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***Master Degree In:
FINANCE AND BANKS***

**Bank regulation, Risk taking and banking
performance evidence from MENA countries**

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Dedication

A special dedication to my dear sister Soumia may she rest in peace, you live forever
in my heart

To whom was her love and prayers the secret to my success, my mother my heaven

To the one who supported me with his love, my father

To my lovely sisters

To my closest friends Dounia, Amina and Amy

To mister Ryan Allison, my Canadian teacher who helped me a lot to improve my
English

To my friend Smahi Ibrahim who helped me to finish this work

I dedicate this humble work to you all

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Dedication

This thesis is dedicated to the people who have supported me throughout my
education.

Thank you for pushing me see this adventure through the end.

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Abstract

The purpose of this study is to look at the effect of implementing banking regulation measures on both banking performance and banking risk taking behaviour of 89 commercial banks operating in seven MENA countries (Algeria, Tunisia, Morocco, Lebanon, Jordan, United Arab Emirates and Saudi Arabia). We performed a panel data regression analysis using the fixed-effects model on an imbalanced data set. We regressed certain regulatory factors on the bank's profitability (ROA & ROE) and stability (Z-score). We also investigate the interaction of a few control factors (industry-specific and macroeconomic specific variables).

According to the findings, implementing higher capital requirements in addition to higher reserve requirements helps banks lower risk-taking incentives, resulting in enhanced banking stability and profitability. However, in all of the calculated models, we see a disconnect between liquidity and banking performance.

Keywords: Banking regulations, Banking performance, MENA region, Panel data, fixed effects model.

Résumé

L'objectif de cette étude est d'examiner l'effet de la mise en œuvre des mesures de réglementation bancaire sur la performance bancaire et le comportement de prise de risque bancaire de 89 banques commerciales opérant dans sept pays MENA (Algérie, Tunisie, Maroc, Liban, Jordanie, Emirats Arabes Unis et Arabie Saoudite). Nous effectuons une analyse de régression des données de panel en utilisant le modèle à effets fixes sur un ensemble de données déséquilibré. Nous régressons certains facteurs réglementaires sur la rentabilité (ROA & ROE) et la stabilité (Z-score) de la banque.

Nous étudions également l'interaction de quelques facteurs de contrôle (variables spécifiques à l'industrie et spécifiques macroéconomiques). Selon les conclusions, la mise en place d'exigences de fonds propres plus élevées en plus de réserves obligatoires plus élevées aide les banques à réduire les incitations à la prise de risque, ce qui se traduit par une stabilité et une rentabilité bancaires accrues. Cependant, dans tous les modèles calculés, nous observons une déconnexion entre la liquidité et la performance bancaire.

Mots-clés : Réglementation bancaire, Performance bancaire, région MENA, Données de panel, modèle à effets fixes.

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List of Abbreviations

Asset and liability management (ALM), 27	Return on equity (ROE), 39
Consultation paper (CP), 18	Risk weighted assets (RWA), 17
Data envelopment analysis (DEA), 59 (DEA), 56	Static panel models (SPM), 56
Economic value added (EVA), 44	The Bank for International Settlements (BIS), 15
Exposure at default (EAD), 18	The Basel Committee on Banking Supervision (BCBS), 8
Financial Sector Assessment Programme (FSAP), 8	The Financial Action Task Force (FATF), 9
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Statement of Original Authorship

The work contained in this thesis has not been previously submitted to meet requirements for an award at this or any other higher education institution. To the best of our knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made.

Signature:

H.sihem & S.brahim

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Introduction

Banks have long been a major player in economic systems, influencing household consumption, firm investment, entrepreneurship, the labor market, financial markets, and economic growth through their actions on liquidity. Besides that, in recent years, banks have developed a variety of financial products and derivatives, as well as covered various sectors through their credit services.

The rapid development of the credit market and banking activities has increased the reliance of banking systems on the real economy. As a result, having a secure and robust banking system is critical for protecting investors, financial markets, and the entire real economy. Furthermore, as the banking system worsens, so do economic and political institutions. For example, the origins of the recent global financial crisis (2008-2009) have been linked to banking failure, the liquidity crisis, and the credit crunch, among other things.

The recent downturn also highlights the banking system's fragility and the significant risks it poses to the entire economic system. Indeed, the 2008 banking system collapse and bankruptcy of some leading banks (e.g., Lehman Brothers) were the result of a major banking crisis, which resulted in a Great Depression for several major developed and emerging economies, with severe consequences for unemployment, investment, and householder power-parity.

As a result, at several multiple summits (including the G20), economists and policymakers have advocated for the need to reform the banking system by improving regulatory and supervision measures to make banks stronger and more robust. As an outcome, new agreements and a number of supervision and regulation rules (Basel) have been discussed, which must be implemented in order to better control banks, limit banking activities, and improve banking instruments and risk management. Such measures have the potential to have an impact on bank profitability, risk management, and, as a result, banking performance, either directly or indirectly. However, banks in developing economies operate in an extremely unpredictable environment, which can lead to excessive risk-taking.

Banks in the Middle East and North Africa (MENA) area have a poor supervisory environment since they are still in the early phases of financial growth and dominate their countries' financial systems. Despite the fact that banks in MENA nations suffered lower losses during the global financial crisis than banks in the United States and Europe, this does not imply that they are sounder. Because laws in MENA nations are less severe than in other countries, the stability of banking institutions faces significant issues. The Middle East and North Africa (MENA) area is important because it connects Asia and Europe and features Arab oil-rich nations. It is also a rapidly rising region in terms of population and income, and they are attempting to increase the efficiency of their financial and monetary performance.

Recently, the Middle East and North Africa area has encountered various problems and barriers, including political crisis in a number of nations where demonstrations against existing political systems took place in late 2010, known as the Arab Spring revolutions. Specifically, there have been a series of antigovernmental protests in Tunisia and Egypt, which led to the overthrow of their governments, as well as conflicts in both Iraq and Libya, as well as increased labor unrest, deteriorating mining, low oil production rates in the GCC countries, and low credit growth, all while the region faces persistent challenges, including extremely high unemployment rates and refugee crèches.

Finally, most MENA countries have begun banking regulation reform initiatives under the auspices of multilateral organizations such as the World Bank, the International Monetary Fund, and the International Settlement Bank, with the Basel Committee providing a structural framework for these initiatives in areas such as capital adequacy, disclosure, risk management, and regulation aimed at reducing bank risk behavior and improving efficiency.

This study examines the key subject of the impact of banking regulations on banking performance. This was applied to banks in the Middle East and North Africa (MENA) region (Lebanon, Tunisia, Algeria, Morocco, Emirates, Saudi Arabia, Jordan) on an annual basis from 2006 to 2018. As a result, the following questions are addressed in this research:

Is there an effect of applying banking regulation on banking performance in the Mena countries banks?

STUDY HYPOTHESES

- There's no significant effect of applying "banking regulations" on the bank's "profitability " captured by ROA in MENA countries.
- There's no significant effect of applying "banking regulations" on the bank's "profitability " captured by ROE in MENA countries.
- There's no significant effect of applying "banking regulations" on the bank's "stability " captured by Z-score index in MENA countries.

STUDY IMPORTANCE

The research unfolds in its theory part, in an attempt to clarify the principles of banking regulation and supervision, risk taking, and what influences banking performance. By reviewing the principles of this study topic, the theoretical observation will let researchers perform new research.

Concerning the practical side, the study's value appears to be based on it being one of the few studies that dealt with the influence of banking regulation on banking performance in the MENA region, given that the region is among rising economies, which might be at risk to excessive risk taking.

REASONS FOR CHOOSING THE TOPIC

the deficiency of studies on banking regulation and supervision in this region of the world (MENA), as well as the banking sector as a whole. Since the region is regarded a part of emerging regions in terms of banking and economy in general.

Only a few researches have been made when it comes to studying the effect of banking regulation on banking performance in the region.

STUDY OBJECTIVES

We performed the following study:

To Investigate if there is an impact of applying banking regulation on banking performance in the Mena region.

To investigate additional relevant factors that may have an effect on banking performance.

METHODOLOGY OF THE STUDY

The empirical section of our research is based on a database that spans the years 2006 to 2018, and includes 89 banks from seven countries in the Middle East and North Africa (MENA). The data is acquired from the BankScope Moody's analytics database, which contains balance sheets and other financial indicators for a significant number of banks from various countries.

The panel data approach was employed, which is the most relevant to our work. This method allows for the control and prevention of unobservable heterogeneity, which leads to biased estimators. This factor is critical in our study since each bank has its unique credit policy and risk-taking and risk-management practices. Furthermore, each nation has its own unique position, particularly in terms of country banking system and macroeconomic indicators.

RESEARCH DIFFICULTIES

- Difficulty finding enough bank data to form a respective study.
- Lack of previous studies concerning banking regulations in the Mena region.
- The banks are not providing sufficient data and information regarding certain variables.

RESEARCH FRAMEWORK

To tackle the research topic and evaluate the validity of the suggested hypotheses, the study was split using the IMRAD technique, which is one of the most prominent ways for allowing researchers to examine and explore the various portions of the study. This approach is built on:

- Introduction (I) - Method (M) - Result and Discussion (RAD).

The first chapter deals with the theoretical elements of our research. First, we defined banking regulation and supervision, reviewed their importance in the banking sector, and highlighted the sources of banking regulations and their theories. The Basel accords and their structures were then examined. Following that, we highlighted the field of risk and risk management in terms of its great influence on pressing for regulations and supervision to be included in the banking system. Finally, we defined performance and proceeded to go through an overview of banking sector profitability and efficiency approaches, as well as how to evaluate and determent them.

The second chapter focuses on the study's practical aspects. Beginning with an introduction to the Mena region's banking system and an overview of banking regulation in the countries included in our study sample, we then evaluated some previous studies made on our theme in the Mena region and other places around the world, before explaining the conducted data and defining variables used in our study. Finally, we formulated hypotheses and tested them for the study's final results.

Chapter 1: THEORETICAL FRAMEWORK

Chapter Introduction

This chapter contains a brief theoretical lookup at the regulation and supervision of banking, its types, sources and theories. It also includes the banking risks with its classification and risk management process. Banking performance, tools and measurements are also presented in this chapter, and finally, an overview of banking efficiency.

1.1 BANKING REGULATIONS AND SUPERVISION

1.1.1 DEFINITION OF BANKING REGULATION AND SUPERVISION

Banks play an important role in the economy by providing credit and payment services. All governments regulate banking because any interruption to the financial system might have wide-reaching consequences for businesses and individuals. However, this was not always the case. When it comes to banking, there were still sections of the world that didn't have any regulations in place until the early 20th century; anybody who was willing and able to create a bank could do so. Governments began aggressively regulating banks as bank collapses became more prevalent in an unrestrained financial system.

Banking regulation refers to a set of laws, rules, and regulations issued by central banks to all banks operating in the banking sector in order to determine the legal and regulatory status of these banks, as well as the permitted activities and banking operations they carry out and how to carry them out, with the goal of ensuring the banking sector's protection, safety, and stability. (apostolik, donohue, & went, 2009)

The central bank's key tasks include supervising and regulating the functioning of financial institutions. Only when the power of supervision and regulation is properly pursued, and supervision and regulation are correctly conducted, can the financial sector completely participate in macroeconomic regulation and control, and monetary policy objectives be easily accomplished. As a result, all central banks throughout the globe have given close attention to supervision and regulation, establishing dedicated departments and staffing them appropriately. Our central bank is no different, having placed a high priority on oversight and regulation. (Mancera, Volcker, & Godeaux, 1991)

Regulation, in general, is a kind of government intervention in economic activity and interference with the free-market system's operation. Some people believe that regulation is "synonymous with government interference in social and economic life." (Moran, 1986)

Regulation is opposed by free marketeers because they reject any type of government involvement and wish to feel the full force of the market. Those who feel that government involvement may be required (even if it is a necessary evil) and that individuals should not be subjected to the complete tyranny of the market, on the other hand, find regulation bearable, if not desirable.

According to (Mitnick, 1980), who provides the most extensive assessment of opposing definitions, regulation can be defined in more than one manner. According to (Moran, 1986), "regulation is a controversial term, its basic essence being the topic of ongoing debate."

However, he goes on to describe regulation as "an activity in which the discretion of people or organizations is limited by the imposition of norms." Similarly, (Hertog, 2010) claims that "there is no fixed definition of regulation in the legal and economic literature," then goes on to define regulation as "the employment of legal instruments for the implementation of social-economic policy objectives," noting that "a characteristic of the legal instrument is that individuals or organizations can be compelled by [the] government to comply with prescribed behaviour under pecuniary penalties."

Examples from (Hertog, 2010) concept of regulation imply that companies might be required to follow certain pricing, offer specific items, avoid certain markets, use specific manufacturing processes, and pay the legal minimum wage. (Hertog, 2010) definition of regulation is illustrated with examples. Strict sanctions can include fines and penalties for violators as well as punishments such as incarceration and the installation of certain conditions.

Banking supervision is the entire process of monitoring banks' performance, policies, and procedures to ensure that they are managed safely and soundly in line with applicable laws and regulations. Financial supervisors are institutions that are legally mandated to promote the safety and soundness of banks and the banking system. They carry out this fundamental goal using special authorities afforded by the country's legislative structure. (BCBS, Core principles for effective banking supervision, 2012)

1.1.2 THE IMPORTANCE AND OBJECTIVES OF REGULATIONS AND SUPERVISION FOR BANKS

One of the most severely regulated businesses is banking. There are several reasons why rules are important in this business, which may be generally classified into three major categories: The economy relies heavily on it. Banks serve several important functions in the economy. Disruptions in the banking industry may have a negative influence on the economy. Financial safety nets and the economic costs associated with banking crises give justification for governments to act and try to prevent contagion. The initiatives, known collectively as financial safety nets, impose direct costs on governments and taxpayers. The banking industry is unique in that it is based on trust and confidence. Previous financial crises have shown us that a lack of trust and confidence in a bank may instantly jeopardize its capacity to survive.

Banking supervision is the entire process of monitoring banks' performance, policies, and procedures to ensure that they are managed safely and soundly in line with applicable laws and regulations. Financial supervisors are institutions that are legally mandated to promote the safety and soundness of banks and the banking system. They carry out this fundamental goal using special authorities afforded by the country's legislative structure. (Mancera, Volcker, & Godeaux, 1991)

1.1.3 TYPES AND SOURCES OF BANKING REGULATIONS

1.1.3.1 TYPES OF BANKING REGULATIONS

Banking rules are classified into four kinds. Table 1-1 highlights the many sorts of rules that are intended to achieve certain policy goals.

Table 1-1 Types of banking regulations

Regulation Types	Description
Competition	- Competition regulations address issues of non-competitive behaviour among banks. The objective is to foster competition among banks to ensure that they provide consumers with banking services and products at reasonable prices. - There is a complex relationship between competition and financial stability. Some studies show that competition is favourable to bank stability. Other studies, however, conclude that competition may endanger the stability of banks. This is because banks should have sufficiently large capital and diversified exposures to withstand potential shocks in the business environment. Hence, there may be conflicting objectives. Examples: - Separation of commercial and investment banking, e.g. the Glass-Steagall Act during the 1930s Great Depression - Antitrust regulations in banks - Banking entry restrictions - Licensing criteria - Branching restrictions
Safety and soundness	- Regulations seek to promote a safe and sound banking system. The regulations are not intended to dictate how banks should be managed. Rather, they prescribe minimum standards on the management of banking organizations. Examples: - Minimum capital and liquidity standards - Guideline and limits on large credit exposures - Corporate governance requirements - Regular reporting and disclosure standards - Internal control standards - Accounting standards - Anti-money laundering standards
Consumer protection	- Regulations also seek to protect consumers from irresponsible and unfair banking business practices. It also aims to protect banks from potential legal liabilities and ensure public confidence in the banking organizations. - Regulations aim to promote high ethical and professional standards in the banking sector. Examples: - Consumer disclosures - Bank confidentiality requirements - The U.S. Truth in Lending Act - Client suitability requirements
Monetary policy	- Regulations are designed to implement the monetary policy objectives of a country's central bank. Through regulations on reserve requirements and deposit rates, the central bank can control monetary supply and implement its monetary policy objectives. Examples: - Reserve requirements - Deposit rates regulations

Source: open knowledge world bank.

1.1.3.2 SOURCES OF BANKING REGULATION

Domestic/national laws, international laws, and international soft law standards are all sources of banking regulations.

Domestic/National laws

Each country has its own set of laws, which are largely based on legislation established by the legislative body. Because these statutes are phrased in broad words, they must be interpreted and enforced. Banking supervisors will give interpretation and implementation guidance in the form of memorandums, guidelines, and/or circulars.

International laws

In terms of banking regulation, there are just a few international treaties that explicitly address bank regulation. There are, however, accords that include clauses that have an indirect influence on banking laws. The International Monetary Fund's (IMF) Financial Sector Assessment Programme (FSAP) is one example.

When a country joins the IMF, it commits to have the international community scrutinize its economic and financial policies. The IMF's frequent monitoring of economies and related policy recommendations, known as surveillance, aims to uncover flaws that are causing or may contribute to economic instability.

Country surveillance is a continuous process that culminates in extensive meetings with individual member nations on a regular basis. These are the 'Article IV consultations,' as mandated by Article IV of the IMF Articles Agreement.

The Financial System Assessment Programme (FSAP), created in 1999, is a thorough examination of a country's financial sector. It is an important IMF surveillance tool that contributes to Article IV discussions. The IMF's 2007 Observation Decision stated unequivocally that financial sector measures will always be subject to bilateral surveillance by the IMF, and the October 2008 'Statement of Surveillance Priorities for 2008–2011' emphasized financial sector concerns.

✓ *International standards (Soft laws)*

International standards, sometimes known as 'soft laws,' are a system of norms comprised of law-like assertions or regulations that fall short of hard legislation.

• Basel Committee on Banking Supervision

The Basel Committee on Banking Supervision (BCBS) is the major worldwide standard setter for bank prudential regulation and serves as a venue for banking supervisory cooperation. Its mandate is to strengthen global banking legislation, supervision, and practices in order to improve financial stability.

The BCBS is devoid of any official supranational authority. Its rulings are not legally binding. Rather, the BCBS relies on the commitments of its members to carry out its mission.

To ensure global financial stability, BCBS develops supervisory norms and recommendations. These supervisory criteria and guidelines, like its rulings, have no legal authority. They are designed and released with the hope that individual national authorities will execute them, based on member agreement.

Minimum standards: The BCBS provides minimal criteria for prudential regulation and bank supervision. These criteria are minimal requirements, and members may choose to go above and beyond.

The BCBS's primary benchmarks include its capital adequacy framework (Basel III), liquidity coverage ratio, and Core Principles for Banking Supervision.

Guidelines: The standards are supplemented by guidelines. They usually complement the minimum criteria by offering extra guidance for their execution. BCBS has published a slew of policies on corporate governance, liquidity risk management, operational risk and internal controls, foreign exchange settlement risk, internal and external audit, stress testing, and supervisory colleges.

Sound practices: BCBS also publishes good practice papers that detail real observed procedures. Stress testing, asset securitization, resolution, and remuneration are only a few of the subjects discussed in recent sound practices papers.

Implementation: BCBS has instituted a more active monitoring mechanism to track members' promises to meet Basel Committee criteria. This is intended to encourage better uniformity in the execution of global standards as well as increased transparency in cases where national variances exist. (BIS, [Basel Committee on Banking Supervision](#) , 2013)

- ***International Organization of Securities Commissions***

The International Organization of Securities Commissions (IOSCO) is a well-known international organization that brings together the world's securities regulators and is widely regarded as the worldwide standard-setter for the securities industry. More than 95 percent of the world's securities markets are regulated by IOSCO members.

The IOSCO Objectives and Principles of Securities Regulation have been recognized as the applicable norms in this field by both the G20 nations and the Financial Stability Board. They serve as the foundation for the IMF and World Bank's Financial Sector Assessment Programmes (FSAPS) evaluations of the securities sector. (kenton, 2019)

- ***The Joint Forum***

The Joint Forum is a group of senior financial sector supervisors who operate under the auspices of its parent committees, which are BCBS, IOSCO, and the International Association of Insurance Supervisors. Its goal is to assist banking, insurance, and securities supervisors in accomplishing their regulatory and supervisory objectives, as well as to contribute to the worldwide regulatory agenda more broadly.

- ***Financial Action Task Force***

The Financial Action Task Force (FATF) is an intergovernmental organization founded in 1989 by the ministers of its member countries. The FATF's goals are to develop standards and support the effective implementation of legal, regulatory, and operational measures to combat money laundering, terrorist financing, and other risks to the financial system's integrity.

The FATF has created a set of Recommendations that are widely accepted as the international standard for countering money laundering, terrorism funding, and the proliferation of weapons of mass destruction. (FATF, n.d.)

- ***Financial Stability Board***

The Financial Stability Board (FSB) was established to coordinate the work of national financial authorities and international standard-setting bodies at the international level, as well as to develop and promote the implementation of effective regulatory, supervisory, and other financial sector policies.

The Financial Stability Forum Report on Enhancing Market and Institutional Resilience was released by the FSB in April 2008, and it advocated tangible steps in the following areas:

- Strengthening prudential oversight of capital, liquidity and risk management
- Enhancing transparency and valuation
- Changes in the role and uses of credit ratings
- Strengthening the authorities' responsiveness to risks
- Robust arrangements for dealing with stress in the financial system. (FSB, 2020)

- ***International Accounting Standards Board***

The International Accounting Standards Board (IASB) is the IFRS Foundation's independent standard-setting body. Its members are in charge of creating and disseminating the International Financial Reporting Standards (IFRS).

The IFRS Interpretations Committee (IFRIC) of the IFRS Foundation is tasked with reviewing accounting difficulties that have developed in the context of the present IFRS and providing authoritative guidance on those concerns. (IFRS, n.d.)

- ***International Swaps and Derivatives Association***

The International Swaps and Derivatives Association (ISDA), founded in 1985, is a non-profit organization tasked with making over-the-counter (OTC) derivatives markets safe and efficient, as well as facilitating effective risk management for derivative product users. ISDA represents approximately 800-member institutions in 64 countries, supporting high standards of business behaviour and spearheading industry action on derivatives problems such as:

- Providing standardized documentation globally to ensure legal certainty and maximum risk reduction through netting and collateralization.
- Promoting infrastructure that supports an orderly and reliable marketplace as well as transparency to regulators.
- Enhancing counterparty and market risk practices, and advancing the effective use of central clearing facilities and trade repositories.

Representing the derivatives industry through public policy, ISDA governance, ISDA services, education and communication. (ISDA, n.d.)

1.1.4 THEORIES OF BANKING REGULATION AND SUPERVISION

- **The Public Interest Theory of Regulation**

the public interest theory was pioneered by Arthur Cecil Pigou (Pigou, 1920). The basic concept is that regulation is produced in response to public demand for the rectification of inefficient or unfair market activities. The essential premise is that regulation helps society as a whole rather than a specific entrenched interest. (BCBS, Core principles for effective banking supervision, 2012) Other assumptions include that markets may work inefficiently or inequitably, and that regulatory organizations reflect society's interests. The majority of criticism levelled against public interest theory is based on doubts about the validity of these assumptions.

According to the public interest hypothesis, when markets are unable to regulate themselves, the government steps in (which the proponents of regulation believe to be the rule rather than the exception). In other words, regulation is government involvement precipitated by market failure, a circumstance in which the pricing mechanism fails and resource allocation is suboptimal.

The best feasible distribution of a specific economy's finite resources can be defined as the public interest. Under some situations, it is theoretically possible to demonstrate that the allocation of resources governed by market mechanisms is optimum. Because these characteristics are not met in practice, resource allocation is not optimum, necessitating the need for change. Regulation is one method for attaining allocative efficiency, since it improves resource allocation by supporting, sustaining, or replicating market activities. Regulators must have adequate knowledge and enforcement capacity to promote public interest in order for regulation to be effective.

Furthermore, regulators must be charitable and seek to serve the public interest. Regulators' opponents contest the legitimacy and soundness of the claim that regulators have sufficient knowledge and are motivated only by (and only by) public interest.

Regulation is explained in terms of imperfect competition, uneven market operations, and missing markets, as well as the need to avoid or repair unwanted market outcomes, according to the public interest thesis. Correction of unfavourable results may be beneficial for reasons other than economics, such as notions of fairness, paternalism, and ethical standards.

(Posner, 1974) broadens the public interest thesis to indicate that regulation is designed to address inefficient or unequal market activities. Legal minimum salaries, maximum rents, regulations boosting access to health care, and rules guaranteeing income in the case of sickness, unemployment, disablement, old age, and so on are examples of laws and rules aimed at averting or ameliorating negative market outcomes. In any of these circumstances, trade-offs between economic efficiency and equity may occur. However, free marketers are concerned with efficiency and only efficiency, which means that trade-offs do not matter and that regulation that affects efficiency to accomplish a non-efficiency goal should be abandoned or not imposed at all.

The following are some of the reasons why the public interest thesis has been criticized. First, the concept of market failure is criticized since the market mechanism itself is frequently capable of compensating for any inefficiencies. Companies, for example, can tackle the problem of adverse selection caused by insufficient information by adopting brand names and pursuing significant advertising efforts to signify high quality. Second, the idea presupposes that regulation is both effective and inexpensive to apply, which may not be the case. Third, while the theory posits that regulation is designed to increase economic efficiency, it does not explain why other goals (such as procedural justice and redistribution) may be pursued at the price of economic efficiency.

Fourth, the theory is insufficient for example, it does not explain how a particular point of view on public interest translates into legislative acts designed to maximize economic benefit. Another objection is that regulators lack adequate knowledge about cost, demand, quality, and other aspects

of the manufacturing process; without this information, regulators are unable to advance public interest by correcting market failure. Regulators, as economic agents, seek their own interests, which may or may not be congruent with the public interest. This statement serves as the foundation for the capture hypothesis, which we will look at next.

All of these objections of the public interest theory imply that we should disregard regulation and let the market take its course. While regulators may promote their own interests, this is not a cause to abandon regulation. This is analogous to the notion that the police force should be dismantled because certain officers are corrupt. The notion that regulation is expensive is precisely why new regulations should be reviewed and assessed in terms of costs and benefits. The efficiency debate hinges on what we understand by efficiency.

Efficiency, according to free marketers, refers to the allocation of resources in relation to commercial output. However, allocative efficiency may and should relate to resource allocation when output includes factors like safety, justice, and corruption prevention. The other arguments are too vague and rhetorical to warrant response. (Moosa, 2015)

- **The Capture Theory of Regulation**

Regulatory capture is a type of political corruption that happens when a regulatory agency, which is supposed to operate in the public interest, instead advances the commercial or special interests of the corporations or industries it is supposed to regulate. It is dubbed a "captured agency." Regulatory capture is a type of government failure that allows companies to act in ways that hurt the public. The possibility of regulatory capture is a danger to which an agency is predisposed due to its very existence. This implies that a regulatory agency should be as free of outside influence as feasible.

It may even be better not to form an agency at all if it seems likely that it would become a victim of regulatory capture, in which case it will serve its regulated subjects rather than those whom the agency is meant to protect. Because it possesses government authority, a captive regulatory body is frequently worse than no regulation. Increased openness of the agency, on the other hand, may lessen the impacts of capture. Recent data demonstrates that more broad and complicated regulatory systems, particularly regulatory capture, are connected with higher levels of corruption, even in mature democracies with high levels of openness and media freedom (Hamilton, 2013)

The concept of regulatory capture has a clear economic basis, in that vested interests in an industry have the greatest financial stake in regulatory activity and are more likely to be motivated to influence the regulatory agency than dispersed individual consumers, each of whom has little specific incentive to influence regulators. When regulators convene expert panels to review policy, they typically include current or former industry members, or at the absolute least, persons with business links. the phenomena spread beyond political agencies and organizations.

Businesses have a motive to dominate anything that has influence over them, including media, academic, and popular culture organizations. This is referred to as "deep capture." For example, the banking industry has clearly seized academia, since certain academics (in exchange for favours) have provided the logical rationale for allowing financial institutions and markets to operate freely. To its advantage, the finance sector interprets the efficient market hypothesis, with the assistance and support of academics, to indicate that the market is capable of appropriately valuing financial assets and that deviations from basic values cannot endure. In other words, financial institutions employ the efficient market hypothesis to inform the government that regulation yields suboptimal results.

The capture hypothesis is based on the idea that regulators do not look after the public interest, but rather private interests that may want to be regulated in order to increase their (the private interests') profits. In this sense, the regulator is enslaved by a vested interest (a firm or business association). (Posner, 1974)

This was beneficial to bankers and stock traders but detrimental to the economy and the general public in the aftermath of the crisis, the Fed engaged in significant quantitative easing to supply cheap cash to banks while risking sparking hyperinflation. Congressman Ron Paul's book, *End the Fed*, shows how, why, and for whom the Fed has been tugging the strings of the American financial system for more than a century (Ron, 2009).

The following are some of the reasons why the capture hypothesis is criticized. The first is that the theory cannot be properly separated from the public interest theory since it also implies that public interest motivates the commencement of regulation. The second objection is that it is unclear why a company can successfully submit a regulatory agency to its interests while failing to prevent its existence.

Third, regulation frequently appears to promote the interests of groupings of consumers rather than corporations. Regulated businesses are frequently required to go above and above the freely chosen level of service (for example, the supply of telecommunication services to consumers living in sparsely populated areas and the granting of credit to subprime borrowers to buy houses).

Fourth, most kinds of regulation are often opposed by businesses due to the perceived detrimental impact on profitability (examples are environmental regulation and the regulation of product safety and labour conditions). Finally, the argument does not explain why a company may take over a regulatory agency but consumer organizations are unable to stop it. These arguments do not refute the capture theory since it is extremely compatible with empirical facts that substantiate the thesis that regulators serve the interests of the corporations they are intended to control under specific situations.

Furthermore, responding to these arguments is not difficult. While the public interest theory and the capture theory are comparable in terms of the motivation for commencing regulation, they are not the same in any other way. A big enough business to dominate a regulatory agency will not desire to prevent its existence for the simple reason that the agency will serve the firm's interests. The assertion that regulation seems to serve the interests of consumers rather than companies is not always correct, especially in the case of financial regulation.

Deregulation measures that benefit businesses may come from regulators or their managers. In terms of the regulated businesses, not all types of regulation are bad regulation may offer and perpetuate monopolistic power, not to mention financial aid and subsidies. Why can't consumers stop corporations from taking over regulatory agencies? The explanation is simple: corporations are more powerful and politically connected than consumers. corporations from capturing regulators. The issue here is not so much regulation as it is corruption. (Moosa, 2015)

According to The Economist (2014): "It was always the French and the Germans," complains a top financial regulator, accusing peers from those two nations for obstructing international attempts to improve bank capital ratios. Every time the Basel committee, a collection of the world's bank supervisors, was on the verge of reaching an agreement on a higher norm, he claims, a phone call from the Chancellery in Berlin or the Trésor in Paris would bring everyone back to the table. Similar phone calls almost definitely influenced the committee's decision to pare down a proposed new "leverage ratio" for banks on January 12th [2014].

- **The Special Interest Groups Theory of Regulation**

The key distinction between the capture theory and the special interest groups theory is that the latter implies that competition among special interests can be both extensive and strong. Pressure organizations, advocacy groups, lobbying groups, campaign groups, and interest groups are various terms for special interest groups. Firms, customers or consumer organizations, regulators or their personnel, politicians and unions are all examples. As political pressure increases, so does political influence, and the financial yield derived from the pressure increases.

