

**MEASURING THE DETERMINANTS OF CAPITAL ADEQUACY
AND ITS IMPACT ON EFFICIENCY IN THE BANKING
INDUSTRY: A COMPARATIVE ANALYSIS OF ISLAMIC AND
CONVENTIONAL BANKS**

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Abstract

In terms of profit maximization, being efficient, is one of the key concerns of banks, the regulators are more concerned with setting the most appropriate policies and standards to optimize their role in achieving financial stability in the market. More precisely, capital adequacy standards are among the top priorities of the regulators in the banking sector. In addition, due to the unique nature of Islamic financial principles, the Islamic banks face different challenges when it comes to capital requirements and bank efficiency related issues compared to conventional banks. Therefore, this research aims to examine capital adequacy requirements and measure the key factors that may have an impact. Furthermore, this research assesses the impact of the capital adequacy requirements on the efficiency of Islamic and conventional banks in the case of the Gulf Cooperation Council (GCC) region.

Following the existing literature related to banking, this study developed two regression models; the first one was applied to examine the determinants of the capital adequacy ratio. The Data Envelopment Analysis (DEA) was used to investigate the level of efficiency, and then, the second regression model was used to examine the relationship between the capital adequacy ratio and the efficiency of the banks. The examined data are obtained from 50 banks, 25 Islamic banks and 25 conventional banks, in the GCC countries over the period between 2006 and 2015. The overall results are consistent with most of the developed hypotheses indicating that liquidity has a significant negative effect on the capital adequacy of Islamic and conventional banks. The results also confirmed that credit risk has a significant positive effect on the capital adequacy of Islamic and conventional banks. Furthermore, the results confirmed that bank profitability has a significant positive effect on the capital adequacy of Islamic and conventional banks together. Net interest income remains an insignificant association with the capital adequacy requirements of the examined banks. The results confirmed that management quality stays in a positive significant association with capital adequacy requirements in the case of both Islamic and conventional banks in the GCC region over the period between 2006 and 2015. Based on the results delivered through

the DEA method, the empirical results reveal that the efficiency of Islamic banks are less efficient than conventional banks in the GCC region. Such results could be due to the unique nature of the Islamic financial principles that impose more complexity to the Islamic financial products and operations that in turn leads to lower efficiency compared to the conventional banks. The empirical results, consistent with the developed hypothesis, reveal that the capital adequacy negatively affects the banks efficiency of the examined GCC banks. However, the results show that such effect is lower in the case of the Islamic banks compared to the conventional banks. The obtained result could be due to financial operations that are based on Islamic financial principles.

Dedication

In the name of God, the Most Gracious, the Most Merciful

I dedicate this work to my great parents, who never stop giving of themselves in countless ways.

A special dedication to my beloved wife, the symbol of love, sacrifice and giving. This work would not have been possible without her endless support and encouragement. I am truly owed to her for everything she has done throughout my life and study.

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“Allah will raise those who have believed among you and those who were given knowledge, by degrees”. *Surah al-Mujadilah* verse- 11.

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CHAPTER ONE
INTRODUCTION

CHAPTER ONE

INTRODUCTION

1.1. Research Background

The banking sector plays a vital role in the financial market through the function of intermediation by transferring deposits into productive investments (King and Levine, 1993). In terms of profit maximization, being efficient, is one of the key concerns of the banks, although the regulators are more concerned with setting the most appropriate policies and standards to optimize their role in achieving financial stability in the market. More precisely, the capital adequacy standards are among the top priorities of the regulators in the banking sector.

In the banking industry, capital adequacy is considered an essential tool for enhancing the reliability and sustainability of banking activities (Dietrich and Wanzenried, 2011). Accordingly, the Basel I, II and III regulations were introduced to increase capital requirements and adjust leverage ratios, increase the capital of the banks and the quality of that capital, as well making changes in the provisioning regulations and adjustment of liquidity standards (Jayadev, 2013). However, the trend in the banking industry for the past ten years shows that leverage has not changed significantly in the commercial banking industry. Yet, the main argument is that the losses suffered by banks during the global financial crisis of 2007-2009 were not caused by their leverage and the amount of capital they held to cushion the potential losses, however, the main cause was the quality of assets in which they invested (Kalemli-Ozcan et al., 2012). Thus, it can be stated that the regulation should focus on changes in the quality of the investments of the banks rather than the amount of the capital that banks should hold.

The Basel Committee introduced a capital adequacy regulation in 1988, which required globally active banks to maintain a minimum capital equal to eight

percent of risk adjusted assets, with capital consisting of Tier I capital (equity capital and disclosed reserves) and Tier II capital (long term debt, undisclosed reserves and hybrid instruments). This has been adopted by more than 100 countries (Jacobson et al., 2002). Accordingly, as financial intermediaries, banks are now required by regulatory bodies to maintain their capital at a specific minimum level in order to avoid and mitigate risks and bankruptcy (Jacobson et al., 2002).

In other words, the capital adequacy requirement is determined by the risk level, hence, the regulators force the banks to hold capital that is equivalent or more than the anticipated risk to be able to meet their obligations in case of a default (Appuhami, 2008). In the banking regulations, the capital adequacy ratio is determined by the capital adequacy ratio of the previous year that provides a basis for the adjustment of costs. Furthermore, the capital adequacy ratio is determined by the asset management quality. In addition, liquidity, profitability, credit risk, net interest income and management quality are considered major determinants of the capital adequacy requirement (Al-Ansary and Hafez, 2015).

On the other hand, efficiency is most commonly interpreted as being efficient in an area of work (Adams et al., 1998). It can be referred to as the process that encompasses the conversion of tangible and intangible inputs into outputs whilst being productive and making the best use of resources. In other words, it is about the maximization of the production of output while minimizing, and in some extreme cases eliminating, the costs of inputs. An entity will be regarded as efficient when it employs the best practices in using minimum resources in maximum production.

Moreover, efficiency refers to efficient use of different resources including financial, human, machines and equipment with an aim of enhancing the output and reducing the costs of an entity. It involves planning the operations of an organization tactically in order to ensure a balance exists between productivity and costs. Hence, operational efficiency helps detect uneconomical processes that drain resources and consume corporate earnings (Aggarwal and Jacques, 1998).

In other words, it deals with reducing costs and getting the most out of the available resources. It basically involves using fewer resources to produce more goods and services or maintain the same production levels using reduced resources (Cooper et al., 2003).

Banking efficiency can be grouped into four major categories. The first type of banking efficiency is known as scale efficiency. A bank is said to have scale efficiency when it operates under the range of constant returns to scale (CRS). The second type of banking efficiency is known as scope efficiency, which is usually achieved when a bank has operations efficiently in different diversified places. The third efficiency is known as technical efficiency and it is achieved when a bank makes the most of the available input level (Dabla-Norris and Floerkemeier, 2007). The last type of banking efficiency is known as allocative efficiency and it is usually achieved when a bank chooses output mixes which maximize revenue. In contrast, operational efficiency in banking is associated with various facets of its operations like profitability, financial soundness and quality customer service. The word efficiency is a combination of technical efficiency, growth and performance, profitability and productivity. The major goal of operational efficiency in banking is to attain economic growth using minimum social and technical costs.

Given the rapid growth of the Islamic banking industry, which operates based on Islamic financial principles that are derived from Islamic law, the banking regulations are rather challenging compared with their conventional counterparts. The efficiency of Islamic financial products and operations may be negatively affected because of the unique nature of these products and operations. (Ahmed, 2011). Whilst there is substantial literature that studied, analyzed and evaluated the implications of such regulations of capital adequacy on the efficiency of conventional banks, there is scarce literature on how and to what extent such capital standards may impact and influence the efficiency of Islamic banks (Hadriche, 2015).

Even though there is abundant evidence of the negative effects of capital requirements on the efficiency of banks (Lee and Chih, 2013; VanHoose, 2007; Lee and Hsieh, 2013; Akhgbe et al., 2012), alternative evidence from the existing literature suggests that tighter capital requirements set by the Basel Accord have had a positive effect on the efficiency of banks (Barth et al., 2013; Pasiouras et al., 2009). Therefore, there is a tendency towards further tighter regulation in the post-crisis period.

Accordingly, it can be argued that one of the key concerns of regulators is setting up adequate capital adequacy in order to sustain stability in the market. Furthermore, taking into consideration that the efficiency is the most crucial matter for banks, it is important to explore the factors that impact capital adequacy and its association with the efficiency of Islamic banks in a comparative manner with conventional banks, which is the main focus of this study.

1.2. Motivation of the Study

The key purpose of setting capital regulations in the banking sector is to ensure that, adequate capital is in place to ensure that banks are in a position of meeting their financial obligations in a timely manner to prevent any potential bankruptcy. In particular, during stressful times, capital adequacy provides a cushion for banks in the event of a shortfall and it helps the bank to meet its obligations when they fall due. The capital requirement helps the banks in sustaining confidence in all stakeholders. Furthermore, the evidence from the existing literature substantially suggests that the capital regulations have a direct and significant impact on the efficiency of banks. While the existing literature has substantially discussed these issues in conventional banking, it lacks evidence on the effect on Islamic banks. Therefore, exploring the determinants of the capital requirement ratio is one of the important issues that need to be extensively explored and analyzed. Furthermore, examining the effect of the capital requirements on the efficiency of banks is crucial to the banking sector as a whole and in particular to the Islamic banking sector, which is the key motivation for this research.

1.3. Research Aims and Objectives

The aim of this research is to measure the factors that determine the capital adequacy ratio and assess the impact of the capital requirements on the efficiency of Islamic banks in a comparative manner with conventional banks in the case of the GCC countries. In order to fulfill the research aims, the objectives of the research are developed as follows:

- (i) To measure the capital requirements ratio of Islamic banks in comparison with conventional banks in the case of the sampled banks.
- (ii) To measure the efficiency of Islamic banks in comparison with conventional banks in the case of the sampled banks.
- (iii) To investigate the determinants of capital adequacy ratio of the examined banks.
- (iv) To examine the impact of the capital adequacy ratio on bank efficiency of the assessed banks.

1.4. Research Questions

In order to fulfill the research aims and objective, this study attempts to answer the following questions:

- (i) Are there any differences in the regulations regarding capital adequacy between Islamic and conventional banks?
- (ii) Are there any differences in the ratio of capital requirements between Islamic banks and conventional banks?
- (iii) Are there any factors/problems that could affect the efficiency of Islamic banks compared to conventional banks?
- (iv) What are the factors that could affect the ratio of capital requirements in Islamic and conventional banks?
- (v) To what extent does the ratio of capital requirements affect the efficiency of Islamic and conventional banks?

1.5. Summary of Research Methodology

Based on the nature of this study and due to the research aims and objectives, this research will adopt positivism as a philosophical position and accordingly the quantitative approach is applied. Based on such a philosophical stand and methodological approach, this study identifies that explanatory design and deductive strategy will be used to answer the research questions. Furthermore, secondary data is identified as the most appropriate for testing the research hypotheses. The research sample consists of 50 banks from the GCC region between 2006 and 2015. As for the data analysis, this study will analyze the data by conducting regression analysis using SPSS software.

1.6 Problem statement

A detailed review of existing literature reveals the abundance of research that has been carried out in the domain of capital adequacy requirements and their consequent impact on bank efficiency; however, there are material research gaps that still exist. These primarily pertain to the assessment and evaluation of the phenomenon in the context of the GCC countries where Islamic banking is experiencing phenomenal growth. There is little or no recent research evidence that measures the determinants of capital adequacy in the GCC region and the influence such variables may have on the efficiency of financial institutions. Furthermore, the existing literature on the research topic offers conflicting viewpoints and varied conclusions. This adds to the overall confusion as it cannot be stated with empirical certainty how the capital adequacy requirements will impact the GCC financial institutions. Hence, there is a need to empirically explore the phenomenon in the context of the GCC to better understand how the variables function.

Academic efforts have mainly concentrated on conventional banking and regulatory efforts (such as the BASEL conventions) have also kept conventional banking at its epicenter. There is therefore little or no research evidence that focuses on the implications of capital requirements for the different types of

financial institutions that exist. There is therefore a need to bridge this research gap and to this end the study is conducted to understand and assess how the same capital adequacy requirements may impact the conventional and Islamic banking institutions. The implications for Islamic institutions are far more pervasive given the additional restrictions mandated by the Islamic jurisprudence.

1.7. Research Contribution

Taking into consideration the challenges faced by the banking sector, and by Islamic banks in particular, in sustaining their solvency in the market as well as maintaining their efficiency, understanding the capital adequacy ratio and the factors that determine such a ratio is crucial. Furthermore, examining the impact of the capital ratio on bank efficiency is critical in order to determine whether setting restricted requirements may have positive or negative effects. Therefore, based on the research aims, objectives and questions, this research will extend the existing literature through investigating the determinants of the capital requirement of Islamic and conventional banks. Moreover, this research will provide empirical evidence of the effects of capital adequacy requirements on banking efficiency in the case of the Gulf Cooperation Council (GCC) region and will expand the literature on capital adequacy as well as bank efficiency, particularly within developing countries, as most of the studies currently focus on developed countries. As for the banking industry, this study is expected to highlight the key factors that banks need to take into consideration when regulating the capital requirement, which will help them to set more comprehensive and more adequate capital standards that will enhance their capacity in absorbing risks and will boost their ability to meet their financial obligations in a timely manner. Furthermore, this study will empirically provide evidence of the efficiency of Islamic and conventional banks in a comparative manner that is expected to highlight the gaps in their performance, which is particularly crucial in the case of Islamic banks. Moreover, for banking customers, this study will highlight the most efficient banks in the market that will affect their behavior in making their decisions when depositing and investing their funds. This, in turn, will incentivize

the banks, whether Islamic or conventional, to follow the best practices in relation to capital requirements as well as their operations to optimize their efficiency, which is expected to positively contribute to the welfare of all stakeholders in the banking industry.

1.8. Summary of Research Results

This study, in the first empirical section in Chapter Six, provides empirical evidence of the association between capital adequacy requirements and its determinants, including asset quality management, liquidity, management quality, credit risk, profitability, changes in net interest income and bank size of 50 banks, 25 Islamic banks and 25 conventional banks, in the GCC countries over the period between 2006 and 2015. The overall results are consistent with most of the developed hypotheses indicating that liquidity has a significant negative effect on the capital adequacy of Islamic and conventional banks. The results also confirmed that credit risk has a significant positive effect on capital adequacy of Islamic and conventional banks, however, the results confirmed an insignificant association in the case of Islamic banks when the regressions were conducted based on industry. The results confirmed that the bank profitability has a significant positive effect on capital adequacy of Islamic and conventional banks together, yet, significant only in the case of Islamic banks when the industry- based regressions were conducted. Net interest income remains in an insignificant association with capital adequacy requirements of the examined banks. The results confirmed that the quality of management stays in a positive significant association with capital adequacy requirements in the case of both Islamic and conventional banks in the GCC region over the period between 2006 and 2015.

In addition, this research, in Chapter Seven, investigates the assessment of the capital adequacy regulation on the efficiency of 50 banks, 25 Islamic banks and 25 conventional banks, in the GCC countries over the period between 2006 and 2015. Based on the results delivered through the DEA method, the empirical results reveal that the efficiency of Islamic banks are less efficient than conventional banks in the GCC region. Such results could be due to the unique

nature of the Islamic financial principles that impose more complexity to the Islamic financial products and operations that in turn leads to lower efficiency compared to the conventional banks. The empirical results, consistent with the Hypothesis H7, reveal that capital adequacy negative affects the efficiency of the examined GCC banks. However, the results show that such an effect is lower in the case of Islamic banks compared to conventional banks. The obtained results could be due to financial operations that are based on Islamic financial principles.

1.9. Thesis Overview

This thesis consists of eight chapters, which are detailed as followings:

Chapter One: Introduction, starts with the background of the research and then highlights the rationale and motivation of conducting and choosing the study in the question. This chapter, furthermore, outlines the research aims and objectives followed by the research questions. Then, this chapter summaries the research methodology and highlights the significance of the research by providing the contributions that this study is expected to achieve. The key findings of this research are summarized to provide a brief on the empirical evidence obtained in this investigation. This chapter concludes with the provision of an overview of the Thesis.

Chapter Two: Capital Adequacy Requirement: A Conceptual Understanding, begins with providing a conceptual understanding of the capital adequacy requirement. This chapter then highlights the importance of setting capital requirements in the banking sector. After providing the duties of bank management towards the capital requirement and the challenges that face Islamic banks in implementing the capital requirements, this chapter, furthermore, provides an overview of the Basel Committee and ends with a conclusion.

