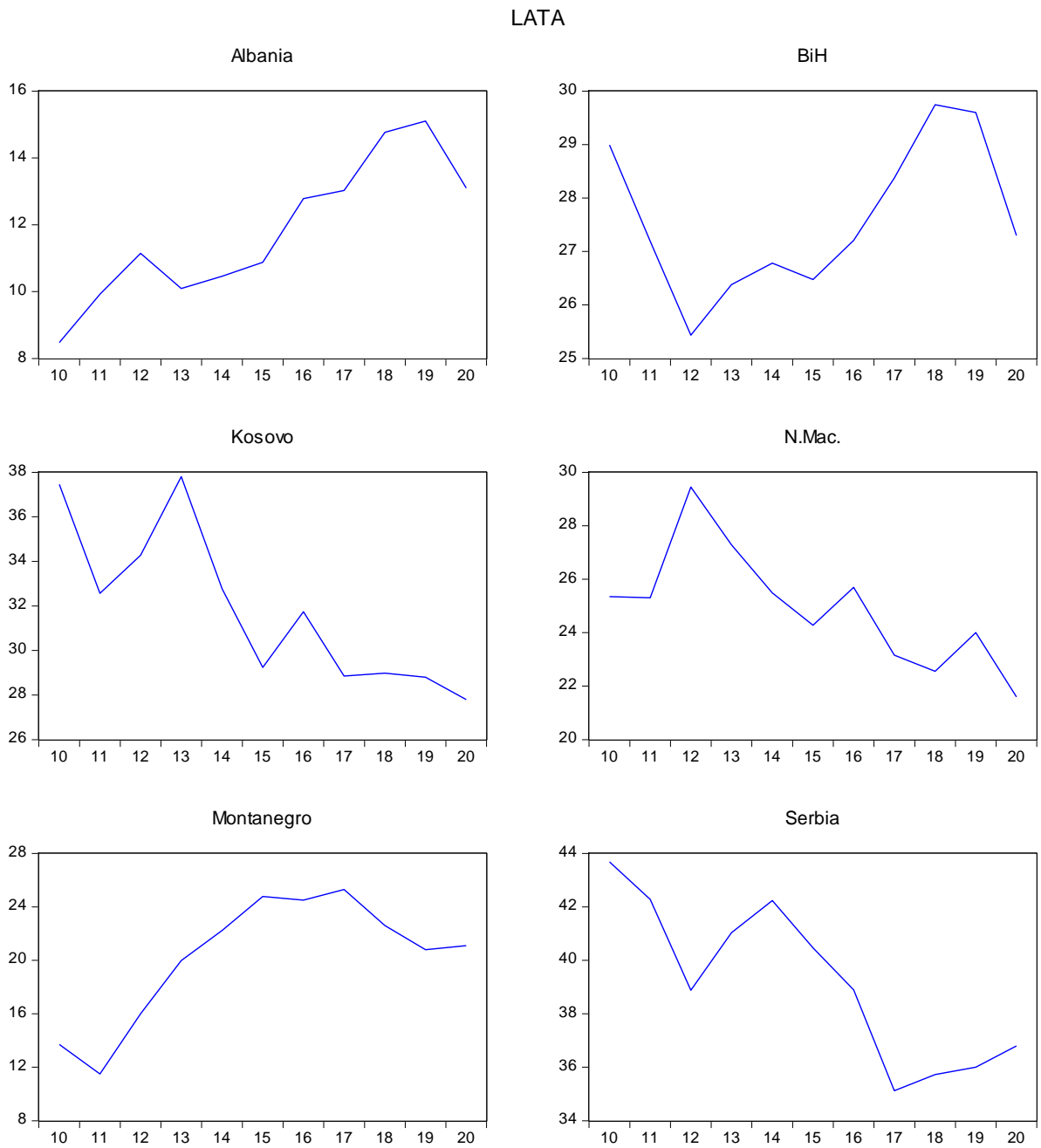


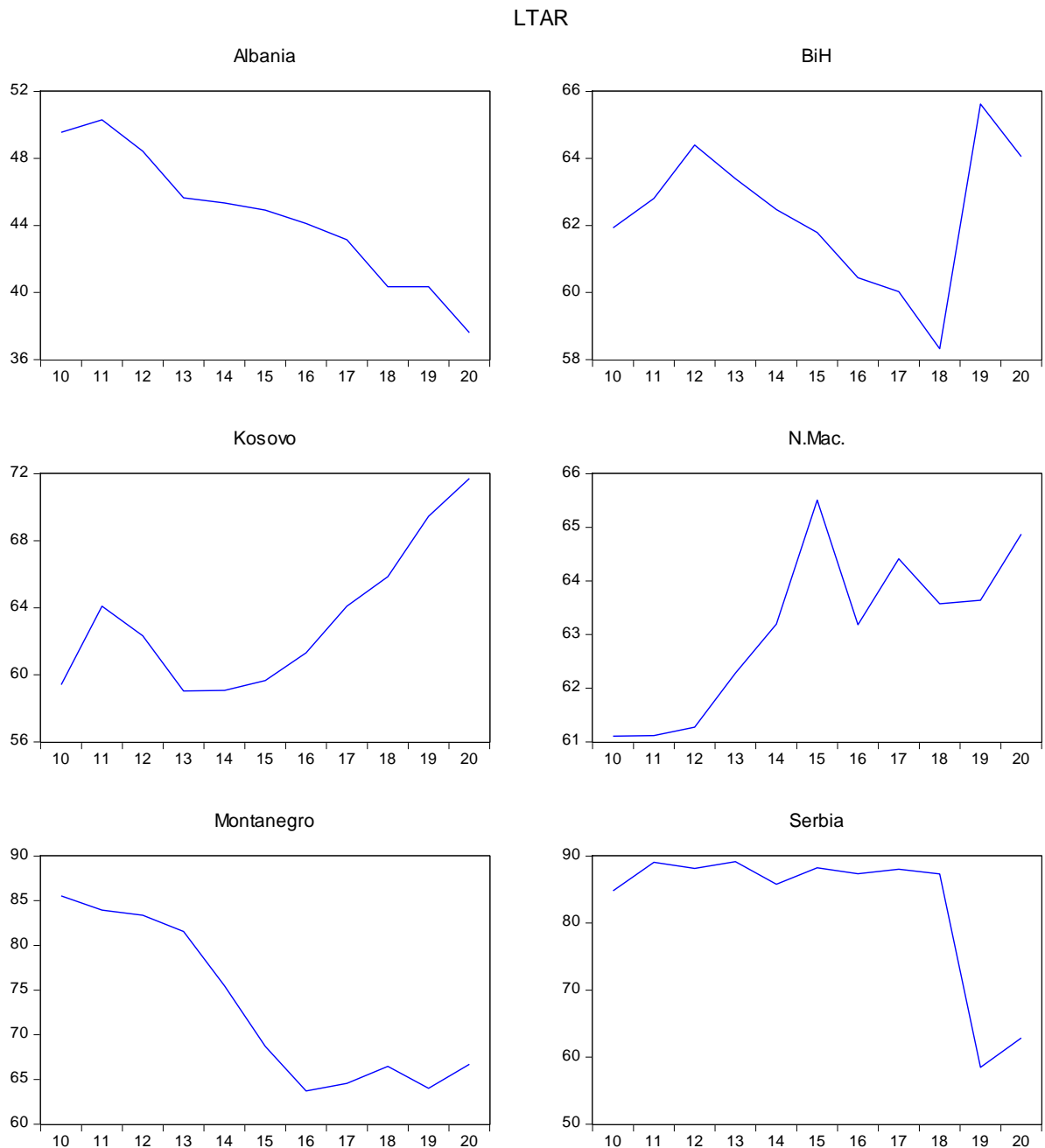
Figure 4.1 Graphical representation of capital adequacy ratio for all countries



*Figure 4.2* Graphical representation of liquid assets to total assets ratio for all countries

Figure 4.2 reflects that bank in region are able to meet short term obligations without having to disrupt or redirect its business plans and regular activities. The bank assets are liquid and assets which could be converted into cash or cash equivalents within short period to meet their liabilities. The ratio of liquid assets as of 2020 is ranging from minimum 13.6% in Albanian banking sector to 30.1% in Kosovo and 37.1% in Serbia which countries are very well equipped with liquidity. It shows that most of Western Balkan countries practically does not see as important issue of lender of last resort carried by the national regulators.





*Figure 4.3* Graphical representation of loans to assets ratio for all countries

Analyzing Figure 4.3 it is seen how much funds of banks in form of loans are used compared to total assets. In economic or financial crises periods banking institutions are eager to slow down or decrease loan portfolios as such to increase their liquid assets. Banking institutions with higher LTAR are generating more income from loans and placements, while banks with lower LTAR are generating income from other banking services and products. In event of economic downturns banking systems with lower LTAR as is Albania, could perform better or have less bad financial consequences.

Return on assets is a very important financial indicator of the banking industry showing the capability and efficiency of banks to generate profit from the use of their assets. An increase of the level of return on assets is practically a direct facilitation for an increase of bank capital and capital adequacy ratio as such. The higher return on assets increases shareholders equity and it is a factor of good performance and bank stability. The return on assets in the banking sector of Western Balkan countries derives from the analysis show different situations in the region. While Montenegro's banking system is still facing instability or weak financial performance the best performer in this aspect is the banking system in Kosovo facing stable and good financial results.