Scholars who support the special interest groups hypothesis oppose the capture theory's emphasis on the control of specific agencies by a single corporation or a small group of big firms. Instead, they propose that different organizations, including customers and regulators, fight for control of an agency's actions. According to this theory, strong organizations compete for the use of the government's forceful authority to impose laws and regulations that benefit their enterprises. Regulation, like the capture theory, is not considered as inherently bad by regulated enterprises; rather, regulated firms desire regulation if regulation is beneficial to the retention of power and the increase of profitability.

(Macey, 1988) utilizes special interest group theory to argue that politicians are not always selfish or bad when they pass legislation that prioritize the interests of small special interest constituencies over the greater good. The opposite viewpoint he conveys is that the wishes of organized interest groups will always win in the political arena because politicians must maximize political support in order to remain in government. He emphasizes that under a governmental system in which politicians must fight for votes, they must win political support in order to live. He then claims that one of the most important contributions of the special interest groups theory is the awareness that well-organized organizations are better positioned to supply political support than poorly organized members of the general public. Politicians pass legislation to benefit those organizations that can afford to pay for the laws with pledged political support. The expenses of these legislation are paid by those who are least able to oppose them (the public at large).

Macey contends that organized interest groups' economic interests are more accurate predictors of regulatory outcomes than public opinion and public ideology. The hypothesis of special interest groups has been criticized on numerous grounds. First, while redistribution is viewed as the source of regulation, in actuality, redistribution is invariably coupled with deregulation. Investigating who benefits and who endures the expenses of regulation does not show the reason of regulation. This is why, like the capture theory, this theory is about why and how special interest groups capture their regulators rather than the start and supply of regulation. Another flaw is that the theory makes no predictions about which organizations will be the most effective politically or who will get income transfers.

The idea holds that interest groups dictate election outcomes, that legislators honour the wishes of the interest groups, and that lawmakers have authority over regulators. The theory pays little or no attention to (i) the motivation and behaviour of various political actors, such as voters, legislators, government workers, and agencies; (ii) the interaction of various actors in the regulatory process; and (iii) the mechanism by which legislators and regulators conform to the wishes of organized interests. These critiques are insignificant in comparison to the fact that the theory is a correct description of stylized reality. (Scott, 2003)

Regulation theories are classed along numerous aspects, however there is significant overlap in the categorization methods. Positive and normative theories, public and private interest theories, teleological theories, administrative theories, and diverse analytical approaches are among the categories in which the theories are categorised. The public interest–private interest difference yields two broad categories: public interest theory and private interest theory.

However, there is a propensity to differentiate between two private interest theories: the capture theory and the special interest groups theory. Regulation is enforced under the public interest theory to safeguard the general population. Regulation, according to the private interest theory, is required by parties with private interests, implying that regulation is unlikely to advance public interest. There is a heated discussion on regulation, regardless of which theory of regulation is most reasonable.

However, the issue between regulation versus no regulation or deregulation should not be framed in terms of "either or." It should be a battle of good versus poor regulation. The argument should not focus just on the expenses of regulation, but also on the costs and benefits of regulation.

The argument fails to address a key issue: regulatory enforcement. The legislation is sometimes there, but the underlying regulatory actions are not enforced. (Shleifer, 2005)

1.2 BASEL CAPITAL ACCORDS

1.2.1 EVOLUTION OF BASEL CAPITAL ACCORDS

The Bank for International Settlements (BIS) assists the central bank in its pursuit of monetary and financial stability, promotes international collaboration in these areas, and seems to operate as a bank for central banks. The BIS was founded in May 1930 and is widely regarded as one of the world's oldest international financial institutions. The BIS has regular meetings every two months in Basel, with Governors and senior officials from member central banks actively participating. These sessions provide participants with several opportunity to debate the global economy and financial markets, as well as an exchange of opinions on current problems of central bank interest. The key objectives of these discussions are participants' understanding of advancement and development, problems, and visionary policies that will affect various nations or marketplaces throughout the world.

The Basel Committee on Banking Supervision (BCBS) is an international committee of banking supervisory authorities that was established at the end of 1974 by the central bankers of the G 10 countries under the umbrella of (BIS), following the sudden collapse of Bankhaus Herstattin, Germany and Franklin National Bank, USA. Senior representatives from bank supervisory agencies and central banks from Belgium, Canada, France, Germany, Italy, Japan, Luxembourg, the Netherlands, Spain, Sweden, Switzerland, the United Kingdom, and the United States make up the BCBS. The primary goal of the BCBS is to improve understanding among all important members of the G 10. (Group of Ten). These countries gathered for consultation and cooperation on economic, monetary, and financial issues. (BCBS, History of the Basel Committee, n.d.)

The importance of capital in maintaining a secure and strong financial system cannot be emphasized. When banks have a sufficient amount of capital on hand, they may assure that they can satisfy their obligations to their creditors.

Similarly, a significant quantity of capital will inspire depositors and other creditors to believe that such banks would refund their money, even if some of their assets cause them to default. Finally, the Basel Accord has emerged as a supporting component in ensuring stable stability in financial systems and structures by the application of a set of norms that is accepted in all global financial centres and allows for some scientific treatment for risk aversion. All banks were required to meet a set of minimum capital standards as part of the Basel Accord. These strict standards are beneficial to the economy since they protect banks' performance from losses caused by credit, operational, and market risk exposures, as well as ensuring the availability of capital within the economy throughout the economic cycle (BCBS, Press release , 2004).

The capital restrictions set for banks safeguard them against systemic threats as well. The G10 group supported the establishment of the Basel Accord on minimum capital requirements in 1988. The Accord has since expanded to numerous governments and is being implemented in over 100 nations throughout the world. The BCBS has published three capital agreements since 1988, known as Basel I, Basel II, and Basel III. Basel I was adopted by member nations in 1992, Basel II is currently being implemented in certain countries, and Basel III went into force gradually on January 1, 2014 in most member countries. (Gottschalk, 2010)

1.2.2 REGULATIONS AND SUPERVISION IN THE BANKING INDUSTRY PRIOR BASEL 1

Early types of bartering were quickly superseded by systems that employed symbols of trade such as coins, which had a monetary value based on convention. The most popular type of early money was precious metals, which held their worth because to their scarcity and the impossibility of anybody to manufacture them cheaply and readily. As a result, gold and silver became widespread units of money in modern civilizations.

Money, as an abstract yet effective mechanism of transferring value "on the spot" between two people exchanging things, arose alongside the notion of credit, in which the value paid by the "borrower" is delayed to a later point in time. Of course, credit was only conceivable if the borrower's promise was sufficiently trustworthy to the "lender," who took the risk of non-payment in exchange for a reasonable return, usually the interest on the debt in question. Credit made it possible for international trade to develop. Price contracts an early type of financial derivatives stimulated trade by allowing both parties to accept agreements on a forward-looking rather than a "spot" basis. Credit and derivatives providers evolved into a type of formal banking system, with the entire system built on risk and its antidote trust.

All money is built on trust. The soundness of any currency whether it is made up of metal disks, paper rectangles, or some other means of trade is determined by how much each of its users believes that others will regard it as valuable. The lesson of history is that trust may be misplaced, resulting in circumstances in which risk takers accumulate excessive credit and financial exposure, losing enormous sums when the "bubble explodes." These financial crises are typically violent in their growth and consequences.

Nonetheless, financial crises continue to arise because we do not learn from our failures. Financial overconfidence and misplaced faith are founded on a rejection of previous lessons and the belief that "this time it's different." Asset bubbles are seldom precisely the same, but they are rarely unlike in character: as Mark Twain famously noted, "history does not repeat itself, but it frequently rhymes." During the period of European expansion into far-flung colonies, the most notable financial crashes happened. Taking enormous risks in exploration, colonization, and development resulted in large fortunes. Bubbles formed inevitably.

The Mississippi Scheme in 1719 in France and the South Sea Bubble in England at the same time were instances of national investment programs that grew so popular that the price of assets climbed well past their logical value before collapsing. The promise of enormous riches via colonial exploitation was backed up by a hefty dividend paid for by new recruits to the pyramid scheme. The underlying firms' expectations did not materialize, and investors, many of whom had actually struggled to get their shares, lost everything. "Tulipomania" of the 1630s in Holland, on the other hand, evolved secretly and spontaneously, rather than being prompted to bolster the state coffers. Tulip bulbs, which were fairly scarce at the time, began to change hands for ever-increasingly exorbitant rates.

There are records of single bulb sales for a price equal to the value of twelve acres of land. A sophisticated trading infrastructure emerged, which appeared to divert the nation's attention away from alternative ways of earning riches. People bought the bulbs in the hope that the growing price trend would continue and that they might benefit from the later sale of the tulip bulb, despite its apparent limited utility. When the bubble burst, prices plummeted, and many Dutch people were disappointed to discover that they had given up a big percentage of their money for a few bulbs. These big financial crises had a significant societal impact.

Many people who had emerged from the lower classes for a brief period of time were hurled back into their previous obscurity. Substantial businessmen were driven to beggary, and many a representative of a noble family saw his family's wealth devastated beyond restoration. Financial crises in the twentieth century have also resulted in major social shifts, with the 1929 Wall Street

Crash causing economic depression and contributing to the rise of nationalism and, ultimately, the Second World War. Finance's proclivity for excess, as well as the disastrous consequences of financial crashes, have prompted attempts to regulate the industry, imposing a degree of financial discipline on the banking industry. (Docherty & Viort, 2014)

1.2.3 BASEL 1

The Basel I Accord was started by the BCBS in 1988, with two very essential and achievable objectives from the start. The first goal was to strengthen the international banking system's secure and sound stability, and the second was to establish fair playing fields among banks of worldwide renown by reducing the current methods and ways of competitive disparity (BCBS, Press release , 1988). To fulfil these objectives, a set of two tiers was chosen to define capital in banks. Tier 1 capital is applicable to common stocks and other preferred stocks in perpetuity, as well as retained earnings. International banks were obliged to maintain Tier 1 risk-weighted capital, at a minimum of 4%. As a result, capital in Tiers 1 and 2 is defined as "fixed maturity preferred stock, subordinated debt, and loan losses reserves with an 8 percent capital-to-risk-weighted-assets (RWA) ratio." As a result, banks' assets are classified into multiple categories, or "buckets," ranging from 0% to 20%, 50% to 100%, based on the risks specified by the Basel I Accord. These are then multiplied by the risk weight assigned to each group (BCBS, Press release , 1988).

Table 1.2 describes several asset classifications as well as the risk weights ascribed to them.

Table 1-2 Basel I Risk-weighted Assets

Risk Weights	Category
0%	• Cash • Claims on central governments and central banks in their national currencies • Claims on the OECD central governments and central banks
10%	• Claims on domestic public-sector entities (at national discretion)
20%	• Claims on multilateral development banks • Claims on banks incorporated in the OECD* • Claims on banks incorporated outside the OECD with maturity of less than one year
50%	• Loans secured by mortgage on residential properties
100%	• Claims on private sectors • Claims on banks incorporated outside the OECD with maturity of greater than one year • Claims on central governments outside the OECD • Fixed assets • Real estates and other investments

Source: Bank for International Settlements, Basel Committee on Banking Supervision

Basel 1 credited as being the first to establish a global standard for banking rules, although its design was far from flawless due to several defects and shortcomings. At start, Basel 1 concentrate solely on credit risk, while market hazards were later incorporated through an Amendment in 1996, leaving other critical categories of risks (operational, reputational, strategic, and liquidity) unaddressed. The second and most important part is the notion and concept of allocating risks and

matching regulatory capital based on the identification of borrowers, which instantly exposed its shortcomings. Under Basel I, all loans are deemed to be 100 percent risk-weighted assets. As a result, banks include all risk-weighted assets in the loan's total value. Those that receive commercial loans from banks, on the other hand, do not face the same hazards. A loan to a well-established firm.

When Basel 1 triggered extreme criticism and attempted to exceed all bounds, the BCBS members resolved to amend the Basel I Accord of 1988. Within this framework, the first consultation paper (CP) was released in June 1999, followed by two more until the final proposal was published five years later, in June 2004. The final and ultimate regulatory framework, titled "International convergence of capital measurement and capital standards: a new framework," originated and matured as Basel 2, and was finally released in June 2006. Three more quantitative impact studies (QIS) were then conducted to ensure that worldwide levels of regulatory capital in the banking and financial systems were adequate. (BIS, Basel I, II, III: evolution of global banking regulation, 2019)

1.2.4 BASEL 2

In comparison to Basel I, Basel II was released in June 2006 and featured two major improvements. The first innovation is based on the fact that its introduction rating is considered rather than the identification of borrowers; hence, Basel II is concerned with the inherent risk of borrowers rather than their identity. As a result, Basel II intends to promote the adoption of more severe risk management methods based on three mutually reinforcing pillars: Minimum Capital Requirements, Supervisory Review, and Market Disciplines.

The first pillar, "Minimum Capital Requirements," extended the most essential and critical function of Basel I risk measurement and alignment with regulatory capital (BIS, Basel I, II, III: evolution of global banking regulation, 2019), but gradually expanded the scope of risks to encompass credit risks, market risks, and operational risks. To elaborate on the "Credit Risk" factor, it may be quantified in two ways: There are two approaches: The Standardized Approach (SA) and the Internal Ratings Based (IRB).

The first is the Standardized Approach (SA), in which external agencies grade borrowers and banks utilize their ratings to calculate regulatory capital. The IRB method allows banks to utilize internal evaluations of borrower credit quality to calculate any possible losses. Under the IRB method, two separate and changing levels of complexity are available. Under the Foundation IRB (FIRB) method, banks attempt to compute various estimates of the risk of default (PD) of their individual borrowers, and their supervisors in the respective regions progressively supplement these estimates with other relevant inputs in the next phase. Alternatively, an Advanced IRB can be used.

Banks may employ the probability of default (PD), loss given default (LGD), exposure at default (EAD), and maturity (M) approaches to calculate credit risk (BCBS, Press release , 2006). Furthermore, in order to improve credit risk monitoring, Basel II mandated that banks assign proportional capital for operational risks. This would broaden the scope of Basel II, because it compels all banks to assess the potential magnitude of losses caused by insufficient internal procedures, systems, and personnel mistakes, all of which are relative to external circumstances. Three additional methodologies were also proposed in an attempt to quantify operational risks: The three approaches are as follows: i) the fundamental indication method, ii) the standardized approach, and iii) the internal measurement technique.

It is important to note that Basel II also defines capital costs for market risk exposures based on the banks' risk of loss, which arise from on- and off-balance-sheet positions as a result of market price volatility. Interest rate risk, foreign currency risk, and commodity risk are examples of these sorts of hazards. Basel II also offers standards for evaluating trading book positions.

These standards include rules for flawless and appropriate systems and systematic controls, valuation methodology of marking to market and marking to model, independent price verifications, valuation adjustment and reserves, and so on. As a result, valuation approaches often entail the actual measurement of market risks, either using the Standardized Measurement Method or the Internal Models Approach.

As previously stated, the Supervisory Review is the foundation of Basel II's second pillar, which requires banks to establish a proper risk management framework to assess, identify, determine, and manage all major risks inherent in an institution and requires the timely allocation of adequate capital to secure against those risks. Major risks, including as liquidity risks, interest rate risks, concentration risks, and so on, that are not included in and addressed by Pillar I. (BCBS, Press Release , 2006)

The Basel Accord is always in a position to demand that all banks operating under its jurisdiction have proper systems and structured processes in place for capital adequacy assessment, and in performing such activities, the Accord recommends that banks develop their own assessment procedures and that the calculation of capital targets is continuously updated and thus remains in line with capital adequacy requirements (BCBS, Press Release, 2001). This would guarantee that banks have the resources to conduct internal risk assessments (BCBS, Press Release , 2006). Simultaneously, regulators were granted sufficient authority to assess whether banks should keep more capital than the 8% target required in Pillar I.

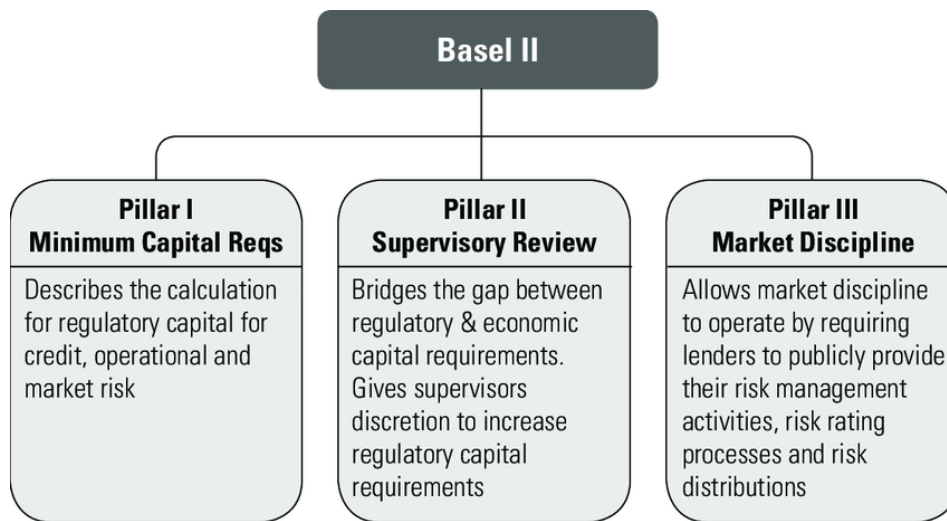
Furthermore, supervisors were given the authority to interfere in risk management procedures as well as revise and upgrade procedures and processes as needed. The third pillar's market disciplines have established bank requirements for public disclosures, including as duties to provide information on business profiles, risk exposures, and risk management. The primary goal of this pillar is to increase capital adequacy disclosure in banks through various public reports. It also explains problems expressed before, which specify that market participants may only seek to measure capital adequacy risk profiles if the reporting banks are in conformity with the higher levels of market discipline (BCBS, Press Release, 2001).

As a result, market participants are in a position to reward banks by monitoring their viable operations and competent ability to manage risk exposure, which conservatively verifies risk management while punishing those banks that fail to do so.

Structure of the Basel II Accord (Three Basic Pillars)

The Basel II framework comprises three parts referred to as the three pillars of the Accord:

Figure 1-1 The three pillars of Basel 2



Source: Bank for International Settlements, Basel Committee on Banking Supervision

Surprisingly, during the global financial crisis, a number of severe faults and fundamental vulnerabilities were expressly highlighted in Basel II. However, as far as Pillar 1 is concerned in this regard, many useful goals are achieved by utilizing more complex and more risk sensitive internal bank models to compute that statutory capital needs are not free. It introduces additional hazards, the most visible of which are the so-called model risks, which arise as a result of inaccurate information and incompatibility of incentives. Furthermore, the most popular Basel II Accord omitted a significant problem with the pro-cyclicality of regulatory capital and systemic risk aspects, namely, macroprudential overlay. This is due to the Basel II Accord's exclusive focus on banking.

In a larger sense, "pro-cyclicality" refers to a rise (reduction) in capital requirements during any downturn (upturn), and is regarded a difficult issue since it has the potential to exacerbate the economic slump.

To be more specific, if banks' capital needs rise during a recession when it is impossible to build reserves from dropping earnings or raise new capital, the banks are forced to restrict lending activity, which exacerbates the slump. This would aggravate the recession, setting in motion an unfavourable vicious spiral that might eventually have a negative macroeconomic impact on the economy. Basel II also ignores concerns such as leverage, macroprudential stability (the influence of banks on the overall financial system), and systemic risk. As a result, some of these glaring flaws have begun to be corrected in a third agreement. (Balthazar, 2006)

1.2.5 BASEL 3

In response to several flaws in the Basel II Accord, which were brought to light during the global financial crisis, the BCBS adopted a further revision in September 2010 known as the Basel III Accord. The Basel III Accord is not a replacement for the Basel II Accord, but rather an addition to and expansion of the Basel II Accord. The major purpose of the Basel III Accord was to strengthen banks' ability to withstand asset losses while without negatively impacting other sectors of the economy. The Basel III Accord focuses on both the quantity and quality of capital maintained by

banks when it comes to capital standards. One of the most important aspects of the Basel III Accord was its proposal for a "new definition" of regulatory capital, making it more restricted while still emphasizing quality.

Furthermore, the Basel III Accord has preserved the separate levels of tier 1 and tier 2, but limiting their composition elements to higher-quality capital that is better equipped to withstand losses. According to the Basel III Accord, Tier 1 capital must consist primarily of "core capital," which includes equity capital and retained profits. Furthermore, most assets, such as some forms of subordinated debt, that were previously included in bank capital calculations under Basel II would now be omitted from the new Basel III Accord. As a result, under the Basel III Accord, capital instruments that no longer qualify as "capital" will be totally phased out of bank capital calculations beginning in 2013.

Aside from improving capital quality, the Basel III Accord has been revised to increase the amount of capital that banks are required to retain. Banks are anticipated to maintain a total capital ratio of 10.5 percent by the time participating nations completely implement Basel III in 2019, up from the 8 percent minimum under Basel II.

The Basel III Accord requires banks to maintain a total capital ratio of at least 8% of risk-weighted assets. However, after calculating their 8 percent capital requirements, banks will still be required to maintain and hold additional capital as a conservation buffer, equal to at least 2.5 percent of their risk-weighted assets, bringing the overall total capital requirement to 10.5 percent of risk-weighted assets.

The primary goal of preserving the capital conservation buffer, which was established in the Basel III Accord, is to ensure that banks retain greater levels of adequate capital to sustain losses in assets, particularly during times of financial and economic crisis.

The Basel III Accord tackles several obstacles and concerns associated with pro-cyclical capital regulations (an increase in economic upturns and vice versa) and counter-cyclical capital rules (too low in economic upturns and vice versa) by instituting a counter-cyclical capital buffer. In order to combat pro-cyclical behaviour, banks are required by the Basel III Accord to maintain a counter-cyclical buffer ranging from 0 to 2.5 percent of risk-weighted assets ([michael, 2019](#)). Its true quantity will be allotted by national regulatory bodies, with the amount typically decided by the amount of credit available in the economy, with greater capital resulting in a larger buffer. The counter-cyclical buffer guarantees that banks have adequate capital during periods of excess loan expansion, which often happens when assets have a low level of perceived risk. As a result, when larger capital levels are properly maintained during strong economic times, banks prefer to avoid drastic actions to save capital during terrible financial times.

Additionally, the leverage ratio is applied under the Basel III Accord in such a way that banks are required to keep a minimum capital level equal to 3% of their exposures. As a result, the leverage ratio ensures that banks are required under the Basel III Accord to retain the least amount of capital at all times. As a result, banks with limited competence engage in tactics aimed to scrape away at the requirements of minimum capital. As a result, the leverage ratio serves as the foundation of capital, with an amount set aside to defend against any unanticipated calamities.

At the end, ([apostolik, donohue, & went, 2009](#)) the most visible complaint levelled against the Basel III Accord is to the amount of minimum resources (capital) required of banks. If it is deemed excessively high, it may have a negative influence on the loan process. The Basel III Accord's high levels of capital may eventually restrict banks' lending ability. ([Regulation Guide](#))

Table 1-3 Evolvments of the Basel Accord Minimum Capital Requirements

	Basel I	Basel II	Basel III						
			2013	2014	2015	2016	2017	2018	2019
Minimum common equity ratio			3.5%	4%	4.5%	4.5%	4.5%	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%	4.5%	5.125%	5.75%	6.375%	7%
Phase-in of deductions from CET1				20%	40%	60%	80%	100%	100%
Minimum Tier 1 Capital	4%	4%	4.5%	5.5%	6%	6%	6%	6%	6%
Minimum Total Capital	8%	8%	8%	8%	8%	8%	8%	8%	8%
Minimum Total Capital plus conservation buffer	8%	8%	8%	8%	8%	8.625%	9.25%	9.875%	10.5%
Liquidity coverage ratio					60%	70%	80%	90%	100%

Source: Bank for International Settlements, Basel Committee on Banking Supervision

The following table highlights the development of the Basel Accords. It demonstrates that the minimum capital requirement will progressively climb from the current 8% to a potential 10.5 percent. At the conclusion of the phase-in period, in 2019, the highest quality components of capital must account for at least 6% of risk-weighted assets (RWA); more specifically, at least 4.5 percent of RWA must be held as common equity. Beginning in 2016, a capital conservation buffer will be gradually implemented. Other clauses include deductions from Core Equity Tier 1, which were implemented in 2013 and will be steadily enhanced until 2018. Non-core Tier 1 or Tier 2 capital must be removed from the regulatory capital base as they are being phased out over a one-year period commencing in January 2013. Furthermore, disclosures for Basel III began on January 1, 2015, and the liquidity minimum requirement was implemented on the same day. (Ferreira, Jenkinson, & Wilson, 2019)

1.3 **BANKING RISKS AND RISK MANAGEMENT**

1.3.1 DEFINITION OF RISK AND RISK MANAGEMENT

Risk is described as an unpredictable but likely event that may result in financial loss. Uncertainty regarding the divergence from the expected outcome is at the root of the risk. Risk is defined as a phenomenon that occurs when a decision maker is able to recognize potential trends/events, as well as their likelihood, but is unable to predict which of these occurrences will occur.

Negative deviations from expected or intended outcomes are related with the potential of a loss in the financial industry in general, but notably in the banking system, whereas positive deviations are regarded opportunities. Any procedure, transaction, or decision involving a degree of uncertainty

regarding the outcome is subject to the risk associated with banking activity. All banking operations add to a bank's total risk since they all have a degree of uncertainty connected with them.

Banking risk is associated with financial risks in the literature because, due to the nature of their activities, banks are the first and most affected by worsening economic and financial conditions in the countries where they operate.

As previously said, banking risks may be divided into two categories: permanent risks (risks that are caused by a source or element that does not change over time) and unique risks (risks that are caused by a source or factor that does not vary over time) (occurring as the result of a specific, discontinuous source). Banking risk is a phenomenon that occurs throughout the course of banking operations and has a negative impact on these activities by deteriorating asset quality, reducing earnings, or even registering losses, all of which have an impact on the bank's functionality. Banking risk can develop due to internal or external factors, and in view of the potential for unplanned costs, risk management operations are of special relevance to banks.

Customers repay late or do not pay back loans or interest, depositors request early withdrawal of savings, market interest rates vary considerably; human mistake, fraud, regulatory changes, system breakdown, inadequate management, and so on are all dangers that banks may encounter in their business. (Apăvăchioae, 2015)

Risk management is the process of deciding whether to accept a known or estimated risk or acting to limit the consequences or possibility of an undesirable event occurring. Risk management techniques, methods, and technologies are used to detect and control risk to an acceptable level.

Risk management, according to ISO 31000:2009 (Risk management: principles and guidelines), is a coordinated collection of actions and processes used to drive an organization and control the various risks that might impact its capacity to fulfil objectives. (Ennouri, 2013)

1.3.2 CLASSIFICATION OF BANK RISKS

Bank risks are divided into two categories: financial risks and non-financial risks. (Bessis, 2002)

Financial risks are the risks that come with financial transactions. The following are the primary risks that fall under the category of financial risks:

- Market risk
- Credit risk
- Asset and liability management risk
 - Balance sheet interest rate risk
 - Liquidity risk
- Operational risk (Note: We categorized operational risk as a financial risk for categorization reasons.

Non-financial risks are risks that are linked with non-financial transactions. They have traditionally received significantly less attention than financial ones. This is because measuring non-financial risks is more difficult than measuring financial risks. Non-financial risks, on the other hand, have gained more attention in recent years as many banks have realized they are just as vulnerable to non-financial risks as they are to financial obstacles. The following are the primary risks that are categorized as non-financial risks:

- Compliance risk
- Strategic risk
- Reputational risk
- Model risk

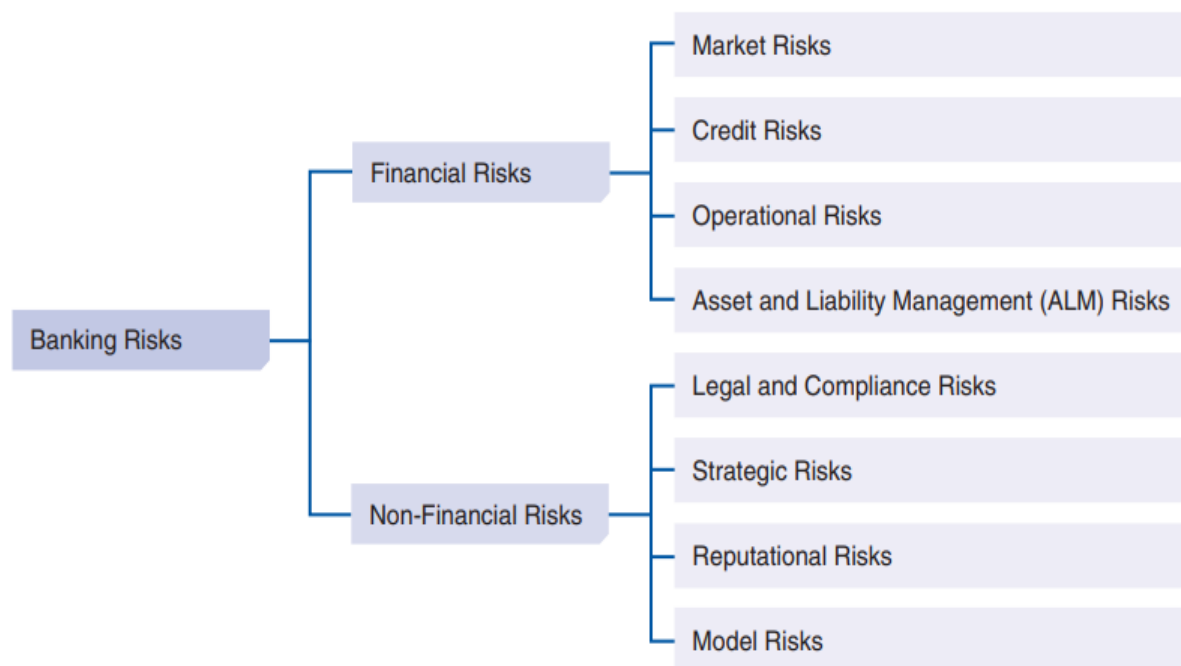


Figure 1-2 Classification of bank risks

1.3.2.1 FINANCIAL RISKS

1) *Market risk*

Market risk is the risk of losses in on-and off-balance sheet holdings as a result of market price changes. Market risk has two categories:

General market risk— represents the risk posed by changes in the general level of market rates and prices. Systematic market risk is another name for general market risk. General market risks, according to current portfolio theory, are risks that cannot be diversified away. Systematic risks include things like the global financial crisis and recessions.

Specific market risk— also called as unsystematic market risk refers to the risk posed by adverse price movements in the market that are directly related to the performance of a certain investment. Specific market risks, according to current portfolio theory, are risks that can be reduced by proper diversification.

Market risk may also be classified into the four categories of risks listed below:

Interest rate risk in the trading book— is the bank's profits and financial condition's susceptibility to interest rate fluctuations. Fixed income assets are frequently connected with interest rate risk. Interest rate risks are divided into two categories:

- The interest rate risk connected with market risk is known as traded interest rate risk or interest rate risk related with the bank's trading book.
- The interest rate risk connected with the bank's balance sheet, known as structural interest rate risk, is better defined as an asset and liability management (ALM) risk.