Chapter Three: Efficiency in Banking Industry: A Conceptual Understanding, provides a conceptual outline of efficiency in the banking sector. It also highlights the conceptual differences between efficiency and other related concepts, such as

productivity and effectiveness. Then it outlines types of efficiency in the banking sector followed by an explanation of measurement approaches that are used in the banking industry, such as financial ratios methods, quantitative methods and the CAMELS approach (**C**apital Adequacy, **A**ssets Quality, **M**anagement Quality, **E**arnings, **L**iquidity and **S**ensitivity). This chapter, then, provides an understanding of the factors that affect banking efficiency.

Chapter Four: Literature Review and Hypotheses Development, after a brief introduction, this chapter delineates the basic concepts of capital adequacy and capital structure. Then it sheds light on the function of capital and outlines the determinants of the capital adequacy ratio and the expected hypothesis. Moreover, it explores the association between capital adequacy and bank efficiency and develops the research hypotheses. In conclusion, this chapter highlights the gaps in the existing literature, which is the key motivation of the current research.

Chapter Five: Research Methodology, provides the research methodology that is applied in conducting this study. It starts by explaining the key research philosophies related to the research in question and justifies the philosophical position taken in this study. Furthermore, this chapter outlines the research approach that has been employed in this study followed by the explanation of the research design and strategy that have been used and the reasons for choosing them. Then this chapter highlights the research methods of collecting and analysing the data. After that, this chapter provides the definitions and measurements of the examined variables followed by an explanation of the modelling process. Then this chapter concludes by highlighting the challenges of conducting this study.

Chapter Six: Measuring the Determinants of Capital Adequacy, provides the empirical results of capital ratio of Islamic banks compared to conventional banks. It further outlines the factors that affect the capital requirement ratio in the case of the GCC banking sector.

Chapter Seven: Assessing the Impact of Capital Adequacy on Bank Efficiency, compares the efficiency of Islamic banks compared to conventional banks.

Furthermore, it provides the empirical results of the association between the capital ratio and the efficiency of the GCC banking sector.

Chapter Eight: Conclusion, summaries the main findings and provides a critical reflection on them. Then this chapter highlights the potential policy implications and recommendations. Furthermore, this chapter discusses the limitations of the study and highlights the gaps left in the existing literature that points to the needs for future research.

CHAPTER TWO

CAPITAL ADEQUACY REQUIREMENT:

A CONCEPTUAL FRAMEWORK

CHAPTER TWO

CAPITAL ADEQUACY REQUIREMENT: A CONCEPTUAL FRAMEWORK

2.1. Introduction

The key function of the banks is the transformation of the money provided by creditors and the customer deposits into investments or loans or financing activities. Accordingly, banks are required to be sure that they hold sufficient capital to cover their financial obligations in a timely manner. The capital reserves, that have been set in line the financial obligations of the banks in the event of a financial crisis. Hence, having such a requirement is crucial to maintain their operations. For instance, during the period of the financial crisis of 2007-2009 that led to the closure of many banks around the world, if the capital requirement had been present the banks would not have been in such a critical position (Avery and Berger, 1991).

As for the structure of this chapter, it begins with providing a conceptual understanding of the capital adequacy requirement. Then this chapter highlights the importance of setting a capital requirement in the banking sector. This chapter then provides the duties of bank management towards the capital requirement and the challenges that face Islamic banks in implementing the capital requirements. This chapter, furthermore, provides an overview of the Basel Committee and ends with a conclusion. The study will then focus on showing the determinants and applicability of the capital adequacy requirement in the conventional banking sector and the Islamic banking system.

2.2. The Concept of Capital Adequacy

The capital adequacy requirement has played a central role in the banking industry for several decades. The capital adequacy requirement refers to a legal obligation

set by the authorities that forces banks to hold a certain level of capital that can be used in the instances of financial shortfalls.

The main purpose of setting a capital requirement is to protect the shareholders of the banks by ensuring that all financial obligations can be met in a timely manner to prevent the liquidation of the bank in case of a default (Altman et al., 2002). Therefore, the capital adequacy requirement ensures that a bank is properly managed and establishes a safe and effective market environment that provides the protection not only for shareholders but also to all customers, depositors, the government and the economy as a whole.

The key function of the Basel committee was to publish the requirement on banking supervision. As a result, the Basel Accords were put in place with the international effort to establish rules and policies related to the capital adequacy requirement. Hence, it can be stated that the capital adequacy requirement involves rules, and policies put in place to insure the stability of the banking sector.

The capital adequacy requirement was initially prepared through the consideration of two standards. Firstly, it considered the leverage level, which refers to the specific amounts of debt and equity that should be held by a bank. Secondly, the requirement addressed the risk-based capital ratio to identify the percentage of risk that should be held by a bank against the equity of the shareholders. The aim was to provide a directive in which the banks should measure their financial health that led to a capital measurements system, which should be used by the respective banks.

Basel I was established in 1988 to facilitate the measurement followed by Basel II that was established in June 2004 .Evaluation shows that the approach was very effective because it was more comprehensive than Basel I (Cantor, 2001). However, due to some shortcomings of Basel II, Basel III was developed with an explained for enforcing it between 2013 and 2020. Therefore, Basel II details the current capital measurement tool and that incorporates Tier I and Tier II capital. Tier I capital has been incorporated to consider the shareholders in the banking sector. Therefore, it refers to the amount paid to purchase the original stock of the

bank. It is a major indicator of the capital strength of the bank. Precisely, the capital refers to the common stock and disclosed earnings (Shehzad et al., 2010). In addition, Tier I capital includes the non-redeemable and non-cumulative preferred stocks, hence, the requirement directs that the total Tier I capital level should not be less than 4 per cent.

On the other hand, Tier II capital refers to the supplementary capital, which constitutes the undisclosed reserve, general loan-loss reserve and revaluation reserve among others. The purpose of setting up such a requirement is to prevent unexpected losses in the bank. Precisely, Tier II capital serves as a cushion to approach the unexpected surprises in comparison to the expected losses, which are settled by provisions. The requirement states that the undisclosed reserves should be accepted by the supervisory authorities of the banks (Choi, 2000). Moreover, Tier II capital is tied to the revaluation reserve, where the requirement demands that the banks should consider any asset revaluation as capital as some of the assets, which undergo revaluation, including Land and building. Therefore, the excess amount is considered as capital. Differently, Tier II capital involves the general provisions that have been established by the requirement to protect the banks from the instances of losses (Kahane, 1977). Specifically, they serve as a cushion for any losses, which might be suffered by the entity. The requirement states that the provisions should be limited to 1.25 percent of risk weighted assets. Furthermore, the requirement directs that Tier II capital should consider the hybrid instruments as capital. These are financial instruments with the characteristics of debt and equity capital. More specifically, they involve a perpetual preferred stock and a cumulative fixed charge. In addition, the requirement states that Tier II capital should consider short-term debt such as capital. However, it limits its recognition among the banks to those with an economic life of more than five years.

The nature of Islamic finance and Islamic banking products imply that the requirements for capital adequacy may not be replicated in a fashion similar to conventional banking. On conceptual grounds it may be argued that the equity based capital structure of the Islamic banks that comprises of investment deposits

based on profit and loss sharing (PLS) and the dominance of shareholders' equity differentiates it from conventional banks (Muljawan, Dar and Hall, 2004). If for argument purposes it is assumed that the Islamic banks function and are structured on the basis of pure PLS arrangements there would be no need for determining the capital adequacy requirements for such banks. However, the fixed claim liabilities do exist on an Islamic bank's statement of financial position courtesy of the risk aversion by the investors and the presence of informational asymmetry that results in a need to determine the capital adequacy requirements for such banks (Muljawan, Dar and Hall, 2004).

The implications of the nature of the Islamic finance products on the CAR of Islamic banks when compared to conventional banks are studied by Spinassou and Wardhana (2018). The authors comment that the recent implementation of Basel III capital framework and the large use of profit-sharing investment accounts (PSIA) in Islamic banking have resulted in implications for leverage ratio and risk-weighted capital ratios. Resultantly, courtesy of the less competitive environment the enactment of the capital requirements has created an incentive to opt for Islamic banking as it has led to better stability. The PSIA acts as loss-absorbing instrument which is not available in the case of conventional banks. It therefore improves the CAR of Islamic banks which is one of the many reasons why Islamic banks are observed to have higher CAR.

2.3. Importance of Setting a Capital Requirement in the Banking Sector

Bank capital plays an integral role by providing a buffer in the event of cash shortfalls when the bank may lack adequate cash to undertake its activities. Therefore, the bank may rely on the capital to offset the condition. The shortage impacts greatly on the primary stakeholders in the bank. Bank capital offers a degree of protection for the customers of the bank as knowledge of financial holdings give confidence to those customers to engage with the services offered. Therefore, bank capital protects the bank from losing its investors (Rojas-Suarez, 2001)

It is clear that the investors in any entity employ their funds hoping that the investment will attract good returns. Unfortunately, during economic turmoil, if a bank does not undertake effective operations it may lead to lower income especially to the common stockholders. Therefore, bank capital is employed at such a time to boost the operations of the bank so that profits may not be affected. In addition, having the required capital ensures that all borrowed funds are effectively used in the bank, which provides protection for the creditor demands in a timely manner. Furthermore, the capital of the bank provides protection for the principal amount of the investors when the bank is forced by law to close due to high debts in the market. Statistics show that 60 per cent of the global banks have applied capital at such instances where they have restored their position in the market.

Holding bank capital allows the board of directors to undertake less risk than they might do with other sources of capital. It is a practice where the management will consider investing with low capital high yield investments to ensure that the capital of the bank is safe as they fear to invest in several high-capital high-yield contracts fearing that a particular contract may fail meaning that the banks' capital will be used (Goodhart and Persaud, 2008). Unfortunately, if two contracts fail, the capital may completely be used meaning that the bank can easily be liquidated. Therefore, the capital allows them to operate effectively as it signals to the investors that the management will not undertake risky activities. Therefore, the financial authorities force the banks to hold a certain amount of capital to prevent any financial crisis damaging the welfare of the stakeholders.

The capital adequacy ratio plays an essential task in assessing the strength of the banking system. Importantly, the ratio ensures that the bank has an adequate potential to absorb relevant losses. Furthermore, the ratio helps in protecting the interests of the depositors as well as the societal reputation of the bank. Therefore, the ratio ensures that the bank can meet its financial obligations in a timely manner.

In this regard, it is crucial to elaborate the factors that affect setting the capital requirement ratio. First, the risk level of a bank affects the capital adequacy ratio

(Peura and Jokivuolle, 2004). This means that the size of risk undertaken by the bank should be less than the amount of held capital. The requirement implies that when the bank holds a high level of capital, it can engage in high debt investments to ensure that the shareholders capital is safe. Similarly, banks that hold low capital should not seek very risky debts to avoid exposing the bank to liquidation. Furthermore, the capital adequacy ratio for the previous year affects the ratio of the current year, which allows adjustments so that the ratio can be objective to the current obligations of the bank. Such determinants facilitate efficiency and effectiveness in the operation of the bank to generate profits. Another factor that affects the capital requirement, is the amount of the debt that banks have as they are required to hold more capital than their debts to ensure that they can honor them in the event of default. Equally, the return on the alternative cost of capital affects the capital adequacy ratio, which implies that when the bonds and debt ratio of the bank attract high returns to the investors, it should hold a high amount of capital as the bank may not be able to make appropriate returns at the end of every financial period where such a condition undermines its capability to pay the creditors as well as declaring dividends to equity stockholders (Peura and Jokivuolle, 2004). Therefore, the bank should hold sufficient capital to meet the interest payments due to the creditors.

Furthermore, the average capital adequacy of the sector is considered another key factor that affects the capital adequacy ratio. It is a point where the information disclosed to the investors in the community influences their decision on the amount which they are going to invest. Hence, the amount of capital held by the bank allows them to utilize low funds or high funds. For instance, when the bank holds a high level of capital, it will positively impact the investors (Altman and Saunders, 2001).

2.4. Risks Related to Capital Reserve

Given the complex nature of the banking operation, banks may face different type of risks that directly affect their capital reserves. The operational risk is a critical type of risk that has a direct impact on the capital of the banks. For instance if the

management is not competent, it may lead to conducting risky activities that may lead to the bank's liquidation. Therefore, it is important to source an effective manager who will ensure that the banks operations are effectively undertaken.

Theft or fraud is another source of risk that has a direct impact on the bank capital. The operations of the bank are highly influenced in the case of fraud because the cash flow is not effective to realize relevant returns (Wirch and Hardy, 1999). In addition, bank capital can be negatively affected by a low rate of return. A low rate of return may lead the bank to cover their financial obligation by using their reserves.

Furthermore, having a bad reputation can be another source of risk that may affect the bank capital. If the bank has a poor reputation in the market it might face difficulties in obtaining loans that would incentivize it to use its reserves to meet its financial obligation that will dramatically reduce its capital (Kim and Santomero, 1988). Furthermore, in the case of a credit default, the bank may use its reserves to meet its obligations. Market risk has a direct impact on the bank capital. For instance, if the inflation rate increased, the value of the held capital might essentially depreciate; thus, lowering the value of the held capital.

A loss of reputation in society can be another issue that will put the bank in a weak position and lower attractiveness to customers, which may lead to a lower profitability. Furthermore, the retained earnings of the bank may not be adequate leading to low dividends for the shareholders (Repullo, 2004). In addition, in the event of a high interest rate, the bank may be forced to use the capital to offset their obligations. Similarly, when the creditors expect fixed returns within the stated period, the bank can only rely on the capital to meet such obligations if the returns are not sufficient. Therefore, these practices reduce the amount of the capital held by the bank (Rime, 2001). Therefore, it can be stated that amount of the capital that bank holds can be at risk of decrease at any time that would put it in an illegal situation in regard to the capital adequacy regulations.

2.5. Bank Management Obligations toward the Capital Adequacy Requirement

The capital adequacy requirement has essentially been implemented to ensure that the capital of the bank is safely and optimally kept. The concept implies that the capital should always be retained by the banks to meet their financial obligations. Hence, firstly, the management is required to uphold general provisions. The task is given to the accounting department where the accountants should ensure that there are provisions for bad debts among other financial crises. In a more critical review, the requirement strengthens the supervision of capital adequacy in commercial banks so that they can operate safely and sound manner (Keeley and Furlong, 1990). The regulatory bodies require bank management in commercial banks to establish an effective workplace culture which will ensure that the capital of the bank is well accounted for. Secondly, the bank management is required to calculate and measure the capital adequacy ratio. Furthermore, the banks are required to develop accurate measurements to regularly assess their capital ratio that signals the financial health of the bank. Most of the banks rely on the following equation to determine their capital strength: $\text{Capital Requirement} = (\text{Tier I capital} + \text{Tier II capital})$ to risk-weighted assets. The management is required to make a regular review of the capital adequacy interventions. The concept defines that the board of directors should clearly define the objectives of the capital in the memorandum of association (Jagtiani et al., 1995). Any objective which is stated in the memorandum should be adhered to, to avoid the legal liability of the bank. Therefore, the approach plays an imperative role in protecting the capital of the bank. Further, the management should make rules and policies for the stressful issues for the bank so that the capital can optimally be employed. The management is also required to support effective disclosure mechanisms that provide the basis on which the financial information of the bank should be disclosed to the public. The aim is to ensure that the information is factual and understandable to the public (Dietrich and James, 1983). Further, the regulation forces the management to prepare the information based on the international financial reporting standards to facilitate objective decisions which allows the bank to merit maximum

profitability. The regulation requires the management to support supplementary provisions. Precisely, the regulations demand that the management should clearly define the capital of the bank as the investors are usually attracted by a bank, which maintains a high level of capital as they view it an adequate security. Importantly, the provision should define the risk weight on the balance sheet assets where the management should define the manner in which the assets are held in respect to its debt.

2.6. Challenges in Implementation of the CAR for Islamic Financial Institutions

According to the Islamic banking system, all deposits are mainly modeled based on profit and loss sharing. This means that if any losses occur, they should be equally shared among the parties; the banks and customers, which is not the case for their conventional counterparts (Rochet, 1992). Secondly, the implementation of the capital adequacy requirement is constrained by some complications that are imposed in an Islamic banking statement of financial position due to complexity of Islamic financial products and operations. For instance, the restricted *Mudarabah* transactions are treated off-the-balance-sheet. Precisely, the Islamic banking statement of financial position ignores most of the off -balance sheet elements. Besides, some of its components should not be included in the statement in agreement with the directives of the Basel accords. Furthermore, the implementation of the CAR is made difficult by the fact that the Islamic banking system relies heavily on equity capital. Therefore, it is challenging to ascertain the capital adequacy ratio. Accordingly, it can be stated that due to the unique nature of Islamic finance, the Islamic banks face difficulties in calculating a precise capital adequacy ratio. As a result of such complexity in the nature of Islamic

finance and the difficulties in assessing the required capital ratio, the regulatory bodies encourage Islamic banks to hold larger amounts of capital compared to conventional banks (Cecchetti and Li, 2008). Consequently, holding high amounts of capital boosted the Islamic banks' risk absorption that strengthened their position in the market so they were seen as safer banks compared to conventional ones. This strengthened position led in return to enhance their financial performance and expanding their customer base market in the global market (Chiu et al., 2008).