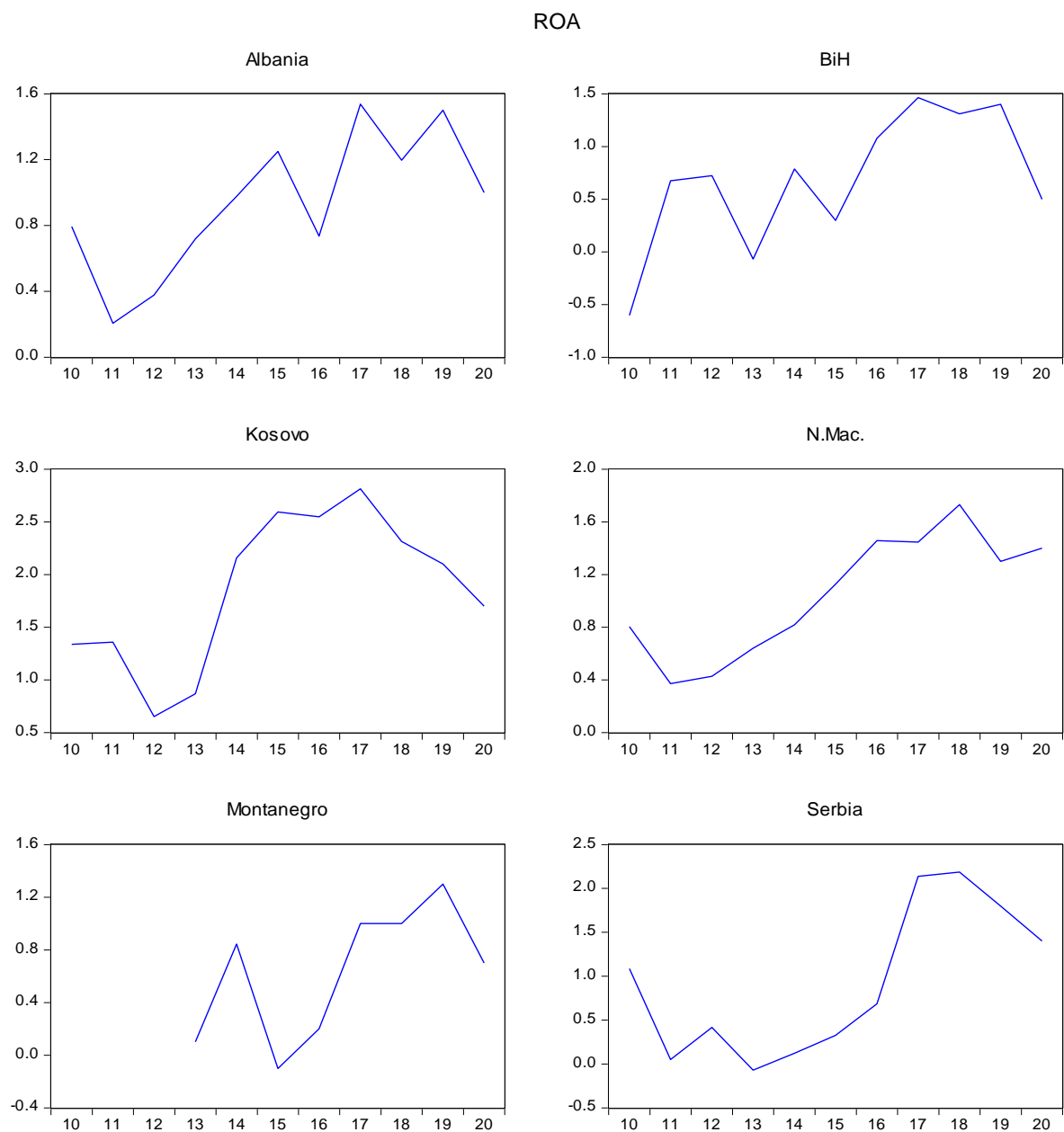


Figure 4.4 Graphical representation of return on assets ratio for all countries

Assets are very important for revenue generation, the increase of business value and facilitation in operating a business. Firstly, reflection of the balance sheet is the size of the banking institution. Figure 4.5 shows that the banking institutions in Western Balkan countries are experiencing an increase in their assets through the entire examining period which could be a reliable indicator for future growth and investments capacity.

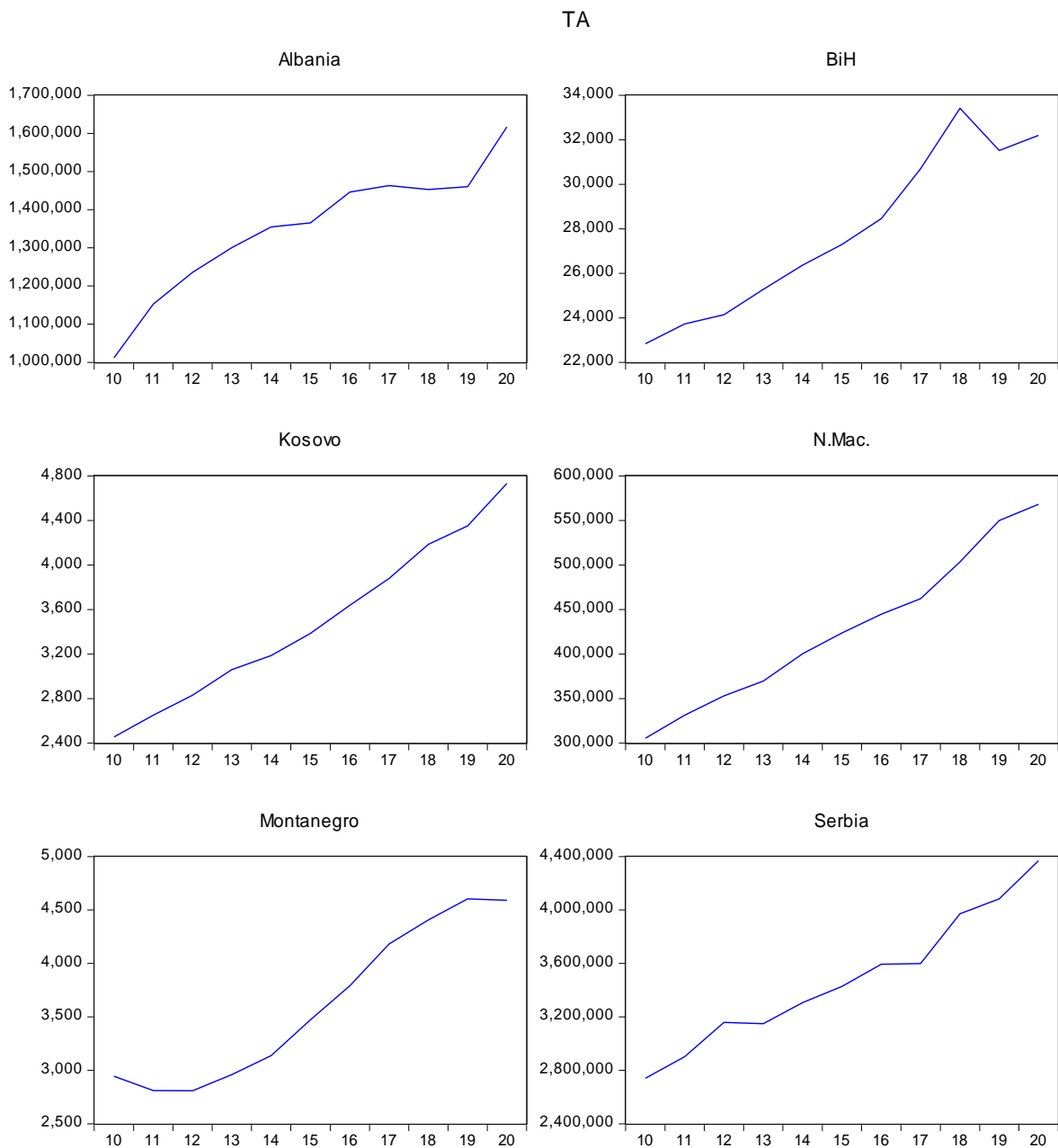
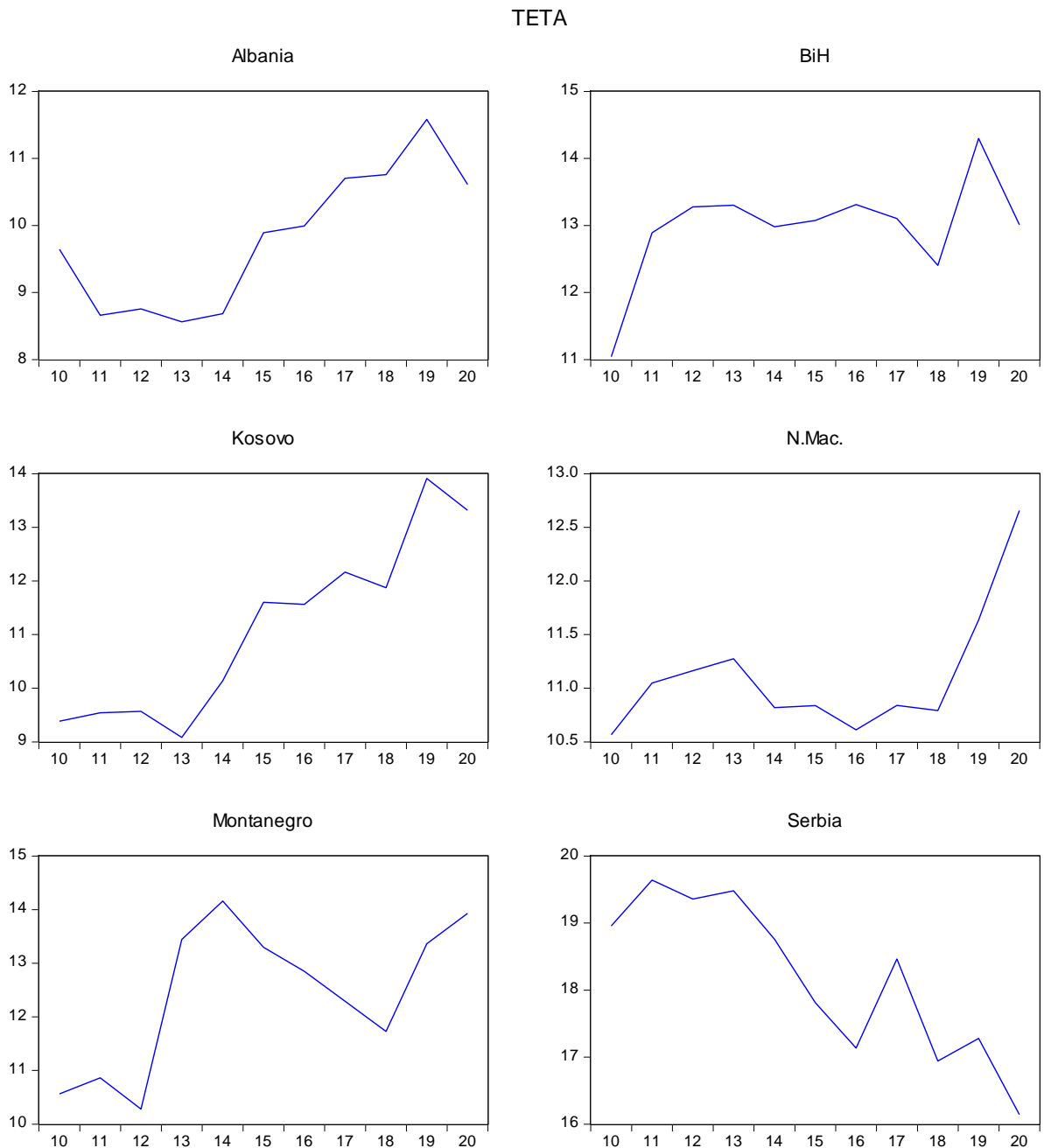