Foreign exchange risk— is the bank's profits and financial condition's susceptibility to unfavourable changes in foreign currency rates. Foreign exchange risk comes from two major sources:

- Traded foreign exchange risk: stems from the bank's market-making and proprietary trading operations, such as satisfying a client's foreign exchange hedging obligations, which produce foreign exchange exposures.
- *Structural foreign exchange risk*: comes from the bank's assets and liabilities having a structural foreign exchange position mismatch. Misalignments in structure are caused by:

Currency mismatches in the bank's assets and liabilities; and Accounting discrepancies (*e.g.* investments in foreign currency denominated assets are translated using historical exchange rates but financial assets and liabilities are translated using the closing exchange rates).

Foreign currency risk is divided into three categories:

- **Transaction risk**— occurs as a result of exchange rate fluctuations on foreign currency receivables and payables. It occurs when the price at which receivables or payables are collected differs from the price at which they are reported in the bank's financial records.
- **Business risk**— is the risk that exchange rates will have on a company's long-term competitive position.
- **Translation risk**— The risk of changes in the reported domestic accounting results of international activities or transactions as a result of changes in foreign currency rates is known as revaluation.

Equity price risk—is the bank's profits and financial condition's vulnerability to adverse changes in benchmark stock indices and individual equities prices (systematic or general equity market risk) (non-systematic or specific equity market risk). Equity price risk is divided into two categories:

The risk linked with the overall market, known as systematic risk or beta risk, cannot be diversified away. The equity benchmark index of the appropriate individual stock is typically the general market. Some of the benchmark equity indexes for various nations are listed below.

The risk associated with firm-specific risks that can be ameliorated by diversification is known as unsystematic or specific risk. Negative industry developments, negative news about a specific firm, labour issues, and weather disruptions in the principal location of operation are all examples.

Commodity price risk— is the risk that a bank's earnings and financial health may be affected by commodity price volatility. Because of the following characteristics of the commodities market, commodity price risk demands specific attention when compared to other forms of market risks:

- Supply concentration—a small number of market actors dominate the supply of numerous goods. This means that commodity prices may not always change in lockstep with their economic fundamentals. The actions of a small number of market participants can have a big influence on commodity prices.
- Commodity features—Various commodities have varied qualities and physical properties that influence their pricing. Commodity pricing may be affected by factors such as storability. When compared to energy, which cannot be kept, or even an agricultural product, gold, as one of the most durable commodities, would have a distinct price behaviour.
- Periodic factors—Changes in demand and supply over the year may have an impact on commodity prices. Different commodities have seasonal characteristics.

2) Credit risk

Credit risk is the possibility that a borrower or counterparty may fail to satisfy their obligations according to the terms agreed upon. Credit risk is divided into two categories:

- Credit risk exposures produced on a transactional basis are called **transactional credit risk**. It is essentially decided by the borrower's or counterparty's capacity and desire to meet their commitments when they become due. Transactional credit risk is classified into five categories:
- The risk of loss from a customer defaulting on a consumer credit product coming from the bank's retail operation is known as **retail credit risk**. Retail credit exposures are described by the Basel Committee on Banking Supervision as identical portfolios that include:
 - Large number of small, low-value loans
 - Consumer or small business concentration
 - Incremental risk of any single exposure is small
- Corporate credit risk is the risk of losing money if a corporate or institutional client default. Traditional commercial banks' biggest risk is generally corporate credit risk.
- Counterparty credit risk is the risk that a counterparty to a financial transaction, such as derivatives, would default and fail to satisfy its obligations under the contract before the term expires. While counterparty credit risk is categorised as credit risk, market risk plays a key role in determining a bank's counterparty credit risk exposure.

- The risk of a government defaulting on its financial responsibilities is known as sovereign risk.
- Nation risk refers to the risk of financial loss caused by events in a certain country that are, to some extent, under the government's control. Country risk encompasses a broader spectrum of risks than national credit risk. Transfer risk is an example of a risk that falls under the category of country risk. The borrower's failure to meet its commitments as a result of government measures, such as limits on private sector borrowers' ability to obtain foreign cash to repay their foreign exchange obligations, is referred to as transfer risk.
- The bank's credit risk exposure on an aggregated basis is called portfolio credit risk. Individual transactional credit risk exposure is combined on a consolidated bank basis to calculate portfolio credit risk. Taking individual exposures on a portfolio level has a favourable diversification impact. Concentration risk is a significant component of portfolio credit risk.
- Concentration risk refers to an exposure that has the potential to cause significant losses that might endanger a bank's financial stability. Excessive exposure to the following substances might cause concentration risk:
 - A Single counterparty or group of related counterparties
 - A certain instrument
 - A particular market segment

3) *Asset and liability management (ALM) risk*

Area with asset and liability management (ALM) are risks linked with structural imbalances in a bank's balance sheet. ALM dangers can come from two places:

- The susceptibility of a bank's balance sheet to negative interest rate fluctuations is known as **balance sheet interest rate risk**. Interest rate risk on the balance sheet is a common occurrence in the banking industry. There are four major sources of interest rate risk on the balance sheet:
 - Differences in the maturity and repricing of bank assets, liabilities, and off-balance sheet positions create **repricing risk**. Repricing risk comes from two basic sources:
 - Maturity differences
 - Cash flow repricing (for variable rate assets or liabilities)
 - Yield curve risk—A yield curve is a straight diagram that depicts the connection between interest rates across a bond's various maturities. Yield curve risk occurs when unexpected yield curve adjustments have a negative impact on the bank's income or underlying economic value. Basis risk—is the risk arising from an imperfect correlation in the adjustment of interest rates earned and paid on different instruments with similar repricing characteristics.
 - Optionality risk—this is the risk of cash flow changing options inherent in bank assets, liabilities, and off-balance sheet positions.
 - Liquidity risk—the risk that the bank may be unable to fund asset growth and satisfy commitments as they become due. Liquidity risk comes from two basic sources:
 - Liquidity risk from assets

Selling existing assets is one option for a bank to fund asset expansion or pay its commitments when they become due. Assets that can be quickly turned into cash are often thought to be of greater liquidity quality than those that cannot. This guarantees that the bank can fund asset growth while still meeting its obligations without experiencing unacceptably high losses.

Off-balance sheet obligations are another key source of asset-based liquidity risk. Banks usually enable customers to borrow cash on demand during a commitment term. A loan commitment deal is what this is called. When a client uses their loan commitment, the bank must pay the obligation right away, producing a liquidity demand.

- Liquidity risk depending on liability or funding the quality of the bank's financing sources

the liabilities side of the balance sheet—is also a big factor in its liquidity profile. When liability holders demand cash by withdrawing deposits (or loans), the bank must either borrow more money or sell assets to cover the withdrawals. To meet the needs of liability holders, banks employ cash.

In times of liquidity crisis, banks would be forced to replace unstable sources of cash (liabilities) in order to continue operating as a going concern. Replacing these sources of cash in this circumstance will require banks to accept unreasonable increases in funding costs.

Having access to dependable sources of capital, on the other hand, gives banks the freedom to not replace or increase funding when it is not necessary.

4) *Operational risk*

Operational risk is defined under Basel II as the risk of loss caused by insufficient or failing internal processes, people, and systems, as well as external events. Legal risk is included in this definition, but strategic and reputational risk are not. Operational risk is caused by four key factors:

- **Process risk**—refers to the risk posed by poor overall design and implementation of internal business processes.
- **People risk**—is the risk that workers will not follow the organization's processes, practices, and/or regulations, or that they will act in ways that are not expected.
- **Systems risk**— refers to the possibility of a bank's infrastructure and information technology systems failing.
- **External events risk**— The risk linked with occurrences beyond the bank's control.

While this concept classifies operational risk as financial risk, it really has both financial and non-financial elements. The risk of loss coming from the loss of one or more essential members of the banking organization is known as key man or person risk. It will be tough to rapidly replace this crucial person due to the information or abilities he or she holds. This is an example of a non-financial dimension to an operational risk. Rogue trading, or the unlawful execution of deals by an authorized trader, is an example of an operational risk with a financial impact on the bank. (Greuning & Bratanovic, 2020)

1.3.2.2 NON-FINANCIAL RISKS

1) *Legal and compliance risk*

- Legal risk is the risk that litigation, bad verdicts, or flawed contracts can disrupt or damage the bank's operations or financial position. Legal risk refers to the possibility of receiving fines, penalties, or punitive damages as a consequence of supervisory proceedings or private settlements.
- The risk of noncompliance with laws, rules, and regulations, or internal policies, on the other side, is known as compliance risk. A bank's failure to comply with laws, regulations, rules, relevant self-regulatory organization standards, and code of conduct applicable to its banking activities may result in legal or regulatory consequences, substantial financial loss, or reputational damage.

2) *Strategic risk*

Developments in the corporate environment, poor strategy judgments, inappropriate execution of decisions, or a lack of responsiveness to industrial, economic, or technical changes can all result in a loss of earnings, capital, or reputation. Failure to establish or implement plans adequately can result in substantial harm to a bank's financial condition, reputation, competitiveness, or business expansion possibilities.

3) *Reputational risk*

The possibility of unwanted publicity about an institution's business activities is known as reputational risk. Whether real or not, such a reputational damage can result in a loss of customers, expensive lawsuits, or revenue reductions. In a Deloitte worldwide study of more than 300 organizations around the world conducted in 2013, respondents listed reputational risk as their top worry. Most individual sectors rate reputation as the largest impact risk area.

4) *Model risk*

For identifying and measuring risks, banks depend largely on models. A model is a quantitative method, system, or methodology that processes input data into quantitative estimates using statistical, economic, financial, or mathematical theories, techniques, and assumptions.

Models give banking firms a formal structure for assessing, analysing, and quantifying risks by simplifying the frequently complex, dynamic, and interconnected nature of risk exposures, allowing for more efficient and effective decision-making. These simplifications are frequently used by banks.

The risk of loss, wrong business choices, financial reporting problems, or reputational damage resulting from potential inaccuracies and misapplication of model inputs is known as model risk.

During the height of the global financial crisis in 2008, model risk garnered a lot of attention. In calculating their risk exposures from complex derivatives, several institutions used erroneous model assumptions. The results of the model used to formally quantify the risk exposures led to faulty decisions, which left many banks stuck with highly illiquid assets. (Te, 2016)

1.3.3 RISK MANAGEMENT PROCESS

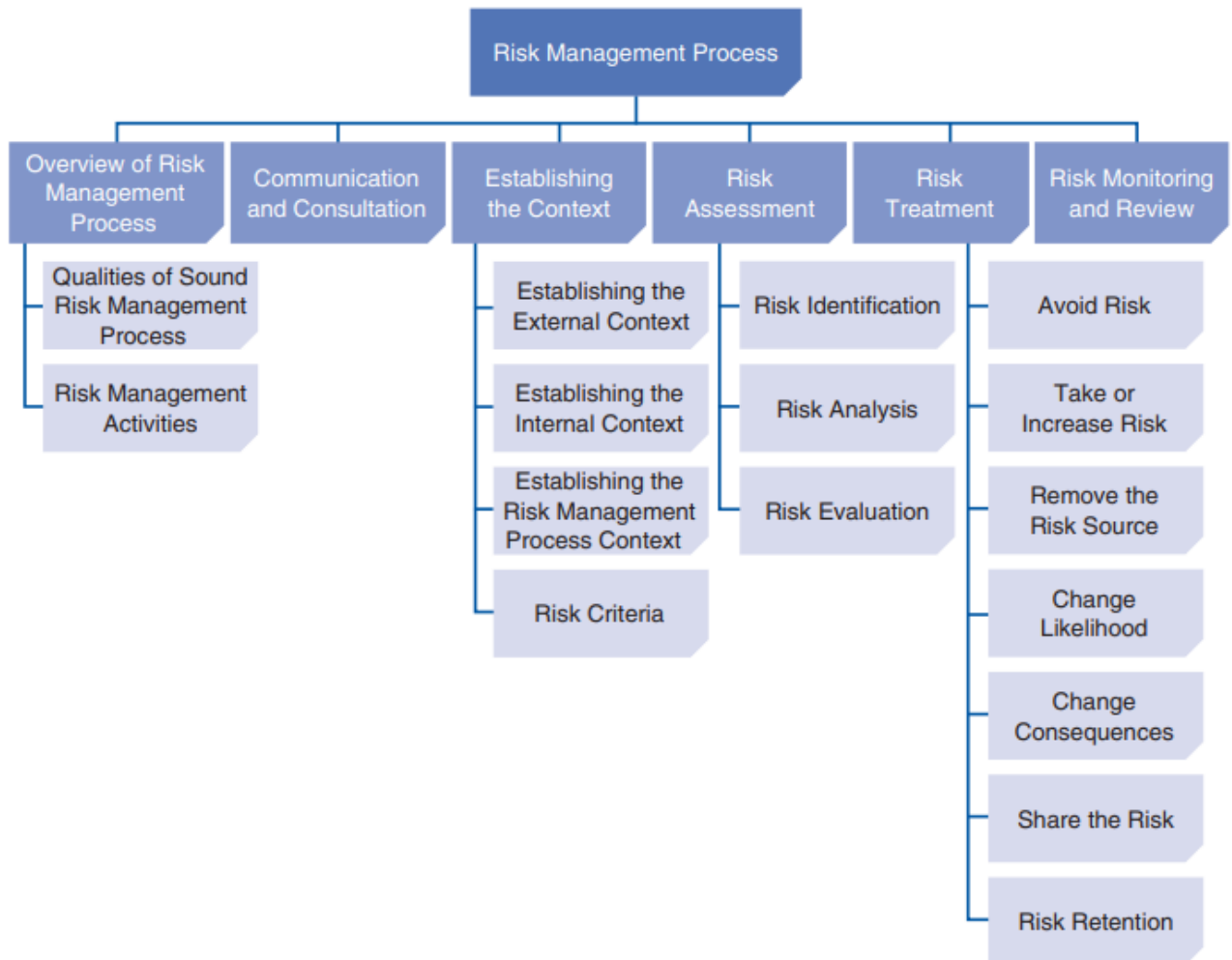


Figure 1-3 Risk Management Process

1.3.3.1 RISK ASSESSMENT

The whole process of risk assessment includes:

- Risk identification
- Risk analysis
- Risk evaluation

1. Risk Identification

The process of identifying, recognizing, and characterizing risks is known as risk identification. Identification of the following is required:

- **Risk sources**

A risk source is a factor that, by itself or in combination, has the inherent ability to cause risk (ISO 31000).

Example— One sort of risk is credit risk. The banking organization's lending activities, which have the potential to cause credit risk, are a risk source.

- **Risk events and their causes**

A risk event occurs when a certain combination of conditions occurs or changes. The incidence might be one or several, and there could be various causes. It might also be the absence of anything. A 'near miss,' 'incident,' 'near hit,' or 'close call' refers to an occurrence that has no repercussions.

Example—With respect to credit risk, an example of a risk event could be the default of a borrower or the deterioration of a counterparty's creditworthiness.

- **Consequences**

A risk consequence is the result of an incident that has an impact on objectives. The event can have a variety of outcomes, which can be predictable or unpredictable, and can have a good or bad influence on the goals.

Example— The possible negative impact on the banking organization's earnings or capital is one risk consequence of a counterparty's creditworthiness deteriorating.

The goal of risk identification is to produce a thorough list of risks based on particular occurrences that might create, improve, prevent, degrade, accelerate, or postpone the fulfillment of goals. Any risk that is not discovered at this step may not be included in the risk analysis stage, hence a thorough risk identification approach is essential. All-important causes and outcomes must be considered.

Examining the knock-on effects of certain consequences should be part of the risk assessment process. These cascading impacts might involve a high number of risk events and outcomes occurring in rapid succession.

2. Risk Analysis

The process of recognizing the nature of risk and assessing the amount of risk is known as risk analysis. It entails gaining a grasp of the danger.

Risk analysis serves as the foundation for risk assessment and judgments regarding how risks should be handled, as well as the best risk treatment tactics and procedures. It also entails calculating the size of a risk or a set of risks, which is defined in terms of a set of outcomes and their likelihood.

Risk analysis considers the following factors:

- Risk causes and sources
- Risk's positive and negative effects
- Probability of such effects occurring
- Factors that influence the outcome and likelihood

The interrelationship of various risks and their sources should be considered in risk analysis.

It can be done qualitatively, quantitatively, or using both qualitative and quantitative methods.

The likelihood of consequences can be determined by:

- Predicting the results of an event or series of events
- Extrapolating from existing data or experimental experiments

3. Risk Evaluation

The process of comparing the results of risk analysis with risk criteria to determine if the risk and/or its level are acceptable or bearable is known as risk evaluation.

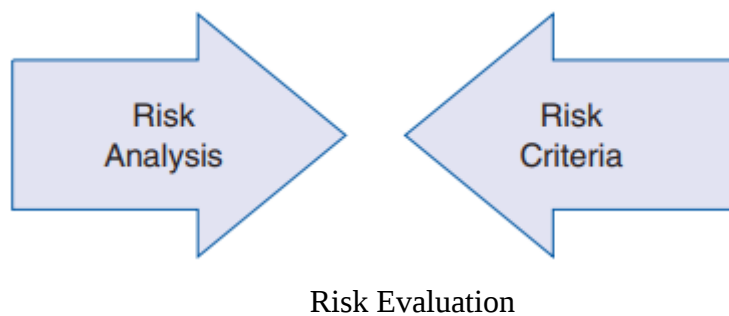


Figure 1-4 Comparing the results of risk analysis and risk criteria

The goal of risk evaluation is to help you make decisions based on the results of your risk analysis, such as which risks need to be treated and which risks should be treated first. It entails

comparing the degree of risk estimated through the risk analysis process to risk criteria that have been defined. Figure 1.4 depicts the probable outcomes of the risk analysis in relation to the risk criteria.



Figure 1-5 Decision-making under the risk evaluation process

The following factors should be considered while making risk evaluation decisions:

- The organization's risk appetite and tolerance
- Risk criteria
- Legal, regulatory and other obligations.

1.3.3.2 RISK TREATMENT

Risk treatment entails deciding on one or more risk-reduction solutions and putting them into action. It involves a cyclical process of evaluating risk treatment and determining if residual risks, also known as retained risks, are manageable. The risk that remains after a risk treatment is known as residual risk. If the remaining risks are unacceptable, the financial organization may develop a new risk treatment, which will be evaluated for efficacy. The risk treatment method is depicted in Figure 1.6

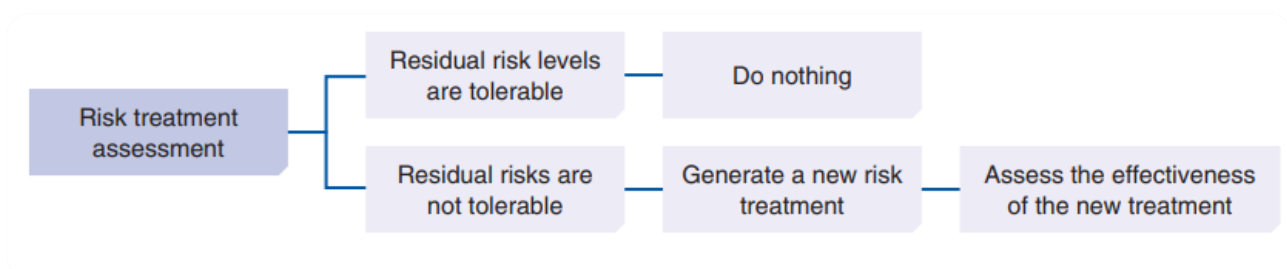


Figure 1-5 Cyclical process of risk treatment assessment

Treatment for risk varies greatly. Figure 1.5 depicts some of the most frequent risk-reduction strategies, which are not mutually exclusive.

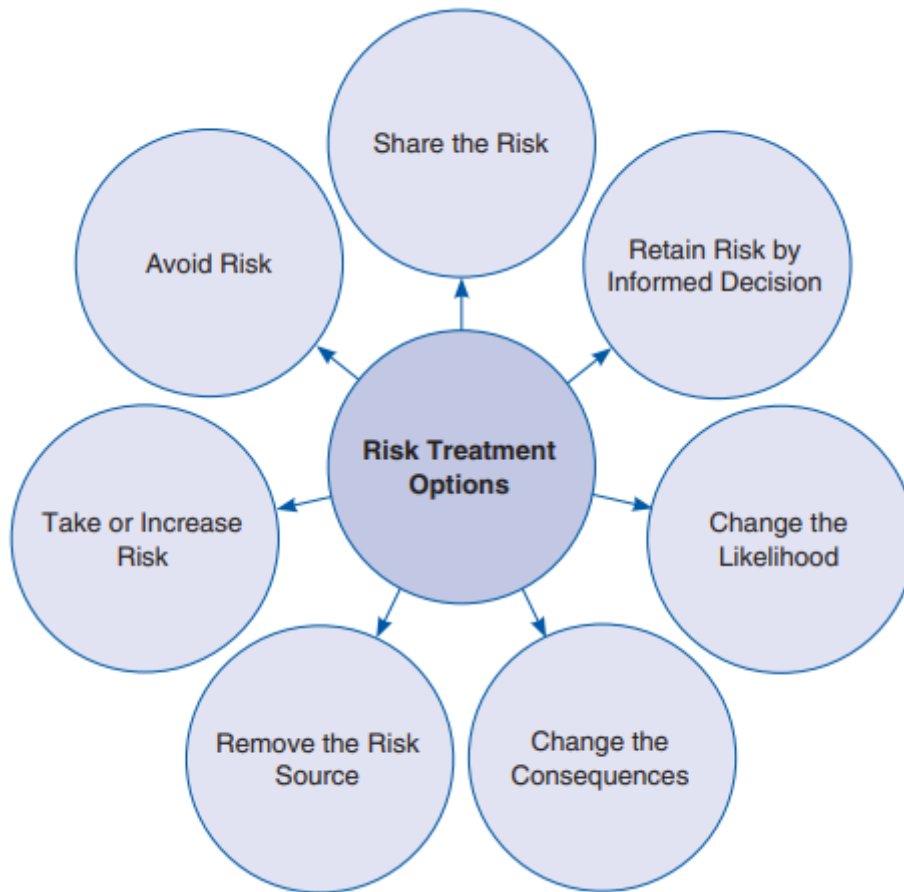


Figure 1-6 Risk treatment options

- ***Avoid Risk***

Avoiding the risk by opting not to pursue or continue with the action that causes the risk is one of the risk treatment alternatives. Banking firms are frequently faced with multiple business prospects in a highly inventive and worldwide business environment. However, if the dangers outweigh the possible advantages, the business may decide to pass on such possibilities

- ***Take or Increase Risk***

Taking or increasing risk in order to seek a business opportunity is another risk treatment approach. This strategy is only viable if the financial organization is confident in its capacity,

competence, and desire to accept and manage the residual risk associated with the business opportunity that creates the specific risk

- ***Remove the Risk Source***

The removal of the risk source is an alternate risk treatment method. Risk transfer, for example, is a risk management approach that involves the contractual transfer of risk from one party to another. While this method efficiently eliminates this sort of risk from the financial institution, additional concerns may develop. The purchase of insurance is an example.

It may eliminate the risk of the insured occurrences, but it exposes the organization to counterparty credit risk, or the chance that the insurance provider may fail to meet its contractual promises or duties.

The usage of derivatives contracts is a prominent risk transfer strategy. Derivatives are financial products whose value is determined by one or more underlying variables' performance. Risk may be efficiently transferred from one party to another through derivative contracts.

- ***Change Likelihood***

Another risk treatment strategy is to lower the likelihood of a risk event occurring. If more stringent controls are in place, the chances of a risk event occurring are lowered.

The goal of preventive controls is to keep risk occurrences from happening. They reduce the chance of a certain risk occurrence occurring.

Table 1-4 Preventive controls to change the likelihood of risk events from happening

Examples of Preventive Controls	Impact on Likelihood of Risk Events
Training on policies and procedures	Lower likelihood of a risk event occurring as personnel are more aware of the policies and procedures
Segregation of duties	Lower likelihood of a risk event occurring due to more effective checks and balances
Strict access authorizations	Lower likelihood of a risk event occurring as unauthorized access may be less likely to happen

Source: open knowledge world bank.

Other examples of risk treatment options are standardization of business processes and automation of manual processes to minimize risks due to human errors.

- ***Change Consequences***

Aside from lowering the possibility of a risk event occurring, another strategy is to minimize the consequences if it does. The demand that the borrower deposit securities or cash as collateral is an example of this risk treatment strategy. If the risk event happens, the bank (creditor) may sell the securities or utilize the cash collateral to reduce the risk event's impact on losses (in this case, a credit risk event)

- ***Share the Risk***

Risk sharing is a risk management strategy in which the risk's consequences are shared among numerous people.

- ***Risk Retention***

Banks may also choose to keep risk by making educated decisions. The decision should be taken after examining the bank's ability and desire to retain the specific risk, similar to the take or raise risk option. After carefully examining the findings of the risk analysis and the pre-determined risk criteria, the choice is taken.

The most appropriate risk treatment approach is determined by weighing the expenses and effort required to implement the plan against the benefits obtained. The bank should consider stakeholder values and perceptions when choosing risk treatment solutions, as well as the best approach to communicate with them.

Individual risk treatments should be explicitly prioritized in terms of execution, according to a risk treatment strategy.

The risk management strategy should be integrated into the bank's management procedures and addressed with relevant stakeholders.

1.3.3.3 RISK MONITORING AND REVIEW

The practice of examining, overseeing, critically evaluating, or identifying the status of a risk in order to allow deviation from the necessary or expected performance level is known as risk monitoring. The process of assessing the acceptability, sufficiency, and effectiveness of the risk management process is known as risk review.

A frequent procedure of checking is included in risk monitoring and evaluation. It should be part of the risk management process from the start. Risk monitoring and review roles should be clearly stated.

The risk monitoring and assessment process is incomplete without risk reporting. It involves recording and reporting to both internal and external stakeholders the outcomes of the bank's risk assessment and treatment strategies. The goal of risk reporting is to keep stakeholders informed about how the firm manages its risk exposures. It is crucial in ensuring that the various stakeholders enforce market discipline on the business, especially in terms of risk assessment and management.

The following are some of the key goals of the monitoring and reviewing process:

- Ascertain that the controls are both effective and efficient in their design and functioning.
- Gather additional data to improve risk assessment
- Examine events, changes, trends, achievements, and failures and draw lessons from them
- recognise changes in both the environmental and internal environment
- Identify emerging risks (Saunders & Cornett, 2014)

1.4 BANKING PERFORMANCE

1.4.1 DEFINITION OF BANKING PERFORMANCE

Bank performance refers to a financial institution's ability to achieve long-term profitability and efficiency.

Bank performance, from the perspective of a bank's shareholders, is earning profit by maximizing revenue and reducing expenditures. Profit maximization is equal to cost minimization in the case of perfect competition, according to economic theory. In practice, however, issues like as changes in the regulatory framework might interfere with achieving the intended performance. Incorrect incentives and inefficiency are two variables that might explain the divergence from profit maximization.

A bank's worldwide performance describes its overall outcomes, with profitability levels connected with the risks taken by the bank in question. In the literature, banking performance is indicated through profitability and financial soundness metrics, as well as risk indicators. Because the control of banking risks is a factor that is dependent on bank profitability, risk indicators must be interpreted in terms of the causes, consequences, and impacts on the bank's profitability.

Because banks play such an important role in financial intermediation, their performance should be evaluated in terms of efficiency, productivity, competitiveness, and profitability. Banks pay special attention to continuous monitoring indicators that represent the efficiency of banking activity and analyse their efficacy in close relation to the bank's exposure to risks or prospects that might imperil the activity. All of these actions at banks emphasize specific institutions' risk profiles and exposure in order to achieve financial results. In international banking practice, maximizing the risk-profitability relationship is a goal that is applied to each banking product and extends to the bank's whole portfolio.

The link between profit and risk determines a bank's global performance. A number of financial indicators are computed in a bank's financial statements that are based on gross and are strongly tied to the risk carried by the bank and characterize, nevertheless, bank performance. However, the information offered by performance indicators is important not only internally, but also to other types of users, such as those associated with the bank's external environment (banking supervisor, fiscal, non-bank clients, bank customers, rating institutions, and so on) (shareholders, general manager, employees, etc..).

The banking supervisor is constantly interested in the bank's status and economic and financial situation, its position in the banking system that it oversees, and its ability to finance and capitalize temporarily some of his available sources as needed. Compares the performance of each bank share with other comparable banks, with the average or the banking system reported by the bank in past periods, and aids in determining the banking company's strengths and shortcomings. The overall performance of a bank describes its overall results, which are offered by the profitability of the capital banking organization, together with its variance according to the risks taken by the bank concerned. (Apăvăchioae, 2015)

1.4.1.1 BANK OWNERSHIP AND PERFORMANCE

Shipments of the bank's ownership structure between 1990 and the beginning of 2000 dramatically impacted banking institution governance. In studies of US corporations, the term governance has often been used to refer to the strategies utilized by shareholders to lower management agency costs. Governance studies that are interested in nations other than the United States, particularly developing countries, have frequently centred on the importance of ownership

structure in alleviating agency difficulties caused by a lack of legal infrastructure. Furthermore, it is commonly recognized that all shareholders want to maximize the firm's worth. The ownership structure is an essential governance tool because it has been modified to account for the relationship between ownership structure and performance in the context of agency theory and public choice. When there is a divide between ownership and control, the major problems/agent might occur.

A large body of literature has been written about the relationship between governance and bank performance. Some studied the static impacts of various forms of bank ownership structures, as well as the consequences of long-term performance linked with a local, foreign, or public property. On the other hand, the dynamic consequences of changes in the bank's ownership structure, the implications of performance connected to domestic mergers and acquisitions, international acquisitions, or privatization, were considered. In some cases, these studies have also looked at the effects of picking some banks that have gone through dynamic changes in governance. (Chenini & Jarboui, 2016)

1.4.1.2 FINANCIAL CRISIS AND BANKING PERFORMANCE

Banking crises affect the entire world on a regular basis with a certain time lag, bad credit often leads to banking instability, which leads to an economic crisis, the International Monetary Fund (IMF) defines one form of banking crisis as issues in the banking system that fulfil at least one of the following conditions: (i) the banking system's bad asset to total asset ratio surpasses 10%, (ii) the cost of bailing out the banks exceeds 2% of GDP, (iii) banking system problems result in bank nationalization, (iv) the government responds to banking problems by freezing deposits, causing a banking panic, or (v) reacts by implementing bank holidays or providing guarantees on bank deposits.

It is also defined that financial instability is a situation in which categorized loans amount for 15-20% of total loan volume and the cost of rescuing the banking industry exceeds 5% of GDP. analysing bank stability results from grading the best banks, which are assessed based on the following criteria: (i) asset growth, (ii) profitability, (iii) global range of operation, and (iv) strategic partnerships. (Cernohorska, 2015)

1.4.2 PERFORMANCE MEASUREMENT

Despite the fact that the phrase "performance measurement" has been in use since the late 1970s, there has yet to be a unified definition for it. The Government Accountability Office defines performance measurement as an assessment of an organization's performance that includes measures of:

- productivity, which quantifies an organization's outputs and inputs;
- effectiveness, which determines the relationship of an organization's outputs to what an organization is intended to accomplish;
- quality, which examines an output or the process by which an output is produced;
- and – timeliness, which evaluates the timeliness of an output.

The most frequently cited definition of performance measurement is that of (Neely, 2002): "the process of assessing the efficiency and effectiveness of previous acts." While this definition emphasizes both effectiveness and efficiency, it is unlikely to cause managers to pause and question their performance measuring techniques. Its, in particular, concentrates solely on the past and provides no hint of what or why they should quantify.