Islamic banks prepare their financial statements in accordance with the accounting standards issued by Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI) (Muljawan, Dar and Hall, 2004). In short, this approach favours the 'form over substance' of transactions as opposed to the 'substance over form' treatment prescribed by the International Accounting Standards (IAS) (Muljawan, Dar and Hall, 2004). Hence, whilst it may appear that the capital ratio for both the banks is being computed using the same formula comprising the same components and determinants, the outcomes may not be totally comparable as the underlying principles used in the recognition, measurement, and disclosure of the assets, liabilities, and equities vary.

Ariss and Saredine (2007) study the challenges in implementing capital adequacy guidelines to Islamic banks. The fundamental challenge that persists is the implementation of Pillar 1 of the Basel II Accord, or the capital adequacy requirements that were originally set to capture different types of risks faced by conventional banks, and that do not cater to the risk specificities of Islamic banks. The use of Islamic financial institutions funding raises serious issues related to the nature of risks which are unique to this type of banking. Determination of risk-weighted assets is an essential prerequisite to determining the CAR. Where market, operational, and credit risks cannot be captured accurately due to the

nature of Islamic finance products the use and interpretation of the standard capital adequacy ratio is seriously compromised (Ariss and Sarieedine, 2007).

2.7. The Basel Committee and Capital Adequacy

The Basel Committee on Banking Supervision (BCBS) was established in 1974 and initially consisted of the heads of central banks of the Group of Ten countries: France, Germany, Belgium, Italy, Japan, the Netherlands, Sweden, the United Kingdom, the United States, Canada and Switzerland. The membership of the committee has expanded since 1974 and now comprises of the central bank governors of 28 countries (Bank for International Settlements, 2014). BCBS aimed to improve banking stability and enhance cooperation amongst members for banking supervision (Bank for International Settlements, 2014). It is worth mentioning that the decisions and regulations of the Committee are not legally binding and act as mere recommendations to improve banking regulation (Bank for International Settlements, 2014).

The Committee stresses the need for regular supervision, timely intervention, as well as compliance with regulatory standards, as a way to improve the functioning of the entire economy (Bank for International Settlements, 2014). The Basel Agreements I, II and III are recommendations of banking regulations by the Basel Committee to be implemented by the central banks of its member countries.

2.7.1. Basel I

The Basel Capital Accord (Basel I) was the first report published by the BCBS in July 1988 (Basel Committee on Banking Supervision, 1988) to solve the problem of a need of a minimum capital requirement for banks. The document was issued after extensive deliberations with the central bank governors of the G10 countries.

The Basel I regulations were the first documents to recommend a minimum amount of capital that banks should be required to hold. This minimum capital is commonly known as the minimum risk-based capital adequacy and is based on the total capital base and asset base of the bank. This development of a minimum

capital amount has been crucial in the development and improvement of financial risk management across the banking and financial industry. Basel I was aimed at enhancing the stability of the existing international banking system and to encourage unity of banking regulations across the member countries of the BCBS committee and to reduce competitive inequality amongst international banks. The regulations were implemented by the end of 1992. Basel I is the first set of banking guidelines that clearly defines the credit risk of bank and classified it through three categories, namely: Risky assets on balance sheet; trading assets being held off-balance sheet and Non-trading assets held off-balance sheet (Basel Committee on Banking Supervision, 1988).

The Committee determined the capital requirement of a bank via the use of ratio that compares a bank's capital with risk-weighted assets. This ratio is now commonly known as the capital adequacy ratio (CAR) and is commonly used to restrict the bank from over-leveraging itself and exposing itself to the risk of insolvency. The CAR is used by central banking regulators to ensure that banks are capable of absorbing minor losses without leading to economic distress in the country.

In addition, Basel I recommends a CAR of 8 per cent for banks, which have an international presence, based on its risk weighted assets. The CAR of 8 per cent is inclusive of (Tier I and Tier II) capital requirements, where Tier 1 capital is expected to take unreasonable amounts of losses and comprises of shareholders equity and disclosed reserves (Basel Committee on Banking Supervision, 1988).

Setting a target CAR helped to provide a baseline for future comparisons between individual countries' CAR requirements. Not only it did help to establish clear guidelines for regulators to monitor bank exposure and stability, it also helped the public to compare banks for their personal requirements. The recommendation of a target CAR is one of the methods by which the BCBS fights for the convergence to the international banking practices ((Basel Committee on Banking Supervision,1988).

The agreement clearly defines capital and highlights its different components. Due to various accounting practices that can lead to the creation of off-balance sheet items, Basel I divides Capital to Tier I and Tier II.

Tier 1 capital is fixed capital of the bank and comprises of owner equity, stock issues, declared reserves of the firm and is meant to smooth out financial shocks from losses or income fluctuations. The Tier I capital ratio is calculated by dividing Tier 1 capital by the weighted assets of the banks (Basel Committee on Banking Supervision, 1988). On the other hand, Tier II capital, which is also known as Supplementary Capital considers undisclosed reserves, debt-securitized assets, long term debts with a maturity of over five years and other general provisions and deductions from capital that can act as hidden reserves. It is worth noting that short-term unsecured debts were not included in the definition of the capital. The Tier II capital ratio is calculated by dividing Tier II capital by risk-weighted assets. The purpose of including Tier II capital is to ensure an additional layer of security for banks without liquidation effects if the losses overtake the amount of the Tier I capital (Basel Committee on Banking Supervision, 1988).

Furthermore, Basel I developed a measure for risk-weighted assets in order to ensure a similarity across international borders. The Committee acknowledges the numerous risk factors that can affect the risk factor of a company, but focuses primarily on country transfer risk in developing its framework (Basel Committee on Banking Supervision, 1988). Basel I calculates asset risk weights on the basis of their credit risk. Accordingly, assets like cash deposits, gold bullion and other precious metal bullion and home country treasury bills are classified as having a 0% weighting. Similarly, AAA rated mortgage-backed securities are weighed at 20%, whereas residential mortgages have a weight of 50%. The final and most risky weight of 100% is assigned to corporate debt. The Basel Accord I also requires the disclosure of off-balance sheet items to improve banking transparency and suggests the inclusion of such items into the CAR. These items are referred to the Tier II capital of the institution and are risk-weighted in accordance with predetermined classifications (Basel Committee on Banking Supervision, 1988).

However, Basel I was criticized as it lacked the ability to differentiate between various lending on the basis of their individual credit risks. The Accord encourages the unanimous application for all assets in a single asset class (Jaime Caruana, 2008) without taking into consideration that different organizations have different levels of counterparty risk that affect the credit risk. Furthermore, Basel I Accord did not mention other types of risks that affect the stability and solvency of banking institutions like market risk, strategic risk, operational risk and reputation risk (Basel Committee on Banking Supervision; Jaime Caruana, 2008). In addition Basel I fails to take into consideration the impact of holding a diversified portfolio and assumes similar risk profiles to banks irrespective of their lending patterns across sectors and geographical regions (Perez, 2014). Furthermore, while the Accord touches on the issue of off-balance sheet items, it did not delve more into the topic of debt-securitization. The securitization risk of banks has increased quickly since the implementation of Basel I and gives a way out of the regulation that has been frequently exploited by banks (Peterson Institute for International Economics, n.d.).

2.7.2. Basel II

Accordingly, due to such shortcomings, the Basel Accord II was published in June 2004 to cover the weaknesses in Basel I (Basel Committee on Banking Supervision, 2004). Basel II was documented to amend the recommendations to capital requirement, thereby improving the adaptability of the guidelines. The implementation of Basel I and the following response from various financial institutions (Bank for International Settlements, 2001-10), along with the changing banking environment led to the development of the Second Accord, which was to be completely implemented by the end 2008. However, the financial crisis of 2007-2008 impeded the complete adoption of Basel II.

Apart from improving upon the framework laid down in Basel I, Basel II was fundamentally driven to improve risk management practices in the industry. The Second Accord was developed to reflect the opinion of the Basel Committee on Banking Supervision (BCBS) that banks, which were exposed to more risk, have to ensure greater capital reserves and improve capital allocation. The accord also

aimed at creating a universal technique for measuring credit risk, operational risk and market risk based on sound research and financial data. The aim of aligning regulatory required capital with the economic capital requirements was undertaken with the hope of reducing regulatory arbitrage that had been prevalent in the implementation of Basel I. While the issue of regulatory arbitrage has mostly been addressed in Basel II, in certain areas of the recommendations, the economic capital and regulatory capital continue to diverge (Basel committee on Banking Supervision, 2004). The Committee placed emphasis on stringent risk management practices which signaled the growing appreciation of the industry to the numerous factors that can affect the solvency and stability of a firm (Basel Committee on Banking Supervision, 2004). Basel II was developed based on three pillars: the minimum capital requirements, the supervisory review process and market discipline.

Pillar I sets minimum capital requirements for market risk reporting and includes operational risk in the calculation. This pillar offers regulators options for calculating each of the individual components of credit risk, market risk and operational risk. The second pillar of Basel II aims to improve the internal regulations of banking institutions regarding risk management. The comparison of internal risk management policies with legal requirements is to encourage banks to improve regulatory compliance (Basel Committee on Banking Supervision, 2004). Another aim of the second pillar is to provide banks with the framework for dealing with residual risks like legal risk, strategic risk, reputation risk, interest rate risk, methodological risk and liquidity risk. The established framework thus helps to create more accurate and environmentally adaptable risk management policy, leading to better long-term sustainability. The Committee also expects this pillar to improve cross-border communications, supervisory transparency, organizational accountability and investor confidence. The Second Pillar also allows for more discretionary adaptation of the Basel II regulations and acknowledges the shortcoming of Basel I, where assets in the same asset class were not allowed to have a distinct credit rating. The adaptive, non-prescriptive nature of the pillar is also crucial to improving communication between legislators,

regulators and banking institutions. The guidelines of this pillar also ensure that due to the additional risk factors being considered under its purview, the CAR of every institution be increased to more than 8 per cent (Basel Committee on Banking Supervision, 2004).

Through the third pillar, Base II insisted on the importance of frequent, accurate and timely disclosures of the existing risk profiles along with a regular reassessment of the risk exposure. The Second Accord is also cognizant of the importance of reassessing internal risk controls and this requirement for disclosure was also helpful in improving internal management and aligning strategic objectives with risk limitations. The Committees recommendation that all market participants, from regulators to investors, are informed of the risk profiles of banking institutions was an effort to improve transparency and increase confidence in the banking system (Basel Committee on Banking Supervision, 2004). Basel II laid down guidelines for the disclosure of the internal risk management control procedures being implemented. These included the description of internal risk management objectives, policies, loss absorption and damage control policies as well as detailed description of exposures according to sector, location and time to maturity. Basel II also lays down guidelines regarding the time-scale in which the disclosures are to be made and their frequency.

2.7.3. Basel III

Basel III was formulated by The Basel Committee on Banking Supervision (BPCS) in response to the financial crisis of 2007-2008. Basel III was published in December 2010 and had the support and endorsement of the G20 leaders. Unlike the previous Basel guidelines (Basel I and II), Basel III pays less attention to bank reserves and focuses more on the liquidity risk and potential of bank runs. The Third Accord also encourages the introduction of leverage ratios to ensure that banks are not over-leveraged and unstable (Basel Committee on Banking Supervision, 2011).

The introduction of a minimum leverage ratio, additional liquidity requirements and the recognition of systemically important banks were some of the most

prominent features of Basel III. The purpose of setting additional liquidity requirements was to reduce bank dependence on short term funds in financing their long term debts to prevent bank runs, to ensure customer confidence and to provide the bank with stability (Basel Committee on Banking Supervision, 2011).

A change in the capital ratio is one of most distinguishing features of Basel III as Basel III regulations emphasized not only increasing the quantity of the required capital base but also its quality. The guidelines recommend an additional layer of buffer equity be added to the existing Tier I capital, that when breached will lead to a limitation on earnings payouts to help ensure minimum common equity requirements are met. The Accord recommends that the Tier 1 capital is 4.5% of risk-weighted assets at any time and additional Tier I capital to be a minimum of 2.5 percent of the same. Basel III also increased the minimum total capital requirements from 8 percent to 10.5 per cent (Basel Committee on Banking Supervision, 2011). Basel III also introduced a counter-cyclical capital buffer to be implemented during excessive growth times (Basel Committee on Banking Supervision, 2011). The capital conservation buffer, or Tier I additional capital requirement is expected to increase to sustain banks through unforeseeable shocks in the market by setting restrictions on bank activities during boom periods and provides them with a cushion during crises.

Most importantly, Basel III introduced two liquidity ratios for banking regulations in an effort to manage the risk of bank runs. Liquidity coverage Ratio (LCR) requires banks to maintain sufficient high-quality liquid assets to cover net outflows over a period of 30 days. This increase to short term liquidity coverage is recommended in an effort to reduce the impact of a bank run as well as to ensure that banks do not become insolvent (Basel Committee on Banking Supervision, 2011). The second ratio is the Net Stable Funding Ratio (NSFR), which is calculated on the basis of the required amount of stable funding during periods of stress being less than the available amount of stable funding. This encourages banks to reduce their dependence on short term finance and increase their reliance on long term funding options (Basel Committee on Banking Supervision, 2011).

The capital adequacy requirements laid down by Basel III are equally applicable to Islamic financial institutions. A theoretical study on the subject and a comparison with conventional banks for the implications of the Basel III framework is provided by Harzi (2017) where it is concluded that Basel III has been unable to make a clear distinction between Islamic and conventional finance. At present, the emphasis is on enhancing the collaboration between the Islamic Financial Services Board (IFSB) and the Basel committee. The new liquidity ratios introduced under Basel III (NSFR and LCR) mean that Islamic banks are now required to hold more liquid assets for wholesale funding than they are required to under the existing liquidity framework. As short selling derivatives are forbidden and that the Islamic finance model is more conservative Basel III is observed to have less pervasive impact on Islamic banks as opposed to conventional banks.

Basel III acknowledged the importance of the Systematically Important Banks (SIBs), which are vital to the economic growth of a country and the failure of which can trigger financial crises. Basel III acknowledges the presence of SIBs and introduces stricter capital requirements and capital surcharges for them in effort to reduce the probability of their fall. The additional restrictions on the SIBs include the introduction of a counter-cyclical capital buffer, higher minimum leverage ratios and liquidity requirements as well as increased disclosures to the market.

Furthermore, under the recommendations of Basel III, banks are required to maintain a minimum leverage – the minimum quantity of loss absorbing capital held by the bank relative to its assets (both inside and outside the balance sheet) risk exposure, regardless of the weights assigned to them. The guidelines recommend a minimum of 3 per cent minimum leverage ratio, however, SIBs are expected to have a higher minimum leverage ratio due to their importance in the economy (Basel Committee on Banking Supervision, 2011).

However, applying the capital and liquidity requirements of Basel III, as implemented by the national regulators, will lead to an increase in the capital required by the industry, leading to a prohibitive effect on the new players in the

industry as such restrictions will not only restrict entry standards to the market and reduce competition, but they will also lead to a conservative banking strategy by Systemically Important Banks, leading to a decline in growth prospects. The capital requirements mentioned in the Third Accord are suggestive, and due to the drastic impact of the financial crisis of (2007-2008), central regulators are enforcing stricter requirements on the banks, leading to a continued economic slowdown. For instance, the US Federal Government in 2013 decided that the minimum leverage ratio for SIBs would be 6 per cent whereas insured bank holding companies would require a ratio of 5 per cent.

Moreover, each of the Basel Accords (I, II and III) are dependent on Basel I's risk-weighted method of allocating capital risk. Basel II changed the method of applying risk-weights to assets, thereby leaving the calculation of capital requirement open to interpretation. Risk was determined on the basis of credit ratings issued by rating agencies (such as S&P, Moodys). By failing to address this issue, Basel III bases its capital and liquidity requirements on the basis of incorrect risk-weighting systems, leading to incorrect capital and liquidity requirements. On the basis of the Basel III, banks are required to keep even more capital base on the basis of a faulty risk-weighting system, thereby creating more incentive for the creation of AAA rated assets out of junk assets (Perez, 2014).