Figure 4.5 Graphical representation of total assets for all countries



*Figure 4.6* Graphical representation of total equity to total assets ratio for all countries

Examination of the TETA ratio reflected in Figure 4.6 indicates the leverage ratio as one of the most important ratios for banking institutions. Data shows that the total equity to total assets ratio is high, even above the BIS requirements, which require international active banks a leverage ratio of t 3% or higher. It means that banking institutions equity in Western Balkan countries is presenting a sound cushion against potential disruption within activities of the banking sector. TETA ratio ranks from 10% to 16% depending on the country.

#### 4.4 Correlation Analysis

Table 4.3

*Correlation analysis result*

	CAR	LATA	LTAR	ROA	TA	TETA
CAR	1					
LATA	0.580	1				
LTAR	0.426	0.766	1	-		
ROA	0.190	0.043	<b>-0.126</b>	1		
TA	0.783	0.345	0.371	<b>-0.036</b>	1	
TETA	0.666	0.686	0.812	<b>-0.096</b>	0.650	1

The table above shows the correlation analysis of the capital adequacy ratio with determining factors. The correlation coefficients are applied to determine the intensity and strength of the linear relationship between the two variables. A value that results in a greater than zero value, implies a positive relationship among variables whereas a value less than zero indicates a negative relationship. As seen from the results all explanatory variables such as LATA, LTAR, ROA, TA and TETA are positively related to the response variable CAR. TA (0.783) and TETA (0.666) have the highest values while ROA has the lowest value of 0.190.

On the other hand, there are three negative associations between variables seen; ROA is negatively related to LTAR, TA is related negatively to ROA and a negative association between TETA and ROA is also found. These negative correlations from the results are also described as an inverse correlation when variables move in opposite directions.

#### 4.5 Panel Unit Test

Stationary properties of data is necessary for the time series, in order to have very good insight into the time behavior of each variable. Normally non-stationary series produce spurious regression results which are not acceptable to interpret estimated parameters. In this study, Hadri (2000) employed Lagrange multiplier (LM) test for testing unit root in the panel data. It suggests the null hypothesis that all the panels are (trend) stationery.

Options allow you to include fixed effects and time trends in the model of the data-generating process.

Table 4.4

*Panel unit root test result table*

	<b>Statistic</b>	<b>Prob.**</b>
<b>CAR</b>	3.35708	0.0004
<b>LATA</b>	3.4827	0.0002
<b>LTAR</b>	3.4827	0.0002
<b>RCAR</b>	4.32621	0
<b>ROA</b>	3.63982	0.0001
<b>ROE</b>	5.39071	0
<b>TA</b>	4.69755	0
<b>TETA</b>	4.33745	0

Hadri panel root test result show that all variables are stationary in levels.

#### **4.6 Panel Regression Analysis**

Least Square is a defaulting approach in regression analysis that is used to assess the parameters of an equation, predict the behavior of dependent variables.

The method is built upon the criteria which represent that choosing the sample regression function (SRF) is required with the aim of having the sum of residuals as small as possible (Startz, 2009). The sum of the squared residuals is a function of the estimators  $\widehat{\beta}_1$ ,  $\widehat{\beta}_2$  and etc.

The Table 4.6 below shows the data derived from the estimations using Panel Least Squares method.

Table 4.5

*Panel least square estimation result*

Dependent Variable: LCAR				
Method: Panel Least Squares				
Sample (adjusted): 2011 2020				
Periods included: 10				
Cross-sections included: 6				
Total panel (unbalanced) observations: 57				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LATA	0.000313	0.001738	0.180079	0.858
LTAR	-0.001003	0.00122	-0.821784	0.416
<b>ROA</b>	<b>0.029429</b>	<b>0.014577</b>	<b>2.018869</b>	<b>0.0501</b>
<b>TA</b>	<b>2.14E-08</b>	<b>1.04E-08</b>	<b>2.0531</b>	<b>0.0465</b>
<b>TETA</b>	<b>0.012233</b>	<b>0.006114</b>	<b>2.000906</b>	<b>0.0521</b>
<b>LCAR (-1)</b>	<b>0.462725</b>	<b>0.138866</b>	<b>3.332161</b>	<b>0.0018</b>
C	1.391807	0.375439	3.707143	0.0006
R-squared	0.854093	Adjusted R-squared	0.800713	
Log likelihood	100.0171	F-statistic	16.00011	

Based on the above estimation output, the intercept of the equation is 1.391807 and the slope of the equation for LATA is 0.000313, -0.001003 for LTAR, 0.029429 for ROA, 2.14E-08 for TA, 0.012233 for TETA, 0.462725 for LCAR(-1). R-squared is the proportion of the variance which measures the total variation percentage in the dependent variable explained by the regression model.  $R^2$  is always positive and its limits are between 1 and 0 ( $0 \leq R^2 \leq 1$ ). If the  $R^2$  value is more than 0.5 then the dependent variable is strongly explaining the independent variable, whereas if the value is less than 0.5 then the independent variable's ability in explaining the dependent variable is not strong.

As Kennedy (1998) states, the value may also result to be equal to 1 which indicates that there is a perfect relationship between the variables, while if it is 0 it implies that there is no relationship at all. The Least Squares table above reveals an  $R^2$  of 0.854093, consequently, the understanding of the result is that almost 85% of the variation in LCAR is explained by variations in explanatory variables; LATA, LTAR, ROA, TA, TETA and LCAR (-1).

To continue further, the adjusted  $R^2$  provides a better explanation of the model and more descriptive variables considering that the value has been corrected with standard error. The results show an adjusted R square of 0.800713 which differs very little in value, a little lower, compared to  $R^2$ , nevertheless shows that the regression model is clearly expressed and well explained.

The PRF (population regression function) is represented by the following equation:

$$LCAR = \beta_0 + \beta_1 ROA + \beta_2 LATA + \beta_3 TA + \beta_4 LTAR + \beta_5 TETA + \beta_6 LCAR(-1) + U_i,$$

Where the regression coefficients:

- $\beta_0$  – the intercept coefficient
- $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$  – the slope coefficients
- $U_i$  – the unobservable random variable or the disturbance term (a random error term)

It is very important to formulate the null hypothesis, denoted by  $H_0$ , which is always formulated by using the operator “equality”. For the coefficient of the slope:

$$H_0: \beta_1 = 0$$

the alternative hypothesis can also be defined which can be formulated as the following  $H_1$ :

$$H_1: \beta_1 \neq 0$$

In the regression model this is a two-side alternative hypothesis.

The test used to compute the hypothesis is the t-test. To achieve a statistical test, it is crucial to understand the distribution of the t-statistic under the null hypothesis. The distribution mainly is the subject of the assumptions made. The t-value is compared with the critical value, and if the absolute value of the t-value is greater than the critical value, the null hypothesis  $H_0$  is rejected. If vice versa the null hypothesis fails to be rejected. The level of significance is 0.05 which dictates the critical value. T-test measures how many standard deviations the coefficient estimate is far from zero.



The standard error shows how much deviation or cause from predicting the slope coefficient correctly.

The probability value (p-value) of the t-statistics shows the smallest evidence, not to reject the null hypothesis. For a model to be statistically significant values between 0.0 and 0.05 are observed. Therefore, at a 5 percent level of significance, there is sufficient evidence to reject the null hypothesis if the value is less than 5 percent. As a result, when looking at the data in the table, the ROA, TA, TETA, and LCAR (-1) p-values are less than 0.05, indicating that they are statistically significant at the 5% level of significance, while the LATA and LTAR p-values are greater than 0.05, indicating that they are not statistically significant and providing only marginal evidence against the null hypothesis, which is why it is retained.

The results from the Panel Least Square data indicate that if ROA increases by 1 percentage point, CAR is estimated to increase by 2.9429 per cent at a 5% significance level, holding the other explanatory variables fixed. Total assets have a significant positive impact on the capital adequacy ratio at a 5% significance level. However, the impact is very limited. Also, the leverage ratio has a significant positive impact on the capital adequacy ratio at a 5% significance level. One percentage point increase in leverage ratio reflects an estimated increase in the capital adequacy ratio at around 1.2 per cent. The adequacy ratios LATA and LTAR have no significant impact on the capital adequacy ratio.

#### **4.7 Generalized Method of Moments and 2SLS estimation method**

The system GMM estimator has been proven by Arellano and Bover (1995) and Bond (2002) to perform much better than difference GMM and other estimation methods especially in the case of endogenous explanatory variables. In the GMM model the first lags of all explanatory variables is used, first and second lag of response variable are used instrument and the coefficients are estimated using 2 stage least square estimation method.

Furthermore, GMM estimation typically accounts for heteroscedasticity and/or serial correlation. So, it is not necessary to perform these tests for model specification suggested by Baum et al. (2003). The sample countries have very specific different characteristics, and it is almost not possible to incorporate these differences in the equation. Unobserved factors in the error term makes error correlated with one or more explanatory variables in

the regression equation. Instrumental variables and the lags of the dependent variable eliminate these correlations.