As a result, (Moullin, 2007) proposed a different definition: "the performance assessment measuring how well enterprises are managed and the value they generate for customers and other stakeholders." His definition provides far more advice to those interested in performance measurement. It will specifically push them to assess the extent to which their company measures the value they provide to their consumers and if it covers the key features of how it is handled. There has been some

fascinating debate around performance measurement. When (BOCCI, 2004) criticized (Neely, 2002) definition, he said that performance measuring included not just quantifying but also comparing to a reference. According to him, performance measurement is a type of main process that may be part of bigger and various processes: we measure performance to evaluate the performance of the organization on the inside or from the outside, and to manage this performance. As a result, the goals of performance measurement may range greatly.

Furthermore, in response to Moullin's definition, Bocci stated that there should be a distinction between performance measurement and performance assessment definitions. Considering performance measurement in this manner, especially in the public sector, is one of the primary challenges that individuals must overcome if the company wishes to go from measurement established to judge to measurement intentionally accepted to assist decision making process.

(Moullin, 2007) said that assessing was a better phrase since it involved interpretation and analysis: "someone somewhere is going to question how well an organization is performing or what is causing the reduction in sales.

1.4.2.1 PERFORMANCE MEASUREMENT TOOLS

The performance metric we use may differ depending on the industry we want to research. (Venkatraman & Ramanujam, 1986) categorize several techniques to measuring business performance, which they regard as a part of the wider area of organizational effectiveness. Business performance under this plan would include both financial and operational performance. Financial performance uses financial indicators to describe the firm's economic successes, assuming the supremacy of financial goals in this manner. Growth in sales, profitability (return on assets (ROA) and return on equity (ROE)), profits per share (EPS), and market metrics (market-to-book value, stock returns, and Tobin's Q1) are among these indicators. Operational performance, on the other hand, broadens the concept of business performance by incorporating key operational success factors that may lead to financial performance, such as market share, product quality, marketing effectiveness, the company's reputation, new product introduction, and manufacturing value-added.

(Garengo, Biazzo, & Bititci, 2005) recently compared performance measurement models using both the eight dimensions of performance measurement strategies (strategy alignment, strategy development, stakeholder focus, balance, process orientation, depth, breadth, dynamic adaptability, causal relationships, and clarity and simplicity) and the three typologies defined by (De Toni & Tonchia, 2001):

- Vertical architectures are defined as models that are strictly hierarchical (or strictly vertical) and are characterized by cost and non-cost performances at different levels of aggregation, until they eventually become economic-financial; the first hierarchical model was that of (Gold, 1985), which linked productivity with ROI.
- Balanced architectures are models that are balanced scorecards or dashboards, in which several separate performances are considered independently; these performances correspond to different perspectives of analysis (financial, internal business processes, customers, learning/growth), which substantially remain separate and whose links are only defined in a general way.
- Horizontal architectures (by process) are models that concentrate on the value chain and consider the internal customer-supplier connection.

They conclude that using the models designed by (De Toni & Tonchia, 2001) demonstrates a clear difference between the structure of most generic models (performance measurement matrix,

performance pyramid system, results and determinants framework, and balanced scorecard), which are primarily vertical, and that of the two specific models for SMEs (organizational performance measurement by Channel and integrated performance measurement for small firms), which are primarily horizontal. On the one hand, there is an emphasis on the distinction between major business models and small and medium enterprise models, and on the other hand, there is evidence of a time-related evolution of the models under consideration.

1.4.2.1.1 CLASSICAL METHODS

Earnings are the foundation of traditional procedures (profit). Managers have always used these conventional approaches to assess financial performance. The following are some of the most common conventional measures used in performance evaluation.

- **Ratio analysis**

The computation and comparison of financial ratios generated from information in a company's financial statements is known as financial ratio analysis. The level and historical trends of these ratios can be used to draw conclusions about a company's financial condition, operations, and investment attractiveness. Financial ratio analysis categorizes ratios to reveal information about many aspects of a company's finances and operations.

The different categories of ratios are given below:

- 1) **Leverage ratios:** They demonstrate how much debt is employed in a company's capital structure. one significant piece of information we can gather from a company's balance sheet is leverage, or the amount to which it relies on debt for funding. A popular measure used to analyse a company's leverage is the debt–equity ratio. This ratio is computed by dividing total short- and long-term debt (including current maturities) by total shareholders' equity:

$$\text{Debt-Equity Ratio} = \frac{\text{Total Debt}}{\text{Total Equity}}$$

$$\text{Debt-to-capital ratio} = \frac{\text{Total Debt}}{\text{Total Equity} + \text{Total Debt}}$$

- 2) **Liquidity ratios:** They provide information on a company's short-term financial situation or solvency. There are three major ratios that we distinguish:

- Current ratio:

Current assets/current liabilities

- Quick ratio:

(Cash + short-term investments + A/R)/ current liabilities

– Cash ratio:

Cash/current liabilities.

- 3) Profitability ratios:** The income statement gives highly important information on the profitability of a firm's business and how it relates to the value of the firm's shares. A company's gross margin is the ratio of gross profit to revenues (sales):

$$\text{Gross Margin} = \frac{\text{Gross Profit}}{\text{Sales}}$$

The gross margin of a company demonstrates its capacity to sell a product for more than its cost of production. Because there are other expenses associated with running a firm in addition to the direct costs of items sold, the operating margin, or the ratio of operating income to sales, is an essential profitability statistic.

$$\text{Operating Margin} = \frac{\text{Operating Profit}}{\text{Sales}}$$

The operating margin shows how much money a company makes before interest and taxes on each dollar of sales. Similarly, we may calculate a company's profits before interest and taxes (EBIT) margin = (EBIT/sales). We can analyze the relative efficiency of the businesses' operations by comparing operating or EBIT margins among enterprises within an industry.

$$\text{EBIT} = \frac{\text{EBIT}}{\text{Sales}}$$

Differences in operating margins can emerge from business strategy, in addition to operational efficiency. Finally, the net profit margin of a company is the ratio of net income to revenues:

$$\text{Net Profit Margin} = \frac{\text{Net Profit}}{\text{Sales}}$$

The net profit margin is the percentage of income available to equity investors after interest and taxes are deducted.

- 4) Operational ratios:** They employ turnover measurements to determine how efficient a company's operations and asset utilization are. Despite the fact that financial ratio analysis is

widely developed and the actual ratios are generally recognized, professional financial analysts frequently build their own measurements for certain sectors and even individual organizations. The following are the most common and widely used ratios:

Return on equity (ROE) is the most important profit indicator since it analyzes banking management in all of its dimensions and provides a picture of how to use the funds contributed by shareholders, as well as the influence of their retainer in the bank's activities. a high ROE may suggest that the business is capable of identifying highly profitable investment possibilities. This indicator is calculated as follows:

$$\text{Return on Equity} = \frac{\text{Net Income}}{\text{Book Value of Equity}}$$

It is defined as the difference between net profit after deducting all expenditures and taxes and the book value of equity. The specialty literature devotes significant study to this indication, which is regarded as one of the most distinctive barometers of various commercial company performances. In the case of banks, a normal margin of this indicator is considered to be between the important thresholds of 10% and 30%.

The return on assets indicator expresses the profitability of a banking sector's entire activity. This metric, also known as profit to assets or asset profitability, measures the impact of management's ability to utilize an institution's financial and real resources to produce profit. The return of assets indicator is thought to be the most accurate measure of banking activity since it immediately represents the outcome of active operations optimization, according to the unique management of banking intermediaries, in relation to a volume of resources evaluated. This indicator's formula is as follows:

$$\text{Return on assets} = \frac{\text{Net Income}}{\text{Total Assets}}$$

ROA measures a company's profitability before leverage and is compared to other firms in the same industry. Because the number for the company's total assets is dependent on the carrying value of the assets, some caution is necessary for corporations whose carrying value may differ from the real market value. ROA is a popular metric for measuring the performance of financial organizations (such as banks) since the most of their assets will have a carrying value that is near to their real market value. The fluctuation limits of indicators are typically between 0.5 and 1.6 percent. The tiny value (1%) is exclusive to large banks, whilst an extra unit dimension of indication is unique to small and medium banks. Return on assets (ROA) has the advantage of being less susceptible to debt than return on equity (ROE) as a performance indicator. It is, however, sensitive to working capital - for example, an equal rise in the firm's receivables and payables will raise total assets, lowering ROA.

The DuPont Identity (called after the corporation that popularized its use) is used to gain further insight into a firm's ROE. The ROE is expressed in terms of the firm's profitability, asset efficiency, and leverage in this tool. The ultimate purpose of the DuPont analysis is to explain the rate of return on common shareholders' equity (ROE) in detail by breaking it down into its component elements: rate of return on sales, asset turnover, and leverage. The model's first two components combine to yield a rate of return on total assets (ROA). When the last component (leverage) is added to the model, the rate of return on common shareholders' equity is produced (ROE). The DuPont identity is:

$$\text{ROE} = \left[\frac{\text{Net Income}}{\text{Sales}} \right] \times \left[\frac{\text{Sales}}{\text{Total Assets}} \right] \times \left[\frac{\text{Total Assets}}{\text{Book value of equity}} \right]$$

ROE = Net profit margin × asset turnover × equity multiplier

ROE = ROA × leverage

Developing ROE:

ROE = $N_i / E = (O_i / S) \times (S / A) \times (N_i / O_i) \times (L / E)$

[Operational margin] × [Asset turnover] × [cost of debt] × [arm of leverage]

[Economic profitability] × [debt structure]

Where:

O_i = operational income

E = equities

N_i = net income

S = sales

A = total assets

L = total liabilities

when we examine the financial statements of non-financial enterprises listed on the stock exchange for the same year as stated in IFRS and national accounting standards, these ratios are dramatically altered.

1.4.2.1.2 MODERN MODELS

For many years, it has been acknowledged that performance assessment may impact a firm's behaviour and, as a result, the successful execution of corporate strategy. Performance measurement must be created and implemented in line with a company's business strategy in order to connect the strategy to the goals of functions, groups of people, and individuals, as well as operational factors. (Neely, 2002)

Traditional models' lack of alignment between performance measurement and company strategy has been identified as one of the major barriers to getting the intended results from a performance measurement.

Indeed, models introduced after the mid-1980s, such as the balanced scorecard and the performance pyramid system, emphasize the importance of strategy and performance measurement alignment.

Performance in a successful overall quality organization will be judged by the benefits experienced by customers as well as the outcomes supplied to other stakeholders, such as shareholders. Examining an organization's performance is also a crucial stage in determining the

direction of strategic actions. Modern models incorporate the notion of wealth maximization as well as non-financial factors including as innovation, customer pleasure, and staff motivation. The Performance Prism, the Cambridge performance measurement process, the TPM process, step TPM process, total measurement development method (TMDM), activity-based costing and management, quality management, customer value analysis, performance pyramid system, and the balanced scorecard are some of the modern techniques. (Azadinamin, 2011)

The EVA (Economic value added), the most often used tool for measuring bank performance, will be the emphasis of this section of modern models. (Salaga, Bartosova, & Kicova, 2015)

Because of its resilience and immunity to "creative accounting," the EVA framework established by Stern Stewart & Company is progressively replacing traditional measurements of financial performance.

EVA is an estimate of genuine economic profit following corrective GAAP accounting adjustments, such as subtracting the opportunity cost of equity capital. EVA calculates the financial amount of wealth generated or destroyed by a firm in a reporting period by considering all capital costs, including the cost of equity. The following formula may be used to determine EVA:

$$\text{EVA} = \text{NOPAT} - \text{WACC} \times \text{capital employed}$$

NOPAT stands for net operating profits after taxes. NOPAT equals profits before interest and tax (EBIT) less adjusted taxes (AT), where EBIT stands for earnings before interest and tax and WACC stands for weighted average cost of capital. It is made up of the two parts listed below:

$$\text{Cost of debt} = \text{Borrowing rate} \times (1 - \text{marginal tax rate}).$$

$$\text{Cost of equity} = \text{Risk-free rate} + \text{risk premium} \times \text{Beta (capital asset pricing model)}$$

$$\text{WACC} = D/V \times \text{Cost of Debt} + E/V \times \text{Cost of Equity}$$

where:

D = average debt

E = average equity (market capitalization)

V = D + E (total value of firm).

The risk-free rate is the same as the yield on a government's long-term bond. The volatility of a stock's price in relation to the market is measured by beta. The market risk premium is the additional return that investors expect from the equity market above and beyond the risk-free rate.

Capital employed is defined as total assets less non-interest-bearing liabilities at the start of the quarter. This definition ignores the capital invested in the firm at various points during the year, which has a positive influence on the final values. The use of average capital utilized, on the other hand, will rectify this prejudice.

Principles of EVA: EVA was created to assist managers in incorporating two fundamental financial principles into their decision-making:

- Any company's principal financial goal should be to enhance the wealth of its shareholders;
- The value of a firm is determined by how much investors expect future profits to differ from the cost of capital. A prolonged growth in EVA will, by definition, result in an increase in a company's market value. This technique has shown to be legitimate and beneficial for a wide range of companies. This is due to the fact that the degree of EVA is not the most important factor. Share prices already

reflect current performance. Continuing development in EVA results in continuous gains in shareholder wealth.

Objectives of EVA:

EVA is one of several frameworks that comprise a value-based management framework. EVA is calculated using conventional accounting-based factors such as interest-bearing debt, equity capital, net operational profit, and so on. The premise underlying EVA is that the shareholder must obtain a return that compensates him for the risks he has committed. The following are the primary goals of EVA:

- the primary goal of EVA is to determine which business units best utilize their assets to generate returns and maximize shareholder value; it can be used to assess a company, a business unit, a single plant, office, or even an assembly line;
- EVA aims to determine a company's true profit, after taxes and the cost of goods sold are deducted. It aids in determining whether a business or project earns more or less than the capital invested in it;
- EVA aims to ascertain the financial health of the organization and its capacity to generate shareholder "value";
- EVA aims at the financial assessment of an organization, which is critical for the company's long-term success and planning;
- EVA is a financial tool, which signifies the gain, or loss that remains after assessing a charge for the cost for all types of capital employed in an organization. EVA helps in ascertaining the "value" of the organization in a given time period;
- Another goal of EVA is to assist managers in setting organizational goals based on financial assessment while keeping the primary goal of shareholder wealth maximization in mind;
- EVA provides true economic profit and assists managers in determining bonuses, corporation valuation, and equities analysis. Its goal is to serve as a motivator for managers as well as a presenter of the real and fair picture of the firm to investors and shareholders.

Traditional performance measurements based on cost accounting data give little assistance to firms on their quality journey since they do not map process performance and customer-visible changes. Performance in a successful overall quality organization will be judged by the benefits experienced by customers as well as the outcomes supplied to other stakeholders, such as shareholders.

1.4.3 EFFICIENCY OF BANKS

The concept of efficiency as a broad performance measure for all sorts of organizations was originally articulated in the early writings of edgeworth (edgeworth, 1881), and its actual implementation was documented in Shephard's book (Shephard, 1953). In economics, efficiency is defined as the highest possible ratio between the output and input of the product development process, indicating the ideal deployment of available resources to achieve the maximum potential. efficiency is also defined as an organization's capacity to produce its result with the least amount of input. In other words, efficiency is defined as the measure of effectiveness that results in the least amount of waste of time, effort, and talent.

The terms efficiency and effectiveness are not synonymous; both are used to describe an entity's performance; however, efficiency summarizes the idea of producing in the best way possible, which means that efficiency is focused on the use of minimum inputs to produce the best output, in other words, the optimized use of resources to generate the best products at the lowest possible cost. In management, efficiency may be defined as the study of the optimal utilization of the firm's internal elements. The effectiveness notion, on the other hand, describes the yield of elements and the achievement of a goal without considering the way and optimal utilization of resources.

In the banking sector, efficiency supports the fruitfulness of implemented macroeconomic policies, which generate long-term development, economic growth, and societal welfare; this is the same meaning that defined efficiency in terms of cost minimization and profit maximization.

The definition of a bank's efficiency is still debatable among academics. To understand what constitutes bank efficiency, one must first determine the nature of banking techniques. In the banking theory literature, there are two basic techniques that are extensively employed, namely, production and intermediation approaches:

- 1- The production model posits that financial institutions operate as providers of services to account holders, such as performing transactions on deposit accounts and processing documents such as loans.
- 2- According to the intermediation model, banks primarily function as financial intermediates, obtaining cash from savers in return for their obligations, and the banks, in turn, issue loans to others for profit. The intermediation strategy, often known as the asset approach, assumes that financial organizations would function as an intermediate between savers and borrowers. Banks are viewed as acquiring labor, materials, and deposit cash in order to generate loan and investment outputs.

Another method to categorize banking efficiency is to divide it into the five groups listed below:

1-The effectiveness with which a specific set of inputs is utilized to generate an output is referred to as pure technical efficiency. The difference between the observed amount of input and output variables and the ideal quantity of input and output variables is defined as the technical efficiency of banks. In comparison to an inefficient bank, which can attain a maximum value of zero, an efficient bank can achieve a maximum value of one.

2-Scale efficiency: a bank's ability to achieve optimal operations. When the bank works in the realm of constant returns to scale, it possesses scale efficiency (CRS).

3-Allocative efficiency assesses a bank's performance in selecting the best set of inputs given a set of input prices.

4-Cost efficiency is a bank's capacity to deliver services without losing resources due to technical or allocative inefficiency.

5-Scope efficiency happens when a bank operates in a variety of diverse locales.

There are two forms of banking efficiency. The first type is known as scale efficiency and was first introduced by and it represents the relationship between a bank's per unit average production cost and volume, the second type is known as X-efficiency and was introduced and it represents deviations from the cost-efficient frontier that depicts the lowest production cost for a given level of output, in a different way, it was also defined by (Kablan, 2010) as a measure of how successfully management integrates technology, human resource management, and other resources to create a specific level of production.

The determinants of bank efficiency are divided into three categories: strategy, strategy execution, and environment. According to their study, these three categories comprise the engine of banking success. (harkar & zenios, 2000)

1- Strategy: A bank must make several strategic decisions about product mix, customer mix, geographical location, distribution methods, and organizational structure. These options indicate not just how the bank provides services to consumers, but also the level of financial risk that the bank is prepared to take. A good strategic client mix selection is dependent on matching a chosen customer segment with well-priced items.

2- Execution of Strategy: A strategy may be executed through human resource management, the use of technology, and process design. Using the concept of X-efficiency described earlier, X-efficiency can be used to evaluate the execution of the bank strategy.

3- Environment: Banks attempt to influence environmental issues via lobbying, marketing, and research and development. These environmental elements include information technology, customer preferences, and government regulation (Kablan, 2010).

The determinants of banking efficiency: In explaining variations in bank efficiency estimates, both regulatory-specific variables (e.g. bank type, ownership status, and geographic region) and bank-specific variables (e.g. size, capital adequacy, asset quality, expenses, and age) can be influenced by the process of producing outputs from inputs.

Chapter conclusion

We may conclude from this chapter that regulation is the most significant cause in the banking industry. It also refers to the practice of keeping track of a bank's performance and efficiency.

Moreover, Basel accords were established to support banks worldwide in maintaining control over their banking activities and preventing further banking crises from occurring. Risk management is critical for banks to maintain their profitability and soundness; poor credit risk management reduces bank profitability, degrades asset quality, and increases loan losses and non-performing loans, all of which can lead to financial distress. Finally, banking performance, metrics, and tools are beneficial in keeping track of the specified bank goals and limiting risk.

Chapter 2: PRACTICAL FRAMEWORK

Chapter Introduction

After examining the most essential theoretical background of the study topic in the previous chapter, we shall match the theoretical side with the practical side in this chapter to study the effect of the banking regulation and multiple other variables on the banking performance in the MENA region. While studying some of the banking systems in the nations utilized in the research sample and keeping track of prior studies on the subject.

2.1 INTRODUCTION TO THE BANKING SYSTEM IN THE MENA REGION

The Middle East and North Africa (MENA) area often abbreviated as MENA. The region is commonly thought to consist of around 20 nations, however the term can be expanded to include up to 24. According to World Atlas, the MENA area has around 6% of the world's population, as well as 60% of the world's oil reserves and 45% of the world's natural gas reserves. MENA is a key source of global economic resources due to the region's considerable petroleum and natural gas deposits. (CHEN, 2021)

Almost three years into the COVID-19 crisis, the Middle East and North Africa (MENA) economic recovery is shaky and unequal. The success of the region's 20 economies is determined by their unique susceptibility to oil price swings and how well they manage the pandemic. As a result, predictions for an average regional GDP growth rate of 2.8 percent in 2021 and a more optimistic 4.2 percent in 2022 assuming the pandemic recedes obscure particular nation disparities. (WorldBank, 2021)

Despite recent privatization initiatives, state-owned banks dominate the financial systems of various MENA nations. The banking industry is relatively large in comparison to emerging markets in Latin America, Eastern Asia, or Eastern Europe, according to common indicators such as deposits held by the financial system or liquid liabilities to GDP. Banks, on the other hand, are less willing to distribute credit than in other regions, as seen by low credit to deposit ratios or high collateral values requested for loans. Banks seek to work with large, well-established companies and to help the government's growth ambitions.

According to the World Bank, about 40% of all enterprises in the region consider access to finance to be a significant or extremely important constraint on their business activities. Less than 20% of small and medium-sized businesses have access to credit lines. Credit to these beneficiaries is less than 10% of total lending. Likewise, competition in the banking industry is weak, as evidenced by low h-statistic values, i.e. the elasticity of bank revenues with regard to input prices. Competition has not improved in recent decades, meaning that concentration remains high. The five largest institutions own 90 percent of commercial banks' total assets. High capital requirements and weak credit reporting systems, which inhibit a fair risk assessment of potential borrowers, are significant hurdles to market access. Countries with a strong presence of stock exchanges and other non-bank financial intermediaries tend to have more competition in the banking industry. (Cherif & Dreger, 2016)

2.2 OVERVIEW ON THE BANKING REGULATIONS IN THE MENA REGION

Table 2-1 Overview banking regulations in MENA countries

Year	Algeria	Tunisia
2008	- To implement the first pillar of the Basel Agreement (2), the Bank of Algeria increased its capital to 10 billion Algerian dinars and determined the minimum capital. - Algeria's Central Bank has required that banks maintain an 8 percent legal reserve level.	- In December 2008, the legal reserve ratio was reduced to 7.5 percent. - In banks, creating an internal control structure and a permanent internal audit committee.
2009	- Banks are still required to maintain an 8 percent legal reserve ratio. - The Bank of Algeria established the notion of bank assessment (scores), which aids in the development of bank supervision based on risk levels.	- Issue directives about the fight against terrorism and the prevention of money laundering. - Continue to require banks to maintain a legal reserve ratio of 7.5 percent.
2010	- The Bank of Algeria increased the required reserve ratio from 8% to 9%. - The Bank of Algeria reinforced the regulatory framework for banks' internal control processes to employ the best techniques of risk assessment and management in accordance with Basel 2.	The Tunisian Central Bank required commercial banks to establish an internal control system for risk and credit policies.
2011	The Bank of Algeria released guidelines on how to implement the liquidity coefficient, requiring banks to provide a liquidity coefficient of at least 100%	The Central Bank of Tunisia has cut the legal reserve level several times, from 5.4 percent to 2 percent.
2012	- The Bank of Algeria increased the legal reserve ratio from 9% to 11%. - The Bank of Algeria has implemented a new method to combat money laundering and terrorist financing.	The Central Bank of Tunisia implemented Pillar (3) market discipline in accordance with Basel (2) standards.
2013	- The Bank of Algeria increased the legal reserve ratio from 11% to 12%. - Algeria's Central Bank passed legislation prohibiting money laundering and terrorist funding. - Algeria's Central Bank passed legislation prohibiting money laundering and terrorist funding.	- Requiring banks to give the Central Bank of Tunisia with all papers and information regarding their financial status, capital levels, and banking risks on a monthly basis. - Using the Pillar (2) "Supervisory Review Process" in accordance with Basel (2) regulations.

2014	Applying Basel (2) norms to Pillar (2) "Supervisory Review Process," which requires banks to adopt a minimum solvency ratio of 9.5 percent and provide a safety cushion of core capital covering 2.5 % of weighted risks "Basel 3."	- The Central Bank of Tunisia cut the legal reserve ratio to 1%. - The Central Bank of Tunisia increased the capital adequacy ratio (CAR) to 10%.
2015	The Bank of Algeria has given directions on the Basel 3 agreement, which include boosting the capital adequacy rate to 9.5 percent and requiring core capital to cover at least 7% of operational, market, and credit risks.	The Central Bank of Tunisia released liquidity ratio guidelines in accordance with Basel (3) standards, which require banks to adopt the liquidity coverage criterion (LCR)
2016	- The legal reserve ratio of the Bank of Algeria was cut from 12 percent to 8%. - The Algerian Central Bank provided directives on financing activities.	- The Central Bank of Tunisia issued instructions related to operational risk coverage. - Issuing the new banking and financial institutions law.
2017	The Bank of Algeria lowered the legal reserve ratio from 8% to 4%.	- Inclusion of market risk in the calculation of capital adequacy ratio. - Adoption of the Basel (3) liquidity ratio (NSFR) norms.
2018	- The Bank of Algeria increased the legal reserve ratio from 4% to 8% - The Bank of Algeria released guidelines on minimum capital requirements.	To guarantee compliance with the minimum capital requirements, the Central Bank of Tunisia issued guidelines on capital adequacy norms.

Year

Morocco

United Arab Emirates

2008	- Reducing the legal reserve ratio from 15% to 12%. - Raise the minimum solvency factor requirement from 8% to 10%. - Using a new system known as "Credit Risk Analysis Assistance" (SAARC).	- The UAE Central Bank required banks to maintain the legal reserve ratio of 14 percent. - The UAE Central Bank issued directives on money laundering and terrorism funding.
2009	- requiring banks to produce monthly reports on sector risk monitoring and credit concentration guidelines. - The Moroccan Central Bank cut the permissible reserve ratio twice in a succession, from 12% to 10% and subsequently to 8%.	- The UAE Central Bank has completed the trial use of the Basel system (2). - A rise in commercial banks' capital adequacy ratio and Tier-1 capital ratio is announced. - Establishment of the Financial Stability Unit to address systemic risks and guarantee financial system stability.
2010	Bank of Morocco issued a new publication on capital adequacy requirements to cover credit, market	The Central Bank of the UAE is revising its standards for loan categorization and provisioning.

	- and operating risks, according to norms Basel (2). - The Bank of Morocco decreased the legal reserve ratio from 8% to 6%.	Increase the minimum capital adequacy rate from 11% to 12%.
2011	Applying Basel (2) standards and work to raise the ratio of conformity of the Banking Supervision Framework to the 25 Principles of Basel.	Issuing guidelines for the regulation of personal loans and other services.
2012	- Central Bank of Morocco reduced the legal reserve ratio from 6% to 4%. - Central Bank of Morocco raised the capital adequacy ratio (CAR) to 12% and the minimum level of Tier 1 capital to 9%. - Bank Al-Maghrib has prepared a strategy to implement the components of Basel III.	- Issuing guidance on the qualitative and quantitative requirements for bank liquidity. - Changes to the regulation governing bank lending.
2013	- Adoption of contemporary capital adequacy and liquidity coverage ratio norms (LCR). - Using the Pillar (2) "Supervisory Review Process" in accordance with Basel (2) regulations.	- The UAE Central Bank issued directions about the monitoring of loan concentration restrictions. - Developing a new financial data framework.
2014	- Issuing the new banking law relating to Credit Institutions and Similar Bodies. - Central Bank of Morocco reduced the legal reserve ratio from 4% to 2%.	- Revision of risk management and internal controls requirements in banks. - Revising the Basel III Capital Framework's regulatory capital requirements for banks. - Developing a new liquidity mechanism
2015	Bank Al-Maghrib issued guidelines for banks to create a countercyclical capital buffer comprised of core capital with a level ranging between 0 and 2.5 percent of weighted risks for macroprudential considerations.	The UAE Central Bank created laws governing bank liquidity requirements, such as requiring banks to keep liquid assets in the case of financing shocks.

2016	• The Moroccan Central Bank changed its capital calculation criteria (first and second tranches) and altered risk weights in accordance with Basel regulations (3). • Increasing the legal reserve ratio from 2% to 5%.	• Issuing a guidance for the use of liquidity under the Basel (3) framework. • Create a new set of risk management regulations. • The Central Bank has finalized new Basel III capital requirements for domestic banks.
2017	• Revision of instructions about the fight against terrorism and the prevention of money laundering.	• The UAE Central Bank released a guidance for applying capital under the Basel (3) framework.
2018	• Keeping the legal reserve ratio constant at 4% from 2016 to 2018.	• It is releasing a new regulatory framework for risk management in banks, which includes five measures.

Year	Jordan	Lebanon
2008	• Jordan's Central Bank decreased the legal reserve requirement from 10% to 9% and issued capital adequacy guidelines in accordance with Basel II norms. • New guidelines for Islamic banks' legal liquidity have been issued.	• The Banque du Liban required banks to maintain a legal reserve ratio of 25%. • According to Basel (2) regulations, the Central Bank of Lebanon gave directions to banks regarding Capital Adequacy Assessment and bank solvency monitoring. • Beginning the implementation of Basel II capital adequacy ratio calculations.
2009	• Jordan's Central Bank decreased the legal reserve requirement from 9% to 7%. • It also issued instructions on stress testing in accordance with the Basel II standard. • It also amended instructions on credit facility categorization.	• The Central Bank of Lebanon issued an instruction on enhancing risk management regimes in banks, as well as an instruction on decreasing credit risk.

2010	• Issuing advice on Islamic banks' capital sufficiency in accordance with (IFSB). • The CBJ changed guidelines on regulated banks' minimum allowed capital.	• Continuing to require banks to maintain a legal reserve ratio of 25%.
2011	• The Jordanian Central Bank issued an order pertaining to Basel III regulations, beginning the supervisory review and evaluation (SREP) procedure for banks' internal capital adequacy examination.	• The Central Bank of Lebanon has given instructions on solvency ratios, including the revision and development of a debt categorization process in accordance with international norms.
2012	• Issuing "Transparency and Fairness in Dealing with Clients" directions that banks must follow and take the required steps to implement.	• The Central Bank of Lebanon changed its mind about ATMs, credit cards, lending activities, and needed reserve requirements.
2013	• Jordan's Central Bank has announced laws aimed at combating money laundering and terrorist funding. • Jordan's Central Bank amended its "Transparency and Fairness in Dealing with Clients" rules, which banks must adopt and implement.	• The Central Bank of Lebanon released guidelines for administering, running, and overseeing retail payment systems.
2014	• Continuing to require banks to maintain a legal reserve ratio of 7%. • Electronic banking risk management guidelines are being issued.	• Composition capital conservation buffer (CCB) of 2.5% of total risk-weighted assets was issued by the Central Bank of Lebanon.
2015	• The CBJ Law and the Banking Law have both been amended in draft form. • The new law for exchange corporations is being implemented.	• The Central Bank of Lebanon has published instructions on how to build up a structure for restructuring debt and non-productive loans, as well as guidelines on how to conduct banking and financial transactions with clients.
2016	• Banks will be subject to Basel III rules, which include additional capital adequacy standards.	• Banks' internal capital adequacy assessment procedure (ICAAP) is being revised and evaluated. • Issuing guidelines on how to change the minimum solvency ratios for banks.
2017	• Domestic Systemically Important Banks (DSIBs) are subject to restrictions. • Giving guidance on how to combat money laundering and terrorist funding	• Continuing to require banks to maintain a legal reserve ratio of 25%.
2018	• Continuing to require banks to maintain a legal reserve ratio of 7%. • Providing capital adequacy instructions to Islamic banks.	• According to Basel III standards, the Central Bank of Lebanon provided instructions on the liquidity coverage ratio and capital adequacy regulatory framework.