As mentioned above, Basel III is also dependent on the credit ratings generated by recognized rating agencies; who have been one of the main reasons for the sub-prime crisis (Perez, 2014). Hence, Basel III encourages lending to risk-free or low risk assets, creating an incentive for banks to continue creating risk-free assets. Since credit ratings are a key factor of consideration, banks will continue to seek out "created" risk-free assets made out of risky assets via the process of securitization. This fails to address one of the key shortcomings of Basel II. The conflict of interest faced by credit-rating agencies in valuing assets created by banks, for the banks, leads to a question of the integrity of the agencies and their ability to act rationally and fairly. The sub-prime crisis of 2007-2009 is a stellar example of the conflict of interest faced by the agencies and its impact on the financial industry.

The additional capital requirements for SIBs and stricter descriptions of the constituents of capital is another shortcoming of Basel III that will lead to less adaptable national banking policies. Banks will have little room for generating the excess capital required and are likely to restrict dividend payments to meet the requirements. This, along with conservative banking practices is likely to lead to an overall reduction in the profitability of the banking sector (Patrick Slovik, 2011).

As mentioned earlier, the minimum leverage ratio calculation excludes the weights attached to the risk exposure of the assets of the bank leading to an inaccurate and inflated calculation of the leverage requirement by the banking institutions. This could act as a negative incentive to banks to pursue higher risk, higher return projects due to the risk-weights being ignored (Jaime Caruana, 2008).

In addition, because of the increased demand from the requirements of capital and liquidity, banks will reduce their lending activity to potentially high-risk projects, which are commensurate with high returns. Due to higher liquidity requirements for such projects, funding available to entrepreneurs will decrease, leading to a domino effect by which economic growth will be affected. If monetary policies stop being restrained then the economic effect of Basel III implementation could be counteracted by a reduction of monetary policy rates, which is crucial to be taken into consideration as the existing economic slowdown, compounded with slow national growth has the potential to trigger another wave of recession that will travel across the world due to global interdependence of the finance industry (Patrick Slovik, 2011).

Based on these arguments, it can be stated that the Basel regulations have been crucial in improving the banking rules and regulations internationally. They have played a pivotal role in improving cross-border communication between banking institutions and successfully achieved their objective of creating competitive, globally consistent banking regulations. The constant updating of the Basel Accords has helped keep them relevant, each one improved on the previous Accords. The widespread acceptance and implementation of the accords is

testimony to their relevance, importance and their crucial role in maintaining financial stability.

However, while many scholars argue the merits of the accords and their inability to prevent or predict the global financial crisis of 2007-2008, they are also unanimous in their acceptance of the impact of the accords on the industry as a whole. The Basel Accords have single-handedly shaped the capital adequacy requirements of banking and other financial institutions and had a dramatic effect on the actions of the industry, which in turn has shaped the global economy.

2.8. Conclusion

The capital adequacy requirement requires banks to hold a certain amount of capital. Such a requirement implies that the bank should not rely on the shareholder funds as the main source of funds. Specifically, the bank capital should be held to be its capacity to respond to a severe financial crisis, which undermines its functionality. Based the above argument, it can be stated that capital adequacy is an obligation for all banks, whether they are Islamic or conventional. However, due to their unique characteristics, applying the capital adequacy requirement is more challenging and has different implications for Islamic banks compared to conventional ones. Therefore, it can be stated that more attention is required when setting up capital requirements for Islamic banks taking into consideration their unique features and the complex nature of the Islamic financial products and operations.

CHAPTER THREE
EFFICIENCY IN BANKING INDUSTRY:
A CONCEPTUAL FRAMEWORK

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3.1. Introduction

Efficiency refers to the efficient use of different resources including financial, human, machines and equipment with an aim of enhancing the output of and reducing the costs to an entity. It involves planning the operations of an organization tactically in order to ensure a balance exists between productivity and costs. Hence, the operational efficiency helps detect uneconomical processes that drain resources and consume corporate earnings (Aggarwal and Jacques, 1998, p. 29). In other words, it deals with reducing waste and getting the most out of the available resources as internal waste contributes to increasing production costs, therefore cutting costs is a good way of enhancing the profitability of a business enterprise. It basically involves using less resources to produce more goods and services or maintaining the same production levels using reduced resources (Cooper et al., 2003, p. 822).

This chapter provides a conceptual outline of efficiency in the banking sector. It also highlights the conceptual differences between efficiency and other related concepts, such as productivity and effectiveness. Then it outlines types of efficiency in the banking sector followed by an explanation of the measurement approaches used, such as financial ratio methods, quantitative methods and CAMELS approach (Capital Adequacy, Assets Quality, Management Quality, Earnings, Liquidity and Sensitivity). (See page 58). Finally, this chapter provides an understanding of the factors that affect banking efficiency.

3.2. A General Understanding of Efficiency

Efficiency is a complex concept, which refers to different understandings depending on the context. For an economist, efficiency refers to one of two ratios. The first ratio involves gauging the success or failure of a firm as far as producing

the highest possible output using the lowest inputs possible is concerned (Gonzalez, 2005). To an economist, this ratio is known as technical efficiency or productivity. The second ratio is also based on inputs versus outputs, expressed in terms of value. On the other hand, for an engineer, the term efficiency refers to the ratio of input to output or percentage whereas a cost accountant uses percentage or ratio to gauge the efficiency of a company or department (Halkos and Salamouris, 2004). From a marketing management perspective, efficiency refers to the ability of the firm to improve its earnings through customer satisfaction. Based on the above, it can be clearly understood that the concept of efficiency carries a wide range of meanings depending on its context.

In financial institutions, efficiency occurs when markets are competitive, transactions between lending institutions and borrowers are dealt with effectively through market contracts, and information is easily accessible to a wide range of stakeholders. Based on this, efficiency in financial institutions helps in reducing the disparity between lending and borrowing rates (Bergerand Humphrey, 1991). Moreover, it helps in the distribution of risk-adjusted lending and borrowing rates among individuals. From the above, it can be concluded that efficiency in financial institutions can be enhanced through innovation, increased competition, easing regulatory entry costs and increased integration in the financial market. It is worth noting that financial efficiency and stability are closely related although they are different concepts (Aggarwal and Jacques, 1998). This is because improved financial efficiency in which risks are shared and distributed, resources apportioned efficiently between investors and savers, enhances financial stability. Additionally, financial stability is a prerequisite for an efficient financial system. Based on this, it can be conclusively stated that financial efficiency and financial stability are in principle complimentary (Aggarwal and Jacques, 1998).

3.3. Concept of Efficiency

There are two broad definitions of the term 'efficiency' based on its interpretation. According to Koopmans (Koopmans 1951), efficiency can be achieved by any diminishing marginal utility (DMU) only if none of its outputs or inputs can be

improved without affecting its other outputs or inputs negatively. In many social science or management applications, the hypothetical probable efficiency levels are not known. The prior definition is consequently substituted by underscoring its uses with empirically available information.

A diminishing marginal utility (DMU) can be said to be fully efficient based on available evidence only if the performance of other DMUs do not reveal that some its outputs and inputs can be enhanced without deteriorating some of its other outputs or inputs (Ariff et al., 2000). In this study, the researcher has embraced the second definition of efficiency which is associated with relative efficiency because of the following;

(i) Efficiency, is a subjective term and is not absolute. This means that the word will always be comparative to some criterion. In any scope of activity, efficiency is a ratio between the results attained to the means employed (Berger et al., 2004). In other words, it is the ability of a firm or individuals to produce the expected effect with minimum inputs, effort and waste. Consequently, efficiency is a relative notion in many situations and should include comparisons.

(ii) For its part, relative efficiency involves using minimum inputs to produce the desired output. An inefficient change is a change that reduces value whereas an efficient change is a change that adds value. This means that a situation that is economically efficient can be inefficient when judged using different standards (Allen and Rai, 1996).

(iii) All available resources must be used properly on the production-possibility frontier. All available resources must be used properly on the production-possibility frontier. Resources that are not used show that additional goods and services could have been created, which shows that the entity was not earlier appraised on production possibility frontier (Berger, & and Udell, 1996, P.17).

Based on the above, it can be concluded that efficiency is not an absolute theory; but is relative. Additionally, it cannot be said that any diminishing marginal utility is absolutely efficient. Hence, the efficiency level of a company is determined by

price, cost and product complexity (Ariff et al., 2000). Accordingly, the increased efficiency of banks and other financial institutions have led to increased demand and application of new technologies, enhanced connectivity and vigorous standards, which in turn will further drive the industry towards greater efficiency.

3.4. The Difference between Efficiency and Productivity

While, efficiency and productivity are concepts that many people find very interlinked, there is a huge difference between them. To establish an understanding, productivity refers to a measure of cumulative output over cumulative input. It requires price information for the particular series to create a measurement for input-output as an index (Altunbas et al., 2007). Based on this, a process that produces more output after consuming minimum input is considered more productive.

On the other hand, efficiency refers to the ability of doing things in an economic manner, keeping in mind that resources are scarce. In other words, efficiency refers to conducting the right things in the right way (Demirguc-Kunt et al., 2004). Compared to productivity, efficiency is measured based on certain sources in a given period and mostly a firm can be considered as efficient when the ratio of total input to total output is high. It is worth noting that firms usually find it difficult to achieve maximum quality at maximum productivity (Chen, 2009). Consequently, firms need to find a balance between the two in order to maximize output while minimizing losses. This is because if a company only emphasizes the quantity side of productivity, like paying bonuses to employees for increased production or sales, it may result in low quality products. However, this may not be negative if the increased quality output overshadows the number of complications.

3.5. The Difference between Efficiency and Effectiveness

Effectiveness and efficiency are common words in business circles and boardrooms. However, these two words are commonly misused and interpreted

wrongly. In order to clarify such confusion, it can be stated that effectiveness refers to performing the right tasks or activities in order to achieve the set organizational goals. On the other hand, efficiency refers to doing the right thing in the right way. In other words, efficiency refers to performing the right task using minimum financial, information, physical and human resources. Furthermore, efficiency ensures maximization of outputs and minimization of inputs (Brigham and Erhardt, 2005). Efficiency is aimed at eliminating or reducing waste of scarce business resources including intangible and tangible resources like labor, raw materials, money, time and supplies. Accordingly, eliminating cost is important as it helps to improve the profit margins of financial institutions.

Conducting a task for long time leads to understanding how to perform it quicker and better and, therefore, making them more productive. In turn, this brings about a competitive advantage as it makes one effective and efficient. Finally, it can be stated that business is all about streamlining operations and cutting costs in the right manner in order to improve margins. Although effectiveness refers to accomplishing tasks that help achieve organizational goals, it involves both front-line and middle-line managers who apply their human and technical skills to lead other employees towards achieving the set organizational goals (Claessens et al., 2001). It is worth noting that both effectiveness and efficiency play an important role in determining business performance. This means that the two terms are mutually interconnected and financial entities require both effectiveness and efficiency to survive.

3.6. Types of Banking Efficiency

Banking efficiency can be grouped into four major categories. The first type of banking efficiency is known as scale efficiency. A bank is said to have scale efficiency when it operates under the range of constant returns to scale (CRS). The second type of banking efficiency is known as scope efficiency, which is usually achieved when a bank has operations efficiently in different diversified places. The third efficiency is known as technical efficiency and it is achieved when a bank makes the most of the available input level (Dabla-Norris and Floerkemeier,

2007). The last type of banking efficiency is known as allocative efficiency and it is usually achieved when a bank chooses output mixes which maximize revenue.

It is worth noting that efficiency in banking also differs depending on the point of view under consideration. More specifically, efficiency may vary depending on whether a researcher is viewing it from the point of view of an individual bank or from the point of view of the community. For instance, when economists use the word 'economy', they refer to the efficiency from a community perspective. Many economists are more concerned with community efficiency compared to individual financial firms. In relation to this study the operational efficiency is considered the key issue to be dealt with in the banking sector to assess their overall efficiency, which is detailed in the following section.

3.7. Operational Efficiency in the Banking Sector

When dealing with efficiency in the banking sector, the first question that comes to mind is why are regulators, stakeholders, customers and managers concerned with operational efficiency? The answer to this question depends on the perspective of the concerned party. Accordingly, from the regulators point of view, efficiency in the banking sector is important because inefficient banks are riskier and have higher chances of failing. Moreover, efficiency in the sector is directly related to economic productivity. Without an efficient banking sector, the economy cannot run efficiently and smoothly. If the banking system in a country fails, the entire payment system of that country is in danger of failing. According to the customer perspective, efficient banks offer superior services at reasonable prices (Gorton and Winton, 1998). According to stakeholders, efficient banks are those that produce sensible returns on their investment. On the other hand, according to the manager perspective, banks operate in a competitive and dynamic environment and, consequently, the efficient ones are the banks that can survive the competition and increase their market share. Efficient banks have a competitive edge against their competitors because they have low operational costs and can take business away from their less efficient competitors (Brozen, 1982). Hence, it can be stated that efficiency in banking is a broad concept and is

of serious interest to stakeholders, regulators, managers and customers. This is because it involves carefully choosing the best combinations of inputs and outputs.

In developing countries where the propensity to consume is high and consequently people save less, banks play a crucial part in attracting deposits. The banks then use these deposits as lubricants for different economic sectors. Recently, the performance of banks has become a concern for policy makers and planners in many countries (Boyd and Nicolo, 2006). This is because the gains of the mainstream economy depend on how efficiently the banking industry executes the function of financial intermediation. Efficiency in the banking sector has become an important issue in many countries. In the financial market, financial institutions play a major role. Each organization regardless of whether it is a service firm, government department or a manufacturing company are continually trying to advance their operational efficiency in line with their short and long-term goals as well as their objectives. Banks are not exceptions and are now viewed as normal business enterprises. Like other business, banks offer services with an aim of making profits (Ezeoha, 2011). As with other businesses, banks are also concerned about customer retention and nowadays it is common to hear bank managers talking about this. In the past, many banks offered services like loans, cash deposits, cash withdrawals and money transfers manually. In order to remain competitive, many banks are increasingly putting more effort towards understanding drivers of operational efficiency like technology, performance benchmarking, employees, infrastructure and the process of delivering quality customer service (Berger et al., 1993). In today's financial market, the need to be competitive is at the heart of effective competition. This is because efficiency is largely concerned with output relative to cost and their effects on long term commercial success. So as to compete effectively with other financial institutions, banks must increase their efficiency levels.

Accordingly, it can be argued that operational efficiency in banking is associated with various facets of its operations like profitability, financial soundness and quality customer service. The word efficiency is a combination of technical efficiency, growth and performance, profitability and productivity. As a whole, in

the past, the banking sector has given a lot of emphasis on credit deployment, deposit mobilization and branch expansion. However, this has changed over the years and banks are now putting an emphasis on operational efficiency. It would be impossible for banks to increase their earnings without improving productivity and efficiency (Bonaccorsi and Hardy, 2005). The heightening competition in the banking sector has forced commercial banks to become efficient and cost effective in using the available resources in achieving their goals. Hence, the major goal of operational efficiency in banking is to attain economic growth using minimum social and technical costs. Accordingly, the challenge of enhancing operational efficiency in the banking sector becomes weightier with the adoption of modern technology. It can be argued that new technology has enabled banks to handle large volumes of transactions and also to offer efficient services to clients (Gorton, et al.2002). This has enabled banks to attract new clients in the face of increased competition in the market. In this regard, it is important to highlight that common policy and standards coupled with employees, who are well trained, play a key role in improving operational efficiency.

3.8. Measuring Banking Efficiency

In the banking industry, measurement of efficiency in banking serves two main purposes. First, it helps in benchmarking the comparative efficiency of an individual bank against other banks that are considered as having best practices. Secondly, it helps in appraising the effect of different policy measures on the performance and efficiency of these banks (Brigham and Erhardt, 2005). Given that the banking sector offers a payment system and transaction services, having an efficient banking system would positively improve overall business transactions. In the last few decades, there have been reforms in the banking industry with a purpose of improving operational efficiency in general. Policy makers in many countries have realized that inefficiency in the banking sector is a major factor that contributes to the high cost of banking services. Therefore, developing comprehensive efficiency measurement has been at the top of the

agenda in banking sector. Accordingly, some of methods have been identified which are summarized below.