Following regression model is estimated by 2SLS estimation using GMM approach.

$$\ln CAR_{i,t} = \beta_0 + \beta_1 \ln ROA_{i,t} + \beta_2 \ln LATA_{i,t} + \beta_3 \ln TA_{i,t} + \beta_4 \ln LTAR_{i,t} + \beta_5 \ln TETA_{i,t} + U_{i,t}$$

where i is country index, t is time index. Response variable is lnCAR while lnROA, lnLATA, lnTA, lnLTAR and lnTETA, are the explanatory variables. The estimation output is as the following:

Table 4.6

*GMM results*

Dependent Variable: lnCAR				
Method: Panel Two-Stage Least Squares				
Periods included: 9				
Cross-sections included: 6				
Total panel (unbalanced) observations: 48				
White period standard errors & covariance (d.f. corrected)				
Instrument specification: C lnLATA (-1) lnLTAR (-1) lnROA (-1)				
lnTA (-1) lnTETA (-1) lnCAR(-1) lnCAR(-2)				
Constant added to instrument list				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
lnLATA	0.06607	0.09085	0.72723	0.4721
lnLTAR	-0.192677	0.18441	-1.0448	0.3035
<b>lnROA</b>	<b>0.053111</b>	<b>0.01311</b>	<b>4.0511</b>	<b>0.0003</b>
lnTA	0.012029	0.01042	1.15461	0.2563
<b>lnTETA</b>	<b>0.45937</b>	<b>0.21513</b>	<b>2.13531</b>	<b>0.04</b>
C	2.152731	0.45826	4.69766	0
R-squared	0.650198	Adjusted R-squared	0.51645	
F-statistic	4.861373	Instrument rank	16	

As seen from the Table 4.7, the results of the overall model show that the R-squared is 0.65 whereas the adjusted R square is 0.52. The R-square shows how much the variation in the response variable is explained by explanatory variables. In this case, the R-square of 0.65 means that 65% of variation in the capital adequacy ratio is explained by the response variables.

Additionally, the individual results from the upper section can be interpreted. The interpretation can be done from the probability point of view, therefore, if the probability of any variable is less than 0.05 then this variable is statistically significant at 5% significance level. Thus, two of the variable probability values  $\ln$ ROA and  $\ln$ TETA have values less than 0.05, therefore are statistically significant, while  $\ln$ LATA,  $\ln$ LTAR and  $\ln$ TA variable are equal to 0.4721, 0.3035 and 0.2563 which indicates that are not statistically significant.

Furthermore, from the t-statistics it can also be confirmed the results of the probability. If t-statistics value is greater than 1.96 in an absolute form, than it implies that the variable is significant at 5% significance level. So, again ROA and TETA values are statistically significant, whereas other variables are not significant.

The coefficient of LATA shows that if LATA is increased by 1 then the LCAR will be increased by 0.06607. Coefficient value of TETA is 0.45937 which implies that if TETA is increased by 1 then LCAR will be increased by 0.45937. The same interpretation goes for other variables as well.

According to the result reported in Table 4.7:

LATA has a positive impact on the capital adequacy ratio. But the impact is not significant at any level of significance. The liquidity ratio has no significant impact on the capital asset ratio. This result is in line with Roman and Sargu (2014), Lin, Penm, Gong and Chang (2005), Thoa, P. T. X., and Anh, N. N. (2017), Hewaidy and Alyousef (2018) unlike Hafez (2018). Hafez (2018) examined data of 40 banks comprised of Islamic banks, conventional and conventional banks with Islamic windows covering pre-period and post-period of 2002 to the 2015 year of the global financial crisis.

LTAR has a negative impact on the capital adequacy ratio. However, this impact is not significant at any level of significance in line with the Hancock & Wilcox (1994), Kartal (2019) unlike Karim, et al. (2014) in the literature.

ROA has a positive highly significant impact on the capital adequacy ratio meaning that profitability is an important factor in determining capital adequacy ratio. One percent increase in profitability ratio reflects an increase in the capital adequacy ratio at 0.053 per cent. The result is supported by (Berger, 1995; Kleff & Weber, 2004; (Athanasoglou, et al., 2006; Bitar, Hassan & Hippler, 2018 and Bertrand et al, 2000), Capraru and Inhatov (2014), (Agoraki, M. E. K., Kouretas, G. P., & Tsamis, A. et al. 2019, Lin, Penm, Gong and Chang (2005), Udom and Onyekachi (2018), Nguyen, T. H. (2020) unlike Goodard et al (2004). Mursal et al (2019) showed that Return on Assets (ROA) has a negative effect on Capital Adequacy Ratio (CAR) in the related literature.

TA has positive impact the capital adequacy ratio. However, this impact is not significant at any level of significance. This result is supported by (Al-Sabbagh, 2004, Akhter and Daly (2009), (Almazari, 2013; Abba et al, 2013; Bateni et al, 2014), Thoa, P. T. X., and Anh, N. N. (2017) against Kleff and Weber, 2008; Stolz and Wedow, 2005, Yahaya et al (2016), Hewaidy and Alyousef (2018), (Bitar et al, 2018, Mursal et al (2019) in the related literature.

TETA has a significant positive impact on the capital adequacy ratio at a 5% significance level. Anyone percent increase in leverage ratio is estimated to increase the capital adequacy ratio at around 46%. The magnitude of the impact indicates that the most important factor in determining the capital adequacy ratio is the leverage ratio among all other factors included in the equation. The result for leverage ratio is supported by Yu (2000), Aktas et al. (2015) unlike Toby (2008), Thoa, P. T. X., and Anh, N. N. (2017) examine a data set for Vietnamese banks in the period 2011-2015. Findings indicate that leverage ratio does not appear to have a significant effect on CAR in the literature.

Two different specification tests are applied to check robustness and consistency of GMM estimators. First specification test is called over identification test proposed by Arellano and Bond (1991) to analyze overall validity of the instruments. It is based on estimation process offered by Baltagi (2005). The hypotheses are formed whether the instrumental variable are interrelated to residuals.

$$u_{i,t} = \lnlata(-1)_{i,t} + \lnltar(-1)_{i,t} + \lnroa(-1)_{i,t} + \lnlta(-1)_{i,t} + \lnlteta(-1)_{i,t} \\ + \lnlcar(-1)_{i,t} + \lnlcar(-2)_{i,t} + e_{i,t}$$

Where;

- $u_{i,t}$  is the residual in the GMM model.
- $lnlata(-1)_{i,t}$  instrumental variable, first lag of the logged LATA
- $lnltar(-1)_{i,t}$  instrumental variable, first lag of the logged LTAR
- $lnroa(-1)_{i,t}$  instrumental variable, first lag of the logged ROA
- $lnta(-1)_{i,t}$  instrumental variable, first lag of the logged TA
- $lnteta(-1)_{i,t}$  instrumental variable, first lag of the logged TETA
- $lnicar(-1)_{i,t}$  instrumental variable, first lag of the logged CAR
- $lnicar(-2)_{i,t}$  instrumental variable, second lag of the logged CAR

Table 4.7

*Over identification analysis result*

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Dependent Variable: RESID02  
Method: Panel Least Squares  
Periods included: 9  
Cross-sections included: 6

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Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNIATA(-1)	0.005267	0.104041	0.050623	0.9599
LNLTAR(-1)	0.001335	0.177027	0.007544	0.994
LNROA(-1)	-0.00334	0.026871	-0.12418	0.9018
LNTA(-1)	-0.0001	0.011245	-0.00911	0.9928
LNTETA(-1)	-0.00809	0.182745	-0.04429	0.9649
LNCAR(-1)	0.143371	0.424513	0.337729	0.7373
LNCAR(-2)	-0.14428	0.446911	-0.32283	0.7485
R-squared	0.003206	Mean dependent var		-1.77E-18
Adjusted R-squared	-0.14631	S.D. dependent var		0.141954
S.E. of regression	0.151984	Akaike info criterion		-0.79347
Sum squared resid	0.92397	Schwarz criterion		-0.51792
Log likelihood	25.64664	Hannan-Quinn criter.		-0.68978
Durbin-Watson stat	2.052411			

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Over identification analysis in Table 4.8 indicates that instrumental variables are not interrelated with the residuals. The GMM model successfully satisfy this condition.

Second specification test includes the serial correlation of first order and second order correlation between successive values of residuals.

Formally, this specification test is expressed as;

$$E(u_i u_j) = Cov(u_i u_j) = 0 \text{ for all values of residuals}$$

If this specification test show whether the residual in one period affect the residual in the subsequent period.

So, the following equation to check serial correlation is formulated;

$$u_{i,t} = \delta u_{i,t}(-1)$$

Where;

-  $u_{i,t}$  is the residual series obtained in the GMM equation

-  $u_{i,t}(-1)$  is the first lag of the residual

And the coefficient of first lag of the residual in the equation is estimated.

Results reported in Table 4.9 Estimated coefficient of residual is found not significant. It indicates that there is no significant relationship between residuals.

Table 4.8

*Estimation of the coefficient of the first lag of residual*

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESID01(-1)	0.252856	0.15857	1.59461	0.1195
R-squared	0.051261	Mean dependent var		-0.0103
Adjusted R-squared	0.051261	S.D. dependent var		0.083209
S.E. of regression	0.081048	Akaike info criterion		-2.16089
Sum squared resid	0.236477	Schwarz criterion		-2.11736
Log likelihood	40.97652	Hannan-Quinn criter.		-2.14554
Durbin-Watson stat	1.743554			

#### 4.8 Model 2 and Model 3: macroeconomic and financial factors

The research performed two separate models to explore the impact of macroeconomic factors and financial factors on capital adequacy ratio in western Balkan countries:

Model 2:

$$LCAR_{ij} = \beta_0 + \beta_1 ROA_{ij} + \beta_2 LATA_{ij} + \beta_3 TA_{ij} + \beta_4 LTAR_{ij} + \beta_5 TETA_{ij} \\ + \beta_6 DGDP_{ij} + \beta_7 DUNEMP_{ij} + \beta_8 DINF_{ij} + U_i$$

Where;

DGDP is the first difference of Gross Domestic Product for countries over years

DUNEMP is the first difference of unemployment for countries over years

DINF is the first difference of inflation for countries over years

Empirical result of Model 2 show that macroeconomic variables such as GDP, unemployment and inflation have no significant impact on the capital adequacy ratio. CAR depends on return on assets and total equity to total asset ratio (see: ANNEX 5. GMM results with macroeconomic factors).