2008	• The Saudi Arabian Monetary Agency increased the mandatory reserve requirement from 9% to 10% and then to 13%, requiring banks to adopt all three Basel II Pillars. • The Standard Approach for Credit Risk and the Basic Indicator and Standardized Approach for Operational Risk were implemented by all institutions.
2009	• Reducing the permissible reserve percentage on many occasions, from 13 percent to 7%. • Internal Capital Adequacy Assessment Process (ICAAP) is being used. • Risk Management and the International Framework for Liquidity Risk Measurement are two publications linked to Basel II that have been released.
2010	• SAMA has provided guidance on the Basel III standards for bank disclosure enhancement (2). • Issuing instructions on the BCBS consultation document: counter capital buffer plan, which would safeguard the banking sector from future possible threats
2011	• Providing disclosure required instructions (pillar 3). • Issuing instructions for the monitoring of liquidity risk.
2012	• issuing directions on capital composition disclosure standards for banks and regulatory guidelines for risk management.
2013	• Continuing to require banks to maintain a legal reserve ratio of 7%. • SAMA has issued a Liquidity Coverage Ratio (LCR) order. • Creating a draft for Loan Classification Rules.
2014	• SAMA released its final guidance document on Basel standards for liquidity coverage ratio and lending ratio disclosure, requiring banks to maintain an aggregate provisions ratio of at least 100 % of nonperforming loans at all times of the economic cycle, and to increase this ratio to 200 % at the peak of the economic cycle.
2015	• A framework for Countercyclical Capital Buffer (CCyB) regulations was released by SAMA.
2016	• The Basel III Capital Adequacy Ratio was implemented and monitored by SAMA (CAR). • Implementation of Basel III in terms of Pillar I capital requirements, Pillar II supervisory review requirements, and Pillar III data disclosure requirements.
2017	• The Basel Committee on Banking Supervision released SAMA recommendations for the management and measurement of step-in risk (BCBS).
2018	• The net stable funding ratio (NSFR) and limits on big bank exposures were amended in SAMA's "advice paper addressing Basel III."

Source: Processed by the authors based on data obtained from Arab Monetary Fund & Central banks' reports

2.3 LITERATURE REVIEW

The impact banking regulation on the banking performance may be influenced through a variety of ways. This section attempts to showcase some of the prior studies done in this subject in the Mena region and other regions of the world.

Mena region studies

(Alber & Ramadan, 2022) focuses on the effect of applying banking regulations on banking performance conducted on 19 MENA region countries on a yearly basis over the period from 2008 to 2018. Banking regulations have been measured by capital adequacy requirements (capital base to risk-weighted assets), liquidity requirements (liquid assets to total assets), legal reserve requirements (balances with CB to banks' deposits), leverage requirements (total equity to total assets), and provisions policy (total provisions to total capital), whereas banking performance has been measured by banking efficiency (data envelopment analysis "DEA" & operational efficiency) and profitability (return on assets & return on equity).

The findings show that adopting banking regulations has a considerable impact on "banking efficiency," "banking stability," "credit risk," and "profitability." This was done with panel data analysis utilizing static panel models (SPM) in three different models (pooled regression, fixed effects, and random effects).

Using a sample of 177 banks from ten MENA countries, (Al-Smadi, 2015) studies the influence of banking regulations and supervision on bank soundness. While controlling for other macroeconomic and banking sector factors, four explanatory variables were used: capital regulatory requirements, regulatory restrictions on banks' operations, supervisory authority independence, and official supervisory power.

The findings suggest that as capital requirements become more stringent, bank stability improves. Greater restrictions on bank operations improve bank stability. Furthermore, banks in nations with higher independence of regulatory agencies are sounder, but official supervisory power has no effect on bank soundness. The study's findings provide empirical data for supervisory authorities and bank management on the significance of banking rules and supervision in ensuring the safety and soundness of banks in MENA countries.

(Ben Naceur & Omran, 2008) examine the impact of bank regulations, concentration, financial and institutional development, and other factors on commercial bank margins and profitability in a variety of Middle East and North African (MENA) nations. The analysis spans the years 1989 to 2005 and accounts for a wide range of macroeconomic, financial, and bank factors.

According to the empirical findings, bank-specific factors, particularly bank capitalization and credit risk, have a positive and substantial influence on banks' net interest margin, cost efficiency, and profitability. In terms of the influence of macroeconomic and financial development indicators on bank performance, we conclude that, with the exception of inflation, these factors have no substantial impact on net interest margin. However, inflationary shocks appear to be transmitted primarily through deposit rates, implying that banks suffer the whole negative cost of inflation. Furthermore, the findings indicate that banks reduce their operating costs in a well-developed banking sector environment (as evidenced by the negative and statistically significant coefficient of the bank development variable in the cost-efficient regression models).

Furthermore, the regulatory and institutional factors appear to have an influence on bank performance, as the findings indicate that corruption increases cost efficiency and net interest margins, although an improvement in the law and order variable reduces the cost of efficiency without altering performance. The findings have significant policy implications for the MENA region. It is clear that increasing competition by allowing foreign banks to enter should be tolerated since it may lower interest margins by strengthening rivalry. Furthermore, capital market expansion is promoted in order to increase bank transparency and enable for better screening and monitoring of bank operations. Governments can also strengthen macro-level governance by launching programs to combat corruption and enforce law and order, as they have a favorable influence on bank performance. Finally, countries are encouraged to accelerate bank privatization initiatives, which allow for the transfer of ownership and management from the state to the private sector, hence enhancing bank competition, transparency, and performance.

(Haquea & Brownb, 2017) investigates the impact of bank regulation and ownership on bank efficiency in the growing MENA area. The relationship of bank regulation and ownership is examined, as is the public and private view of bank regulation.

The findings support the public's perception of bank regulation and imply that both ownership concentration and supervisory authority, both alone and in combination, have a beneficial impact on cost efficiency. Furthermore, government ownership, capital stringency, and market power all have a beneficial impact on cost efficiency, whereas activity limits and deposit insurance have the reverse effect. Since Basel II, capital regulation and supervisory power have improved.

Cross-region studies:

(Wiley & Navickas, 2021) studied the effect of financial regulation on performance of banking sector in the United States of America. The research was based on the literature. The study's conclusions were based on earlier research findings.

According to the study's results, financial regulations have both good and bad effects on the performance of the banking industry in the United States. Convenient policies improve performance, whereas unfavourable policies/regulations degrade performance. Unfavourable restrictions damage bank competitiveness, resulting in higher loan costs and a higher likelihood of loan defaults. The study revealed that government regulations are critical in influencing the performance of the country's banking industry. The research also stated that it is critical for the government to provide favourable financial regulation conditions to the financial systems. The United States government must implement guidelines that do not have a negative influence on banks. According to the report, all commercial banks in the nation should completely comply with the stated standards, and the central bank should guarantee that all banks comply. This will assure a stable banking sector, which is important to the economy. If this sector performs well, the economy will prosper and the country will escape a financial catastrophe. Furthermore, it is suggested that government restrictions be less strict and friendlier. This will encourage the banking industry to expand and improve its performance.

(Sum, 2015) research aims to investigate the relationship between banking regulation and bank performance in EU nations from 2005 to 2014. It includes 929 banks from 27 EU member states. The study makes three major contributions: an examination of banking regulations and their changes in 2003, 2008, and 2012, an investigation of their mutual relationship with bank performance in 2005–2014, and an examination of intertemporal effects and endogeneity between post-crisis regulatory changes and bank performance.

In contrast to prior research' findings, the study in this paper reveals that national banking laws had a major influence on individual bank performance. Furthermore, the findings indicate that several unregulated bank features, such as individual and systemic bank size, might have a considerable impact on bank performance. The findings have consequences for the ongoing debate in EU countries concerning banking regulation reform.

(Yang, Gan, & Li, 2019) use double bootstrap data envelopment analysis to quantify bank efficiency and investigate the link between regulation, supervision, and state ownership in Asia-Pacific commercial banks from 2005 to 2014.

Their findings show that removing off-balance-sheet operations from efficiency estimates understates pure technical efficiency and overstates scale efficiency of banks in the Asia-Pacific area. According to cross-country comparisons, Australian banks have the greatest levels of technical efficiency, while Indonesian banks have the lowest average. Their bootstrap regression results indicate that bank regulation and supervision are positively connected to bank technical efficiency, although state ownership is not. Furthermore, their data reveal that stricter regulation and supervision are strongly associated with improved efficiency for both small and large banks.

(Delis, Molyneux, & Pasiouras, 2008) research investigates the connection between the regulatory and supervisory framework and bank productivity in 22 countries from 1999 to 2006. They used a semi-parametric two-step procedure. First, they estimated bank productivity growth using the Malmquist index. The estimates of the first stage productivity estimates were then regressed on variables related to capital requirements, official supervisory power, market discipline, and restrictions on bank activities, while controlling for country-specific and bank-specific characteristics using a bootstrap procedure.

The findings suggest that legislation and incentives that encourage private monitoring boost productivity. Restrictions on banks' operations related to securities, insurance, real estate, and ownership of non-financial enterprises are also beneficial. Regulations linked to Basel II's first and second Pillars, namely capital requirements and official supervisory power, do not appear to have a statistically significant influence on productivity.

(Pasiouras, Chrysovalantis, & Zopounidis, 2006) investigated the influence of bank regulations, supervision, market structure, and bank characteristics on individual bank ratings using data from 71 nations and 857 banks.

The findings show that less cost-efficient banks with higher-than-average provisions relative to income and weaker liquidity likely to have lower ratings. Larger and more profitable banks often receive better ratings. Higher equity to assets ratios results in higher ratings only when bank supervision and rules are not considered. Capital requirements, bank activity restrictions, official disciplinary power, explicit deposit insurance scheme, greater deposit insurer power, liquidity and diversification guidelines, entry requirements, fraction of entries denied, and economic freedom all have a significant impact on ratings in all of our specifications. Disclosure requirements and foreign bank entrance have a substantial influence on ratings only when the regulatory environment and market structure are concurrently controlled for, whereas auditing requirements have a significant impact only when we control for the regulatory environment alone.

Finally, developed-country banks are given higher ratings. When we incorporate the regulatory and supervisory variables in the models, this influence disappears.

(Barth, Lin, Ma, Seade, & Song, 2013) tries to investigate whether bank regulation, supervision, and monitoring improve or impair bank operational efficiency.

They discovered that tighter restrictions on bank activities are negatively associated with bank efficiency while greater capital regulation stringency is marginally and positively associated with bank efficiency based on an unbalanced panel analysis of over 4,050 bank observations in 72 countries from 1999 to 2007.

Furthermore, they discovered that boosting official supervisory power is only connected with increased bank efficiency in nations with independent supervisory agencies. Furthermore, independence combined with a more experienced regulatory authority improves bank efficiency. Finally, market-based bank supervision in terms of increased financial transparency is connected with increased bank efficiency.

(Pasiouras, 2007) study employs a sample of 715 banks from 95 countries, as well as a two-stage data envelopment analysis (DEA), to give worldwide evidence on the influence of regulations and supervisory practices on bank efficiency. He began by estimating technical and scale efficiency with DEA. They then utilized Tobit regression to study the influence of several regulations on banks' technical efficiency, including capital adequacy, private monitoring, bank activities, deposit insurance schemes, disciplinary authority of the authorities, and entrance into banking. He calculated different parameters while controlling for bank-specific and country-level factors such as macroeconomic conditions, financial development, market structure, overall institutional development, and access to banking services. In some situations,

the findings support all three pillars of Basel II, which encourage the adoption of rigorous capital adequacy rules, the establishment of robust supervisory bodies, and the establishment of market disciplining mechanisms. Only the latter, however, is relevant in all of our criteria. While the remaining restrictions do not appear to have a major influence on efficiency, numerous other country-specific features do.

2.4 DATA AND VARIABLES

2.4.1 DATA DESCRIPTION

In this study we built an interesting updated database to examine the effects of financial regulation and supervision on the performance of banks from selected MENA countries. Our sample includes seven MENA countries. three countries from north Africa (Algeria, Morocco, and Tunisia) and four countries from middle east (Jordan, Lebanon, Saudi Arabia, and United Arab Emirates). As we faced a hard time finding data for the last available few years for MENA banks, our investigation covers a total of 89 banks from the time period 2006-2018. Our data set includes an unbalanced panel data set based on 680 observations. (some countries have more banks than others & some banks have fewer period of time than others).

The bank's inputs and outputs data are obtained mainly from Moody's analytics previously known as Bankscope database for banking financial variables, and the World Development Indicators for macroeconomic and industry variables from The World Bank.

Table 2-2 List of banks used in the sample

<i>Algeria</i>	<i>Jordan</i>
ALBARAKA of ALGERIA	ARAB BANK
AL-SALAM BANK	ARAB BANKING CORPORATION JORDAN
ARAB BANKING CORPORATION ALGERIA	ARAB JORDAN INVESTMENT BANK
LOCAL DEVELOPMENT BANK	BANK AL ETIHAD
BADR BANK	BANK of JORDAN
EXTERNAL BANK OF ALGERIA	CAIRO AMMAN BANK
NATIONAL BANK OF ALGERIA	CAPITAL BANK of JORDAN
BNP PARIBAS EL_DJAZAIR	EGYPTIAN ARAB LAND BANK
POPULAR CREDIT OF ALGERIA	ISLAMIC INTERNATIONAL ARAB BANK
GULF BANK ALGERIA	JORDAN AHLI BANK
HOUSING BANK FOR TRADE and FINANCE ALGERIA	JORDAN COMMERCIAL BANK
NATIXIS ALGERIA	JORDAN KUWAIT BANK
SOCIETE GENERALE ALGERIA	SOCIETE GENERALE JORDAN
TRUST BANK ALGERIA	

<i>Morocco</i>	<i>Tunisia</i>
AL_BARID BANK	ALBARAKA BANK TUNISIA
ATTIJARIWAFABANK	AMEN BANK
AXA CREDIT	ARAB TUNISIAN BANK
POPULAR CENTRAL BANK	ATTIJARI BANK
EXTERNAL BANK OF COMMERCE	CENTRAL BANK OF TUNISIA
BMCI BANK	BANK OF HABITAT
CREDIT AGRICOLE MAROC	BIAT BANK
CREDIT OF MORROCO	NATIONAL BANK OF AGRICULTURE
	TUNISIA KUWAIT BANK
	BANK ZITOUNA
	QATAR NATIONAL BANK TUNISIA
	TUNISIAN SAUDI BANK
	UBCI BANK

<i>Lebanon</i>	<i>Saudi Arabia</i>
ALBARAKA LEBANON	AL_RAJHI BANK
AL-MAWARID BANK	ALAWWAL BANK
BLC BANK	ALINMA BANK
BANK AUDI BANK	ARAB NATIONAL BANK SA
BANK BEMO	BANK ALBILAD
BANK LHABITAT	BANK ALJAZIRA
BANK OF LEBANON	BANK SAUDI FRANSI
BLOM BANK	HSBC SAUDI ARABIA
BYBLOS BANK	NATIONAL COMMERCIAL BANK SA
LEBANESE CREDIT	SAUDI BRITISH BANK
EMIRATES LEBANON BANK	
FIRST NATIONAL BANK	
LEBANESE SWISS BANK	
LEBANON & GULF BANK	
NATIONAL BANK of KUWAIT LEBANON	
SGBL BANK	
SYRIAN LEBANESE COMMERCIAL BANK	

<i>United Arab Emirates</i>
ABU DHABI COMMERCIAL BANK
ABU DHABI ISLAMIC BANK
AJMAN BANK
AL HILAL BANK
BANK of CHINA MIDDLE EAST
CITIBANK UNITED ARAB EMIRATES
COMMERCIAL BANK INTERNATIONAL
CREDIT EUROPE BANK
HSBC BANK MIDDLE EAST LIMITED
NATIONAL BANK of FUJAIRAH
NATIONAL BANK of RAS AL-KHAIMAH
NATIONAL BANK of UMM AL-QAIWAIN
UNION NATIONAL BANK
UNITED ARAB BANK

Source: Prepared by the authors

2.4.2 VARIABLES AND DEVELOPING HYPOTHESES

2.4.2.1 VARIABLES DEFINITION

❖ *Dependent Variables*

- **Return on Assets (ROA):** Demonstrates management's capacity to obtain deposits at a fair cost and deploy them in lucrative investments. This ratio represents the amount of net income made per \$ of assets. The higher the return on assets (ROA), the more profitable the bank.
- **Return on Equity (ROE):** The most crucial indication of a bank's profitability and development potential is its return on equity (ROE). It is the rate of return on equity or the percentage return on each Pound of equity invested in the bank.
- **Z-Score (ZSC):** A popular risk measure in the banking and financial stability. propose the z-score method as a risk indicator. it is common that z-score, sometimes together with the non-performing loan ratio is used as an indicator of bank risk taking. Banks that take more risks and hence have a lower z-score are less efficient in capital allocation and project financing. z-score links a bank's capitalization with its return (ROA) and risk (volatility of returns), and it indicates the number of standard deviations of a bank's asset returns has to drop before the bank becomes insolvent. Z-score thus represents a bank's distance from insolvency. A higher value of z-score indicates greater banking stability.

❖ *Independent Variables*

○ *REGULATION VARIABLES*

- **Capital Adequacy Requirements (CAR):** The capital adequacy ratio (CAR) is a calculation that expresses a bank's available capital as a proportion of its risk-weighted credit exposures. The capital adequacy ratio, also known as the capital-to-risk-weighted assets ratio (CRAR), is used to safeguard depositors while simultaneously promoting the stability and efficiency of global financial institutions. There are two categories of capital measured: tier-1 capital, which can absorb losses without requiring a bank to discontinue operations, and tier-2 capital, which can absorb losses in the case of a winding-up but offers less protection to depositors.
- **Liquidity Requirements Ratio (LIQR):** refers to the percentage of highly liquid assets kept by financial institutions to ensure their capacity to satisfy short-term obligations in the future. This ratio is essentially a general stress test designed to predict market-wide shocks and ensure that financial institutions have sufficient capital preservation to ride out any short-term liquidity disruptions that may occur in the market.
- **Reserves Requirements (RESR):** Reserve requirements are the sums of money that a bank must have in reserve in order to cover liabilities in the event of an unexpected withdrawal. Reserve requirements are a technique used by the central bank to affect interest rates by increasing or decreasing the money supply in the economy.

- **BANK SPECIFIC VARIABLES**

- **Bank Size (BS):** Measured by the natural logarithm of total assets, controls for effects of scale economies and market power associated with a bank's size.
- **Cost to Income Ratio (CIR):** One of the efficiency ratios used to assess an organization's efficiency is the cost-to-income ratio. It is used to compare a bank's operational expenditures to its income. The smaller the company's cost to income ratio, the better its performance. The cost to income ratio is largely used to determine a bank's profitability. It represents the bank's operational efficiency. The smaller the ratio, the better, and it shows that banks are more profitable. The cost-to-income ratio and the bank's profitability have an indirect link.
- **Loan Assets Ratio (LAR):** The loans to assets ratio calculate the total number of outstanding loans as a proportion of total assets. The greater this ratio, the more loans a bank has and the lower its liquidity. The greater the ratio, the more vulnerable a bank is to increased defaults.
- **Loan Deposits Ratio (LDR):** The loan-to-deposit ratio (LDR) measures a bank's liquidity by comparing total loans to total deposits for the same time period. The LDR is given as a percentage. If the ratio is too high, the bank may not have adequate liquidity to meet any unexpected fund needs. In contrast, if the ratio is too low, the bank may be earning less than it might.

- **INDUSTRY SPECIFIC VARIABLES**

- **Broad Money on GDP (BRGD):** Broad money is a measurement of the quantity of money in circulation in an economy. It is characterized as the most comprehensive method of assessing a country's money supply, and it includes narrow money as well as other assets that may be quickly changed into cash to purchase goods and services.
- **HHI Market (HHI):** The Herfindahl-Hirschman Index (HHI) is a popular measure of market concentration that is used to gauge market competitiveness, particularly before and after merger and acquisition (M&A) deals.
- **Domestic Credit on GDP (DCGD):** Domestic credit is credit granted to various industries by the banking industry. Monetary authorities such as the central bank (the agency that oversees the issue of a country's currency), deposit money banks (commercial "main street" banks), and other financial institutions are all part of the financial sector.

- **Macro-economic specific variables**

- **Inflation (INF):** Inflation is the rate at which prices rise over a specific time period. Inflation is often defined as a broad metric, such as the total increase in prices or the cost of living in a country.
- **Gross Domestic Product (GDP):** is a standard measure of the value added generated by a country's production of goods and services over a certain time period. As a result, it also assesses the money generated by that output, or the total amount spent on finished products and services (less imports).

Table 2-3 List of variables used in the study

Dependent Variables	
ROAA Return on average assets	Net income/Total assets (average)
ROAE Return on average equity	Net income/Total equities (average)
Z-score a standard score	$(ROA + (equity/assets))/std(ROA)$
Independent Variables	
<i>REGULATION VARIABLES</i>	
CAR Capital Adequacy Requirements	Total Equity/Total Assets
LIQR Liquidity Requirements	Liquid Assets /Total Assets
RESR Reserve Requirements	Total Reserve/Total Deposits
<i>BANK SPECIFIC VARIABLES</i>	
BS Bank Size	Ln (Total Assets)
CIR Cost to Income Ratio	$(Operating\ cost/Operating\ income)$
LDR Loan to Deposit Ratio	Loans/Total Deposits
LAR Loan to Assets Ratio	Loans/Total Assets
<i>INDUSTRY SPECIFIC VARIABLES</i>	
BRGD broad money percentage of GDP	Broad money (% of GDP)
HHI Herfindahl–Hirschman index	Market Concentration
Z-score a standard score	$(ROA + (equity/assets))/std(ROA)$
DCGD domestic credit to private sector	domestic credit to private sector (of GDP)
<i>Macro-economic specific variables</i>	
INF inflation	Inflation measured by Consumer Price
GDP Gross domestic product	Ln (GDP)

Source: Prepared by the authors

Banking regulations have been measured by capital adequacy requirements ratio (CAR) to express a bank's available capital as a proportion of its risk-weighted credit exposures, liquidity requirements (LIQR) as an index for how much liquid assets a bank has to have to face its future obligations, and legal reserve requirements (RESR) to measure the reserve that the bank has to have in order to cover liabilities in the event of an unexpected withdrawal.

While banking performance has been captured by banking profitability variables, return on average assets (ROAA) it demonstrates the amount net income made per \$ of assets. return on average assets (ROAE) The most crucial indication of a bank's profitability. Moreover, to measure the bank stability and its exposure to risk Z-SCORE(ZSCR) gives a clear imagine of the banks risk and stability at the same time.

Furthermore, to Assess the impact of regulatory environment on bank performance, we control for other potential determinants. This would allow us to identify the regulatory variables that are significant on bank performance conditional on other bank specific factors, as well as market environment and macro-economic conditions.

Depending on the availability of data, we first control for bank-specific variables using cost to income ratio (CIR) as a proxy of efficiency, the natural logarithm of total assets (*BS*) to control for the bank size, and also Loan to deposit ratio (LDR) to control for the bank's liquidity. And finally, Loan on assets ratio (LAR) controlling for vulnerability to defaults.

The data are calculated based on Moody's analytics *Database of BankScope*.

To control for cross country differences in the development of the banking sector, we use the following measures: the concentration in terms of assets held by the three largest banks Herfindahl–Hirschman index (*HHI*). (*DCGD*) is the ratio of domestic credits to the private sector to GDP, and (*BRGD*) Broad money measures the quantity of money in circulation in an economy to GDP.

The size of the economy captured by the Logarithm of the GDP (LNGDP) and the inflation rate (INF) to control for macroeconomic environment.

The data were taken from *the Global Financial Development Database (2022)* which is an extensive dataset of financial system characteristics for 206 economies published by the World Bank.

This research aims at testing the following three hypotheses:

- There's no significant effect of applying "banking regulations" on the bank's "profitability " captured by ROA in MENA countries.
- There's no significant effect of applying "banking regulations" on the bank's "profitability " captured by ROE in MENA countries.
- There's no significant effect of applying "banking regulations" on the bank's "stability " captured by Z-score index in MENA countries.

Regarding the first hypothesis, the null hypothesis H0 states that, $\beta_n = 0$, while the alternative hypothesis H1 states that, $\beta_n \neq 0$:

$$ROAA = \alpha + \beta_1 CAR + \beta_2 LIQR + \beta_3 RESR + \varepsilon$$

Regarding the second hypothesis, the null hypothesis H0 states that, $\beta_n = 0$, while the alternative hypothesis H1 states that, $\beta_n \neq 0$:

$$ROEA = \alpha + \beta_1 CAR + \beta_2 LIQR + \beta_3 RESR + \varepsilon$$

Regarding the third hypothesis, the null hypothesis H0 states that, $\beta_n = 0$, while the alternative hypothesis H1 states that, $\beta_n \neq 0$:

$$Z-SCORE = \alpha + \beta_1 CAR + \beta_2 LIQR + \beta_3 RESR + \varepsilon$$

We developed the following models:

- ✓ **Model 1** Tests the effect of banking regulation on Return on Assets while controlling for other potential determinants.
- **Sub-Model 1:** Return on assets = Capital adequacy requirement + Bank specific variables + Industry specific variables + macro-economic specific variables
- **Sub-Model 2:** Return on assets = Liquidity requirement + Bank specific variables + Industry specific variables + macro-economic specific variables
- **Sub-Model 3:** Return on assets = Reserve requirement + Bank specific variables + Industry specific variables + macro-economic specific variables
- **Sub-Model 4:** Return on assets = Capital adequacy requirement + Reserve requirement + Liquidity requirement + Bank specific variables + Industry specific variables + macro-economic specific variables

- ✓ **Model 2** Tests the effect of banking regulation on Return on Equity while controlling for other potential determinants.
- **Sub-Model 1:** Return on equity = **Capital adequacy requirement** + Bank specific variables + Industry specific variables + macro-economic specific variables
- **Sub-Model 2:** Return on equity = **Liquidity requirement** + Bank specific variables + Industry specific variables + macro-economic specific variables
- **Sub-Model 3:** Return on equity = **Reserve requirement** + Bank specific variables + Industry specific variables + macro-economic specific variables
- **Sub-Model 4:** Return on equity = **Capital adequacy requirement** + **Reserve requirement** + **Liquidity requirement** + Bank specific variables + Industry specific variables + macro-economic specific variables

- ✓ **Model 3** Tests the effect of banking regulation on Z-score while controlling for other potential determinants.
- **Sub-Model 1:** Z-score = **Capital adequacy requirement** + Bank specific variables + Industry specific variables + macro-economic specific variables
- **Sub-Model 2:** Z-score = **Liquidity requirement** + Bank specific variables + Industry specific variables + macro-economic specific variables
- **Sub-Model 3:** Z-score = **Reserve requirement** + Bank specific variables + Industry specific variables + macro-economic specific variables
- **Sub-Model 4:** Z-score = **Capital adequacy requirement** + **Reserve requirement** + **Liquidity requirement** + Bank specific variables + Industry specific variables + macro-economic specific variables

2.4.2.2 DESCRIPTIVE STATISTICS

Tables 2-4 and 2-5 illustrate descriptive statistics of the research variables using a sample of 7 countries, and 89 banks over the period from 2006 to 2018. The variables appear to be normally distributed. Average profitability, as measured by ROAA and ROAE, equals 1.36% and 10.9% respectively. It can be seen that banks in the MENA region perform relatively poorly Compared to those in developed countries. In terms of overall risk, we found that the entities included in the sample have on average an indicator of Z-score risk of 45.11%. Regarding normality, Probability for Jarque-Bera test is smaller than 0.05 this implies that most variables are not normally distributed.

Table 2-4 Descriptive statistics of dependent variables

Variables	ROAA	ROEA	Z-SCORE
Mean	1.363500	10.90817	45.11130
Median	1.266429	10.75652	34.23262
Maximum	23.90004	86.11290	384.6584
Minimum	-4.777599	-75.79650	-3.079518
Std. Dev.	1.576237	10.89448	42.13340
Skewness	5.787579	-0.577023	3.748627
Kurtosis	79.63523	22.86474	25.01249
Jarque-Bera	170196.7	11218.29	15321.50
Probability	0.000000	0.000000	0.000000
Observations	680	680	680

* Significant at 10 % level; ** Significant at 5 % level; *** Significant at 1 % level

Source: Authors' own calculations using EViews v12.

Table 2-5 Descriptive statistics of independent variables

Variables	CAR	LIQR	RESR	BS	CIR	LDR	LAR
Mean	13.4840808	0.23244348	0.01668560	16.63471	48.91730	0.546349	0.740879
Median	11.4947274	0.20732630	0.00381753	16.86876	47.26289	0.584958	0.753867
Maximum	90.1709616	0.87656953	2.22903321	21.86180	165.2500	0.924114	10.38761
Minimum	0.96903698	0.00871890	2.28468289	9.972296	0.000000	0.012087	0.021198
Std. Dev.	8.65834551	0.13238613	0.12268047	2.354591	16.98754	0.181558	0.493940
Skewness	3.78381214	1.26136488	16.9180793	-0.278740	1.584482	-0.692961	12.13991
Kurtosis	24.5368266	5.65485991	300.863997	2.824897	9.297681	3.084675	226.0497
Jarque-Bera	14764.6087	380.019322	2546255.66	9.674271	1408.255	54.62527	1426320.
Probability	0.000000	3.01892709	0.000000	0.000000	0.000000	0.000000	0.205460
Observations	680	680	680	680	680	680	680

Variables	BRGD	HHI	Z-score	DCGD	INF	GDP
Mean	108.5589	0.085557	29.78334	72.04815	3.244502	25.85084
Median	79.32875	0.081110	23.01000	71.25000	3.254239	26.06588
Maximum	260.0586	0.178365	70.97000	137.0508	14.00000	27.39089
Minimum	46.87477	0.040252	15.01000	13.72000	-3.749145	23.43510
Std. Dev.	63.03711	0.030297	14.95421	30.65792	2.813875	1.148748
Skewness	1.487807	0.030297	1.489990	-0.023309	0.727122	-0.178640
Kurtosis	3.800090	3.184288	3.712192	2.669042	5.643311	1.547362
Jarque-Bera	269.0086	86.42146	265.9791	3.165010	257.8876	63.40447
Probability	0.000000	0.000000	0.000000	0.205460	0.000000	0.000000
Observations	680	680	680	680	680	680

* Significant at 10 % level; ** Significant at 5 % level; *** Significant at 1 % level

Source: Authors' own calculations using EViews v12.

Note: Z-score used as independent variables is the countries average. as for the Z-score used as dependent variable is the banks yearly calculated Z-score.

2.5 METHODOLOGY

In this study, we regress the regulatory variables as well as the other control variables discussed above on the ROA, ROE and Z-score calculated result. we use panel data. A data set that comprises both time series and cross-sectional elements known as a panel of data or longitudinal data. In panel data models, the data set consists of n cross-sectional units, denoted $i = 1, \dots, N$, observed at each of T time periods, $t = 1, \dots, T$. In data set, the total observation is $n \times T$. The basic framework for the panel data is defined according to the following regression model:

$$Y_{it} = \alpha + \beta' X_{it} + U_{it}$$

where Y_{it} is the dependent variable, α is the intercept term, β is a $k \times 1$ vector of parameters to be estimated on the explanatory variables, and X_{it} is a $1 \times k$ vector of observations on the explanatory variables, $t = 1, \dots, T$; $i = 1, \dots, N$. And U_{it} is an error term.