3.8.1. Financial Ratios

There are three main financial ratios that are used in measuring operational efficiency in banking institutions. The first set of ratios is known as the operating assets ratio which is used to determine the number of assets that can be removed from the production process without prejudicing the operating capability of an enterprise. The operating assets ratio is calculated by dividing operation assets with total assets. In this case, operating assets are those used to generate revenue, and hence, a high operating assets ratio suggests that a bank uses its resources in an efficient manner. This ratio is an effective measure of operational efficiency as it presents a deep insight into a bank's use of capital. It achieves this by comparing assets used in production, and other processes that produce revenue against the overall assets owned by the company (Awojobi and Amel, 2011). Armed with this information, the management can comfortably measure efficiency and decide which assets can be eliminated in order to make the bank more efficient. The second financial ratio that is used in measuring operational efficiency in banks is the operating income ratio (Berger, 1995). This ratio measures efficiency by relating costs and revenues to average assets. The third type of financial ratio used in measuring efficiency in banks is known as the operating equity ratio and it is calculated by relating costs and revenues to average equity.

3.8.2. Quantitative Methods for Measuring Operational Efficiency

There have been different quantitative approaches identified in measuring operating efficiency in the banking industry. Data Envelopment Analysis (DEA) is considered as one of most popular quantitative methods for measuring operational efficiency. It measures efficiency in banks by identifying efficient banks and setting them as benchmarks. The input combinations of other banks are then measured against the benchmark. DEA measures operational efficiency by coming up with the best production function based on observed data. This minimizes chances of production technology misspecification.

Furthermore, it is semi-parametric and involves making assumptions about the functional form of the frontier. Unlike other quantitative methods, it does not include the imposition of a specific form on the efficiency distribution terms. Unlike DEA, it permits random error in visible values of the dependent variables. The last quantitative method used in measuring efficiency is the stochastic frontier model. This method basically measures efficiency by describing random shocks that affect the production process (Berger and De Young, 1997). The shocks or inefficiencies are not directly associated with a particular variable but are carefully scrutinized to establish the root cause. After the source of the inefficiency is identified, it is then corrected so that the production process can become more efficient (Berger and De Young, 1997). Given the practicality of these methods (Berger and De Young, 1997), the current study will utilize them to measure the efficiency of the sampled banks in the GCC region.

3.8.3. CAMELS System

CAMELS is an international system that is used to rank banks and financial institutions based on six factors namely capital adequacy, assets, management capability, earnings, liquidity and sensitivity. Banks are assigned ratings based on a ratio analysis of financial statements coupled with on-site evaluations conducted by a selected supervisory regulator. Supervisory regulators in the United States include the Federal Deposit Insurance Corporation, Office of the Comptroller of the Currency, Farm Credit Administration, Federal Reserve and the National Credit Union Administration (Bikker and Haaf, 2000). The results of a CAMELS review are released to the senior management only and are kept from the public in order to avert a likely bank run if the concerned bank receives a downgrade on its CAMELS rating. Banks with declining ratings are subjected to a regular supervisory scrutiny with an aim of protecting depositors. If a bank fails, it is resolved through an official resolution process.

There are six components that make up the CAMELS rating system. The first component is known as capital adequacy and is part of the National Credit Union Administration rules and regulations. This component sets the statutory net worth groups and net worth requirements for all credit unions insured by the federal

government. Banks and other credit institutions that fall short of this requirement run under a sanctioned net worth restoration plan. Federal evaluators conduct regular capital assessments to check the progress of the bank in question towards meeting the provisions of the plan (Amer et al., 2011). The first step in determining the adequacy of the capital of a bank starts with a qualitative assessment of its critical variables that bear directly on its financial condition. The evaluation includes the opinion of the assessor concerning the strength of the capital position of the bank in the near future. Banks and other financial institutions that sustain capital levels proportionate to their current and future risk profiles and can withstand any losses are given a rating of 'one'. A capital rating of 'five' is awarded to a bank that is seriously undercapitalized or has negative earnings tendencies, has major asset quality issues or high interest risk exposure, which puts it at risk of becoming undercapitalized.

The second component of the CAMELS scale is asset quality and is concerned with loan concretion levels that may pose an unnecessary risk to the bank. Asset quality rating is based on the prevailing conditions and the possibility of improvement or worsening in future based on economic conditions and the prevailing trends and practices. The assessor examines the credit management of the bank in order to decide on the right rating to give (Aly et al., 1990). Moreover, the assessor examines the effect of other risks like liquidity, compliance, interest rates and strategy. The rating also includes the trends and quality of all main assets including real estate, loans and other investments. A rating of one reflects high quality portfolio risks while that of five represents progressively deteriorating asset quality problems. If left uncorrected, such an institution faces a dark future caused by the corrosive effect of its asset difficulties on its capital level and earnings.

The third component of the CAMELS scale is management and it is considered the most progressive pointer of condition and major determinant of whether a bank has the ability to respond to financial difficulties. This component presents assessors with objective indicators. An examination of management is not dependent on the existing financial conditions of the bank only and is not an

average of other rating components. The rating of this component reflects the ability of the management and of the board of directors to detect, quantify, monitor, and control risks in the activities of the bank. Moreover, it reflects their ability to ensure stability and adherence to the applicable laws and regulations by the financial institution (Athanasoglou et al., 2008). It is the duty of the management to address the following risks; liquidity, reputation, credit, transaction, interest rate and compliance among other risks. A rating of one is an indication that the board of directors is effective and responsive to the ever-changing nature of the banking sector. Moreover, it shows that the management is ready and prepared to deal with any problems that may arise in the foreseeable future. On the other hand, a management rating of five is applicable to cases where there has been self-dealing and incompetence on the part of the board and the management. Problems resulting from issues with management are usually serious and immediate management action may be taken including replacing the board.

The next component of the CAMELS scale is earnings and mainly deals with the ability of the bank to earn returns on the investments. Earnings are important because they enable a financial institution to remain afloat by funding its expansion, increasing capital and remaining competitive. In assessing this component, the assessors do more than reviewing current and past performances (Baltagi, 2005) as they go a step further and examine future performance as it is of great importance to the future of the institution concerned. A rating of 'one' shows that the bank is currently, and in the future, projected to be able to absorb any financial emergency. On the other hand, a rating of 'five' is an indication that the bank is undergoing losses which pose a threat to its solvency due to capital erosion. Moreover, a rating of 'five' is assigned to institutions that are unprofitable and are at risk of running out of capital within a year.

Liquidity assessment is the next component of the CAMELS scale and it comprises the assessment, monitoring and controlling risks associated with the balance sheet. A good assessment of liquidity includes an assessment of profitability, strategic and net worth planning (Drake, and Simper. 2002). During assessment, the examiners appraise interest rate exposure and sensitivity,

availability of assets, dependence on short term and volatile sources of funds, and technical competence relative to liquidity. A rating of 'one' is an indication that the financial institution exhibits average exposure to risk associated with its balance sheet (Baral, 2005). Moreover, a rating of 'one' is also an indication that the management has shown the required procedures, controls, and resources to manage any risk. A rating of 'five' is an indication that the bank has dangerous risk exposure that threatens its viability.

The last component of the CAMELS scale is known as sensitivity and it is a relatively new measurement tool. This component mainly deals with interest rate risk and the sensitivity associated with deposits and loans to abrupt changes in interest rates. Unlike other components that are based on classic ratio analysis, sensitivity involves probing different hypothetical future prices and ranking scenarios and modeling their effects. It is also worth noting that sensitivity is not rated on a scale of 'one' to 'five' like the other components of the CAMELS scale.

However, there are a number of challenges that face managers in banking sector in measuring efficiency. For instance, compared to other enterprises like manufacturing, a combination of the total assets, total deposits, number of accounts and total loans of the bank do not provide an accurate output index (Gorton and Rosen, 1995). Furthermore, any measure of profitability in banks is related to measuring real profit instead of the operational one as the published accounts of banks do not represent a fair picture. Banking is anchored on confidence; hence, banks are allowed to choose whether to disclose crucial accounting information or not and are known to create secret reserves every year through accounting undervaluation of their assets. Therefore, the profitability of banks as reflected in their published accounts is assumed to be below their true value, which makes it very challenging to assess their efficiency in an accurate manner (Calomiris and Kahn, 1991). Measuring efficiency in banking also poses a challenge because banking services are usually priced discreetly through interest rates which are way below market levels. This makes the resultant revenue flows erroneous guides towards identifying crucial outputs to be incorporated in the analysis of bank efficiency.

Due to the important role that banks play in the economy they are highly regulated; however, substantial shortcomings have been proven to exist (Dimitris, 2008). Consequently, any technical developments that improve the productivity of the most efficient banks might not be reflected in the entire industry. This makes it challenging to come up with a benchmark upon which to measure efficiency. The other challenge associated with measuring efficiency in banking is that the deposit side of banks in many countries has undergone considerable deregulation in the past. An example of such deregulation is removing effective interest rates ceilings on certain deposits as well as creating new types of accounts (Chames et al., 1978). Operating under such conditions raised the costs of banking and changed the optimal mix between payment of interest to depositors and service provision, which caused more difficulties for banks to accurately assess their efficiency.

3.9. Factors Affecting Banking Efficiency

In the banking industry, there are different factors that affect efficiency. Capital adequacy is one of the key factors that affects efficiency in banking. Capital reserves are important to a bank because they enhance the confidence of customers and also prevent the bank from becoming insolvent. In other words, capital adequacy affects efficiency as it mirrors the financial condition of a bank and its ability to meet its financial obligations and absorb sudden losses. Asset size is another significant variable that has a great impact on efficiency. The assets owned by a bank are important because they can determine its liquidity and future existence. On the liability side, deposits are very influential when it comes to bank efficiency. Banks make money by lending out the money deposited by customers (Claessens and Laeven, 2004). Consequently, deposits can affect banking efficiency because they are part of the main basis upon which banks conduct their business. Advances and loans are also important factors that affect efficiency in the banking sector. One way through which banks earn money is by lending out money to borrowers which they repay with interest. If loans and advances are not performing well, this may affect the efficiency of a bank. The other factor that affects efficiency in banking is the quality of assets. This factor is important

because it is a reflection of credit risk (Hauner, 2005). Management efficiency also affects efficiency in banking as it is responsible for making business decisions based on perceived risks. If they make wrong decisions, it may result in the bank being declared bankrupt. Another factor effecting efficiency in the banking sector is quality of earnings. This factor is crucial as it determines the profitability and sustainability of a bank. Last but not least, liquidity is another crucial factor that affects the efficiency of a bank. The threat of liquidity is a vital factor that has a great impact on the stability of banks. Therefore, banks should undertake measures to avert the risk of liquidity while at the same time ensuring that some funds are invested in securities with good returns.

3.10. Concepts Related to Operational Efficiency

The following section clarifies the Concepts Related to Operational Efficiency

3.10.1. Growth Performance

Growth and continuity is the most important of the main goals of any economic system. The period after the nationalization of banks has witnessed a growth of banks multi-dimensionally, geographically and functionally following different business parameters. Moreover, banks have attracted more deposits through an increase in branches. Regardless of the type of deposit, a rise in the number of deposits in banks is an indication of growth. Accordingly, the increases in deposits certainly tempts banks to increase their advances and investment portfolio (Bonin et al., 2005). The increase in either of these two is an indication of the growth of bank and banks would fail without balanced growth in these two variables as a growth of one affects the others. If managed accordingly, the growth in advances and deposits contributes to an increase in profits, and if managed poorly, it may result in loses. Moreover, an increase in profits can in turn result in growth in reserves and subsequently in equity. Hence, a growth in several variables in the right direction is therefore needed for sound performance and all-inclusive growth of banks (Editz et al., 1998). Generally, growth is considered one of the major determinants of operational efficiency in the banking sector. Therefore, it can be stated that growth is the product of the overall management function of a bank.

Obviously, the priorities and policies of the central bank and the government play a key role in this respect. Prudent funds management and the general economic environment also affect the growth of banks.

3.10.2. Productivity Performance

Productivity has become a common topic in today's business world. According to Bakar and Tahir (2009), productivity has become a challenging subject for both learners and practitioners, challenging in terms of measurement, definition and efforts to achieve it. Currently, the theme of productivity and how it can be measured is characterized by numerous loose ends and too much confusion. Stunned and confused by diminishing productivity rates, many governments and firms are looking for answers and action. However, action necessitates an understanding of concepts and issues (Christian, 2008). As a phenomenon, productivity has not only been researched by economists but also by management scientists. Over the years, economists have tried to measure productivity and approximate its effect on output and growth. Pioneers in management science such as Mc. Gregor and F.W. Taylor (1856-1915) came up with theories and techniques for enhancing the productivity of employees.

Accordingly, productivity is defined using different words in different situations. This is because some questions about productivity are best answered with one type of productivity measurement and others with another type. People in fields like engineering, accounting, organizational psychology, industrial psychology and economics understand productivity in different ways. Productivity is calculated through dividing total output by total input and is expressed as a ratio (Gilbert and Alton, 1984). This definition of productivity is applied in industries, enterprises or the economy as a whole. In simple terms, productivity can be defined as an arithmetic ratio between the quantity produced and the quantity of resources or inputs used in the production. The outputs of banks are heterogeneous in nature. Hence, in the banking sector, it is hard to ascertain an efficient amount of resources required to produce tangible service outputs (Bikker and Haaf, 2000). Therefore, it is more difficult to measure and evaluate productivity in the banking sector compared to the manufacturing sector where the output or product is tangible.

However, measuring productivity becomes increasingly essential as economies develop the significance of services and the tertiary sector increases (Diamond, 1984). Consequently, it can be said that if operational efficiency is a complex word, then productivity is its benchmark.

3.10.3. Profitability Performance

Like other business ventures, the main goal of banks is to maximize their earnings. Profits and profitability can be compared with pulse and blood in the body as it is very hard for a business to survive without generating enough profits (Gale and Branch, 1982).

As noted above, profit is the key and ultimate goal of a business. If a business is unable to generate profits, the invested capital is consumed and within a short time, the business fails. Additionally, profits play a discrete role in the sharing out of economic resources which are scarce. Moreover, it directs investment into the areas that are most beneficial to the business (Beck et al., 2000). A business can discharge its duties to different sections of society only through profits. This explains why the aspiration to maximize profits is the most persistent, universal and strongest force that governs the actions and decisions of a business enterprise. In other words, it can be said that profit is the pivot upon which all business activities rotate.

According to Berger and Hannan (1989), banks are vital institutions as far as development and economic transformation are concerned. Earnings are the outright measure of the performance of any business enterprise. According to financial vocabulary, the profitability of a certain business is the quantitative relationship between its profits and several variables relevant to the generation of profit. Examples of such variables are share capital, turnover size, quantum of owned funds, level of working funds and many others. On the hand, profitability refers to the ability of a business to make profits. In the case of banks in many countries, any measure of profitability is that of the accounting profit instead of the operational one. This is the case because the published accounts of banks do not represent a fair picture (Barth et al., 2004.). Banks rely on trust and allow banks

to choose to disclose critical accounting information or not. They are known to create secret reserves each year by assessing their asset accounting. Therefore, the profitability of banks as reflected in their published accounts is assumed to be below their true value. However, profit maximization is not the only reason why public-sector banks exist. Consequently, profitability alone cannot be used as a parameter of determining operational efficiency. It is worth noting that good profits can cause inefficiency (Bresnahan, 1989). This occurs when prices are relatively high due to increased demand or other reasons. Likewise, a good degree of efficiency can be attained without maximizing profit. Hence, it is clear that profitability and efficiency are not synonymous. However, as an index, profitability guides management towards achieving better efficiency (Bresnahan, 1989).

3.10.4. Technical Efficiency

Technical efficiency is one of the key standards used in measuring efficacy in the banking sector. Technical efficiency means using the allocated resources to produce maximum output, or producing the desired output using the minimum input. Efficiency involves using labor, machinery and capital as inputs to generate outputs according to the best practice in a sample of decision making units. This means that with identical technology and external environment, no wastage of resources is incurred in producing the expected outputs. The connections between physical amounts of input and output are used in measuring technical efficiency (Christian, 2008). Through the use of technical efficiency, there is always a comparative efficiency score. When a system is referred to as inefficient, it is being claimed that the same output can be realized using less input, or that the input used could have generated more output (Christian, 2008).

3.11. The impact of Islamic finance principles on bank efficiency

Yudistira (2004) make use of the Data Envelopment Analysis (DEA) non-parametric technique to measure the scale, pure technical, and technical efficiency to assess efficiency of Islamic banking in 18 banks. At just over 10%, the authors conclude that efficiency of Islamic banking is low in comparison to conventional

banks. The fundamental reason behind it is the presence of the diseconomies of scale given the small size of the Islamic banks. Yudistira (2004) recommends more mergers and acquisitions in order to improve the efficiency in Islamic financial institutions.