Model 3:

$$LCAR_{ij} = \beta_0 + \beta_1 ROA_{ij} + \beta_2 LATA_{ij} + \beta_3 TA_{ij} + \beta_4 LTAR_{ij} + \beta_5 TETA_{ij} \\ + \beta_6 DBMONEY_{ij} + \beta_7 DEXP_{ij} + \beta_8 DCREDIT_{ij} + U_i$$

Where;

DBMONEY is the first difference of broad money as a percentage of GDP for countries over years

DEXP is the first difference of government expenditures as a percentage of GDP for countries over years

DCREDIT is the first difference of domestic credit provided by financial sector as a percentage of GDP for countries over years

Empirical result of Model 3 show that financial variables such as broad money, government expenditures and domestic credit to financial sector have no significant impact on the capital adequacy ratio. CAR depends on return on assets and total equity to total asset ratio (see: ANNEX 6. GMM results with financial factors).

## 4.9 Conclusion

This section demonstrates, analyzes, and interprets the data retrieved from various statistical models and analyses. In this research, panel data methods are used to explore and assess the impact of selected financial variables ROA, LATA, TA, LTAR, TETA on CAR.

The results of the descriptive analysis show that the mean values of variables are the highest in Serbia, whereas Albania has the lowest mean values among other Western Balkan countries. Kosovo has the highest value in ROA and ROE, which can be expressed that the higher ROA indicated more asset efficiency. Also, a higher ROE implies that the country is efficiently using the equity investors' contributions to produce further earnings, therefore providing an attractive level of profits to shareholders. Serbia has scored the highest mean value of Capital Adequacy Ratio, which suggests that the higher the CAR the more is the probability to resist a financial downturn.

To continue further, in terms of correlation analysis a positive effect of independent variables with Capital Adequacy Ratio are found. The Panel Least Square method data has found that nearly 85% of the variation in LCAR is explained by variations LATA, LTAR, ROA, TA and TETA. From all the variables, only LATA and LTAR has resulted in no statistically significant relationship. On the other hand, the GMM and 2SLS method findings have shown that 65% of the variation in the dependent variable is shown by these independent variables, with ROA and TETA variables being statistically significant. In both methods, ROA and TETA p-values are less than 0.05, thus statistically significant, while LATA and LTAR are in both cases not statistically significant. Among all included financial variables, leverage ratio is the most important factor followed by profitability ratio in determining capital adequacy ratio. The GMM model also satisfies the over-identification and serial correlation specification test.

When comparing the estimation results obtained from two different method, GMM gives more significant and better results than panel least square estimation method. To conclude, the research findings may have several future implications for researchers, experts and officials.



## **CHAPTER 5**

### **CONCLUSIONS**

#### **5.1 Introduction**

The Basel Committee on Banking Supervision in 2010 as a regulatory response to the financial crisis 2007/2008 introduced the Basel III Capital Accord. Lack of sufficient capital requirements and high-quality capital for banks was a relevant lesson learned after the bankruptcy of a number of financial institutions. Regulatory divergence in applying Basel III standards was another concern of BIS. The concern over future risks of being impacted by the financial crisis having non-optimal and high-quality capital was raised not only by the members of BCBS but from other banking jurisdictions as well. It worried Western Balkan country regulators which undertake initiatives to apply capital regulations of Basel III.

The main goal of this research is to examine if capital adequacy ratios are in compliance with BIS III (as global standard setters) requirements and to examine how specific bank factors impact capital adequacy ratio. This study used secondary data. Most of the data are retrieved from IMF data and others from central banks. The period of study is ten years, from 2010 to 2020. Two econometric methods are used in the study the Panel Least Squares and the GMM (Generalized Method of Moments). The study is designed to evaluate the determining factors of capital adequacy ratio in Western Balkan countries. In the empirical analysis, CAR is used as a response variable whereas ROA, LATA, TA, LTAR and TETA as explanatory variables.

The results of this study in terms of correlation analysis show a positive effect of independent variables with Capital Adequacy Ratio. The Panel Least Square method data has found that most of the variation in LCAR is explained by variations LATA, LTAR, ROA, TA, TETA and LCAR (-1). From all the variables, only LATA and LTAR has resulted in no statistically significant relationship. On the other hand, the GMM 2SLS method findings have shown that 65% of the variation in the dependent variable is shown by these independent variables, with ROA and TETA variables being statistically significant. In both methods, ROA and TETA p-values are statistically significant, while LATA and LTAR are in both cases not statistically significant.

## **5.2 Summary of the Results**

Research objectives has been accomplished through analysis and extensive investigation of prudential capital regulations and capital ratios standards adopted by the central bank authorities of Western Balkan countries and at the same time overviewing the Basel III requirements.

*Research Objective 1:* to examine the determining factors of capital adequacy ratio in Western Balkan countries

LATA has a positive impact on the capital adequacy ratio. However, the impact is not significant at any level of significance. Liquidity ratio has no significant impact on the capital asset ratio.

LTAR has a negative impact on the capital adequacy ratio. However, this impact is not significant at any level of significance.

ROA has a positive highly significant impact on the capital adequacy ratio meaning that profitability is an important factor in determining capital adequacy ratio. One per cent increase in profitability ratio reflect an increase in the capital adequacy ratio at 0.053 per cent.

TA has a positive impact the capital adequacy ratio. However, this impact is not significant at any level of significance.

TETA has significant positive impact on the capital adequacy ratio at 5% significance level. Any one per cent increase in leverage ratio is estimated to increase capital adequacy

ratio at around 46%. The magnitude of the impact indicates that the most important factor in determining the capital adequacy ratio is leverage ratio among all other factors included in the equation.

Research Objective 2: to investigate impact of profitability and leverage ratio on the capital adequacy ratio

The profitability of a bank relates to external and internal factors i.e. size, capital, loans and deposits. In the literature, the profitability of the bank is normally measured by return on assets (ROA), return on equity (ROE), or net interest margins (NIM). Profitability is a sine qua non for bank survival in the financial industry where exists a very highly competitive environment. The positive and significant relationship between capital adequacy and bank efficiency profitability indicates that banks with higher equity capital are supposed to bring more safety and stability which could be converted into higher profitability. The higher the capital adequacy ratio it will give the bank's the opportunity to extend their banking products and services avoiding the eventual risk of intervention by banking regulators and supervisors. The bank's return on assets (profits) is included in the equity capital equation and the regulatory capital equation. The research has shown that the banking industry in Western Balkan countries until 2015 has performed differently while since 2015 the profitability ratios are showing stable and better performance.

As indicated by the findings ROA has a positive highly significant impact on the capital adequacy ratio meaning that profitability is an important factor in determining capital adequacy ratio. The average Return on Assets of Western Balkan countries in 2020 is 1.12% (Annex 1).

TETA (leverage) has a significant positive impact on the capital adequacy ratio at a 5% significance level. Anyone per cent increase in leverage ratio is estimated to increase the capital adequacy ratio at around 46%. The magnitude of the impact indicates that the most important factor in determining the capital adequacy ratio is the leverage ratio among all other factors included in the equation.

The leverage ratio is one of the main and very important ratios especially for banks measuring a bank's core capital to its total assets. The ratio uses tier 1 capital to adjudicate

how leveraged a bank is in relation to its assets. Tier 1 capital is the primary funding source of the bank which can be easily liquidated in case of a financial crisis.

Generally, a bank with a high capital adequacy ratio is considered safe and likely to meet its financial obligations. Leverage is an investment strategy particularly for the banking industry using borrowed money or borrowed capital with the aim to increase the potential return of an investment. Leverage is also known as the amount of debt used to finance assets.

In principle, banks are expected to absorb the losses from the normal activities and earnings, but in practice, happens unanticipated losses cannot be absorbed by normal earnings. Equity comes in force in loss situations to cushion off the losses. In this regard, capital plays an insurance and stabilization function. Adequate capital in banking provides the customer, the public and the regulatory body with confidence in the ongoing business activities.

The BIS III requirement regarding the leverage ratio is set as equal to higher than 3% and the research shows that the leverage ratio in Western Balkan countries as of 2020 is ranging from 10 – 16% (Annex 1). It means that the banking industries in the region have a capital level that could be converted into liquid assets in a short period and it brings safety and confidence to the public.

Research Objective 3: to evaluate the compliance of the banking industry with domestic and capital standards set by their Central banks and BIS III?

All banking industries of WB countries are in compliance with domestic capital standards set by their Central banks. Answer findings to research objective 2 and research objective 1 conclude that all WB jurisdictions have at least the same or higher capital ratio requirement as applied by the Basel III standards; that the regulatory Tier 1 Capital to Risk-Weighted Assets stands between 15.0 % to 21.5% and the regulatory Capital to Risk-Weighted Assets is between 16.9% to 22.4%. According to BIS III, capital requirements minimum Regulatory capital must be at least higher than 8% while Tier 1 capital (going concern) must be higher than 6%.

The research results show that the banking industry of WB countries fully complies with domestic and capital standards set by the BIS III.

Research question 1: Do current capital ratios bring safety and confidence in the banking industry of Western Balkan countries?

The regulatory Tier 1 Capital (comprised of Common Equity Tier 1 and additional Tier 1) to Risk-Weighted Assets as the most qualitative component of regulatory capital in WB is in level 15.0 % to 21.5% which is well above national and Basel III requirements. The other capital ratio, regulatory Capital to Risk-Weighted Assets in WB countries is ranging from 16.9% to 22.4%, reflecting a very high ratio compared to legal national and BIS III requirements.

The importance of results is that the highest quality of regulatory capital stands at the level between 15%-21.5%. The findings of research for examining periods since 2010-2020 demonstrate that the capital ratios of banking systems in Western Balkan countries are very stable and at the same time experiencing very high ratios for a longer period (a decade). These results (Annex 1) argue a high confidence function for the bank creditors and depositors regarding their placed funds in the banking system.

Research question 2: What are the domestic requirements related to the capital adequacy of banks?