Panel data models are usually estimated using either fixed effects or random effects models. In the fixed effects model, the individual-specific effect is a random variable that is allowed to be correlated with the explanatory variables. The rationale behind random effects model is that, unlike the fixed effects model, the individual specific effect is a random variable that is uncorrelated with the independent variables included in the model. The fixed effects model is an appropriate specification if we are focusing on a specific set of N firms and our inference is restricted to the behavior of these sets of firms. Also, in order to find which of these models is the most appropriate, the Hausman test can be conducted. In this study, the fixed effects model is used after running the Hausman test to pick the appropriate techniques.

while estimating the model we control for various country characteristics. For each specification we control the five bank-specific variables and we estimate the impact of individual regulatory policies on profitability and stability scores Model 1 to 3 (column1-3). However, many regulations can be substitutes or complements and countries will probably not select these policies in isolation. Hence, we consider our *Base Model (N4)* (column4) that incorporates simultaneously all the regulatory variables with the bank-specific controls.

After that, we introduce, *individually*, the Two groups of control variables (Banking industry specific variables, macroeconomic specific variables. for two reasons; the first reason deals with the necessity to reduce the degrees of freedom and enhance the statistical significance of the estimates, and the second one, is to avoid the presence of potential multicollinearity. With regard to the second reason, we checked the correlations among the variables. Most of the coefficient estimates show a correlation below 0.4 (table 2.6). Accordingly, including these variables simultaneously in the models make us comfortable regarding the presence of multi-collinearity bias.

Table2-6 Variables correlation matrix

	<i>ROAA</i>	<i>ROEA</i>	<i>ZSC1</i>	<i>CAR</i>	<i>LIQR</i>	<i>RESR</i>	<i>BS</i>	<i>CIR</i>	<i>LAR</i>	<i>LDR</i>	<i>BRGD</i>	<i>HHI</i>	<i>ZSC2</i>	<i>DCGD</i>	<i>INF</i>	<i>GDP</i>
<i>ROAA</i>	1.00															
<i>ROEA</i>	0.52 ***	1.00														
<i>ZSC1</i>	0.02	0.02	1.00													
<i>CAR</i>	0.52 ***	-0.11 ***	0.07 **	1.00												
<i>LIQR</i>	-0.01	0.06	0.06	0.03	1.00											
<i>RESR</i>	0.63 ***	0.07 **	-0.01	0.41 ***	-0.04	1.00										
<i>BS</i>	0.13 ***	0.22 ***	-0.09 ***	-0.10 ***	-0.02	-0.05	1.00									
<i>CIR</i>	-0.57 ***	-0.45 ***	-0.07 **	-0.14 ***	0.13 ***	-0.17 ***	-0.34 ***	1.00								
<i>LAR</i>	-0.07 **	-0.23 ***	-0.18 ***	0.06	-0.63 ***	-0.14 ***	0.26 ***	-0.12 ***	1.00							
<i>LDR</i>	0.20 ***	-0.13 ***	-0.02	0.56 ***	-0.16 ***	0.31 ***	0.10 ***	-0.12 ***	0.49 ***	1.00						
<i>BRGD</i>	-0.17 ***	-0.07 *	0.43 ***	-0.17 ***	0.25 ***	-0.04	-0.43 ***	0.16 ***	-0.56 ***	-0.34 ***	1.00					
<i>HHI</i>	-0.13 ***	-0.02	-0.23 ***	-0.09 **	-0.13 ***	-0.04	-0.10 ***	0.18 ***	0.27 ***	0.11 ***	-0.48 ***	1.00				
<i>ZSC2</i>	-0.09 **	-0.13 ***	0.10 ***	-0.05	-0.07 **	-0.01	-0.26 ***	0.05	-0.06 *	-0.10 ***	0.06 **	0.07 *	1.00			
<i>DCGD</i>	-0.26 ***	-0.15 ***	0.22 ***	-0.25 ***	-0.12 ***	-0.05	-0.32 ***	0.19 ***	-0.01	-0.08 **	0.45 ***	-0.09 **	0.27 ***	1.00		
<i>INF</i>	0.04	0.08 **	-0.18 ***	0.02	0.08 **	-0.05	0.07 **	-0.05	0.03	0.03	-0.23 ***	0.33 ***	-0.14 ***	-0.37 ***	1.00	
<i>GDP</i>	0.22 ***	0.10 ***	-0.03	0.13 ***	0.04	0.07 *	0.32 ***	-0.26 ***	-0.00	0.05	0.11 ***	-0.59 ***	-0.56 ***	-0.09 **	-0.12 ***	1.00

* Significant at 10 % level; ** Significant at 5 % level; *** Significant at 1 % level

Source: calculated by the authors using EViews12.

2.6 REGRESSION RESULTS AND TESTING HYPOTHESIS

Model 1 Tests the effect of banking regulation on Return on Assets while controlling for other potential determinants.

Table 2.7 presents the main regression results of our first base model. The dependent variable is the return on assets. The column (1), (2), and (3) summarize the regression of return of average assets score on one only regulatory variable. The column (4) reports the regression on all regulatory variables (the base model). We perform the same specification methodology when controlling for banking industry specific variables as well as for macroeconomic variables in table 2.8 and 2.9.

Table 2-7 Regulations and Return on assets (panel data regression results)

ROA as dependent variable	(1)	(2)	(3)	(4)
CAR	0.07 (0.01) ***			0.07 (0.01) ***
LIQR		4.18 (7.68)		0.07 (0.60)
RESR			1.76 (0.52) ***	2.29 (0.51) ***
BS	-0.22 (0.11) **	-0.57 (0.10) ***	-0.58 (0.10) ***	-0.21 (0.11) *
CIR	-0.05 (0.00) ***	-0.05 (0.00) ***	-0.05 (0.00) ***	-0.05 (0.00) ***
LAR	0.77 (0.57)	0.42 (0.63)	0.47 (0.58)	1.10 (0.78)
LDR	-0.53 (0.09) ***	-0.12 (0.07)	-0.20 (0.08) **	-0.69 (0.11) ***
C	6.54 (1.94) ***	13.16 (1.78) ***	13.34 (1.76)	6.23 (2.01)
F	32.46 (0.00) ***	29.41 (0.00) ***	30.08 (0.00) ***	32.99 (0.00) ***
OBSV	680	680	680	680
R²	0.83	0.82	0.82	0.84

*Significant at 10 % level; ** Significant at 5 % level; *** Significant at 1 % level (standard-error in parentheses)
Source: Authors' own calculations using EViews v12.

Table 2-8 Regulations and Return on assets (controlling for banking industry characteristics –*panel data regression results*)

<i>ROA as dependent variable</i>	<i>(1)</i>	<i>(2)</i>	<i>(3)</i>	<i>(4)</i>
CAR	0.08 (0.00) ***			0.08 (0.00) ***
LIQR		-0.35 (0.62)		-0.01 (0.58)
RESR			1.76 (0.51) ***	2.33 (0.49) ***
BS	0.09 (0.12)	-0.35 (0.12) ***	-0.37 (0.12) ***	0.10 (0.12)
CIR	-0.04 (0.00) ***	-0.04 (0.00) ***	-0.04 (0.00) ***	-0.04 (0.00) ***
LAR	0.80 (0.55)	-0.03 (0.80)	0.45 (0.57)	1.07 (0.76)
LDR	-0.56 (0.09) ***	-0.07 (0.09)	-0.18 (0.08) ***	-0.71 (0.10) ***
BRGD	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)
HHI	0.93 (2.38)	-0.30 (2.53)	-0.54 (2.48)	0.96 (2.36)
Z-Score	-0.02 (0.00) ***	-0.02 (0.00) ***	-0.02 (0.00) ***	-0.02 (0.00) ***
DCGD	-0.01 (0.00) **	-0.00 (0.00) *	-0.00 (0.00) *	-0.01 (0.00) ***
C	3.42 (2.20)	12.1 (2.13) ***	12.1 (2.03) ***	3.18 (2.22)
F	34.1 (0.00) ***	30.0 (0.00) ***	30.7 (0.00) ***	34.9 (0.00) ***
OBSV	680	680	680	680
R²	0.85	0.83	0.83	0.85

* Significant at 10 % level; ** Significant at 5 % level; *** Significant at 1 % level (standard-error in parentheses)

Source: Authors' own calculations using EViews v12.

Table 2-9 Regulations and Return on assets (controlling for macroeconomic characteristics –*panel data regression results*)

<i>ROA as dependent variable</i>	<i>(1)</i>	<i>(2)</i>	<i>(3)</i>	<i>(4)</i>
CAR	0.08 (0.00) ***			0.08 (0.00) ***
LIQR		-0.39 (0.62)		-0.00 (0.59)
RESR			1.75 (0.51) ***	2.32 (0.49) ***
BS	0.08 (0.13)	-0.41 (0.12) ***	-0.42 (0.12) ***	0.09 (0.13)
CIR	-0.04 (0.00) ***	-0.05 (0.00) ***	-0.04 (0.00) ***	-0.04 (0.00) ***
LAR	0.81 (0.55)	-0.06 (0.80)	0.45 (0.57)	1.09 (0.76)
LDR	-0.56 (0.09) ***	-0.07 (0.09)	-0.19 (0.08) **	-0.72 (0.10) ***
BRGD	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)
HHI	1.40 (2.49)	-0.53 (2.64)	-0.23 (2.59)	1.34 (2.46)
Z-Score	-0.02 (0.00) ***	-0.02 (0.00) ***	-0.02 (0.00) ***	-0.02 (0.00) ***
DCGD	-0.01 (0.00) **	-0.00 (0.00) **	-0.00 (0.00) **	-0.01 (0.00) ***
INF	-0.00 (0.01)	-0.01 (0.01)	-0.01 (0.01)	-0.00 (0.01)
GDP	-0.01 (0.07)	0.06 (0.08)	0.06 (0.08)	-0.01 (0.07)
C	3.95 (2.65)	11.3 (2.68) ***	11.3 (2.61) ***	3.73 (2.64)
F	33.3 (0.00) ***	29.4 (0.00) ***	30.1 (0.00) ***	34.1 (0.00) ***
OBSV	680	680	680	680
R²	0.85	0.83	0.83	0.85

* Significant at 10 % level; ** Significant at 5 % level; *** Significant at 1 % level (standard-error in parentheses)

Source: Authors' own calculations using EViews v12.

In general, the base model (table2.7) shows a significant impact across regulatory variables (CAR & RESR) on Return On assets except for (LIQR). However, when incorporating the control variables to the estimation (table2.8&2.9) we didn't lose the statistical significance of most regulatory variables. Showing a significant result across all specifications except for the (LIQR) the result stayed insignificant.

1. We note that overall capital adequacy requirement has a significant positive effect on return on assets in all specifications. (high significant at 1 %) in both the individual specification (column 1) and also when associated with the other regulatory variables (column4). we also noted the same results while controlling for other specifications (table2.8&2.9).
These results are in line with the IMF suggesting that capital adequacy ultimately determines the robustness of financial institutions to balance sheet shocks. According to the *public interest view*, official capital adequacy regulations play a crucial role in aligning the incentives of bank owners with depositors and other creditors which results in more careful lending and better bank performance (Barth, Caprio, & Levine, 2006). If bank owners are required to have more capital at risk a decrease in potential loss of their capital would compensate the increase gains that they would enjoy from greater risk-taking. Accordingly, regulation related to capital adequacy requirements may help banks in MENA region reduce the bank risk taking behavior by having enough capital on reserve to handle a certain amount of losses. It seems that imposing higher capital requirement in our selected banking systems will increase bank profitability determined by return on assets (ROA).
2. Regarding to the effect of banking reserve requirement, we find that it has a positive significant effect in explaining the profitability (ROA), (high significant at 1 %) in both the individual specification (column 3) and also when associated with the other regulatory variables (column4). we also noted the same results while controlling for other specifications(table2.8&2.9). This result indicates that having a solid reserve requirement regulation will have a positive influence on profitability (ROA). Banks in MENA countries will have to hold in reserve to ensure that it is able to meet unexpected liabilities such as sudden withdrawals.
3. Surprisingly, we find that liquidity ratio is disconnected with the banking performance in all the estimated models for return on assets (ROA).

Finally, when controlling for the bank-specific and banking industry variables, we obtain conflicting results for some controls while others are confirming to the theory. The cost to income ratio (CIR) has negative significant connection with the bank profitability (ROA) (high significant at 1 %). The bank size (BS) seem to have a low negative significant effect (significant at 10 %) and not significant when being controlled with other variables (table2.8&2.9). The bank Loan to assets ratio (LAR) has no significant effect on profitability (ROA). While the loans to deposits ratio (LDR) shows a negative significant effect on banking profitability (ROA). When controlling for industry specific we noticed that the money supply variable Broad money (BRGD) and the market concentration proxy Herfindahl-Hirschman index both has no significant effect on banking profitability (ROA). While, the average Z-score per country and Domestic credit (DCGD) has a significant negative effect on the profitability (ROA). when it comes to the macro-economic variables GDP per capita (GDP) and Inflation (INF) have a non-significant effect on banking profitability (ROA).

So, for the first hypothesis, the null hypothesis is rejected and the alternative one could be accepted.

Model 2 Tests the effect of banking regulation on Return on Equity while controlling for other potential determinants.

Table 2.10 presents the main regression results of our second base model. The dependent variable is the return on equity. The column (1), (2), and (3) summarize the regression of return of average equity score on one only regulatory variable. The column (4) reports the regression on all regulatory variables (the base model). We perform the same specification methodology when controlling for banking industry specific variables as well as for macroeconomic variables in table 2.11 and 2.12.

Table 2-10 Regulations and Return on equity (*panel data regression results*)

<i>ROE as dependent variable</i>	<i>(1)</i>	<i>(2)</i>	<i>(3)</i>	<i>(4)</i>
CAR	0.17 (0.09) *			0.17 (0.09) *
LIQR		-4.27 (5.61)		-3.96 (5.67)
RESR			1.49 (4.69)	2.20 (4.78)
BS	-0.34 (1.02)	-1.25 (0.94)	-1.18 (0.93)	-0.42 (1.03)
CIR	-0.39 (0.03) ***	-0.39 (0.03) ***	-0.39 (0.03) ***	-0.39 (0.03) ***
LAR	-4.00 (5.26)	-8.87 (7.17)	-5.00 (5.26)	-7.20 (7.30)
LDR	-1.18 (0.88)	0.17 (0.82)	-0.23 (0.73)	-1.01 (1.05)
C	36.5 (17.8) **	56.8 (16.8) ***	52.5 (15.7) ***	40.4 (18.8) **
F	15.6 (0.00) ***	15.4 (0.00) ***	15.4 (0.00) ***	15.2 (0.00) ***
OBSV	680	680	680	680
R²	0.71	0.71	0.71	0.71

* Significant at 10 % level; ** Significant at 5 % level; *** Significant at 1 % level (standard-error in parentheses)

Source: Authors' own calculations using EViews v12.

Table 2-11 Regulations and Return on equity (controlling for banking industry characteristics –panel data regression results)

<i>ROE as dependent variable</i>	<i>(1)</i>	<i>(2)</i>	<i>(3)</i>	<i>(4)</i>
CAR	0.25 (0.08) **			0.26 (0.09) ***
LIQR		-5.26 (5.43)		-5.04 (5.46)
RESR			1.42 (4.49)	2.51 (4.55)
BS	2.40 (1.16) **	0.90 (1.06)	0.97 (1.05)	2.33 (1.16) **
CIR	-0.38 (0.03) ***	-0.39 (0.03) ***	-0.38 (0.03) ***	-0.39 (0.03) ***
LAR	-4.10 (5.03)	-10.42 (6.95)	-5.61 (5.05)	-8.26 (7.05)
LDR	-1.44 (0.84) *	0.42 (0.79)	-0.05 (0.70)	-1.22 (1.01)
BRGD	-0.09 (0.04) **	-0.09 (0.04) *	-0.09 (0.04) *	-0.09 (0.04) **
HHI	-1.94 (21.6)	-3.76 (21.93)	-6.43 (21.7)	0.61 (21.88)
Z-Score	-0.33 (0.07) ***	-0.33 (0.07) ***	-0.33 (0.07) ***	-0.33 (0.07) ***
DCGD	-0.08 (0.03) **	-0.07 (0.03) *	-0.07 (0.03) *	-0.07 (0.03) **
C	16.34 (20.01)	47.62 (18.51) **	42.95 (17.84) **	20.65 (20.65)
F	17.18 (0.00) ***	16.91 (0.00) ***	16.87 (0.00) ***	16.83 (0.00) ***
OBSV	680	680	680	680
R²	0.74	0.73	0.73	0.74

* Significant at 10 % level; ** Significant at 5 % level; *** Significant at 1 % level (standard-error in parentheses)

Source: Authors' own calculations using EViews v12.

Table 2-12 Regulations and Return on equity (controlling for macroeconomic characteristics –panel data regression results)

<i>ROE as dependent variable</i>	<i>(1)</i>	<i>(2)</i>	<i>(3)</i>	<i>(4)</i>
CAR	0.26 (0.09) ***			0.27 (0.09) ***
LIQR		-5.10 (5.45)		-4.71 (5.48)
RESR			1.43 (4.49)	2.64 (4.56)
BS	2.78 (1.24) **	1.05 (1.12)	1.14 (1.12)	2.69 (1.25) **
CIR	-0.38 (0.03) ***	-0.39 (0.03) ***	-0.38 (0.03) ***	-0.38 (0.03) ***
LAR	-3.93 (5.04)	-10.22 (6.99)	-5.55 (5.06)	-7.80 (7.08)
LDR	-1.48 (0.84) *	0.42 (0.79)	-0.04 (0.71)	-1.29 (1.01)
BRGD	-0.10 (0.05) **	-0.10 (0.05) *	-0.10 (0.05) **	-0.10 (0.05) **
HHI	-3.65 (22.65)	-4.61 (22.93)	-7.23 (22.78)	-1.38 (22.83)
Z-Score	-0.32 (0.07) ***	-0.33 (0.07) ***	-0.32 (0.07) ***	-0.33 (0.07) ***
DCGD	-0.07 (0.03) *	-0.06 (0.03) *	-0.06 (0.03) *	-0.07 (0.03) *
INF	0.02 (0.10)	0.00 (0.10)	0.00 (0.10)	0.02 (0.10)
GDP	-0.58 (0.72)	-0.28 (0.72)	-0.33 (0.72)	-0.54 (0.73)
C	25.38 (24.14)	52.51 (23.26) **	48.96 (22.94) **	28.56 (24.49)
F	16.81 (0.00) ***	16.52 (0.00) ***	16.49 (0.00) ***	16.47 (0.00) ***
OBSV	680	680	680	680
R²	0.74	0.73	0.73	0.74

* Significant at 10 % level; ** Significant at 5 % level; *** Significant at 1 % level (standard-error in parentheses)

Source: Authors' own calculations using EViews v12.

In general, the base model (table2.10) shows a low significant impact of capital adequacy requirement (CAR) on Return On equity. while for the rest of regulatory variables liquidity requirements (LIQR) and reserve requirements (RESR) the results indicate no significant effects on the banks return on equity. However, when incorporating the control variables to the estimation (table2.11&2.12) the significance of the capital adequacy requirements (CAR) has increased to be high significant. While other regulatory variables (LIQR)&(RESR) the result stayed insignificant.

1. We note that capital adequacy requirement has low positive significant effect on return on equity (significant at 10%) in all specifications. in both the individual specification (column 1) and also when associated with the other regulatory variables (column4). However, while controlling for other specifications (table2.8&2.9). Results indicate significance increase (high significant at 1%) when controlling for both industry and macro-economic specifications (table2.11&2.12)
These results suggest that capital adequacy requirements have no individual effect on the banking profitability (ROE). And the effect may be seen when regulation related to capital adequacy requirements is connected to other proxies related to the banking industry and macro-economy in Mena region. In general, it seems that imposing higher capital requirement in our selected banking systems will increase bank profitability (ROE) Likewise, in return on assets (ROA).
2. In contrast, to Return on assets (ROA), reserve requirement shows no significant effect over return on equity (ROE).
3. Similarly, the results were indicating that liquidity has no significant impact on return on assets (ROA), it has been proving the same on return on equity (ROE).

Finally, when controlling for the bank-specific and banking industry variables, we obtain conflicting results for some controls while others are confirming to the theory. The cost to income ratio (CIR) has negative significant connection with the bank profitability (ROE) (high significant at 1 %). The Bank size (BS) seem to have a no significant effect in the base model (table 2.10) and a positive significant effect when being controlled with other variables (table2.11&2.12). The bank Loan to assets ratio (LAR) has no significant effect on profitability (ROE). While the loans to deposits ratio (LDR) shows no significant effect on banking profitability (ROE). When controlling for industry specific we noticed that variable the market concertation proxy Herfindahl-Hirschman index has no significant effect on banking profitability (ROE). While, the money supply Broad money (BRGD), the average Z-score per country, and Domestic credit (DCGD) has a significant negative effect on the profitability (ROE). when it comes to the macro-economic variables GDP per capita (GDP) and Inflation (INF) have a non-significant effect on banking profitability (ROE).

So, for the second hypothesis, the null hypothesis is accepted and the alternative one could be rejected.

Model 3 Tests the effect of banking regulation on Z-score while controlling for other potential determinants.

Table 2.13 presents the main regression results of our third base model. The dependent variable is the Z-score. The column (1), (2), and (3) summarize the regression of Z-score on one only regulatory variable. The column (4) reports the regression on all regulatory variables (the base model). We perform the same specification methodology when controlling for banking industry specific variables as well as for macroeconomic variables in table 2.14 and 2.15.

Table 2-13 Regulations and Z-score (panel data regression results)

<i>Z-score as dependent variable</i>	(1)	(2)	(3)	(4)
CAR	1.68 (0.07) ***			1.65 (0.07) ***
LIQR		1.26 (5.74)		-0.76 (4.23)
RESR			-25.96 (4.78) ***	-8.00 (3.71) **
ROA	0.92 (0.47) *	4.79 (0.60) ***	5.47 (0.60) ***	1.21 (0.49) **
ROE	-0.12 (0.05) **	-0.40 (0.06) ***	-0.46 (0.06) ***	-0.14 (0.05) ***
BS	1.17 (0.77)	-4.96 (1.00) ***	-4.40 (0.97) ***	1.19 (0.77)
CIR	-0.03 (0.02)	0.05 (0.03)	0.05 (0.03)	-0.02 (0.02)
LAR	9.06 (3.97) **	-3.65 (7.35)	-7.83 (5.27)	7.14 (5.50)
LDR	-0.08 (0.69)	10.16 (0.84) ***	11.64 (0.74) ***	0.63 (0.84)
C	-0.29 (13.48)	117.30 (18.06) ***	109.27 (16.69) ***	0.28 (14.15)
F	568.08 (0.00) ***	299.58 (0.00) ***	314.95 (0.00) ***	558.97 (0.00) ***
OBSV	680	680	680	680
R²	0.98	0.97	0.98	0.98

* Significant at 10 % level; ** Significant at 5 % level; *** Significant at 1 % level (standard-error in parentheses)

Source: Authors' own calculations using EViews v12.

Table 2-14 Regulations and Z-score (controlling for banking industry characteristics –panel data regression results)

<i>Z-score as dependent variable</i>	(1)	(2)	(3)	(4)
CAR	1.64 (0.07) ***			1.59 (0.07) ***
LIQR		2.65 (5.65)		-0.24 (4.24)
RESR			-25.86 (4.66) ***	-8.48 (3.68) **
ROA	1.06 (0.47) **	4.85 (0.59) ***	5.53 (0.59) ***	1.38 (0.49) ***
ROE	-0.11 (0.05) **	-0.36 (0.06) ***	-0.42 (0.06) ***	-0.13 (0.05) **
BS	-0.28 (0.90)	-7.90 (1.12) ***	-7.31 (1.10) ***	-0.28 (0.90)
CIR	-0.03 (0.02)	0.05 (0.03)	0.05 (0.03)	-0.02 (0.02)
LAR	8.61 (3.95) **	-2.42 (7.25)	-7.88 (5.16)	7.04 (5.52)
LDR	0.08 (0.69)	9.75 (0.83) ***	11.35 (0.72) ***	0.81 (0.84)
BRGD	-0.00 (0.03)	0.02 (0.05)	0.01 (0.05)	-0.00 (0.03)
HHI	-27.28 (16.81)	-56.39 (22.73) **	-54.25 (22.01) **	-27.57 (16.88)
DCGD	0.06 (0.03) **	0.12 (0.04) ***	0.12 (0.03) ***	0.06 (0.03) **
C	22.50 (15.38)	158.64 (19.51) ***	151.13 (18.47) ***	22.99 (15.77)
F	558.99 (0.00) ***	305.61 (0.00) ***	321.97 (0.00) ***	551.05 (0.00) ***
OBSV	680	680	680	680
R²	0.98	0.98	0.98	0.98

* Significant at 10 % level; ** Significant at 5 % level; *** Significant at 1 % level (standard-error in parentheses)
Source: Authors' own calculations using EViews v12.

Table 2-15 Regulations and Z-score (controlling for macroeconomic characteristics –panel data regression results)

<i>Z-score as dependent variable</i>	(1)	(2)	(3)	(4)
CAR	1.63 (0.07) ***			1.59 (0.07) ***
LIQR		1.97 (5.65)		-0.29 (4.25)
RESR			-25.7 (4.56) ***	-8.53 (3.69) **
ROA	1.03 (0.47) **	4.71 (0.59) ***	5.39 (0.59) ***	1.35 (0.49) ***
ROE	-0.10 (0.05) **	-0.34 (0.06) ***	-0.40 (0.06) ***	-0.13 (0.05) **
BS	-0.49 (0.96)	-8.78 (1.19) ***	-8.17 (1.16) ***	-0.49 (0.96)
CIR	-0.03 (0.02)	0.04 (0.03)	0.05 (0.03)	-0.02 (0.02)
LAR	8.71 (3.96) **	-2.96 (7.26)	-7.78 (5.15)	7.08 (5.55)
LDR	0.08 (0.69)	9.73 (0.83) ***	11.2 (0.72) ***	0.82 (0.84)
BRGD	0.00 (0.03)	0.04 (0.05)	0.03 (0.05)	0.00 (0.03)
HHI	-23.0 (17.5)	-48.0 (23.6) **	-0.46 (29.9) **	-23.1 (17.59)
DCGD	0.05 (0.03) *	0.10 (0.04) **	0.10 (0.04) ***	0.05 (0.03) *
INF	-0.06 (0.08)	-0.12 (0.10)	-0.12 (0.10)	-0.07 (0.08)
GDP	0.08 (0.56)	1.30 (0.75) *	1.25 (0.73) *	0.09 (0.56)
C	23.4 (18.6)	138 (2.68) ***	131 (23.4) ***	23.87 (18.87)
F	546 (0.00) ***	301 (0.00) ***	317 (0.00) ***	539 (0.00) ***
OBSV	680	680	680	680
R²	0.98	0.98	0.98	0.98

Table 1

* Significant at 10 % level; ** Significant at 5 % level; *** Significant at 1 % level (standard-error in parentheses)
Source: Authors' own calculations using EViews v12.

In general, the base model (table2.13) shows a significant impact across most of the regulatory variables (CAR & RESR) on Z-score except for (LIQR). However, when incorporating the control variables to the estimation (table2.14&2.15) we didn't lose the statistical significance of most regulatory variables. Showing a significant result across all specifications except for the (LIQR) the result stayed insignificant.

1. We note that capital adequacy requirement has positive high significant impact on Z-score (significant at 1%) in all specifications. in both the individual specification (column 1) and also when associated with the other regulatory variables (column4). we also noted the same results while controlling for other specifications (table2.14&2.15).
These results suggest that greater capital adequacy requirements increase bank stability. This finding supports the traditional approach of capital regulations that considers capital as a buffer against losses resulting from banking operations, and thus protects the bank from failure.
2. Likewise, the profitability determinants return on assets (ROA) and return on equity (ROE). The liquidity requirement has no significant effect on the banking stability determined by (Z-score).
3. Regarding to the effect of banking reserve requirement, surprisingly, we find that it has a negative significant effect on banking stability (Z-score), (high significant at 1 %) in the individual specification (column 3) while when associated with the other regulatory variables (column4) the significance dropped to (significant at 5%). we noted the same results while controlling for other specifications(table2.14&2.15). These findings are mainly in contrast with both the theory and related literature review.

Finally, when controlling for the bank-specific and banking industry variables, we obtain conflicting results for some controls while others are confirming to the theory. The return on assets has a positive significant effect on bank stability (Z-score) (high significant at 1 %). On the other hand, return on equity has a positive significant effect on stability (Z-score) (significant at 5 %). The cost to income ratio (CIR) has no significant connection with the bank stability (Z-score). The Bank size (BS) seem to have a no significant effect on the banking stability(Z-score). The bank Loan to assets ratio (LAR) has no significant effect on stability(Z-score). While the loans to deposits ratio (LDR) shows no significant effect on banking stability(Z-score). When controlling for industry specific we noticed that the variables the market concertation proxy Herfindahl-Hirschman index & the money supply Broad money (BRGD) both has no significant effect on banking stability(Z-score). While, Domestic credit (DCGD) has a positive significant effect on the bank stability(Z-score). when it comes to the macro-economic variables GDP per capita (GDP) and Inflation (INF) have a non-significant effect on banking stability(Z-score).

So, for the third hypothesis, the null hypothesis is accepted and the alternative one could be rejected.

Chapter conclusion

We collected data from several banks in the MENA region to evaluate the effects of banking regulation on risk-taking and performance in the region in this chapter.

To begin, we introduced the financial system in the region. Then we began to define our research variables, which are as follows: banking regulation (capital adequacy requirements, reserve requirements, and liquidity). Bank performance, on the other hand, was measured by profitability variables including return on assets and return on equity. In addition, the Z-score was used to assess financial stability. We also included several bank-specific, industry-specific, and macroeconomic-specific factors because they may have an influence on our base variables. Furthermore, we attempted to estimate this impact using panel data, which appeared to be the best fit for our research.

Finally, the findings agreed with the literature, indicating that adopting banking regulation requirements may have a favourable influence on banks' risk-taking behaviour and performance.

Final Conclusion

Banks are more susceptible to failure than other sectors, and their ineffectiveness stunts economic growth. The 2007-2009 financial crisis shows how bank collapse may cause economic calamity. Banks should operate safely and thoroughly to avoid economic contagion. Banks are the most regulated sector, regardless of country development. Policymakers always overestimate what regulatory level can promote a well-functioning banking system, and there is unclear theoretical or empirical evidence concerning the influence of different regulation levels on bank performance, especially in developing regions like MENA.

This research attempts to investigate the effect of applying banking regulations on banking performance and risk-taking behaviour of 89 commercial banks operating in seven MENA countries (Lebanon, Tunisia, Algeria, Morocco, United Arab Emirates, Saudi Arabia, Jordan), on a yearly basis over the period from 2006 to 2018. On an unbalanced data set, we carried out a panel data regression analysis with the fixed-effects model.

Banking regulations have been measured by each of capital adequacy requirements (total assets/total loans), liquidity requirements (liquid assets to total assets), reserve requirements (total reserve/total deposits), while Banking performance has been measured by each of banking profitability (return on assets & return on equity) and banking stability (Z-score).