Čábelová (2016) study the impact of Islamic finance principles on bank efficiency in the Middle East region where she makes use of Stochastic Frontier Analysis and Data Envelopment Analysis to measure the efficiency of Islamic and conventional banks. Prohibition of interest is the key Islamic finance principle which is replaced by profit and loss sharing. Hence, the bank is no longer a creditor but a partner. Findings of the study showed that Islamic banks are more resilient to financial instability but their operation is more cost demanding compared to traditional banks. This eventually affects their operating efficiency.

3.12. Conclusion

Based on the above, it can be stated that efficiency in financial institutions provides guidelines in reducing the disparity between lending and borrowing rates. Moreover, it helps in the distribution of risk-adjusted lending and borrowing rates among individual banks. From the above, it can be concluded that efficiency in financial institutions can be enhanced through innovation, increased competition, easing regulatory entry costs and increased integration in the financial market. It is worth noting that financial efficiency and stability are closely related although they are different concepts. This is because improved financial efficiency in which risks are shared and distributed, resources apportioned efficiently between investors and savers, brings about financial stability. Additionally, financial stability is a prerequisite for an efficient financial system. Based on this, it can be conclusively said that financial efficiency and financial stability are in principle complimentary. Furthermore, it can be argued that the efficiency occurs when markets are competitive, the relationships between the lending institutions and borrowers are dealt with effectively through market contracts and making information easily accessible to a wide range of stakeholders.

CHAPTER FOUR
LITERATURE REVIEW AND HYPOTHESES
DEVELOPMENT

CHAPTER FOUR

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

4.1. Introduction

From regulators point of view, the ultimate aim of enacting financial regulations is to enhance solvency and improve the liquidity position of banks. Hence, it has been argued that greater stability in the banking industry may be achieved through setting strict regulations. However, it has also been argued that such stringency may negatively affect bank efficiency.

While the existing literature has extensively identified, analyzed, and evaluated the capital adequacy requirements and efficiency in banking sector, there are different views on the impact that the stringency on the requirements may have on their efficiency. For example, a strand of literature proves that the bank efficiency is adversely affected by imposing strict capital adequacy requirements. On the other hand, another strand of literature shows that imposing capital ratios can positively contribute towards the performance, efficiency, and stability of the banks. Miller and Moigilani (1958) introduced the notion of capital structure, which some consider a fundamental concept and pioneering theory that has been used by various scholars in their empirical and theoretical studies related to the capital structure requirements in the financial and non-financial industry. Macey and Miller (1995) discuss some important factors that affect the investors when making decisions, where the capital structure of the companies was identified as one of the key factors in this regard.

There is abundant literature available that discusses the importance of the CAR to the banking sector (Dinçer and Hacıoğlu, 2013). The capital structure prevailing in companies that belong to the financial sector is materially different to that prevailing in the non-financial sector which is mainly due to the regulatory requirements that require such an arrangement and the objectives, functions, and structures that vary from one industry to another. Benli (2010) therefore concurs

that regulatory requirements, market forces, and internal bank considerations and policies are some of the categories that identify capital adequacy requirements.

As for the structure, after a brief introduction, this chapter delineates the basic concept of capital adequacy and capital structure. Then it sheds light onto the function of capital and outlines the determinants of the capital adequacy ratio and the expected hypothesis. Moreover, it explores the association between capital adequacy and bank efficiency and develops the research hypotheses. In the conclusion, this chapter highlights the gaps in the existing literature, which is the focus of the current research.

4.2. The Function of Capital in Banking Sector

In the banking environment, according to Ledgerwood and White (2006), the key function of capital is to provide a cushion in event of business losses. The greater the capital a bank holds, the higher the probability that the bank will be able sustain losses and remain solvent. Setting a capital requirement ensures that sufficient funds are available for the organization to grow and afford the development of facilities, programs and services. Kapila and Kapila (2006) argue that by prescribing the minimum capital requirements the regulator ensures that banks possess the necessary financial health to remain solvent in times of serious losses and unforeseen events. While there are noticeable differences between the objectives for which capital requirements are laid down there also exists some similarities over what purposes the capital may be used for. Such objectives, according to Greuning and Bratanovic (2009), can be broken down in two broad categories – primary and secondary. The primary and foremost function of capital is to safeguard the operational latitudes of the bank whereas its secondary objective is to promote greater efficiency. Established literature reveals a high preference for the primary function in the regulator whereas banks are more inclined towards fulfilling the secondary function of capital.

The functional significance of capital has also been laid down by Nwanko (1991) who categorized its importance into three broad stages or phases of a bank's

lifecycle. At the commencement phase of the lifecycle, the capital usually compensates for the lack of profit and is also used to meet the minimum regulatory requirement. In the second stage where the bank advances to some maturity, additional capital is used to accommodate unforeseen additional losses and provide for expansion and growth. The third and final stage of the lifecycle is characterized by either bankruptcy or liquidity shortfall where additional capital comes in handy to counter both of these situations. Throughout these times, the capital does not only protect the creditors but also safeguards the interests of the depositors.

4.3. Determinants of Capital Adequacy Ratio (CAR)

It has been observed in various research activities that in order to maintain a sustainable banking environment, it is essential to assess the capital adequacy and its key determinants (Saunders & Cornett, 2014). It has also been noticed that the capital adequacy ratios are determined by making use of various other factors which are generally called the CAMEL model which are all used to assess the financial performance of any banking segment (Hassan et al., 2016; Al Mamun, 2013). Besides these there are certain other factors also which act as determinants of Capital Adequacy Ratio and these are, namely, Credit Risk and Net Interest Income Growth (Hasan et al., 2015).

It is essential for financial providers that they should be aware of the qualities as well as of the drawbacks of methodologies and policies that they employ in any given financial framework (Mizgier et al., 2015; Hassan et al., 2016). Thus, it has been observed that now most of the regulators have expanded the scope of supervision of banks by employing the CAMEL model which they use for evaluating and assessing the performance as well as the financial soundness of the banking sector (Shingjergji and Hyseni, 2015; Paudel and Khanal, 2015).

Following the existing literature in banking studies, bank size is generally measured by the log of total assets, bank profitability is measured by return on assets, credit risk is measured by loans portfolio loss rate and the capital adequacy

ratio (CAR) is generally measured by the percentage of capital to risk weights assets, and which should be at least 8% (Aktas et al., 2015; Bateni et al., 2014; Abusharba et al., 2013).

Assets management quality in the banking sector is considered as a key indicator of positioning on a bank toward the credit risk (Kaplan and Atkinson, 2015). The type of assets have a direct association with credit risk. Thus, it can be understood that the Assets Management Quality helps the banks in determining the level of monetary quality of the resources of the bank and also the related dangers that might be associated with the resources of the bank and which primarily includes advances and loans (Sallis, 2014).

It has also been observed that the Assets Management Quality is considered the most important feature of the banking sector as whenever an investigation taken place in a bank, the asset quality is taken as a major issue (Heizer and Barry, 2013). Such importance of the Assets Management Quality which stems from the significant role it plays in predicting the level of efficiency in the banking unit in controlling as well as monitoring the credit risk that is associated with the assets and this also helps in deciding as to what kind of credit rating should be given to the bank. Thus, it can be said that the Assets Management Quality helps the banking sector to evaluate the assets which are held by any firm where it measures the level along with the size of the credit risk that is considered to be associated with the operations of that firm (Bodie, 2013). Assets Management Quality determines the level of the present credit risk and also the potential credit risk which may be associated with the portfolios of investment, advancement of loans, any other property that the firm might be holding, several other assets and also various other transactions which are off-balance sheet (Boedker et al., 2014).

It has also been stated that the inspector who is evaluating the asset quality must take into consideration the sufficiency of the loans along with the lease losses and should also measure the presentation that is being made to the counterparty, or any debt or failure in paying any actual or implied contractual understandings. Thus it can be said that every possible risk which may have an impact on the worth or

value of the assets of the firm must be considered and this may also include the market, strategic, operating, reputation related, or compliance risks. Since Assets Management Quality helps in determining the overall risk which is associated with any different kinds of assets which are held by the banks, it helps the banks in deciding the total amount of assets held by them that may present a financial risk and thus they are able to decide as to how much allowance they are required to make for such potential losses (Mansoor et al., 2014).

The term Assets Management Quality thus helps in determining the development and productivity of a firm. Also, the asset quality position of the firm helps in measuring the monetary proficiency of the banking business to determine the capital adequacy position that helps in measuring the ongoing concerns in the nature of the banking business (Wang and Jiang, 2015). Thus, it can be said that the capital adequacy position of the firm depends upon the Assets Management Quality due to the incredible role that it may play in mitigating the risks that are faced by the banks due to the asset quality. The Asset Management Quality is of equal relevance for Islamic banks as for their conventional counterparts. Hosen (2017) study the determinants of Islamic bank Asset Quality in the MENA region using a sample of 46 banks. The author concludes that Asset Management Quality is a statistically significant indicator in determining the financial stability and contributing to the efficiency of Islamic banks.

Thus, it can be argued that it helps in determining the strengths of the financial institutions the capital adequacy of a bank. Accordingly, the following hypothesis is developed:

Hypothesis 1: Assets Management Quality has a positive effect on capital adequacy of Islamic and conventional banks.

It has been observed that the liquidity ratios are also used for ascertaining the overall administrations of banks. Liquidity refers to the presence of cash in the firm or any other equivalent. It is the liquidity ratio of the bank which depicts the capability of the bank in meeting its liabilities when they mature (Almeida et al., 2014). Thus, it can also be described as the capability of the bank to transform its non-cash assets into cash as and when the need arises. Thus, it can be argued that liquidity depicts the cash position of the banks. In other words, it is the capability of the banks in meeting the day-to-day needs of its customers (Goldmann, 2017). These needs can be met either by drawing cash out of the stock of cash holdings, or by making use of the current cash inflows or even by converting liquid assets into cash form. The most common examples of liquidity ratios are current ratios, working capital ratio and quick ratios (Bianchi and Bigio, 2014). The current ratio is considered the determinant of company liquidity. It helps in showing the ability of the company in meeting its short-term liabilities as it evaluates if the company has enough assets to meet its liabilities for a year. On the other hand, more specifically, the quick ratio is considered as the determinant of the ability of the company in meeting its short-term liabilities which are due before the end of a year. These covers the quick or liquid assets of the company which are readily convertible into cash form without making a significant decrease in their book value (Subrahmanyam et al., 2017). It shows the financial strength and weakness of the company. The Working capital ratio shows the working capital of the firm which is calculated as the amount of current assets which is in excess of the current liabilities of the firm and it generally depicts the ability of the firm in meeting its current obligations. Thus, it evaluates how much the firm is holding in liquid assets which is necessary for the expansion of the business of the firm.

The term Assets Management Quality thus helps in determining the development and productivity of a firm. Also, the asset quality position of the firm helps in measuring the monetary proficiency of the banking business to determine the capital adequacy position that helps in measuring the ongoing concerns in the nature of the banking business (Wang and Jiang, 2015). Thus, it can be said that the capital adequacy position of the firm depends upon the Assets Management

Quality due to the incredible role that it may play in mitigating the risks that are faced by the banks due to the asset quality. The liquidity ratio is of equal relevance for Islamic banks as for their conventional counterparts. Maqbool (2018) study the impact of liquidity on Islamic bank's profitability and efficiency in the context of the Pakistani banking environment where she is able to conclude that liquidity has an inverse relationship with Islamic banks profitability and efficiency and is therefore capable of affecting the capital adequacy ratio of Pakistani Islamic banks.

Thus, it can be understood that the liquidity ratio plays a key role in determining the capital adequacy ratio that the banks are required to hold to run the day-to-day business operations. On the basis of these arguments, the following hypothesis is developed.

Hypothesis 2: Liquidity has a statistically significant effect on capital adequacy of Islamic and conventional banks.

While establishing the relationships between capital adequacy and risk, based on the existing literature it is crucial to control for credit risk as a key determinant. Credit risk acts as the indicator of performance in the banking sector and in this sense has several variables which are namely: the ratio of net charge off to average gross loans, ratio of loan loss provision to total equity, ratio of loan loss provision to total loans and advances, and ratio of loan loss reserve to gross loans and advances (Jiménez et al., 2014). Based on the existing literature in banking, it is observed that the credit risk ratios have a great impact on the capital requirement. In addition, it can be argued that the credit risk of banks implies that the risk taking depicts the attitude of the management and their behavior towards the shareholders and therefore the bank must ensure that the agency problems are also minimized in order to prevent reputation related risks.

The credit risk ratio is of equal relevance for Islamic banks as for their conventional counterparts. Misman et al. (2015) undertake a panel study to investigate the credit risk in Malaysian Islamic banks where the capital ratio and credit risk demonstrate consistent results.

Therefore, having a well trusted management in place, banking regulators would ensure to take into consideration the level of credit risk when setting up the bank capital requirement (Bluhm et al., 2016). Accordingly, the following hypothesis is developed:

Hypothesis 3: Credit Risk (CR) has a statistically significant effect on capital adequacy of Islamic and conventional banks.

In addition, the earning or profitability quality of the firm depicts its capability of earning income on a regular basis. Thus, it can be said that the sustainability as well as the progress of the earning of a bank in future is another indicator of the banks as to determine the capital requirement as it shows the capability of the bank of earning consistently. The best indicator of the profitability of the commercial banks is the measurement of its current productivity (earnings) (Damodaran, 2016). There are various indicators of profitability and out of all of them, the most significant indicators of profitability are considered to be return on assets (ROA) and return on equity (ROE). Return on assets (ROA) is generally measured as the net income divided by the aggregate of assets of the firm. On the other hand, return on equity (ROE) is calculated as the proportion of the aggregate net income to the capital value of the bank. By and large, the return on assets and return on equity are used as a proxy for profitability (Haslem and Longbrake, 2015). Taking into consideration the bank profitability when setting the capital requirement is due to the benefits of profitability, which boosts the capital base of the bank whereas

misfortunes result in a decrease in the capital base of the banks. This is because earning and profitability are generally measured as long as the returns are received on the assets or capital which are held by the banks. Profitability is generally assumed to have a direct and positive relationship with the capital adequacy ratio and this is mainly because a bank is expected to raise asset risk with a view to gain higher returns.

Bank profitability is of equal relevance for Islamic banks as for their conventional counterparts. Akhtar, Ali and Sadaqat (2011) explore the interrelationship between Islamic bank profitability and their capital adequacy ratios in the Pakistani banking environment. The authors conclude a statistically significant positive relationship between the aforementioned variables.

Thus, it is observed that there is a positive relationship between profit and capital reserves that banks hold. Accordingly, the following hypothesis is developed:

Hypothesis 4: It is expected to have a positive association between bank profitability and capital adequacy of Islamic and conventional banks.

The simplest way of earning for banks is interest income. The interest income of the banks generally includes the income from investments, interest on advances, discount on bills and other inter-bank funds. It has also been observed that most of the conventional banks usually earn income by way of interest income. Banks are required to use income statements for reporting the interest income that is earned (Williams, 2016). But since the interest income is not a part of the original investment, it is required to be reported independently under the heading, interest income (Palley, 2013). Therefore, net interest income is considered as an important variable to consider when it comes to the capital requirement as it critically affects bank earnings which directly associates with the capital requirement. On the basis of these arguments, the following hypothesis is developed.

Hypothesis 5: Net Interest Income (NIIC) has a statistically significant effect on capital adequacy of Islamic and conventional banks.

Another most important factor that ensures the good performance of all banks is management quality. The quality of the management of the bank is measured as the administrative ability of the bank in reacting to diverse circumstances of the business. Management quality also refers to the ability of the bank and its management to generate business and also to maximize profits. It is sometimes called as 'administrative proficiency', which generally refers to the capacity of a bank of increasing its benefits or minimizing its costs in any given circumstance (Koch and MacDonald, 2014). Management quality is also considered a very important tool for measuring the performance of the banks. It is so because it is considered to be a qualitative factor that can be applied to institutions either individually or jointly in order to ascertain the performance of the banks. Expenses ratio, loan size, earnings per employee and cost of unit per lent money are some of the factors which are generally used as an alternative to management efficiency (Ibrahim et al., 2015). Effective management is also essential for the success of financial organization as it is an important factor that helps to ensure the stability and strength of the banks (Banna et al., 2016).

Management must also be efficient in managing the assets efficiency as managing asset efficiency is considered very important mainly due to its impact on the debt service ability of the bank. Accordingly, the following hypothesis is developed

Hypothesis 6: Management Quality (MQ) has a statistically significant effect on the capital adequacy of Islamic and conventional banks.

As a control variable, asset size is usually used as a proxy for measuring the size of the bank, which is presented by the log of total assets (Platonova, 2014). The size of the bank is a key variable that needs to be taken into consideration when controlling for the determinants of the capital adequacy ratio. (Berger and Humphrey, 1997; Isik and Hassan, 2002).