The study examines all laws, regulations, decisions, instructions and guidelines related to capital in WB countries (Annex 3). All analyzed legislation is in force as of 2021 year and reviewed around 50 documents. Each WB country has adopted qualitative and high standards for bank capital requirements. Domestic jurisdictions enforced at least the same capital ratio requirement or higher capital ratio standards as applied by the Basel III standards. North Macedonia and Serbia are applying the same standards as required by the BIS in regard to Common Equity Tier 1 capital/risk weighted exposure and Tier 1 Capital/risk weighted exposure. On the other side Albania, Bosnia & Herzegovina and Kosovo are applying higher minimum legal requirements for similar ratios. Albania, Bosnia & Herzegovina and Kosovo have introduced higher capital ratios in regard to regulatory capital/risk weighted exposure.

Results indicate that domestic requirements on Tier 1 capital/risk weighted assets are at ratio of 9% in Albania, in B&H at 9%, in Kosovo at 8%, in North Macedonia at 6%, and in Serbia at 6%.

The regulatory capital/risk weighted assets are at ratio of in Albania at 12%, in B&H at 12%, in Kosovo at 12%, in North Macedonia at 8%, in Serbia at 8%, Montenegro is 8%

Capital buffers for capital preservation equal to 2.5% of risk weighted assets is enforce within jurisdictions in B&H, Kosovo, North Macedonia and Serbia. There is no currently such requirement in Albania and Montenegro.

Leverage ratio is enforce in B&H in level of 6% and in Kosovo at 7% of total equity/total assets. Other countries during study didn't enforce such requirement.

Research questions 3 : Is there any risk inherited about capital adequacy deficiencies?

The members of BCBS are committed to apply and adopt Basel III capital requirements while for internationally active banks the capital requirements are compulsory. The BCBS members for non-internationally active banks could apply same requirements. In this direction regulatory jurisdictions of WB countries are obliged to monitor internationally active banks operating under their jurisdictions for compliance with Basel III. For banks non-internationally active domestic regulatory authorities has set standards similar to Basel III or higher compliance standards. Examined data of capital adequacy ratios confirm that all countries of WB comply in respect to quality and quantity of capital standards. It is important to emphasize non-existence of deficiencies for a period more than 10 years and to recognize soundness of banking system related to capital requirements and its implementation.

### **5.3 Significance of the Results**

The capital adequacy ratio (CAR) measures the level of capital a bank keeps compared to its risk. The most important stakeholders in this process are depositors, shareholders and regulatory/supervisory authorities.

Regulatory authorities monitor the CAR of banks to define reasonable level of tolerance is respect to amount of loss. Regulatory authorities must also define if a bank's capital adequacy ratio is compliant with prudential regulations. The CAR is significant to shareholders interests because it is an essential measure of the financial soundness of a bank which generate profit and make possible further expansion. In this concept study

confirmed full compliance of WB banking institutions with legislations in force proving high financial and supervisory discipline.

Another significant reason for preserving capital adequacy is connected with depositors' interests. Bank depositors have placed their funds to institutions having asymmetric information and could not recognize their level of risk. It is important to ensure that banks have enough cushion to absorb a reasonable amount of losses in case of insolvency and consequently lose depositors' funds. In this context study proved satisfactory level of safety and confidence toward banking industry.

Past deficiencies in the adoption of optimal global capital requirements and recognition of undisclosed risks have faced world with cyclical financial crises.

BIS III has introduced new requirements in regard to capital adequacy to absorb potential bank losses, to prevent bank from bankruptcy, protect in particular depositors or liability part of its balances.

The research observed that the regulatory capital level in WB countries is between 15%-21.5%. The period of examination is 2010-2020 showing financial stability over longer period of activities. These results indicate high safety and brings confidence for bank creditors and depositors. Creditors and depositors are known as biggest bank debtors allowing banks to extend their business and make profits.

#### **5.4 Contribution of the Results**

Studies on the topic of bank capital adequacy for Western Balkan countries, either collectively or individually, are clearly lacking in the scholarly literature. The study is conducted specifically for this group of countries to examine the soundness of the banking industry in relation to capital adequacy as an instrument for protection against risks of losses or even bankruptcy given that the Western Balkan countries' per capita GDP is around a quarter of the EU's members, that the WB countries are relatively small economies, still in the process of transition, and that they aspire to join the EU. . Studies related to capital adequacy in WB countries are limited therefore this study will be first one examining entire WB region using capital adequacy ratio as dependent variable and bank size, return on assets, liquidity, loans to assets ratio and leverage as independent variables. Second contribution is that this is the first assessment of compliance of domestic capital

jurisdictions with BIS III. Studies conducted until now were focused specifically to individual WB countries. Third contribution is related to use of General Methods of Moments in studying behavior of determining factors on CAR.

Study contribution is oriented toward WB regulatory authorities in charge to regulate capital adequacy within region and compliance with BIS capital requirements. The empirical study show what relationship is and which factors in which direction influence CAR. They could monitor and supervise future banking activities in more depth analyzing level and quality of capital adequacy and intervene with specific measures if needed having in mind risks which arise for financial stability.

### **5.5 Implications**

The findings show high banking solvency and no capital risks are involved within 10 years of period and even current banking parameters are in very satisfactory level. Policy makers having these results could consume more time and efforts to overview and examine closely other inherited banking risks. The study covers all (6) Western Balkan countries examining the level of capital adequacy ratios covering period since 2010 to 2020, consider the national legislations on capital adequacy standards and carried out comparative analysis between national regulations and requirements set by global capital standards setters (BIS).

Taking into consideration their fragile economies and their development and growth reliance on banking system it is of high importance to examine banking system giving recommendation for potential engagement of baking regulatory for strengthening supervisory role in case where there is lack of compliance with prudential regulations and adjust capital adequacy ratios in compliance with risks reflected in economy and financial system.

### **5.6 Limitation of the Study**

As with the majority of studies, this research might be a subject to possible limitations. The limited number of studies for WB countries on capital adequacy contrasts with extensive literature throughout the other regions. . During the process of communication and efforts



to get information and data from central bank institutions researcher face hesitancy for cooperation and support. Due to limitations, the researcher was primarily and mostly oriented to use data from IMF/FSI.

## **5.7 Further Research**

This research is enriched by the further analyses to have some introductory analysis for future studies. Selected financial and macroeconomic factors have been included to explore their possible impact on the capital adequacy ratio (The World Bank, 2021). Findings show that in private banking sector in the Western Balkan countries there is no significant impact on the capital adequacy ratio (Annex 5 and 6 GMM results with financial and macroeconomic factors).

Due to the study limitations and potential opportunity of banking industry in the Western Balkan to introduce new products as consequence of interconnection with EU countries in one hand, and presence of international active banks in WB financial market on the other hand, advisory comment would be to have more specific further researches on capital adequacy subject. The past financial crises have evolved as consequence of sophisticated bank products and unfamiliarity of regulatory authorities with hidden and unknown inherited risks.

Further researches should be focused not in general to the capital adequacy ratio but study focus to be specifically on capital components. Perhaps, study should examine components of Tier 1 capital as most qualitative capital and its compliance with national and BIS requirements.

Future research should focus also in the relationship between size, leverage and the quality of capital. To determine mechanisms that prevent larger banks and leveraged banks reducing their capacity to absorb losses.

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## APPENDICES

### Appendix A: Aggregated Data for Period 2010-2020

#### ANNEX 2: Aggregated Data for Period 2011-2020

ALBANIA	Regulatory Capital to Risk-Weighted Assets	Regulatory Tier 1 Capital to Risk-Weighted Assets	Return on Assets	Liquid Assets to Total Assets (Liquid Asset Ratio)	Equity	Total Assets	Loans	Loans to Assets ratio	Leverage ratio (total equity to total assets)
2010	15.4	14.6	0.8	8.5	97,602	1,012,070	501,557	49.56	9.64
2011	15.6	14.4	0.2	9.9	99,841	1,152,774	579,934	50.31	8.66
2012	16.2	14.6	0.4	11.1	108,216	1,235,866	598,546	48.43	8.76
2013	18.0	14.9	0.7	10.1	111,330	1,300,471	593,625	45.65	8.56
2014	16.8	13.9	1.0	10.5	117,653	1,354,708	614,230	45.34	8.68
2015	16.0	13.7	1.2	10.9	135,092	1,365,628	613,283	44.91	9.89
2016	15.7	13.8	0.7	12.8	144,515	1,446,049	637,885	44.11	9.99
2017	16.6	15.1	1.5	13.0	156,578	1,462,991	631,258	43.15	10.70
2018	18.2	17.0	1.2	14.8	156,329	1,453,177	586,281	40.34	10.76
2019	18.3	17.1	1.5	15.1	169,136	1,460,503	589,229	40.344251	11.58
2020	18.6	17.5	1	13.1	171,611	1,617,333	608,183	37.604068	10.61

Bosnia and Herzegovina	Regulatory Capital to Risk-Weighted Assets	Regulatory Tier 1 Capital to Risk-Weighted Assets	Return on Assets	Liquid Assets to Total Assets (Liquid Asset Ratio)	Equity	Total Assets	Total Loans	Loans to asset ratio	Leverage (total equity to total assets)
2010	16.2	12.6	-0.6	29.0	2,521.9	22,840.7	14,145.1	61.9	11.0
2011	17.1	13.6	0.7	27.2	3,058.7	23,726.0	14,901.9	62.8	12.9
2012	17.0	14.1	0.7	25.4	3,204.7	24,134.2	15,542.5	64.4	13.3
2013	17.8	15.2	-0.1	26.4	3,362.4	25,280.0	16,026.4	63.4	13.3
2014	16.3	14.3	0.8	26.8	3,422.6	26,367.0	16,473.5	62.5	13.0
2015	14.9	13.8	0.3	26.5	3,569.0	27,296.4	16,866.8	61.8	13.1
2016	15.8	15.0	1.1	27.2	3,787.9	28,458.6	17,201.1	60.4	13.3
2017	15.7	14.8	1.5	28.4	4,021.1	30,690.8	18,422.4	60.0	13.1
2018	17.5	16.5	1.3	29.7	4,144.6	33,411.3	19,485.8	58.3	12.4
2019	18.0	17.5	1.4	29.6	4,506.6	31,519.8	20,684.1	65.6	14.3
II/2020	18.4	17.3	0.5	27.3	4,188.3	32,192.8	20,621.3	64.1	13.0