Overall, our findings add to the existing body of literature and focus attention on how regulatory measures affect bank profitability and risk-taking under different specifications. Accordingly, Bank Profitability results show that there is a significant effect of applying each of (Capital adequacy requirements, and Reserve requirements) on Bank Profitability (measured by return on assets). Besides, they only support the significant effect of applying (capital adequacy requirements) on Bank Profitability (measured by return on equity). In regard to Banking Stability, results indicate that there is a significant effect of applying each of (capital adequacy requirements, and reserve requirements) on Banking Stability (measured by Z-score). regulation related to capital adequacy requirements may help banks in MENA region reduce the bank risk taking behavior by having enough capital on reserve to handle a certain amount of losses. It seems that imposing higher capital requirement in our selected banking systems will increase bank profitability determined by return on assets (ROA) and return on equity (ROE). While, maintaining banking stability determined by (Z-score). The result indicates that having a solid reserve requirement regulation will have a positive influence on profitability (ROA). Banks in MENA countries will have to hold in reserve to ensure that it is able to meet unexpected liabilities such as sudden withdrawals.

Further studies could increase the knowledge in this area through the following potential extension of the present research. First: including a full detailed set of data including all of the MENA region countries and banks. Second: using other regulatory parameters to examine the performance of banks in MENA region. Finally, using a different and more efficient research methods to measure the effects of the regulatory requirements on banks risk-taking and performance.

Bibliography

- Alber, N., & Ramadan, H. (2022). The Effect of Applying Banking Regulations on Banking. *European Journal of Business and Management Research*, 7(1). doi:10.24018/ejbmr.2022.7.1.1258
- Al-Smadi, D. M. (2015). Banking Regulations and Supervising, and the Soundness of Banks in MENA Countries. *European Journal of Business and Management*, 7(35).
- Apătăchioae, A. (2015). The performance, banking risks and their regulation. *Procedia Economics and Finance* 20, 35-43.
- apostolik, r., donohue, c., & went, p. (2009). *An Overview of Banking, Banking Risks, and Risk-Based Banking Regulation*. Hoboken, New Jersey, United States of America: John Wiley & Sons, Inc.
- Azadinamin, A. (2011). Modern Tools for Performance Measurements . *Social Science Research*.
- Balthazar, L. (2006). *From Basel 1 to Basel 3: The Integration of State-of-the-Art Risk Modeling in Banking Regulation*. Palgrave Macmillan Ltd.
- Barth, J. R., Caprio, G., & Levine, R. (2006). *Rethinking Bank Regulation Till Angels Govern*. cambridge university press.
- Barth, J. R., Lin, C., Ma, Y., Seade, J., & Song, F. (2013). Do bank regulation, supervision and monitoring enhance or impede bank efficiency? *Journal of Banking & Finance*, 37(8). doi:10.1016/j.jbankfin.2013.04.030
- BCBS. (1988, october 27). *Press release* . Retrieved from BIS: <https://www.bis.org/press/p981027.htm>
- BCBS. (2001). *Press Release*. Retrieved from BIS: <https://www.bis.org/press/p990603.htm>
- BCBS. (2004, may 11). *Press release* . Retrieved from BIS: <https://www.bis.org/press/p040511.htm>
- BCBS. (2006, december). *Press Release* . Retrieved from BIS: <https://www.bis.org/publ/bcbs136.htm>
- BCBS. (2006, JUNE 14). *Press release* . Retrieved from BIS: <https://www.bis.org/press/p060614.htm>
- BCBS. (2012, september 14). *Core principles for effective banking supervision*. Retrieved from Basel Committee on Banking Supervision: <https://www.bis.org/publ/bcbs230.htm>
- BCBS. (n.d.). *History of the Basel Committee*. Retrieved from Bank for International Settlements: <https://www.bis.org/bcbs/history.htm>
- Ben Naceur, S., & Omran, M. (2008). The Effects of Bank Regulations, Competition and Financial Reforms on MENA Banks' Profitability. *economic research forum*. doi:10.2139/ssrn.1554537
- Bessis, J. (2002). *risk management in banking* . Chichester: John Wiley & Sons Ltd.,.
- BIS. (2013). Basel Committee on Banking Supervision . *Bank for International Settlements*.
- BIS. (2019, march 13). *Basel I, II, III: evolution of global banking regulation*. Retrieved from youtube: https://www.youtube.com/watch?v=_783Md-NNFE&ab_channel=BankforInternationalSettlements
- BOCCI, F. (2004, september). Defining performance measurment . *Bocci consulting papers & articales*, 3(1/2), 20-21.

- Brooks, C. (2008). *Introductory Econometrics for Finance* (2 ed.). CAMBRIDGE UNIVERSITY PRESS.
- Cernohorska, L. (2015). Impact of Financial Crisis on the Stability Banking Sectors in the Czech Republic and Great Britain. *Procedia Economics and Finance*, 26, 234-241.
- CHEN, J. (2021, may 20). *International Markets Middle East and North Africa*. (s. gordon, Editor) Retrieved from Investopedia: <https://www.investopedia.com/>
- Chenini, H., & Jarboui, A. (2016). Analysis of the Impact of Governance on Bank Performance: Case of Commercial Tunisian Banks. *J Knowl Econ*.
- Cherif, M., & Dreger, C. (2016). Institutional Determinants of Financial Development in MENA countries. *econstor*, 20(3), 670-680.
- De Toni, A., & Tonchia, S. (2001). Performance measurement systems Models, characteristics and measures. *International Journal of Operations & Production Management*, 21(1/2), 46-70.
- Delis, M., Molyneux, P., & Pasiouras, F. (2008, june). Regulations and productivity growth in banking. *University of Bath School of Management*.
- Docherty, A., & Viort, F. (2014). *Better Banking*. The Atrium, Southern Gate, Chichester, West Sussex, United Kingdom: John Wiley & Sons Ltd.
- edgeworth, M. (1881). *Mathematical psychics* . london: C. KEGAN PAUL & CO.
- Ennouri, W. (2013). Risks management: new literature review . *Polish journal OF managementstudies*, 8.
- FATF. (n.d.). *About*. Retrieved from fatf-gafi: <https://www.fatf-gafi.org/about/>
- Ferreira, C., Jenkinson, N., & Wilson, C. (2019, june). From Basel I to Basel III: Sequencing Implementation in Developing Economies. *IMF*.
- FSB. (2020, nov 16). *About the FSB*. Retrieved from fsb: <https://www.fsb.org/about/>
- Garengo, P., Biazzo, S., & Bititci, U. S. (2005). Performance measurement systems in SMEs: A review for a research agenda. *International journal of management reviews*, 7(1), 25-47.
- Gold, b. (1985). Foundations of Strategic Planning for Productivity Improvement. *Interfaces*, 15(3), 15-30.
- Gottschalk, R. (2010). *The Basel Capital Accords in Developing Countries*. london: Palgrave Macmillan .
- Greuning, H. v., & Bratanovic, S. B. (2020). *Analyzing Banking Risk*. (4, Ed.) Washington: International Bank for Reconstruction and Development / The World Bank. doi:10.1596/978-1-4648-1446-4
- Hamilton, A. (2013, January). Small Is Beautiful, at Least in High-Income Democracies. *The World Bank Institute*, 39.
- Haqea, F., & Brownb, K. (2017). Bank ownership, regulation and efficiency: Perspectives from the Middle East and North Africa (MENA) Region. *International Review of Economics and Finance*, 273-293.
- harkar, P. T., & zenios, S. A. (2000). *Performance of Financial Institutions*. Cambridge: Cambridge University Press.
- Hertog, J. d. (2010). *review of economic theories of regulation*. Utrecht University , Utrecht School of Economics . Utrecht: Tjalling C. Koopmans Research Institute. Retrieved from <http://www.koopmansinstitute.uu.nl/>
- IFRS. (n.d.). *about us* . Retrieved from IFRS : <https://www.ifrs.org/about-us/>
- ISDA. (n.d.). *About ISDA*. Retrieved from ISDA: <https://www.isda.org/about-isda/>
- Kablan, S. (2010). Banking Efficiency and Financial Development in Sub-Saharan Africa. *International Monetary Fund* .

- kenton, w. (2019, april 07). *laws & regulation sec* . Retrieved from investopedia:
<https://www.investopedia.com/terms/i/iosco.asp>
- Macey, J. R. (1988, september 1). The Myth of "Reregulation": The Interest Group Dynamics of Regulatory Change in the Financial Services Industry. *Washington and Lee Law Review*, 45(4).
- Mancera, M., Volcker, P. A., & Godeaux, J. (1991). Perspectives on the Role of a Central Bank. *International Monetary Fund*, 102.
- Mancera, M., Volcker, P. A., & Godeaux, J. (1991). *Session III Role of Regulation and Supervision of the Central Bank*. International Monetary Fund. Retrieved from <https://www.elibrary.imf.org/view/books/071/05224-9781557752062-en/ch03.xml>
- michael, a. (2019). *Risk Weighted Assets: Basel III (Banking Simplified Book 1)*.
- Mitnick, M. (1980). The Political Economy of Regulation: Creating, Designing, and Removing Regulatory Forms. *New York: Columbia University Press*, 75(3), 778-779.
- Moosa, I. A. (2015). *Good Regulation, Bad Regulation The Anatomy of Financial Regulation*. Palgrave Macmillan.
- Moran, M. (1986). Theories of Regulation and Changes in Regulation: The Case of Financial Markets. *political studies association*, 34(2), 185-201.
- Moullin, M. (2007). Performance measurement definitions. *International Journal of Health Care*, 20(3), 181-183.
- Neely, A. (2002). *Business performance measurement*. Cambridge: Cambridge University Press.
- Pasiouras, F. (2007, september 22). *Review of Quantitative Finance and Accounting*, 187-223. doi:10.1007/s11156-007-0046-7
- Pasiouras, F., Chrysovalantis, G., & Zopounidis, C. (2006). *Review of Quantitative Finance and Accounting structure, and bank characteristics on individual bank ratings: A cross-country analysis*, 403–438. doi:10.1007/s11156-006-0045-0
- Pigou, A. C. (1920). *The Economics of Welfare*.
- Posner, R. A. (1974). Theories of Economic Regulation. *The Bell Journal of Economics and Management Science*, 5(2), 335-358.
- Regulation Guide. (n.d.). *moody's analytics* .
- Ron, P. (2009). *End the Fed*. United States: Grand Central Publishing.
- Salaga, J., Bartosova, V., & Kicova, E. (2015). Economic Value Added as a measurement tool of financial performance. *Procedia Economics and Finance* 26, 484 – 489 .
- Saunders, A., & Cornett, M. M. (2014). *Financial Institutions Management A Risk Management Approach* . (8, Ed.) New York: McGraw-Hill Education.
- Scott, W. R. (2003). *Financial Accounting Theory*. (3, Ed.) Prentice Hall.
- Shephard, R. W. (1953). *Cost and production functions*. (Vol. 1). Princeton University Press.
- Shleifer, A. (2005). Understanding Regulation. *European Financial Management*, 11(04), 439–451.
- Sum, K. (2015). Banking regulation and bank performance in the EU – what should be the scope of the regulatory reform? *Bank i Kredyt*, 46(3), 207-236.
- Te, P. (2016). *Risk Management in Banking Principles and Framework* . Oxford University Press.

- Venkatraman, N., & Ramanujam, V. (1986). Measurement of Business Performance in Strategy Research: A Comparison of Approaches. *The Academy of Management Review*, 11(4), 801-814.
- Wiley, B. J., & Navickas, J. (2021, September). Effect of Financial Regulation on Performance of Banking Sector in the United States of America. *Journal of Finance and Accounting*, 5(3), 11-21.
- WorldBank. (2021, december 15). *Middle East and North Africa Overview*. Retrieved from The World Bank : <https://www.worldbank.org/>
- Yang, Z., Gan, C., & Li, Z. (2019). Role of Bank Regulation on Bank Performance: Evidence from Asia-Pacific Commercial Banks. *Journal of Risk and Financial Management*. Retrieved from <https://www.mdpi.com/>

Appendices

Appendix A

Model 1 ROA Regression tables from EViews12.

Dependent Variable: ROAA
Method: Panel Least Squares
Date: 06/13/22 Time: 21:50
Sample: 2006 2018
Periods included: 13
Cross-sections included: 89
Total panel (unbalanced) observations: 680

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CAPITAL ADEQUACY REQUIREMENTS...	0.071650	0.010097	7.096261	0.0000
LN TOTAL ASSESTS	-0.223108	0.112023	-1.991617	0.0469
COST TO INCOME	-0.050334	0.003516	-14.31631	0.0000
LOANS_ASSETS	0.775622	0.572559	1.354659	0.1760
LOANS_DEPOSITS	-0.539099	0.096183	-5.604919	0.0000
C	6.546540	1.941566	3.371783	0.0008

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.837442	Mean dependent var	1.363500
Adjusted R-squared	0.811644	S.D. dependent var	1.576237
S.E. of regression	0.684087	Akaike info criterion	2.206234
Sum squared resid	274.2332	Schwarz criterion	2.831347
Log likelihood	-656.1195	Hannan-Quinn criter.	2.448200
F-statistic	32.46102	Durbin-Watson stat	1.414772
Prob(F-statistic)	0.000000		

Dependent Variable: ROAA
Method: Panel Least Squares
Date: 06/13/22 Time: 21:57
Sample: 2006 2018
Periods included: 13
Cross-sections included: 89
Total panel (unbalanced) observations: 680

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LIQUID ASSETS	4.18E-10	7.68E-10	0.544608	0.5862
LN_TOTAL_ASSESTS__	-0.571023	0.106639	-5.354716	0.0000
COST_TO_INCOME__	-0.050357	0.003666	-13.73438	0.0000
LOANS_ASSETS	0.420422	0.631285	0.665979	0.5057
LOANS_DEPOSITS	-0.120599	0.079011	-1.526365	0.1275
C	13.16917	1.782946	7.386189	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.823563	Mean dependent var	1.363500
Adjusted R-squared	0.795561	S.D. dependent var	1.576237
S.E. of regression	0.712694	Akaike info criterion	2.288168
Sum squared resid	297.6483	Schwarz criterion	2.913280
Log likelihood	-683.9770	Hannan-Quinn criter.	2.530133
F-statistic	29.41172	Durbin-Watson stat	1.404588
Prob(F-statistic)	0.000000		

Dependent Variable: ROAA
Method: Panel Least Squares
Date: 06/13/22 Time: 22:01
Sample: 2006 2018
Periods included: 13
Cross-sections included: 89
Total panel (unbalanced) observations: 680

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESERVE REQUIREMENTS	1.769537	0.526047	3.363841	0.0008
LN TOTAL ASSESTS	-0.580826	0.104688	-5.548176	0.0000
COST TO INCOME	-0.050139	0.003629	-13.81570	0.0000
LOANS ASSETS	0.476925	0.589248	0.809380	0.4186
LOANS DEPOSITS	-0.207152	0.082496	-2.511061	0.0123
C	13.34141	1.763877	7.563685	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.826817	Mean dependent var	1.363500
Adjusted R-squared	0.799333	S.D. dependent var	1.576237
S.E. of regression	0.706089	Akaike info criterion	2.269548
Sum squared resid	292.1575	Schwarz criterion	2.894661
Log likelihood	-677.6463	Hannan-Quinn criter.	2.511514
F-statistic	30.08291	Durbin-Watson stat	1.496504
Prob(F-statistic)	0.000000		

Dependent Variable: ROAA
Method: Panel Least Squares
Date: 06/13/22 Time: 22:05
Sample: 2006 2018
Periods included: 13
Cross-sections included: 89
Total panel (unbalanced) observations: 680

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CAPITAL_ADEQUACY_REQUIREMENTS...	0.077643	0.010030	7.740785	0.0000
LIQUIDITY_REQUIREMENTS	0.070690	0.606826	0.116491	0.9073
RESERVE_REQUIREMENTS	2.295379	0.511786	4.485035	0.0000
LN_TOTAL_ASSETS	-0.216774	0.111044	-1.952140	0.0514
COST_TO_INCOME__	-0.050109	0.003504	-14.30096	0.0000
LOANS_ASSETS	1.104252	0.781148	1.413627	0.1580
LOANS_DEPOSITS	-0.696359	0.113244	-6.149194	0.0000
C	6.231620	2.015978	3.091114	0.0021

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.842933	Mean dependent var	1.363500
Adjusted R-squared	0.817383	S.D. dependent var	1.576237
S.E. of regression	0.673585	Akaike info criterion	2.177757
Sum squared resid	264.9708	Schwarz criterion	2.816170
Log likelihood	-644.4373	Hannan-Quinn criter.	2.424871
F-statistic	32.99111	Durbin-Watson stat	1.534366
Prob(F-statistic)	0.000000		

Dependent Variable: ROAA
Method: Panel Least Squares
Date: 06/13/22 Time: 22:52
Sample: 2006 2018
Periods included: 13
Cross-sections included: 89
Total panel (unbalanced) observations: 680

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CAPITAL_ADEQUACY_REQUIREMENTS...	0.080437	0.009827	8.185195	0.0000
LN_TOTAL_ASSETS	0.099031	0.127950	0.773984	0.4393
COST_TO_INCOME__	-0.049299	0.003428	-14.38134	0.0000
LOANS_ASSETS	0.806431	0.553563	1.456799	0.1457
LOANS_DEPOSITS	-0.565227	0.092825	-6.089182	0.0000
BROAD MONEY ON GDP	-0.008707	0.005455	-1.596007	0.1110
HHI_MRKT	0.932012	2.385660	0.390673	0.6962
Z_SCORE	-0.025547	0.008204	-3.113913	0.0019
DOMISTEC CREDIT ON GDP	-0.010748	0.004233	-2.538867	0.0114
C	3.421945	2.200592	1.555011	0.1205

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.850602	Mean dependent var	1.363500
Adjusted R-squared	0.825702	S.D. dependent var	1.576237
S.E. of regression	0.658063	Akaike info criterion	2.133580
Sum squared resid	252.0332	Schwarz criterion	2.785294
Log likelihood	-627.4173	Hannan-Quinn criter.	2.385843
F-statistic	34.16116	Durbin-Watson stat	1.464008
Prob(F-statistic)	0.000000		

Dependent Variable: ROAA
Method: Panel Least Squares
Date: 06/13/22 Time: 22:59
Sample: 2006 2018
Periods included: 13
Cross-sections included: 89
Total panel (unbalanced) observations: 680

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LIQUIDITY_REQUIREMENTS	-0.354103	0.626466	-0.565239	0.5721
LN_TOTAL_ASSETS	-0.357506	0.122396	-2.920903	0.0036
COST_TO_INCOME	-0.049945	0.003666	-13.62506	0.0000
LOANS_ASSETS	-0.035437	0.802594	-0.044153	0.9648
LOANS_DEPOSITS	-0.071020	0.091841	-0.773292	0.4397
BROAD_MONEY_ON_GDP	-0.008031	0.005759	-1.394532	0.1637
HHI_MRKT	-0.307734	2.531184	-0.121577	0.9033
Z_SCORE	-0.025230	0.008679	-2.906959	0.0038
DOMISTEC_CREDIT_ON_GDP	-0.008293	0.004466	-1.856929	0.0638
C	12.15501	2.136232	5.689929	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.833495	Mean dependent var	1.363500
Adjusted R-squared	0.805744	S.D. dependent var	1.576237
S.E. of regression	0.694717	Akaike info criterion	2.241990
Sum squared resid	280.8920	Schwarz criterion	2.893703
Log likelihood	-664.2765	Hannan-Quinn criter.	2.494252
F-statistic	30.03500	Durbin-Watson stat	1.443579
Prob(F-statistic)	0.000000		

Dependent Variable: ROAA
Method: Panel Least Squares
Date: 06/13/22 Time: 23:04
Sample: 2006 2018
Periods included: 13
Cross-sections included: 89
Total panel (unbalanced) observations: 680

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESERVE_REQUIREMENTS	1.762919	0.512692	3.438553	0.0006
LN_TOTAL_ASSETS	-0.374067	0.120929	-3.093293	0.0021
COST_TO_INCOME	-0.049489	0.003584	-13.80965	0.0000
LOANS_ASSETS	0.454170	0.577040	0.787069	0.4316
LOANS_DEPOSITS	-0.189126	0.080982	-2.335399	0.0199
BROAD_MONEY_ON_GDP	-0.007733	0.005703	-1.355891	0.1757
HHI_MRKT	-0.544099	2.487524	-0.218731	0.8269
Z_SCORE	-0.025216	0.008577	-2.939959	0.0034
DOMISTEC_CREDIT_ON_GDP	-0.008587	0.004416	-1.944604	0.0523
C	12.12518	2.036742	5.953223	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.836721	Mean dependent var	1.363500
Adjusted R-squared	0.809508	S.D. dependent var	1.576237
S.E. of regression	0.687955	Akaike info criterion	2.222427
Sum squared resid	275.4503	Schwarz criterion	2.874140
Log likelihood	-657.6251	Hannan-Quinn criter.	2.474689
F-statistic	30.74690	Durbin-Watson stat	1.539658
Prob(F-statistic)	0.000000		

Dependent Variable: ROAA
Method: Panel Least Squares
Date: 06/13/22 Time: 23:07
Sample: 2006 2018
Periods included: 13
Cross-sections included: 89
Total panel (unbalanced) observations: 680

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CAPITAL_ADEQUACY_REQUIREMENTS...	0.086592	0.009739	8.890966	0.0000
LIQUIDITY_REQUIREMENTS	-0.010573	0.589619	-0.017931	0.9857
RESERVE_REQUIREMENTS	2.330797	0.491507	4.742143	0.0000
LN_TOTAL_ASSETS	0.103525	0.126046	0.821332	0.4118
COST_TO_INCOME	-0.049119	0.003413	-14.38964	0.0000
LOANS_ASSETS	1.070575	0.761064	1.406683	0.1601
LOANS_DEPOSITS	-0.719244	0.109164	-6.588660	0.0000
BROAD_MONEY_ON_GDP	-0.008327	0.005360	-1.553612	0.1208
HHI_MRKT	0.966082	2.362214	0.408973	0.6827
Z_SCORE	-0.026009	0.008077	-3.220131	0.0014
DOMISTEC_CREDIT_ON_GDP	-0.011128	0.004166	-2.670794	0.0078
C	3.185815	2.229390	1.429008	0.1535

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.856306	Mean dependent var	1.363500
Adjusted R-squared	0.831779	S.D. dependent var	1.576237
S.E. of regression	0.646489	Akaike info criterion	2.100533
Sum squared resid	242.4102	Schwarz criterion	2.765547
Log likelihood	-614.1813	Hannan-Quinn criter.	2.357944
F-statistic	34.91272	Durbin-Watson stat	1.600101
Prob(F-statistic)	0.000000		

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CAPITAL_ADEQUACY_REQUIREMENTS...	0.080204	0.009931	8.076144	0.0000
LN_TOTAL_ASSETS	0.089395	0.136822	0.653368	0.5138
COST_TO_INCOME	-0.049394	0.003440	-14.35676	0.0000
LOANS_ASSETS	0.819789	0.555165	1.476658	0.1403
LOANS_DEPOSITS	-0.565810	0.093093	-6.077876	0.0000
BROAD_MONEY_ON_GDP	-0.008564	0.005611	-1.526168	0.1275
HHI_MRKT	1.404652	2.491287	0.563826	0.5731
Z_SCORE	-0.025806	0.008250	-3.127945	0.0018
DOMISTEC_CREDIT_ON_GDP	-0.010994	0.004341	-2.532357	0.0116
INFLATION	-0.007754	0.011520	-0.673093	0.5012
LN_GDP	-0.014694	0.079986	-0.183702	0.8543
C	3.957655	2.654782	1.490764	0.1366

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.850721	Mean dependent var	1.363500
Adjusted R-squared	0.825240	S.D. dependent var	1.576237
S.E. of regression	0.658935	Akaike info criterion	2.138669
Sum squared resid	251.8331	Schwarz criterion	2.803682
Log likelihood	-627.1473	Hannan-Quinn criter.	2.396079
F-statistic	33.38716	Durbin-Watson stat	1.470318
Prob(F-statistic)	0.000000		

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LIQUIDITY_REQUIREMENTS	-0.394172	0.628373	-0.627289	0.5307
LN_TOTAL_ASSETS__	-0.412379	0.129781	-3.177496	0.0016
COST_TO_INCOME__	-0.050314	0.003676	-13.68764	0.0000
LOANS_ASSETS	-0.067202	0.805406	-0.083439	0.9335
LOANS_DEPOSITS	-0.073171	0.091935	-0.795899	0.4264
BROAD_MONEY_ON_GDP	-0.006447	0.005912	-1.090436	0.2760
HHI_MRKT	0.538366	2.641504	0.203811	0.8386
Z_SCORE	-0.026365	0.008720	-3.023489	0.0026
DOMISTEC_CREDIT_ON_GDP	-0.009625	0.004578	-2.102317	0.0360
INFLATION	-0.012460	0.012131	-1.027082	0.3048
LN_GDP__	0.064410	0.084013	0.766661	0.4436
C	11.37496	2.680182	4.244102	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.834046	Mean dependent var	1.363500
Adjusted R-squared	0.805719	S.D. dependent var	1.576237
S.E. of regression	0.694763	Akaike info criterion	2.244560
Sum squared resid	279.9632	Schwarz criterion	2.909574
Log likelihood	-663.1504	Hannan-Quinn criter.	2.501970
F-statistic	29.44384	Durbin-Watson stat	1.456846
Prob(F-statistic)	0.000000		

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESERVE_REQUIREMENTS	1.753560	0.512898	3.418923	0.0007
LN_TOTAL_ASSETS__	-0.425317	0.127999	-3.322815	0.0009
COST_TO_INCOME__	-0.049803	0.003592	-13.86411	0.0000
LOANS_ASSETS	0.456490	0.577803	0.790043	0.4298
LOANS_DEPOSITS	-0.193668	0.081072	-2.388821	0.0172
BROAD_MONEY_ON_GDP	-0.006234	0.005854	-1.064927	0.2874
HHI_MRKT	0.233386	2.598124	0.089829	0.9285
Z_SCORE	-0.026254	0.008616	-3.047316	0.0024
DOMISTEC_CREDIT_ON_GDP	-0.009863	0.004531	-2.176861	0.0299
INFLATION	-0.011711	0.012017	-0.974574	0.3302
LN_GDP__	0.061464	0.082961	0.740877	0.4591
C	11.33809	2.615681	4.334661	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.837214	Mean dependent var	1.363500
Adjusted R-squared	0.809428	S.D. dependent var	1.576237
S.E. of regression	0.688099	Akaike info criterion	2.225285
Sum squared resid	274.6186	Schwarz criterion	2.890299
Log likelihood	-656.5969	Hannan-Quinn criter.	2.482695
F-statistic	30.13089	Durbin-Watson stat	1.551622
Prob(F-statistic)	0.000000		

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CAPITAL_ADEQUACY_REQUIREMENTS...	0.086499	0.009847	8.784240	0.0000
LIQUIDITY_REQUIREMENTS	-0.001671	0.592302	-0.002821	0.9978
RESERVE_REQUIREMENTS	2.325929	0.492561	4.722110	0.0000
LN_TOTAL_ASSETS__	0.099745	0.135040	0.738635	0.4604
COST_TO_INCOME__	-0.049173	0.003429	-14.34246	0.0000
LOANS_ASSETS	1.091116	0.765425	1.425504	0.1546
LOANS_DEPOSITS	-0.720554	0.109745	-6.565699	0.0000
BROAD_MONEY_ON_GDP	-0.008323	0.005515	-1.509240	0.1318
HHI_MRKT	1.343367	2.465643	0.544834	0.5861
Z_SCORE	-0.026157	0.008126	-3.218903	0.0014
DOMISTEC_CREDIT_ON_GDP	-0.011258	0.004270	-2.636676	0.0086
INFLATION	-0.006312	0.011323	-0.557431	0.5774
LN_GDP__	-0.019098	0.078836	-0.242249	0.8087
C	3.735553	2.645322	1.412136	0.1584

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.856390	Mean dependent var	1.363500
Adjusted R-squared	0.831296	S.D. dependent var	1.576237
S.E. of regression	0.647418	Akaike info criterion	2.105832
Sum squared resid	242.2687	Schwarz criterion	2.784145
Log likelihood	-613.9827	Hannan-Quinn criter.	2.368390
F-statistic	34.12664	Durbin-Watson stat	1.605196
Prob(F-statistic)	0.000000		

Model 2 ROE Regression tables from EViews12.