4.4. The Capital Adequacy and Bank Efficiency

It is a well-established understanding that what constitutes adequate capital is prescribed by the regulatory bodies or central bank, however, the Basel Accord lays down an international standard of capital adequacy (Babihuga, 2007). The Accord acknowledges that the financial regulators of a country are responsible for setting the capital requirement that must be met by the bank or any other similar financial institution operating in that country (Benli, 2010). Though the Accord does not lay down what the exact capital adequacy ratio must be, it emphasizes that ratio must be held as a percentage of risk-weighted assets (Benli, 2010). It argues that the setting of such limits ensures that excess leverage is not assumed by the bank that may unduly increase its risk of insolvency (Zhou 2011). The ratio of equity to debt is covered by the capital requirements and is different to the reserve requirements that are to be fulfilled by the bank. Zhou (2011) posits that the intent and purpose of the regulation is to ensure that the bank prudently manages its risk so as to protect itself, its customers, and the government, which may need to take an action to bail the bank out in the case of bankruptcy. Hence, holding sufficient capital helps a bank to withstand foreseeable problems and promote the continuation of an efficient and safe market.

The main international effort has come from the Bank for International Settlements which is where the Basel Committee on Banking Supervision has published the Basel Accords, which set the guidelines for capital requirements (Nakagawa, 2011). It illustrates how capital should be calculated and therefore sets a framework to this end. The assessment and regulation of bank capital is guided by its capital ratios. Basel I was issued in the year 1988 followed by Basel II in 2004 which is now superseded by Basel III, which was written in response to the financial crisis of 2007-2009 and is currently in implementation phase as mentioned earlier in chapter two. Moss (2013) observes that the proportion of the bank's capital to its risk weighted assets is what defines the capital ratio and according to the requirements of Basel II the ratio must not be lower than 8%. However, the means of calculation vary from regulator to regulator as the capital requirements must correspond to the national legal framework of the country.

On the other hand, according to Adams et al. (1998), efficiency is most commonly interpreted as being technically efficient in an area of work. The process encompasses the conversion of tangible and intangible inputs into outputs whilst being productive and making the best use of resources. In other words, it is the production of output while minimizing (and in some extreme cases) eliminating the wastage of inputs. An entity would be regarded as operating at 100 per cent efficiency where it is employing best practices in using minimum resources in maximum production. Hence, technical efficiency is influenced by the size or scale of operations and the extent to which best practices are adopted. Furthermore, Blavy (2006) argued that another important concept in the context of efficiency pertains to allocative efficiency. For set input prices and a given level of output, allocative efficiency strives to minimize the cost of production. In doing so it assumes that the entity is completely technically efficient. Accordingly, a combination of allocative efficiency and technical efficiency makes up total economic efficiency which is alternatively called cost efficiency (Blavy, 2006). It is only when an organization is allocative and technically efficient is it regarded as cost efficient. The product of allocative and technical efficiency (both expressed as a percentage) equates to cost efficiency. Hence, an organization will only be a 100 per cent efficient where both efficiencies stand at a 100 per cent.

The movement towards the introduction of stricter regulation for banks and financial institutions has found advocates and opponents. While the advocates found that capital ratios have a favorable impact on bank efficiency, the opponents argue that imposing strict adequacy requirements can adversely impact bank performance.

On the other hand, the majority of evidence from the existing literature suggests that having stricter capital adequacy regulations in place would positively impact the bank efficiency. In this regard, for instance, the extent to which the capital adequacy requirements affect the efficiency of banks has been studied by Babihuga (2007). Based on the research methodology adopted for the study, the authors of the paper assessed the efficiency of Chinese banks for the period 2004-2009. The study was conducted in response to the significant changes that occurred

with respect to capital requirements during this period. Findings of the study conclude that capital requirements have a positive effect on the efficiency of commercial banks operating in China. Moreover, the study revealed that by controlling the ownership structure and size of the bank, increased capital requirements can positively contribute towards bank efficiency.

In addition, Naceur and Kandil (2009), who are among the supporters of further regulation of capital requirements, argued that compliance with Basel requirements in emerging economies and the tightening of capital regulation had a positive effect on the financial efficiency of banks. Alexander et al. (2013) were also able to find positive effects of the revision of the capital requirements and Basel regulation on the financial performance and efficiency. According to their findings, the bank portfolios constructed based on the revised Basel requirements were less sensitive to trading losses. Chortareas et al. (2012) observed similar positive effects of stricter capital requirements regulation in the European banks. They used a panel regression approach with the data envelope analysis. These methods showed that tighter capital requirements were associated with higher efficiency of the European banks. Yet, this study was limited to the period from 2000 to 2008 and did not cover the time range during the economic recession and European Debt Crisis.

Takts and Tumbarello (2009) debate that by mitigating the moral hazard between debt holders and shareholders, capital requirements may positively affect bank efficiency. As shareholders take on limited liability they find themselves in a position to take extensive risk, which is further compounded by a regulation that favors low capital ratios. This is further complemented by government guarantees of deposits. CAR set at high levels forces shareholders and company management to control risk and therefore reduces risk-shifting. Established literature also shows that the profitability of a bank can be positively impacted by capital ratios where monitoring incentives are improved, and a bank-borrower relationship generates a surplus.

A very comprehensive study on the relationship between capital adequacy and bank efficiency was undertaken by Fiordelisi et al. (2011) by analyzing data from the European banking industry over the period, 1995 to 2007. To test such a relationship, they used Granger-Causality tests in the GMM dynamic panel model. Fiordelisi et al. (2011) found that lower capital ratios reduce efficiency.

A study of a similar nature has been conducted by Berger and Bouwman (2011) who tested for an association between other performance metrics of banks and the capital ratios. In this study, they analyzed banking and regulatory data for the period, 1984 to 2009 where the sample was composed of all US banks. Their findings reveal that profitability and market shares of banks improved when higher capital ratios were mandated.

Furthermore, a study has been conducted by Barth et al. (2010) where operating efficiency in 72 countries over the period 1999–2007 has been analyzed to ascertain whether monitoring, regulation and increased bank supervision impedes or enhances banking efficiency. Findings of the study show that a positive correlation exists between capital requirements and bank efficiency. In a similar way, for the period 2000-2008 the data has been analyzed for 22 European Union countries by Chortareas et al. (2012) who concluded his research by stating that bank efficiency improves when the capital requirements are strengthened.

In a study conducted by Pasiouras (2008) it was revealed that technical efficiency is enhanced where there is market discipline, powerful supervision, and stricter capital adequacy requirements. Whilst unnecessary costs may accrue to a bank where capital requirements are excessive, keeping the requirement too low exposes the bank to a risk of failure. Cost overruns are ultimately passed on to the customers which adversely affects the efficiency of the banking sector. Moreover, Barth et al., (2004) outline the conflicting predictions provided by economic theory on the influences of supervisory and regulatory policies on bank performance.

On the other hand, the proponents of anti-capital requirements such as Salem (2013), Jarrow (2013) and Büyükşalvarci (2011) argue that when capital costs are

higher the agency costs between shareholders and managers increase due to the discipline rendered by debt repayment on manager behavior, hence, it can be stated that a negative effect is obtained. In similar manner, Berger and Udell (2006) studied the effect of capital adequacy requirements on efficiency of the US banking industry over the six year period, from 1990 to 1995. They employed a parametric distribution-free approach to ascertain the association between the aforesaid variables and a negative impact was confirmed.

The ultimate aim of enacting financial regulation is to enhance solvency and improve liquidity. Greater bank stability may be achieved in response to strict regulation however at the expense of bank efficiency. Accordingly, Barth et al. (2006) conducted research on the mechanism of banking regulation and the factors that influences it. The findings of their study reveal that for most countries capital adequacy standards and strong regulators do not improve bank efficiency. Arguments for whether or not to restrict bank activities have been put forward by Barth et al. (2004) who concur that imposing restrictions on banks increases the probability of a banking crisis and also lowers bank efficiency.

In this context, VanHoose (2007) argues that even though that the Basel requirements on capital adequacy significantly affect the lending behavior of banks, there is no convincing evidence that such regulation reduces the risk of the financial institutions. Akhigbe et al. (2012) made an interesting observation that higher capital requirements do not have a positive effect on the market value of banks. In fact, they made an opposite observation that those banks that had more capital suffered larger losses in the financial markets as their shares plummeted more in comparison to the banks with lower capital. This is explained by the signaling hypothesis which implies that higher capital sends a signal to investors that this capital is used as a protection against higher risk of the assets. However, Akhigbe et al. (2012) observed that even an increase in capital is not sufficient to cover the risky assets. This is another argument against further regulations of the bank capital.

Another criticism of the strict capital requirements was provided by Kaplanski and Levy (2007). They argue that an increase in the capital requirements after reaching a certain benchmark will lead to a decrease in the efficiency of the bank performance. Interestingly, they concluded that even less strict Basel II requirements were already located in the inefficiency range. Hence, further tightening of the regulation may bring even more disadvantages to the financial industry.

However, Lee and Hsieh (2013) argue that capital requirements have a direct effect on the performance of banks. Thus, regulation can have negative or positive implications for the financial sector. They note that the effects of capital ratios on financial performance are different depending on the type of financial institution (for instance, commercial banks and investment banks) and the market in which they operate (such as, developed countries and emerging economies). These findings were achieved using a panel regression analysis with the generalized method of moments (GMM) estimation. Hakenes and Schnabel (2011) also argue that this relationship between capital requirements and bank performance is different for small and large banks. Small banks are found to be more sensitive to such regulation (Hakenes and Schnabel, 2011).

Tan and Floros (2013) observed an indirect effect of capital requirements on bank efficiency. They found that efficiency was positively related with the loss provision on credit and the latter was negatively related with the total capital held by banks. Thus, it is concluded that capital regulation could indirectly cause deterioration in financial performance.

In contrast to the empirical studies that have been reviewed, Allen et al. (2012) argue that the capital requirements by Basel will not directly affect the efficiency of banks. However, they do admit that there will be effects on the availability of loans and activities from the banks but these effects will be felt because of the adaption of the banks to the new requirements and the changes in the business models. Once this period of adaptation ends, the efficiency of the financial companies will not be affected according to Allen et al. (2012). The changes in the

lending activities of banks, their liquidity and efficiency were observed by Jayadev (2013b). However, similarly to Allen et al. (2012), they argue that these are temporary effects and they can be eliminated by effective management and adaptation to the new environment.

It is interesting to note that empirical literature also provides the third point of view on the relationship between the capital requirements and efficiency of banks. Whereas previous studies that were reviewed concluded whether the regulation had a negative or positive effect on the efficiency, Demirguc-Kunt and Detragiache (2011) conclude that there is no statistically significant effect of capital requirements regulation on the efficiency and risk of banks. This conclusion was based on the analysis of more than three thousand banks from more than eighty countries using panel regressions. However, this conclusion could be affected by the choice of proxies they used to assess the performance and compliance with regulation. Instead of considering individual ratios, they constructed aggregated indices and z-scores that were used to represent the performance and compliance with the capital requirements regulation (Demirguc-Kunt and Detragiache, 2011).

Therefore, following the vast strand of literature that empirically proves that imposing capital ratios can negatively affect efficiency of the banks, and based on theoretical arguments, the following hypotheses is developed:

Hypothesis 7: The capital adequacy ratio has a negative effect on the efficiency of Islamic and conventional banks.

Whilst there is a substantial literature that studied, analyzed and evaluated the implications of such regulations of capital adequacy on the efficiency of conventional banks, there is scarce literature on how and to what extent such capital standards may impact and influence the efficiency of Islamic banks compared to conventional banks (Hadriche, 2015).

4.5. Conclusion

Based on the existing literature, it can be stated that measuring the determinants of capital adequacy in conventional banks has been assessed. However, when it comes to Islamic banks this issue remains almost untouched. Therefore, given the unique features of Islamic banks and their capital structure, it is crucial to investigate the factors that affect their capital ratio in a comparative manner with conventional banks. Furthermore, the existing literature has substantially examined the impact of capital requirements on efficiency in the case of conventional banks. However, there is little in the literature in relation to the implication of the capital adequacy requirement on the efficiency of Islamic banks. Therefore, covering such a gap in the literature is the focus of this study.

CHAPTER FIVE
RESEARCH METHODOLOGY

CHAPTER FIVE

RESEARCH METHODOLOGY

5.1. Introduction

The aim of the research is to measure the factors that determine the capital adequacy ratio and assess the impact of the capital requirements on the efficiency of Islamic banks in a comparative manner with conventional banks in the case of the GCC countries.

To complete this aim, annual reports of Islamic and conventional banks have been examined through analysis of data for 2006-2015 to assess the effect of capital adequacy ratio on bank efficiency.

For this purpose, the following hypotheses were developed and tested:

H1: Assets Management Quality has statistically significant effect on capital adequacy of Islamic and conventional banks.

H2: Liquidity has a statistically significant effect on capital adequacy of Islamic and conventional banks.

H3: Credit Risk (CR) has a statistically significant effect on capital adequacy of Islamic and conventional banks.

H4: Return on Assets (ROA) has a statistically significant effect on capital adequacy of Islamic and conventional banks.

H5: Net Interest Income (NIIC) has a statistically significant effect on capital adequacy of Islamic and conventional banks.

H6: Management Quality (MQ) has a statistically significant effect on capital adequacy of Islamic and conventional banks.

This section provides the research methodology that has been applied in conducting this study. It starts by explaining the key research philosophies related to the research in question and justifies the philosophical position that has been undertaken in this study. Furthermore, this chapter outlines the research methodology that has been employed in this study followed by an explanation of research design and strategy that has been used and clarification of methodological choices. Then, this chapter highlights the research methods of collecting and analyzing the data. The chapter then provides the definitions and measurements of the examined variables followed by an explanation of the modelling process. It concludes by highlighting the challenges of conducting this study.

5.2. Research philosophy

A research philosophy refers to a belief concerning the way through which a phenomenon could be looked at. In other words, it can be explained as the way that an individual may expand her/his knowledge (Saunders et al., 2009). It guides the researcher to develop the assumptions that can help in building the research and it outlines and the approach that can be followed to conduct the research in question (Easterby-Smith et al., 2002). In other words, having a clear understanding of the research philosophy will assist the researcher to understand the methods that should be applied in processing their own research (Easterby-Smith et al., 2002).

A research philosophy delineates a belief concerning the way through which data about a phenomenon ought to be gathered, analysed, and used. The term epistemology or what is conventionally known to be true; unlike doxology (what people believe to be true) incorporates the numerous philosophies of study approaches (Mejbel Al-Saidi, & Bader Al-Shammari, 2013, p. 472). The role of scientific process, then, is to provide a procedure of changing things that people believe in into things that people know, or to facilitate the transformation of data to epistemology.

Two principal research philosophies tend to emerge from the above argument, and these are identified tend to pervade scientific processes globally, including positivist philosophy (sometimes known as scientific) and interpretivism philosophy (otherwise termed as antipositivist) (Cecchetti, & Li, 2005). Some scholars consider the positivist and interpretive philosophies as the exact opposite of one another, bearing in mind that clashing nature of ideologies that underlie the two

The positivist philosophy contends that reality is unchanging and can be described and studied from an objective point of view (Wan et al., 2013). This implies that researchers should avoid interfering with the phenomena under study and deploy standard scientific methods to obtain accurate and generalizable findings. Positivists see that the social phenomena ought to be isolated from the individual perceptions and that the observations must be repeatable.

This philosophical approach looks at social events using the same principles, procedures and attitude that are used in scientific events. The positivists believe that events are perceptible and assessable can be the only source of the developing knowledge in this world (Hussey and Hussey, 1997). Hence, they think that the knowledge can be established by collecting data that can be measured. Based on their view, this is only way of examining the developed assumptions (Bryman, 2001).

On the other hand, the interpretivist philosophy argues that the social events require different approach and procedures than the natural scientific ones (Bryman, 2001). In other words, the interpretivist philosophy suggests that the only way to understand reality is through subjective interpretation (Chunyan Li et al., 2007). The interpretivists highlight that in social phenomena the researchers should emphasize on human perception and the distinctions among them in looking into it, rather than investigating just pure quantifiable data, as understanding such phenomena requires an in-depth understanding of the surroundings (Saunders et al., 2009).

As for this study, given the research aims and objectives and the nature of the required data, the positivist approach is employed as the philosophical position of this research. Choosing this philosophical position is due to the fact that the interpretivist philosophy conceptualizes reality as a factor that can only be studied through considering the experiences of people, which is not the case in relation to the undertaken research. Although interpretivists generally use this aspect of the philosophy as an advantage of arguing that reality is too complex to be studied using predetermined and fixed scientific methods, the philosophy does not fit to this study as the positivist philosophy suits more, as the aim is to measure the quantitative correlation between capital adequacy and efficiency in banking sector.