Kosovo Republic	Regulatory Capital to Risk-Weighted Assets	Regulatory Tier 1 Capital to Risk-Weighted Assets	Return on Assets	Liquid Assets to Total Assets (Liquid Asset Ratio)	Equity	Total Assets	Total Loans	Loans to asset ratio	Leverage (total equity to total assets)
2010	18.6	15.6	1.3	37.5	230.4	2,455.1	1,458.7	59.4	9.4
2011	17.6	14.8	1.4	32.6	252.8	2,649.7	1,698.1	64.1	9.5
2012	17.9	15.0	0.7	34.3	270.7	2,829.3	1,763.4	62.3	9.6
2013	16.8	12.8	0.9	37.8	277.8	3,059.3	1,805.8	59.0	9.1
2014	17.8	14.6	2.2	32.8	323.1	3,186.6	1,882.3	59.1	10.1
2015	19.0	16.7	2.6	29.2	392.7	3,385.3	2,019.5	59.7	11.6
2016	17.9	15.9	2.5	31.7	420.6	3,637.1	2,230.0	61.3	11.6
2017	18.1	16.2	2.8	28.9	471.6	3,877.5	2,485.3	64.1	12.2
2018	17.0	15.5	2.3	29.0	496.7	4,183.9	2,755.5	65.9	11.9
2019	15.9	14.2	2.1	28.8	605.2	4,350.9	3,021.9	69.5	13.9
2020	16.9	15.0	1.7	27.8	630.1	4,731.7	3,393.3	71.7	13.3

North Macedonia	Regulatory Capital to Risk-Weighted Assets	Regulatory Tier 1 Capital to Risk-Weighted Assets	Return on Assets	Liquid Assets to Total Assets (Liquid Asset Ratio)	Equity	Total Assets	Total Loans	Loans to asset ratio	Leverage (total equity to total assets)
2010	16.1	13.4	0.8	25.3	32,256.0	305,290.0	186,545.0	61.1	10.6
2011	16.8	14.1	0.4	25.3	36,589.7	331,176.2	202,405.3	61.1	11.0
2012	17.1	14.5	0.4	29.4	39,394.0	352,885.9	216,224.8	61.3	11.2
2013	16.8	14.4	0.6	27.3	41,656.9	369,505.0	230,131.5	62.3	11.3
2014	15.7	13.7	0.8	25.5	43,309.0	400,281.2	252,967.3	63.2	10.8
2015	15.5	13.9	1.1	24.3	45,912.9	423,667.6	277,533.2	65.5	10.8
2016	15.2	13.9	1.5	25.7	47,190.8	444,680.3	280,962.3	63.2	10.6
2017	15.7	14.2	1.4	23.2	50,081.0	461,992.1	297,575.7	64.4	10.8
2018	16.5	15.0	1.7	22.6	54,331.7	503,469.0	320,085.3	63.6	10.8
2019	16.3	14.8	1.3	24.0	63,998.1	549,969.3	350,004.9	63.6	11.6
2020	16.9	15.5	1.4	21.6	71,913.2	568,174.8	368,586.3	64.9	12.7

Montenegro	Regulatory Capital to Risk-Weighted Assets	Regulatory Tier 1 Capital to Risk-Weighted Assets	Return on Assets	Liquid Assets to Total Assets (Liquid Asset Ratio)	Equity	Assets	Total Loans	Loans to asset ratio	Leverage (total equity to total assets)
2010				13.7	310.91	2,943	2,517	85.52	10.56
2011				11.5	305.23	2,810	2,359	83.95	10.86
2012				16	288.68	2,808	2,341	83.37	10.28
2013	14.4	13.0	0.1	20.0	397.8	2959.0	2413.0	81.55	13.44
2014	16.2	14.4	0.8	22.2	444.0	3136.0	2367.0	75.48	14.16
2015	15.5	14.2	-0.1	24.8	461.7	3472.0	2385.0	68.69	13.30
2016	16	14.7	0.2	24.5	487.2	3791	2,415	63.70	12.85
2017	16.4	15	1	25.3	514	4182	2,700	64.56	12.29
2018	15.6	14.4	1	22.6	517	4,406	2,929	66.48	11.73
2019	17.7	18.1	1.3	20.8	615	4,604	2,947	64.01	13.36
III/2020	19.3	19.7	0.7	21.1	639	4,591	3,062	66.70	13.93

Serbia	Regulatory Capital to Risk-Weighted Assets	Regulatory Tier 1 Capital to Risk-Weighted Assets	Return on Assets	Liquid Assets to Total Assets (Liquid Asset Ratio)	Equity	Total Assets	Loans	Loans to asset ratio	Leverage (total equity to total assets)
2010	19.9	15.9	1.1	43.7	519,692	2,741,266	2,325,064	84.82	18.96
2011	19.1	18.1	0.0	42.3	569,964	2,901,920	2,584,280	89.05	19.64
2012	19.9	19.0	0.4	38.9	611,491	3,158,571	2,784,526	88.16	19.36
2013	20.9	19.3	-0.1	41.0	613,424	3,148,833	2,807,530	89.16	19.48
2014	20.0	17.6	0.1	42.2	620,126	3,306,185	2,836,545	85.80	18.76
2015	20.9	18.8	0.3	40.5	610,402	3,427,141	3,024,336	88.25	17.81
2016	21.8	20.0	0.7	38.9	615,805	3,593,732	3,139,453	87.36	17.14
2017	22.6	21.6	2.1	35.1	664,463	3,598,927	3,167,964	88.03	18.46
2018	22.3	21.1	2.2	35.7	672,825	3,971,317	3,467,266	87.31	16.94
2019	23.4	22.4	1.8	36	705,700	4,084,000	2,388,100	58.474535	17.28
2020	22.4	21.5	1.4	36.8	705,341	4,369,198	2,746,464	62.859683	16.14

## Appendix B: CAR enforced by the six Western Balkan countries

	Albania	B & H	Kosova	Montenegro	North Macedonia	Serbia
<b>Minimum capital</b>	1 billion Lek	15 mil. KM	7 mil. I	5 mil. I	310 mil. Denar	10 mil. I
<b>CAR</b>						
Total Capital/RWA & other risks	9%	12%	12%		8	
Tier 1 Capital/RWA & other risks	9.00%	6%	8%			
Capital Indicators:						
capital/risk weighted exposure	6.75%	6.75%			4.5	4.5
Tier 1 capital/risk weighted exposure	9.00%	9.00%			6	6
Regulatory capital/risk-weighted exposure (CAR)	12.00%	12.00%		8.00%		8
<b>Credit risk</b>						
Standardised approach	12% of the total of the risk-weighted and contingent exposures			total risk weighted assets divided by 10		
IRB approach	n/a					to use
<b>Operational risk</b>						
BIA approach (BIS II)	net income from banking activities for the last three years of the bank's activity, and an $\alpha$ coefficient equal to 15%.	15% of the three-year average of the relevant indicator	15% of gross income shall be added to RWA for calculating risk-asset ratio	multiplying the base for calculating capital requirement for operational risk, by coefficient 0.15 and increase the obtained result	by multiplying the arithmetical mean of the three-year positive values of the basic indicator, determined in line with item 160 of this Decision, by 15%.	equal to a three-year average exposure indicator multiplied by a 15% rate of capital requirement
Standardised approach (consent of CB)	the net income from banking activity for the last three years according to business lines and the respective coefficient $\beta$ ,	as the three-year average of the sum of annual capital requirements for all business lines	average of the 3 years of the risk-weighted relevant indicators calculated each year according to business lines (with prior approval)	annual average of capital requirement for operational risk for the last three consecutive business years, increased by 25%	through calculation of the risk-weighted basic indicator for each business line and the risk-weighted basic indicator for each of the last three years.	
Advanced Approach						consent of NBS

<b>Market risk</b>	Banks shall calculate the capital requirement for market risks as the sum of: a) capital requirements for trading book positions, b) capital requirements for all of credit institution's positions		if CB assess it can require additional capital			
<b>Leverage ratio</b>		6%	7% total equity/total assets			
ECAI - External credit assessment institution (ECRAT) internal capital adequacy assessment process	direct and indirect recognition	direct and indirect recognition	direct and indirect recognition			
<b>Capital buffers</b>						
<b>Combined buffer increased by</b>						
Capital buffers for capital preservation		the regulatory capital that the bank has to maintain in the form of regular core capital in the amount of 2.5 % of their total amount of risk exposure	2.5 % of risk weighted assets		<i>of 2.5% of the risk weighted assets</i>	on an individual and consolidated basis equal to 2.5% of its risk-weighted assets.
Capital buffers for systematically important banks		with an amount of 0% to 2% of the total amount of exposure to risk			<i>may range from 1% to 3.5% of risk weighted assets.</i>	1%-2%
counter-cyclical buffere		if necessary under special enactment			<u>may not exceed 2.5%</u>	at 0%, taking into account the following: - Guide for setting the CCB rate: 0%. - Credit-to-GDP ratio: 75.3%. - Deviation of credit-to-GDP ratio from its long term trend (credit-to-GDP gap): - 12.9 pp
buffer for systemic risk					<u>may range from 1% to 3% of risk weighted assets</u>	equal to 3% of total foreign currency and foreign currency-indexed placements of a
capital buffer for a global systematically important						N/A

## Appendix C: Capital legislation of WB countries

<b>KOSOVO Regulations on Bank Capital Adequacy</b>
Regulation on capital adequacy of banks (2018)
Regulation on licensing of banks and branches of foreign banks (2020)
Regulation on use of external credit assessments for the purpose of calculation of regulatory capital (2016)
Regulation on the internal capital adequacy assessment process for banks (2018)
Regulation on the leverage ratio (2018)