Dependent Variable: ROAE
Method: Panel Least Squares
Date: 06/13/22 Time: 22:11
Sample: 2006 2018
Periods included: 13
Cross-sections included: 89
Total panel (unbalanced) observations: 680

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CAPITAL_ADEQUACY_REQUIREMENTS...	0.172812	0.092827	1.861657	0.0632
LN_TOTAL_ASSETS	-0.345729	1.029909	-0.335689	0.7372
COST_TO_INCOME	-0.391538	0.032324	-12.11309	0.0000
LOANS_ASSETS	-4.006562	5.263931	-0.761135	0.4469
LOANS_DEPOSITS	-1.180585	0.884279	-1.335081	0.1824
C	36.54568	17.85017	2.047358	0.0411

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.712381	Mean dependent var	10.90817
Adjusted R-squared	0.666735	S.D. dependent var	10.89448
S.E. of regression	6.289285	Akaike info criterion	6.643269
Sum squared resid	23179.29	Schwarz criterion	7.268382
Log likelihood	-2164.712	Hannan-Quinn criter.	6.885235
F-statistic	15.60665	Durbin-Watson stat	1.114190
Prob(F-statistic)	0.000000		

Dependent Variable: ROAE
Method: Panel Least Squares
Date: 06/13/22 Time: 22:14
Sample: 2006 2018
Periods included: 13
Cross-sections included: 89
Total panel (unbalanced) observations: 680

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LIQUIDITY REQUIREMENTS	-4.275952	5.618393	-0.761063	0.4469
LN TOTAL ASSETS	-1.255762	0.941162	-1.334268	0.1826
COST TO INCOME	-0.395146	0.032779	-12.05495	0.0000
LOANS ASSETS	-8.878739	7.174559	-1.237531	0.2164
LOANS DEPOSITS	0.172918	0.825357	0.209507	0.8341
C	56.84359	16.80278	3.382986	0.0008

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.710966	Mean dependent var	10.90817
Adjusted R-squared	0.665095	S.D. dependent var	10.89448
S.E. of regression	6.304741	Akaike info criterion	6.648178
Sum squared resid	23293.36	Schwarz criterion	7.273291
Log likelihood	-2166.381	Hannan-Quinn criter.	6.890144
F-statistic	15.49937	Durbin-Watson stat	1.124776
Prob(F-statistic)	0.000000		

Dependent Variable: ROAE
Method: Panel Least Squares
Date: 06/13/22 Time: 22:18
Sample: 2006 2018
Periods included: 13
Cross-sections included: 89
Total panel (unbalanced) observations: 680

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESERVE REQUIREMENTS	1.496904	4.699034	0.318556	0.7502
LN TOTAL ASSETS	-1.180054	0.935148	-1.261890	0.2075
COST TO INCOME	-0.391269	0.032418	-12.06957	0.0000
LOANS ASSETS	-5.001439	5.263593	-0.950195	0.3424
LOANS DEPOSITS	-0.239408	0.736914	-0.324879	0.7454
C	52.56281	15.75624	3.335999	0.0009

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.710730	Mean dependent var	10.90817
Adjusted R-squared	0.664822	S.D. dependent var	10.89448
S.E. of regression	6.307310	Akaike info criterion	6.648993
Sum squared resid	23312.34	Schwarz criterion	7.274106
Log likelihood	-2166.658	Hannan-Quinn criter.	6.890959
F-statistic	15.48161	Durbin-Watson stat	1.125774
Prob(F-statistic)	0.000000		

Dependent Variable: ROAE
Method: Panel Least Squares
Date: 06/13/22 Time: 22:21
Sample: 2006 2018
Periods included: 13
Cross-sections included: 89
Total panel (unbalanced) observations: 680

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CAPITAL_ADEQUACY_REQUIREMENTS...	0.179027	0.093749	1.909648	0.0567
LIQUIDITY_REQUIREMENTS	-3.964484	5.671701	-0.698994	0.4848
RESERVE_REQUIREMENTS	2.204879	4.783411	0.460943	0.6450
LN_TOTAL_ASSESTS	-0.423367	1.037875	-0.407917	0.6835
COST_TO_INCOME	-0.394875	0.032749	-12.05752	0.0000
LOANS_ASSETS	-7.204491	7.301001	-0.986781	0.3242
LOANS_DEPOSITS	-1.017101	1.058435	-0.960949	0.3370
C	40.42741	18.84234	2.145562	0.0323

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.712781	Mean dependent var	10.90817
Adjusted R-squared	0.666059	S.D. dependent var	10.89448
S.E. of regression	6.295665	Akaike info criterion	6.647761
Sum squared resid	23147.07	Schwarz criterion	7.286174
Log likelihood	-2164.239	Hannan-Quinn criter.	6.894875
F-statistic	15.25570	Durbin-Watson stat	1.114249
Prob(F-statistic)	0.000000		

Dependent Variable: ROAE
Method: Panel Least Squares
Date: 06/13/22 Time: 23:12
Sample: 2006 2018
Periods included: 13
Cross-sections included: 89
Total panel (unbalanced) observations: 680

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CAPITAL_ADEQUACY_REQUIREMENTS...	0.252426	0.089388	2.823942	0.0049
LN_TOTAL_ASSESTS	2.405848	1.163830	2.067183	0.0392
COST_TO_INCOME	-0.387201	0.031181	-12.41796	0.0000
LOANS_ASSETS	-4.104068	5.035200	-0.815076	0.4154
LOANS_DEPOSITS	-1.449419	0.844333	-1.716644	0.0866
BROAD_MONEY_ON_GDP	-0.098287	0.049621	-1.980752	0.0481
HHI_MRKT	-1.946566	21.69990	-0.089704	0.9286
Z SCORE	-0.333960	0.074624	-4.475209	0.0000
DOMISTEC CREDIT ON GDP	-0.080737	0.038507	-2.096717	0.0364
C	16.34069	20.01653	0.816360	0.4146

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.741254	Mean dependent var	10.90817
Adjusted R-squared	0.698130	S.D. dependent var	10.89448
S.E. of regression	5.985724	Akaike info criterion	6.549244
Sum squared resid	20852.41	Schwarz criterion	7.200958
Log likelihood	-2128.743	Hannan-Quinn criter.	6.801507
F-statistic	17.18877	Durbin-Watson stat	1.160580
Prob(F-statistic)	0.000000		

Dependent Variable: ROAE
Method: Panel Least Squares
Date: 06/13/22 Time: 23:15
Sample: 2006 2018
Periods included: 13
Cross-sections included: 89
Total panel (unbalanced) observations: 680

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LIQUIDITY_REQUIREMENTS	-5.269538	5.430131	-0.970425	0.3322
LN_TOTAL_ASSETS	0.902953	1.060909	0.851113	0.3951
COST TO INCOME	-0.393111	0.031773	-12.37232	0.0000
LOANS ASSETS	-10.42549	6.956787	-1.498607	0.1345
LOANS DEPOSITS	0.429888	0.796062	0.540018	0.5894
BROAD MONEY ON GDP	-0.095859	0.049916	-1.920401	0.0553
HHI_MRKT	-3.767829	21.93998	-0.171733	0.8637
Z_SCORE	-0.336727	0.075230	-4.475948	0.0000
DOMISTEC_CREDIT_ON_GDP	-0.071410	0.038709	-1.844757	0.0656
C	47.62253	18.51659	2.571885	0.0104

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.738132	Mean dependent var	10.90817
Adjusted R-squared	0.694488	S.D. dependent var	10.89448
S.E. of regression	6.021723	Akaike info criterion	6.561237
Sum squared resid	21103.99	Schwarz criterion	7.212950
Log likelihood	-2132.821	Hannan-Quinn criter.	6.813499
F-statistic	16.91234	Durbin-Watson stat	1.176095
Prob(F-statistic)	0.000000		

Dependent Variable: ROAE
Method: Panel Least Squares
Date: 06/13/22 Time: 23:19
Sample: 2006 2018
Periods included: 13
Cross-sections included: 89
Total panel (unbalanced) observations: 680

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESERVE_REQUIREMENTS	1.429760	4.490872	0.318370	0.7503
LN_TOTAL_ASSETS	0.973641	1.059261	0.919170	0.3584
COST TO INCOME	-0.388089	0.031391	-12.36325	0.0000
LOANS ASSETS	-5.619743	5.054518	-1.111826	0.2667
LOANS DEPOSITS	-0.059378	0.709357	-0.083707	0.9333
BROAD MONEY ON GDP	-0.095986	0.049957	-1.921355	0.0552
HHI_MRKT	-6.438860	21.78919	-0.295507	0.7677
Z_SCORE	-0.332209	0.075128	-4.421898	0.0000
DOMISTEC_CREDIT_ON_GDP	-0.073593	0.038681	-1.902548	0.0576
C	42.95419	17.84062	2.407662	0.0164

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.737754	Mean dependent var	10.90817
Adjusted R-squared	0.694047	S.D. dependent var	10.89448
S.E. of regression	6.026068	Akaike info criterion	6.562679
Sum squared resid	21134.45	Schwarz criterion	7.214393
Log likelihood	-2133.311	Hannan-Quinn criter.	6.814942
F-statistic	16.87931	Durbin-Watson stat	1.177022
Prob(F-statistic)	0.000000		

Dependent Variable: ROAE
Method: Panel Least Squares
Date: 06/13/22 Time: 23:24
Sample: 2006 2018
Periods included: 13
Cross-sections included: 89
Total panel (unbalanced) observations: 680

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CAPITAL_ADEQUACY_REQUIREMENTS...	0.260322	0.090226	2.885237	0.0041
LIQUIDITY_REQUIREMENTS	-5.049657	5.462255	-0.924464	0.3556
RESERVE_REQUIREMENTS	2.516586	4.553346	0.552689	0.5807
LN_TOTAL_ASSETS	2.332644	1.167693	1.997653	0.0462
COST_TO_INCOME	-0.391706	0.031623	-12.38686	0.0000
LOANS_ASSETS	-8.268767	7.050530	-1.172787	0.2414
LOANS_DEPOSITS	-1.225070	1.011301	-1.211381	0.2262
BROAD_MONEY_ON_GDP	-0.097516	0.049656	-1.963841	0.0500
HHI_MRKT	0.619386	21.88366	0.028304	0.9774
Z_SCORE	-0.339027	0.074827	-4.530797	0.0000
DOMISTEC_CREDIT_ON_GDP	-0.079217	0.038598	-2.052336	0.0406
C	20.65131	20.65317	0.999910	0.3178

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.741851	Mean dependent var	10.90817
Adjusted R-squared	0.697788	S.D. dependent var	10.89448
S.E. of regression	5.989110	Akaike info criterion	6.552816
Sum squared resid	20804.27	Schwarz criterion	7.217829
Log likelihood	-2127.957	Hannan-Quinn criter.	6.810226
F-statistic	16.83604	Durbin-Watson stat	1.161093
Prob(F-statistic)	0.000000		

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CAPITAL_ADEQUACY_REQUIREMENTS...	0.263010	0.090308	2.912355	0.0037
LN_TOTAL_ASSETS	2.782882	1.244202	2.236681	0.0257
COST_TO_INCOME	-0.385576	0.031286	-12.32419	0.0000
LOANS_ASSETS	-3.935574	5.048438	-0.779563	0.4360
LOANS_DEPOSITS	-1.489004	0.846552	-1.758904	0.0791
BROAD_MONEY_ON_GDP	-0.108500	0.051026	-2.126355	0.0339
HHI_MRKT	-3.659542	22.65471	-0.161536	0.8717
Z_SCORE	-0.328371	0.075022	-4.376990	0.0000
DOMISTEC_CREDIT_ON_GDP	-0.073527	0.039480	-1.862397	0.0631
INFLATION	0.023894	0.104761	0.228078	0.8197
LN_GDP	-0.584658	0.727362	-0.803807	0.4218
C	25.38955	24.14147	1.051698	0.2934

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.741596	Mean dependent var	10.90817
Adjusted R-squared	0.697489	S.D. dependent var	10.89448
S.E. of regression	5.992076	Akaike info criterion	6.553806
Sum squared resid	20824.89	Schwarz criterion	7.218820
Log likelihood	-2128.294	Hannan-Quinn criter.	6.811216
F-statistic	16.81357	Durbin-Watson stat	1.161469
Prob(F-statistic)	0.000000		

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LIQUIDITY_REQUIREMENTS	-5.101662	5.454863	-0.935250	0.3500
LN_TOTAL_ASSETS	1.056046	1.126620	0.937358	0.3490
COST_TO_INCOME	-0.392222	0.031910	-12.29148	0.0000
LOANS_ASSETS	-10.22455	6.991675	-1.462389	0.1442
LOANS_DEPOSITS	0.426485	0.798084	0.534386	0.5933
BROAD_MONEY_ON_GDP	-0.100700	0.051323	-1.962101	0.0502
HHI_MRKT	-4.612683	22.93070	-0.201157	0.8406
Z_SCORE	-0.333929	0.075699	-4.411246	0.0000
DOMISTEC_CREDIT_ON_GDP	-0.067939	0.039743	-1.709464	0.0879
INFLATION	0.009015	0.105309	0.085601	0.9318
LN_GDP	-0.286097	0.729311	-0.392284	0.6950
C	52.51717	23.26646	2.257205	0.0244

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.738212	Mean dependent var	10.90817
Adjusted R-squared	0.693527	S.D. dependent var	10.89448
S.E. of regression	6.031185	Akaike info criterion	6.566817
Sum squared resid	21097.61	Schwarz criterion	7.231831
Log likelihood	-2132.718	Hannan-Quinn criter.	6.824227
F-statistic	16.52050	Durbin-Watson stat	1.176599
Prob(F-statistic)	0.000000		

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESERVE_REQUIREMENTS	1.435162	4.498545	0.319028	0.7498
LN_TOTAL_ASSESTS	1.147576	1.122658	1.022195	0.3071
COST_TO_INCOME	-0.387252	0.031507	-12.29094	0.0000
LOANS_ASSETS	-5.554840	5.067816	-1.096101	0.2735
LOANS_DEPOSITS	-0.048529	0.711073	-0.068248	0.9456
BROAD_MONEY_ON_GDP	-0.101603	0.051348	-1.978717	0.0483
HHI_MRKT	-7.230608	22.78771	-0.317303	0.7511
Z_SCORE	-0.329168	0.075565	-4.356088	0.0000
DOMISTEC_CREDIT_ON_GDP	-0.069511	0.039740	-1.749153	0.0808
INFLATION	0.008936	0.105397	0.084781	0.9325
LN_GDP	-0.337642	0.727641	-0.464023	0.6428
C	48.96848	22.94170	2.134475	0.0332

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.737863	Mean dependent var	10.90817
Adjusted R-squared	0.693119	S.D. dependent var	10.89448
S.E. of regression	6.035201	Akaike info criterion	6.568148
Sum squared resid	21125.72	Schwarz criterion	7.233162
Log likelihood	-2133.170	Hannan-Quinn criter.	6.825559
F-statistic	16.49072	Durbin-Watson stat	1.177802
Prob(F-statistic)	0.000000		

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CAPITAL_ADEQUACY_REQUIREMENTS...	0.270626	0.091197	2.967506	0.0031
LIQUIDITY_REQUIREMENTS	-4.716083	5.485495	-0.859737	0.3903
RESERVE_REQUIREMENTS	2.644117	4.561762	0.579626	0.5624
LN_TOTAL_ASSESTS	2.696749	1.250649	2.156279	0.0315
COST_TO_INCOME	-0.389812	0.031752	-12.27660	0.0000
LOANS_ASSETS	-7.807575	7.088834	-1.101391	0.2712
LOANS_DEPOSITS	-1.296280	1.016384	-1.275384	0.2027
BROAD_MONEY_ON_GDP	-0.107176	0.051074	-2.098441	0.0363
HHI_MRKT	-1.386946	22.83508	-0.060738	0.9516
Z_SCORE	-0.333376	0.075257	-4.429811	0.0000
DOMISTEC_CREDIT_ON_GDP	-0.072476	0.039543	-1.832843	0.0673
INFLATION	0.026243	0.104866	0.250251	0.8025
LN_GDP	-0.541629	0.730125	-0.741830	0.4585
C	28.56690	24.49914	1.166037	0.2441

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.742155	Mean dependent var	10.90817
Adjusted R-squared	0.697099	S.D. dependent var	10.89448
S.E. of regression	5.995936	Akaike info criterion	6.557522
Sum squared resid	20779.82	Schwarz criterion	7.235836
Log likelihood	-2127.558	Hannan-Quinn criter.	6.820081
F-statistic	16.47183	Durbin-Watson stat	1.161623
Prob(F-statistic)	0.000000		

Model 3 Z-SCORE Regression tables from EViews12.

Dependent Variable: ZSCOREREAL
Method: Panel Least Squares
Date: 06/17/22 Time: 02:48
Sample: 2006 2018
Periods included: 13
Cross-sections included: 89
Total panel (unbalanced) observations: 680

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CAPITAL_ADEQUACY_REQUIREMENTS...	1.689390	0.074589	22.64919	0.0000
ROAA	0.921841	0.474761	1.941695	0.0527
ROAE	-0.121443	0.051640	-2.351726	0.0190
LN_TOTAL_ASSESTS__	1.170538	0.775262	1.509861	0.1316
COST TO INCOME	-0.034145	0.028087	-1.215660	0.2246
LOANS ASSETS	9.066502	3.972285	2.282440	0.0228
LOANS_DEPOSITS	-0.088237	0.693552	-0.127225	0.8988
C	-0.290180	13.48359	-0.021521	0.9828

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.989295	Mean dependent var	45.11130
Adjusted R-squared	0.987553	S.D. dependent var	42.13340
S.E. of regression	4.700625	Akaike info criterion	6.063429
Sum squared resid	12903.99	Schwarz criterion	6.701842
Log likelihood	-1965.566	Hannan-Quinn criter.	6.310543
F-statistic	568.0856	Durbin-Watson stat	1.171167
Prob(F-statistic)	0.000000		

Dependent Variable: ZSCOREREAL
Method: Panel Least Squares
Date: 06/17/22 Time: 02:49
Sample: 2006 2018
Periods included: 13
Cross-sections included: 89
Total panel (unbalanced) observations: 680

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LIQUIDITY_REQUIREMENTS	1.267369	5.743909	0.220646	0.8254
ROAA	4.793323	0.607016	7.896533	0.0000
ROAE	-0.408672	0.068622	-5.955402	0.0000
LN_TOTAL_ASSESTS__	-4.964657	1.002304	-4.953247	0.0000
COST_TO_INCOME__	0.050720	0.038553	1.315571	0.1888
LOANS ASSETS	-3.650388	7.357892	-0.496119	0.6200
LOANS_DEPOSITS	10.16266	0.845985	12.01281	0.0000
C	117.3085	18.06174	6.494864	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.979893	Mean dependent var	45.11130
Adjusted R-squared	0.976622	S.D. dependent var	42.13340
S.E. of regression	6.442161	Akaike info criterion	6.693766
Sum squared resid	24236.84	Schwarz criterion	7.332179
Log likelihood	-2179.881	Hannan-Quinn criter.	6.940880
F-statistic	299.5812	Durbin-Watson stat	0.952802
Prob(F-statistic)	0.000000		

Dependent Variable: ZSCOREREAL
Method: Panel Least Squares
Date: 06/17/22 Time: 02:50
Sample: 2006 2018
Periods included: 13
Cross-sections included: 89
Total panel (unbalanced) observations: 680

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESERVE_REQUIREMENTS	-25.96520	4.787227	-5.423850	0.0000
ROAA	5.473990	0.605389	9.042110	0.0000
ROAE	-0.466618	0.067772	-6.885120	0.0000
LN_TOTAL_ASSESTS__	-4.409505	0.976718	-4.514613	0.0000
COST_TO_INCOME__	0.059243	0.037278	1.589230	0.1125
LOANS_ASSETS	-7.831029	5.279458	-1.483302	0.1385
LOANS_DEPOSITS	11.64980	0.743065	15.67804	0.0000
C	109.2709	16.69741	6.544183	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.980855	Mean dependent var	45.11130
Adjusted R-squared	0.977741	S.D. dependent var	42.13340
S.E. of regression	6.286050	Akaike info criterion	6.644704
Sum squared resid	23076.42	Schwarz criterion	7.283117
Log likelihood	-2163.199	Hannan-Quinn criter.	6.891818
F-statistic	314.9551	Durbin-Watson stat	0.977599
Prob(F-statistic)	0.000000		

Dependent Variable: ZSCOREREAL
Method: Panel Least Squares
Date: 06/17/22 Time: 02:53
Sample: 2006 2018
Periods included: 13
Cross-sections included: 89
Total panel (unbalanced) observations: 680

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CAPITAL_ADEQUACY_REQUIREMENTS...	1.651470	0.076460	21.59906	0.0000
LIQUIDITY_REQUIREMENTS	-0.760340	4.231795	-0.179673	0.8575
RESERVE_REQUIREMENTS	-8.008005	3.712073	-2.157287	0.0314
ROAA	1.219033	0.493364	2.470857	0.0138
ROAE	-0.145886	0.052786	-2.763718	0.0059
LN_TOTAL_ASSESTS	1.195630	0.778347	1.536115	0.1251
COST_TO_INCOME	-0.029992	0.028359	-1.057604	0.2907
LOANS_ASSETS	7.143924	5.509842	1.296575	0.1953
LOANS_DEPOSITS	0.631834	0.844187	0.748452	0.4545
C	0.289269	14.15538	0.020435	0.9837

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.989380	Mean dependent var	45.11130
Adjusted R-squared	0.987610	S.D. dependent var	42.13340
S.E. of regression	4.689887	Akaike info criterion	6.061307
Sum squared resid	12801.11	Schwarz criterion	6.713020
Log likelihood	-1962.844	Hannan-Quinn criter.	6.313569
F-statistic	558.9714	Durbin-Watson stat	1.151947
Prob(F-statistic)	0.000000		

Dependent Variable: ZSCOREREAL
Method: Panel Least Squares
Date: 06/16/22 Time: 18:04
Sample: 2006 2018
Periods included: 13
Cross-sections included: 89
Total panel (unbalanced) observations: 680

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CAPITAL_ADEQUACY_REQUIREMENTS...	1.640605	0.075442	21.74652	0.0000
LN_TOTAL_ASSETS	-0.286829	0.906436	-0.316436	0.7518
COST_TO_INCOME	-0.032237	0.028053	-1.149137	0.2510
LOANS_ASSETS	8.616497	3.957657	2.177172	0.0299
LOANS_DEPOSITS	0.087645	0.690993	0.126839	0.8991
BROAD_MONEY_ON_GDP	-0.002616	0.038126	-0.068627	0.9453
HHI_MRKT	-27.28781	16.81745	-1.622589	0.1052
ROAA	1.064900	0.473158	2.250623	0.0248
ROAE	-0.110702	0.051570	-2.146637	0.0322
DOMISTEC_CREDIT_ON_GDP	0.061567	0.030158	2.041503	0.0417
C	22.50342	15.38824	1.462378	0.1442

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.989506	Mean dependent var	45.11130
Adjusted R-squared	0.987735	S.D. dependent var	42.13340
S.E. of regression	4.666099	Akaike info criterion	6.052358
Sum squared resid	12649.81	Schwarz criterion	6.710722
Log likelihood	-1958.802	Hannan-Quinn criter.	6.307195
F-statistic	558.9939	Durbin-Watson stat	1.177015
Prob(F-statistic)	0.000000		

Dependent Variable: ZSCOREREAL
Method: Panel Least Squares
Date: 06/16/22 Time: 18:05
Sample: 2006 2018
Periods included: 13
Cross-sections included: 89
Total panel (unbalanced) observations: 680

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LIQUIDITY_REQUIREMENTS	2.653355	5.656324	0.469095	0.6392
LN_TOTAL_ASSETS	-7.902506	1.127689	-7.007703	0.0000
COST_TO_INCOME	0.052932	0.037823	1.399454	0.1622
LOANS_ASSETS	-2.423744	7.257312	-0.333973	0.7385
LOANS_DEPOSITS	9.752739	0.833352	11.70303	0.0000
BROAD_MONEY_ON_GDP	0.020242	0.051322	0.394419	0.6934
HHI_MRKT	-56.39946	22.73181	-2.481081	0.0134
ROAA	4.856925	0.592260	8.200657	0.0000
ROAE	-0.363351	0.067668	-5.369637	0.0000
DOMISTEC_CREDIT_ON_GDP	0.121970	0.040480	3.013115	0.0027
C	158.6410	19.51672	8.128467	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.980971	Mean dependent var	45.11130
Adjusted R-squared	0.977761	S.D. dependent var	42.13340
S.E. of regression	6.283269	Akaike info criterion	6.647492
Sum squared resid	22937.57	Schwarz criterion	7.305856
Log likelihood	-2161.147	Hannan-Quinn criter.	6.902328
F-statistic	305.6198	Durbin-Watson stat	0.967713
Prob(F-statistic)	0.000000		

Dependent Variable: ZSCOREREAL
Method: Panel Least Squares
Date: 06/16/22 Time: 18:08
Sample: 2006 2018
Periods included: 13
Cross-sections included: 89
Total panel (unbalanced) observations: 680

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESERVE_REQUIREMENTS	-25.86265	4.665643	-5.543213	0.0000
LN_TOTAL_ASSETS	-7.318681	1.102142	-6.640416	0.0000
COST_TO_INCOME	0.059720	0.036522	1.635184	0.1026
LOANS_ASSETS	-7.882086	5.162194	-1.526887	0.1273
LOANS_DEPOSITS	11.35305	0.728053	15.59372	0.0000
BROAD_MONEY_ON_GDP	0.015499	0.050031	0.309800	0.7568
HHI_MRKT	-54.25230	22.01049	-2.464839	0.0140
ROAA	5.537557	0.590090	9.384256	0.0000
ROAE	-0.421770	0.066753	-6.318380	0.0000
DOMISTEC CREDIT ON GDP	0.126736	0.039417	3.215258	0.0014
C	151.1390	18.47311	8.181567	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.981920	Mean dependent var	45.11130
Adjusted R-squared	0.978870	S.D. dependent var	42.13340
S.E. of regression	6.124590	Akaike info criterion	6.596335
Sum squared resid	21793.66	Schwarz criterion	7.254699
Log likelihood	-2143.754	Hannan-Quinn criter.	6.851171
F-statistic	321.9724	Durbin-Watson stat	0.998949
Prob(F-statistic)	0.000000		

Dependent Variable: ZSCOREREAL
Method: Panel Least Squares
Date: 06/16/22 Time: 18:10
Sample: 2006 2018
Periods included: 13
Cross-sections included: 89
Total panel (unbalanced) observations: 680

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CAPITAL_ADEQUACY_REQUIREMENTS...	1.599065	0.077335	20.67721	0.0000
LIQUIDITY_REQUIREMENTS	-0.244382	4.240622	-0.057629	0.9541
RESERVE_REQUIREMENTS	-8.482468	3.687952	-2.300049	0.0218
LN_TOTAL_ASSETS	-0.280253	0.905437	-0.309522	0.7570
COST_TO_INCOME	-0.027316	0.028315	-0.964700	0.3351
LOANS_ASSETS	7.040126	5.528772	1.273361	0.2034
LOANS_DEPOSITS	0.812773	0.842544	0.964665	0.3351
BROAD_MONEY_ON_GDP	-0.003548	0.038019	-0.093322	0.9257
HHI_MRKT	-27.57966	16.88349	-1.633529	0.1029
ROAA	1.383585	0.491774	2.813458	0.0051
ROAE	-0.136093	0.052633	-2.585695	0.0100
DOMISTEC CREDIT_ON_GDP	0.064465	0.030138	2.138975	0.0329
C	22.99552	15.77806	1.457436	0.1455

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.989602	Mean dependent var	45.11130
Adjusted R-squared	0.987806	S.D. dependent var	42.13340
S.E. of regression	4.652574	Akaike info criterion	6.048987
Sum squared resid	12533.29	Schwarz criterion	6.720650
Log likelihood	-1955.655	Hannan-Quinn criter.	6.308971
F-statistic	551.0576	Durbin-Watson stat	1.159332
Prob(F-statistic)	0.000000		

Dependent Variable: ZSCOREREAL
Method: Panel Least Squares
Date: 06/16/22 Time: 17:56
Sample: 2006 2018
Periods included: 13
Cross-sections included: 89
Total panel (unbalanced) observations: 680

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CAPITAL_ADEQUACY_REQUIREMENTS...	1.636459	0.075983	21.53720	0.0000
LN_TOTAL_ASSETS__	-0.493606	0.968191	-0.509823	0.6104
COST_TO_INCOME__	-0.033521	0.028120	-1.192058	0.2337
LOANS_ASSETS	8.713584	3.967677	2.196142	0.0285
LOANS_DEPOSITS	0.087734	0.692568	0.126679	0.8992
BROAD_MONEY_ON_GDP	0.001697	0.039131	0.043364	0.9654
HHI_MRKT	-23.03958	17.54501	-1.313170	0.1896
ROAA	1.035968	0.474827	2.181780	0.0295
ROAE	-0.107256	0.051806	-2.070358	0.0389
DOMISTEC_CREDIT_ON_GDP	0.056949	0.030938	1.840748	0.0662
LN_GDP__	0.089482	0.566651	0.157914	0.8746
INFLATION	-0.069648	0.081687	-0.852615	0.3942
C	23.42440	18.69996	1.252644	0.2108

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.989520	Mean dependent var	45.11130
Adjusted R-squared	0.987710	S.D. dependent var	42.13340
S.E. of regression	4.670894	Akaike info criterion	6.056847
Sum squared resid	12632.19	Schwarz criterion	6.728510
Log likelihood	-1958.328	Hannan-Quinn criter.	6.316831
F-statistic	546.6980	Durbin-Watson stat	1.182781
Prob(F-statistic)	0.000000		

Dependent Variable: ZSCOREREAL
Method: Panel Least Squares
Date: 06/16/22 Time: 17:59
Sample: 2006 2018
Periods included: 13
Cross-sections included: 89
Total panel (unbalanced) observations: 680

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LIQUIDITY_REQUIREMENTS	1.972631	5.656853	0.348715	0.7274
LN_TOTAL_ASSETS__	-8.789653	1.195484	-7.352380	0.0000
COST_TO_INCOME__	0.047283	0.037822	1.250132	0.2118
LOANS_ASSETS	-2.960517	7.260206	-0.407773	0.6836
LOANS_DEPOSITS	9.731413	0.832226	11.69323	0.0000
BROAD_MONEY_ON_GDP	0.044430	0.052443	0.847203	0.3972
HHI_MRKT	-48.08212	23.63560	-2.034310	0.0424
ROAA	4.713670	0.594533	7.928354	0.0000
ROAE	-0.347459	0.067895	-5.117560	0.0000
DOMISTEC_CREDIT_ON_GDP	0.101426	0.041447	2.447151	0.0147
LN_GDP__	1.306435	0.758409	1.722599	0.0855
INFLATION	-0.120248	0.109581	-1.097348	0.2729
C	138.9245	24.33928	5.707831	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.981128	Mean dependent var	45.11130
Adjusted R-squared	0.977869	S.D. dependent var	42.13340
S.E. of regression	6.267960	Akaike info criterion	6.645048
Sum squared resid	22747.36	Schwarz criterion	7.316711
Log likelihood	-2158.316	Hannan-Quinn criter.	6.905032
F-statistic	301.0206	Durbin-Watson stat	0.975136
Prob(F-statistic)	0.000000		

Dependent Variable: ZSCOREREAL
Method: Panel Least Squares
Date: 06/16/22 Time: 18:00
Sample: 2006 2018
Periods included: 13
Cross-sections included: 89
Total panel (unbalanced) observations: 680

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESERVE_REQUIREMENTS	-25.73360	4.654916	-5.528264	0.0000
LN_TOTAL_ASSETS__	-8.177581	1.166791	-7.008611	0.0000
COST_TO_INCOME__	0.054750	0.036507	1.499683	0.1342
LOANS_ASSETS	-7.788880	5.155505	-1.510789	0.1314
LOANS_DEPOSITS	11.27137	0.727300	15.49756	0.0000
BROAD_MONEY_ON_GDP	0.039049	0.051126	0.763774	0.4453
HHI_MRKT	-46.12225	22.90249	-2.013853	0.0445
ROAA	5.392805	0.592335	9.104312	0.0000
ROAE	-0.405703	0.066986	-6.056518	0.0000
DOMISTEC_CREDIT_ON_GDP	0.106407	0.040382	2.635026	0.0086
LN_GDP__	1.250114	0.737486	1.695102	0.0906
INFLATION	-0.122846	0.106803	-1.150207	0.2505
C	131.9939	23.45479	5.627588	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.982071	Mean dependent var	45.11130
Adjusted R-squared	0.978974	S.D. dependent var	42.13340
S.E. of regression	6.109453	Akaike info criterion	6.593820
Sum squared resid	21611.41	Schwarz criterion	7.265484
Log likelihood	-2140.899	Hannan-Quinn criter.	6.853804
F-statistic	317.1473	Durbin-Watson stat	1.004133
Prob(F-statistic)	0.000000		

Dependent Variable: ZSCOREREAL
Method: Panel Least Squares
Date: 06/16/22 Time: 18:01
Sample: 2006 2018
Periods included: 13
Cross-sections included: 89
Total panel (unbalanced) observations: 680

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CAPITAL_ADEQUACY_REQUIREMENTS...	1.594438	0.077893	20.46964	0.0000
LIQUIDITY_REQUIREMENTS	-0.297022	4.255674	-0.069794	0.9444
RESERVE_REQUIREMENTS	-8.536302	3.692341	-2.311894	0.0211
LN_TOTAL_ASSETS__	-0.497991	0.968211	-0.514341	0.6072
COST_TO_INCOME__	-0.028669	0.028386	-1.009977	0.3129
LOANS_ASSETS	7.083566	5.553562	1.275499	0.2026
LOANS_DEPOSITS	0.821847	0.845706	0.971788	0.3316
BROAD_MONEY_ON_GDP	0.000994	0.039017	0.025478	0.9797
HHI_MRKT	-23.17162	17.59884	-1.316656	0.1885
ROAA	1.355539	0.493216	2.748365	0.0062
ROAE	-0.132673	0.052841	-2.510779	0.0123
DOMISTEC_CREDIT_ON_GDP	0.059664	0.030893	1.931342	0.0539
LN_GDP__	0.099127	0.566439	0.174999	0.8611
INFLATION	-0.071880	0.081456	-0.882439	0.3779
C	23.87613	18.87812	1.264751	0.2065

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.989618	Mean dependent var	45.11130
Adjusted R-squared	0.987783	S.D. dependent var	42.13340
S.E. of regression	4.657111	Akaike info criterion	6.053358
Sum squared resid	12514.37	Schwarz criterion	6.738322
Log likelihood	-1955.142	Hannan-Quinn criter.	6.318491
F-statistic	539.2090	Durbin-Watson stat	1.164566
Prob(F-statistic)	0.000000		