<b>ALBANIA Regulations on Bank Capital Adequacy</b>
Regulation "On the bank's regulatory capital"
Regulation "On granting the license and the exercise of banking activity of banks and branches of foreign banks in the Republic of Albania" (2009)
Regulation "On the leverage ratio of banks" (2020)
Regulation "On the bank's regulatory capital" (2019)
Regulation "On capital adequacy ratio", (2013)
The Guideline 26/2017 "On the internal capital adequacy assessment process" (2017)

<b>B&amp;H Regulations on Bank Capital Adequacy</b>
BANKING LAW Federation of B&H (2017)
Decision on amendments to the decision on capital calculation in banks (2020)
Decision on amending and supplementing the decision on calculation of bank capital (2019)
Decision on the internal capital adequacy assessment process and the internal liquidity adequacy assessment process in a bank (2019)
Decision on criteria for inclusion of formed loan loss reserves into common equity tier 1 (2018)
<b>Banking law of Republika srpska (2016)</b>
Law on Banking Agency of Republika Srpska (2016)
Decision on calculation of capital in banks (2020)
Decision on the internal capital adequacy assessment process in banks (2020)
Instruction for application of particular provisions of the decision on calculating capital in banks (2020)
Instructions for determining the minimum capital requirement and acceptable liabilities of the bank (2020)
Table for the allocation of ECAI credit assessments to credit quality grades for the purposes of Article 69 of the Bank's Capital Calculation Decision (2020)
Decision on criteria for inclusion of formed loan loss reserves into common equity tier 1

<b>NORTH MACEDONIA Regulations on Bank Capital Adequacy</b>
Banking Law (2021)
Decision on the methodology for determining capital adequacy (2020)
Decision on the Methodology for Managing Leverage Risk (2017)
Instructions for enforcing the Decision on the Methodology for Managing Leverage Risk (2017)
Decision on the Methodology for Determining the Rate of the Countercyclical Capital Buffer for Exposures in the Republic of Macedonia (2017)
Instructions for implementation of the Decision on the Methodology for determining capital adequacy (2019)

<b>MONTENEGRO Regulations on Bank Capital Adequacy</b>
Banking law (2017)
Law on credit institutions (2019)
Decision on capital adequacy of banks (2017)
Decision on the countercyclical capital buffer rate (2021)
Decision on the manner of calculating specific countercyclical capital buffer rate of a credit institution (2020)
Decision on internal capital adequacy assessment of a credit institution (2020)
Decision on capital adequacy of credit institutions (2020)
Decision on more detailed requirements for setting the rate of conversion of relevant capital instruments and liabilities to equity of a credit institution under resolution (2020)

<b>SERBIA Regulations on Bank Capital Adequacy</b>
Law on banks (2015)
Decision on capital adequacy of banks (2021)
Decision on the countercyclical buffer rate for the republic of Serbia (2017)
Decision on the rate and manner of maintaining the systemic risk buffer (2018)
Guidelines for the implementation of specific provisions of the decision on capital adequacy of banks relating to bank capital (2017)
Decision on risk management by banks (2011)

## Appendix D: Table of Research Findings

Author/s	Country/ Region/Group	Data	Empirical Methodology	Empirical results
Jackson et al (1999)	G-10	1987-1994	comparable examination of the equity and asset volatilities	improved or not capital ratios has affected increase of asset volatility
Kretzshmar, McNeil and Krichner (2009)	EU		integrated economic-scenario-based models	capital adequacy could be improved, the application of Pillar 2 can be boost and the importance of the Basel framework be restored
Klepaczarek, E. (2015)	EU		stress tests to determine the CET1 Ratio's compliance with Basel III standards	bank size and risk indicators have an impact on capital sufficiency
Hadjixenophontos and Christodoulou-Volos (2018)	Cyprus		multiple linear regression	higher regulatory requirements for the adoption and completion of the Basel III by 2019 have an impact on the capital adequacy ratio
Toscano (2019)	EU	2011-2018	regression analysis	size, risk exposure, leverage and liquidity are factors that affect CET1 ratio and banks solvency
Le, T. N. L., Nasir, M. A., & Huynh, T. L. D. (2020)	UK, Australia	2000-2019	FMOLS (Fully Modified OLS) and DOLS (Dynamics OLS) estimate methodologies	a higher capital ratio boosts operating earnings, it does not improve bank profitability or efficiency. Further empirical research reveals an ideal capital structure for banks to obtain the best results. Surprisingly, these ideal ratios are nearly identical to the Basel-III minimum common equity ratio
Polat, A., & Al-khalaf, H. (2014)	Saudi Arabia	2008-2012	fixed effect, robust estimation, generalized least square (GLS), and feasible GLS	loans to assets ratio has a negative impact on CAR, although leverage and bank size have a favorable impact. The loan to deposit ratio has a negative impact on CAR and the return on assets has a favorable impact.
Udom and Onyekachi (2018)			Ordinary Least Squares (OLS) regression method	that capital adequacy has positive relationship with the financial performance of banks
Hafez (2018)	Egypt	2002-2015	data envelopment analysis liner programming (DEA)	positive significant link between efficiency and capital adequacy ratios, credit risk, profitability, bank size, and management quality prior to financial crises. Liquidity has a substantial negative link.
Kartal (2019)	Turkey	2006-2019	Multivariate Adaptive	credits/total assets ratio, legal equities, risk weighted assets,

			Regression Splines (MARS) method	nonperforming loans (NPL), NPL/total credits ratio, and credit/deposit ratio are influential factors on CAR
Mursal et al (2019)	Indonesia	2015-2017	Multiple Linear Regression	Return on Assets has a negative effect on CAR, size has a negative effect on CAR, Net Interest Margin (NIM) has a positive effect on CAR
Smaoui, H., Salah, I. B., & Diallo, B. (2020)	Islamic banks	2000-2014	Generalized Method of Moments	bank size, deposit structure, and bank competitiveness are all significantly negatively connected to IB capital ratios
El-Ansary, O., El-Masry, A. A., & Yousry, Z. (2019).	MENA	2009-2013	GMM	significant relationship between CAR and (bank size, operational efficiency, and GDP growth rate)
Nguyen (2020)	Vietnam	2010-2018	panel data regression analysis	bank capital adequacy is positively correlated with profitability indicators
Eliskovski (2014)	North Macedonia	2003-2013	application of the Johansen co-integration technique (Vector Error Correction Model - VECM)	profitability all influence the banking sector's capital buffer
Shingjergji & Hyseni (2015)	Albania	2007-2014	regression model similar to ordinary least squares analysis	ROA and ROE have no impact on CAR, however NPL, LTD, and EM have a negative and significant impact on CAR. CAR is positively correlated with bank size, therefore large banks have a larger CAR.
Shabani et al (2019)	Kosovo	2008-2017	GMM model	capital adequacy has a positive impact on asset returns



## Appendix E: GMM results with macroeconomic factors

Model 2:

Dependent Variable: LCAR				
Method: Panel Generalized Method of Moments				
Date: 05/24/22 Time: 11:57				
Sample (adjusted): 2012 2020				
Periods included: 9				
Cross-sections included: 5				
Total panel (unbalanced) observations: 42				
2SLS instrument weighting matrix				
Instrument specification: LCAR(-1) LATA(-1) LTAR(-1) ROA(-1) TETA(-1) DUNEMP(-1) DGDP(-1) C D(DCREDIT) (-1) D(BMONEY) (-1) D(EXP01) (-1) DINF(-1)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LATA	0.00079	0.006401	0.123431	0.9027
LTAR	-0.00332	0.002977	-1.11623	0.2745
ROA	0.14167	0.057668	2.456668	0.021
TETA	0.049521	0.012791	3.871535	0.0007
DGDP	0.007342	0.010609	0.692113	0.495
DUNEMP	0.03263	0.023643	1.380082	0.1793
D(INF)	0.004635	0.024862	0.186444	0.8535
C	2.315873	0.127437	18.17271	0
R-squared	0.730563	Mean dep. var		2.866341
Adjusted R-sq.	0.575119	S.D. dependent var		0.1243
S.E. of regression	0.081022	Sum squared resid		0.17068
Durbin-W. stat	1.29708	J-statistic		10.14945
Instrument rank	20	Prob(J-statistic)		0.037984

## Appendix F: GMM results with financial factors

Model 3:

Dependent Variable: LCAR				
Method: Panel Generalized Method of Moments				
Sample (adjusted): 2012 2020				
Periods included: 9				
Cross-sections included: 5				
Total panel (unbalanced) observations: 43				
2SLS instrument weighting matrix				
Instrument specification: LCAR(-1) LATA(-1) LTAR(-1) ROA(-1) TETA(-1) DUNEMP(-1) DGDGP(-1) C D(DCREDIT) (-1) D(BMONEY) (-1) D(EXP01) (-1) DINF(-1)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LATA	-0.00442	0.005778	-0.76436	0.4513
LTAR	-0.00261	0.002764	-0.9452	0.3529
ROA	0.146426	0.053431	2.740458	0.0107
TETA	0.0567	0.013797	4.109506	0.0003
D(BMONEY)	0.000236	0.007422	0.031776	0.9749
D(EXP)	-0.00224	0.02946	-0.07601	0.94
D(DCREDIT)	0.002565	0.010669	0.240419	0.8118
C	2.263155	0.131969	17.1492	0
R-squared	0.707016	Mean dep. var	2.867662	
Adjusted R-sq.	0.544247	S.D. dependent var	0.123117	
S.E. of regression	0.083116	Sum squared resid	0.186521	
Durbin-W. stat	1.326499	J-statistic	11.77544	
Instrument rank	20	Prob(J-statistic)	0.019102	

## **CURRICULUM VITAE**

Flamur Keqa was born on 19.12.1962, in Mitrovica, Kosovo. He holds Bachelor of Science and Master's Degree both in banking field from University of Prishtina in 1985 and 2010. Flamur worked as the University lecturer in ISPE College and as the University teaching professional in Epoka University. He has various experience working as Senior Official in Central Bank of Kosovo, Commercial Bank, Ministry of Trade and Industry, Kosovo Chamber of Commerce and as Board Director in two public institutions in Kosovo. He has experience in senior position working in production private company and as consultant with different institutions and in different projects. Currently, he is serving for Kosovo Courts in capacity of financial expert and performing duty of President of Bankruptcy Administrators of Kosovo.