5.3. Research Methodology

Researchers can decide to use either qualitative methods or quantitative methods depending on the nature of their research problem. Qualitative methods entail methodological procedures that are best applicable for studies that seek non-quantifiable, descriptive data, which are typically used to understand the why and how of a social phenomenon under study (Jokivuolle et al., 2009). As per the Chorafas (2011) argument, qualitative methods are best used to seek and collect in-depth data to be used in describing the understanding, attitudes, feelings, assumptions and beliefs of people in order to understand a research phenomenon. Qualitative studies mainly end up in findings that are unique to a given population, and it may be difficult to duplicate similar methods or generalize the findings to other groups. Unlike qualitative studies, quantitative studies fit the investigations that use quantifiable data to make generalized assumptions concerning the larger group from which the study sample was drawn. Unlike qualitative approaches, quantitative methodologies use standard methods to attain repeatable observations and measure the correlation and causality among variables (Bryman, 2011).

Given that this study aims to measure the determinants of the capital adequacy obligation and their impact on the efficiency of examined banks, this study will adopt the quantitative research methodology to answer the research questions.

5.4. Research Design

The research design is a very vital component of the methodological framework of the research, as it guides the researchers to the most appropriate way of identifying the most suitable approach of collecting data and analyzing them in an organized way, which assists the researchers to have a better understanding of the research aims. In other words, the research design helps the researchers to know the location of their research in a methodological manner (Denzin and Lincoln, 2005, p. 25). For instance, the research design describes the type of research whether it is semi-experimental, experimental, review, meta-analytic, descriptive, and correlational and it helps the researchers to identify the independent and dependent variables, research question, experimental design, hypotheses, methods of data collection, and statistical analysis plan of the study. By and large, the research design defines the research framework for researchers to answer research questions (Kothari, 2004).

The main research designs are exploratory and explanatory (Ghauri and Gronhaug, 2010, p. 54).

Exploratory research

The exploratory research design is applied when the research problem is not identified to the researcher and stresses on learning about new issues to innovate new understanding of a phenomena. Hence, it starts with gathering data to develop hypotheses that may lead to a new theory. Therefore, it begins with the specific and ends up with more general statements (Saunders et al., 2009). Such research focuses on exploration of the achievement of insights and familiarity for subsequent investigation. The researcher who relies on exploratory research has a very wide picture at the beginning and then becomes increasingly focused at the end of the research (Saunders et al., 2011).

Explanatory research

The explanatory design refers to an approach of studying through testing the correlation among the examined variables. Under this design the researchers apply statistical tests to confirm the reliability of the obtained results (Saunders et al., 2009). According to such understanding of research design and based on the research aims and objectives, this study follows the explanatory design.

Descriptive research

Many researchers and research studies believe that descriptive research is considered to be low in comparison with quantitative research or that it is at a lower level in quantitative research designs. In fact, descriptive research is the real experiment that in turn leads to prediction is the golden model and thus the other models are considered inappropriate and weak (Talbot, 1995)

The descriptive approach is the method that depends on the analysis and study of a set of phenomena, and describes these phenomena accurately and gives specific descriptions, they are then expressed by giving them numerical characteristics, and writing tables and data to determine these phenomena and their correlation with other phenomena, where descriptive approach is a broad approach Includes several approaches and sub-methods (Jablonsky, 1994).

This type of research is of great importance, especially in the field of human studies, where the views of people and their beliefs and attitudes are revealed, and their attitudes from a particular position, where this subject is used to find out a particular issue and opinion related to a particular category of society, To collect descriptive data on a given phenomenon (Robson, 2002).

Case study research

Case study, it represents a case study which cannot provide reliable information about the broader class as well as the case study. The detailed examination of one example of a class of phenomena can be systematically tested with a larger number of examination cases but may be useful in the initial stages of investigation

because it provides hypotheses (Abercrombie et al., 1984, p. 34). Recently, Walton (1992, p. 129) defines the case study as "making case studies theoretical principles".

Based on the research aims and objectives, this study follows the explanatory design.

5.5. Research Strategy

According to Kothari (2004) a research strategy defines an overall plan that allows researchers to answer research questions in a methodological manner. There are two types of research strategies including the inductive and deductive approaches (Feria-Domínguez et al., 2015).

Deductive research approach works from general to more specific. It starts with a theory concerning the topic of the research before narrowing into specific hypotheses that the study aims to test. Meanwhile, the inductive strategy moves from precise observations to wider theories and generalizations. Given that this research aims to investigate the developed hypotheses of the expected association between the examined variables to examine the determinants of the capital adequacy and also test the impact of the capital adequacy on the banking efficiency, this research will apply the deductive strategy to answer the research questions.

5.6. Research Method and Instruments

This section demonstrates an important of the research – the data collection and research method, model description definitions and measurement of variables.

5.6.1. Data Collection and Research Methods

Researchers may use secondary or primary data, or both secondary and primary data in their investigation. Primary data entails information that requires researchers to deploy research instruments, such as questionnaires, interview, focus group discussions and observation to collect data from the field. This

category of data is considered advantageous as it provides direct insight into the research phenomenon, thus supporting originality, accuracy, and applicability of research findings (Moreira and Carvalheira, 2016). On the hand, the secondary data delineates data that that is sourced from some existing sources and this type of data is used especially when the research needs to investigate data of a historical nature. As for this study, based on the nature of the research aims and objectives, secondary data will be utilized, which can be gathered from financial statements including income statements, cash flow statements, and balance sheets of the chosen banks.

In order to measure the determinants of the capital adequacy and assess the impact of capital adequacy on banking efficiency in a comparative manner between examined Islamic and conventional banks, this research will use regressions analysis (Brooks, 2008). Furthermore, with regards to the analysis methods, this research will use Data Envelopment Analysis (DEA) to assess the impact of capital adequacy on the bank efficiency in a comparative manner between Islamic and conventional banks.

In contrast to other tools, the choice of using the DEA technique is suitable as it is considered as one of most popular quantitative methods for measuring operational efficiency. It measures efficiency in banks by identifying efficient banks and setting them as benchmarks. The input combinations of other banks are then measured against the benchmark. DEA measures operational efficiency by coming up with the best production function based on observed data. This minimizes chances of production technology misspecification. Furthermore, it is semi-parametric and involves making assumptions about the functional form of the frontier. Unlike other quantitative methods, it does not include the imposition of a specific form on the efficiency distribution terms. As it allows for the decomposition of technical efficiency into its pure technical and scale efficiency components it can be argued that the technique is most suited given the nature of the research.

Prior to conducting regression analysis, this study will use different econometric tests to check the validity of the data and examined variables. To check whether the data is of a parametric or non-parametric nature, this research will use skewness and kurtosis tests (Brooks, 2008 and Gujarati, 2006). Furthermore, in order to examine the multicollinearity issues between variables to avoid the threat of endogeneity, this study uses the Spearman or Pearson matrix depending on the nature of the data (Wooldridge, 2013). In addition, to check whether to use the fixed effects or random effects model, this study will employ the Hausman test and to check the endogeneity the Durbin-Wu test will be utilized (Brooks, 2008 and Gujarati, 2006). In conducting the statistical tests and regressions analysis, this research will use SPSS software.

5.6.2. Research Tools to Test the Relationship between Capital Adequacy Ratio and Efficiency

5.6.2.1. Model Description

The following regressions model is applied to test the developed hypotheses.

Model 1: The panel data regressions model to measure the determinants of capital adequacy requirements (AL-Ansary and Hafez, 2015).

$$CAR_{it} = \alpha + \beta_1 AMQ_{bit} + \beta_2 LR_{bit} + \beta_3 CR_{bit} + \beta_4 P_{bit} + \beta_5 MQ_{bit} + \beta_6 NIIC_{bit} + \beta_7 Size_{bit} + \epsilon_i$$

Where:

CAR: refers to the capital adequacy ratio is calculated by (tier1+tier2) to risk weighted assets of bank b in country i during the period t .

α : the intercept;

$\beta_1 \dots \beta_n$: the regression coefficients;

ϵ : the error term;

AMQ_{bit} refers to assets quality and calculated by earning assets to total assets of bank b in country i during the period t ;

LR_{bit} refers to Liquidity ratio which is calculated by securities average to total assets of bank b in country i during the period t ;

CR_{bit} refers to Credit risk and calculated by loan loss reserves to total loans of bank b in country i during the period t ;

P_{bit} refers to Profitability and measured by return on assets (ROA) is calculated by Net income to total average assets of bank b in country i during the period t ;

MQ_{bit} refers to management quality which is calculated by total loans to total average assets of bank b in country i during the period t ;

$NIIC_{bit}$ refers to net interest income is calculated by change in interest received – interest expenses of bank b in country i during the period t ;

$Size_{bit}$ is calculated by log of total assets of bank b in country i during the period t .

Model 2: To determine the relationship between capital adequacy ratio and efficiency, the following model is developed (Lee and Chih, 2013).

The explained variables in the regression model have been obtained from the efficiency in the profit model. The efficiency scores (as the explained variable) from DEA are limited to value between 0 and 1.

$$BE_{bit} = \alpha + \beta_1 CAR_{bit} + \beta_2 NPL_{bit} + \beta_3 CIR_{bit} + \beta_4 LIQ_{bit} + \beta_5 Size_{bit} + \epsilon_i$$

Where:

BE_{bit} : refers to efficiency of bank b in country i during the period t .

α : the intercept;

$\beta_1 \dots \beta_n$: the regression coefficients;

ϵ : the error term;

CAR_{bit} : refers to the capital adequacy ratio and is calculated by (tier1+tier2) to risk weighted assets of bank b in country i during the period t .

NPL_{bit} : refers to assets quality and is calculated by non-performing loans to loan unpaid.

CIR_{bit} : refers to Benefit and is calculated by cost to income ratio.

LIQ_{bit} : refers to Liquidity and is calculated by current assets to current liabilities.

Size: refers to total asset of bank b in country i during the period t and calculated by the log of total assets.

According to the equation, the financial regulation variables are divided into four categories: asset quality, benefit, liquidity, and capital adequacy. The provision coverage ratio, cost-to-income ratio, current ratio, and capital adequacy ratio are used as the explanatory variables. And, finally, the establishment time is used as control variable

Data Envelopment Analysis (DEA)

Furthermore, in order to measure the impact of the capital adequacy on bank efficiency, this study will use a profit efficiency model (Profit efficiency is a more inclusive concept than cost efficiency, because it takes into account the cost and revenue effects of the choice of the output vector, which is taken as given in the measurement of cost efficiency) of Data Envelopment Analysis (DEA) to investigate efficiency. Furthermore, according to Berger and Humphrey (1997) the lack of detailed enough cost data to actually generate useful information on where the "money leaks" actually are makes it difficult to rely on this model. In contrast, the ease of reliable access to profit measures (as such data is publicly available) makes the profit efficiency model a suitable choice for the study.

5.6.2.2. Data analysis procedure

This section demonstrates the statistical tests used in the empirical analysis in order to test the hypotheses discussed in the previous chapter as well as the

measurement and impact of capital adequacy ratio on the efficiency of Islamic and conventional banks in the GCC countries.

SPSS V.23.- the Statistical packages are used to conduct statistical analysis, including statistics that describe the relevant test of the Hausmann test, Breusch-Pagan / Cook-Weissberg test, Spearman matrix and the VIF test, and fixed effect multiple regression tests. Furthermore, to test the strength of the actual results of the study, two more sensitivity tests were performed. The first is the Two-stage least -square (2-SLS) regression analysis. Second, to test the endogeneity problem between dependent and independent variables, the Durbin-Wu-Hausman test has been used.

Descriptive statistics

The descriptive statistics show a simple summary of all of the variables which are used in analysis during the period. In addition to the maximum, minimum, mean and standard deviation values for each of the variables in the model, additional features include skewness and kurtosis. Data are generally distributed if the skewness is not more than between of +1.96 and -1.96 and kurtosis is of +3 and -3 (Gujarati, 2006).

Multicollinearity test

The term multicollinearity describes the relationship between both explanatory variables and all regression models (Gujarati, 2004).

Statistics describing variables (dependencies and independent) are calculated for the duration of the request. Diagnostic tests include the Spearman multicollinearity and Variance Inflation Factor (VIF), Inflation rates can be used instead of tolerance while the VIF is just as mutual tolerance with rules a maximum acceptable the variance inflation factor (VIF) rate would be (10) (Garson, 2012). Multicollinearity is a statistical phenomenon for the existence of more than one variable of prediction variables which is strongly associated with the multiple regression models. Should ensure that the data are suitable for

multiple regression analyses. Before continuing the interpretation of the corrective-fixing results of a model to an incidental impact model, it should be determined based on the number of crossings, the number of observations and the characteristics of the missing variables. The problem of multicollinearity occurs very often if the connection is about 0.8 or higher. If the coefficients involved from the zero line between the two returns are outside the recommended range of -0.8 or 0.8. In the upper matrix, there is no zero relation, which exceeds 0.8, which indicates that the null hypothesis is denied, which indicates that there is no true connection between zero (Gujarati, 2004).

Regression analysis

Multiple regression analysis using a panel data set is used to test the advanced hypothesis. This analysis is conducted to examine the impact of capital adequacy ratio on bank efficiency.

A regression analysis involving more than one independent variable is called a multiple regression analysis. When the effect of all independent variables on a dependent variable is linear, this is called linear regression analysis, In this case, data are usually composed of observations and independent variables.

Hausman Test

In order to confirm that the model is most fitted either with fixed effect of random effect, the Hausman test is applied. This test is based on the fact that the variables that insignificant are not related to the variables that cannot be to measure. Therefore, it tests the null hypothesis of the random effects. In contrast, the null hypothesis is rejected and replaced by the alternative hypothesis of fixed effects. This indicates that the variables which are significant will associated with variables that cannot be unobserved (Torres, 2007).

The Hausmann Test is used to select the appropriate test for the static effects model or the random effects model based on the probability value or the probability level of Chi-Square. If the value is less than 5%, the fixed effects model is used and if more than 5% the random effects model is used (Torres, 2007).

Fixed effects mean that the parameter (β) for each data set does not change over time, but only the change in the totals. For the purpose of estimating the parameters of the model and allowing the parameter of the pieces to be changed, the computed totals usually use imaginary variables(N-1) so as to avoid the state of full linear pluralism (Gujarati ,2003)

Sensitivity test

To test the robustness of the empirical results of the study, two more tests are performed. First of all, Two-Stage Least-Squares (2-SLS) regression analysis has been applied as an alternative test to control for endogeneity among the examined variables.

Secondly, the Durbin-Wu-Hausman test is applied. Accepting the null hypothesis of the Durbin-Wu-Hausman test confirms that there is no threat of endogeneity among the examined variables (Gujarati, 2004).

Justification

For the empirical analysis various statistical models have been used. Given the social sciences nature of the study and in accordance with the principal aims and objectives of the research correlation tests and multiple regression tests are carried out.

The correlation test is used to ascertain the strength and direction of relationship between the underlying research variables (Weinberg and Abramowitz, 2008). The choice of this technique is appropriate as it identifies first-hand whether or not the underlying research variables depict any association. If so, it can also suggest whether or not the movements are in the same or opposite direction and more importantly suggest the magnitude of such a relationship (if any) (Asaad, 2001). The use of this technique allows the behavioural determination of the variables and how they relate to one another (Asaad, 2001). It is therefore interesting to see whether or not the determinants of capital adequacy in the GCC depict relationships that conform to those evident in the existing literature. A preliminary evaluation of the research variables at this stage provides a suitable basis to

proceed with the multiple regression test as the researcher is now aware of the behavioural characteristics of such variables.

The use of multiple regression test is most appropriate in measuring the determinants of capital adequacy and its impact on efficiency in the banking industry as it highlights the extent of variation triggered in the dependent variable by the independent variables (Rubin, 2010). The model description section outlines the dependent variable as the capital adequacy ratio and the dependent variables as asset management quality, liquidity ratio, credit risk, profitability, management quality, net interest income, and size. Whilst the use of such variables is acceptable and consistent with the existing literature, it can be argued that in the context of Islamic banking the model may not give a true picture. This is because Islamic banks are prohibited to deal in interest and therefore there will be no element of net interest income.

The second multiple regression model seeks to capture the extent to which the capital adequacy ratio can predict the movements in bank efficiency. Its use is justified as the technique allows the researcher the flexibility to determine the relative influence of one or more predictor variables (i.e. capital adequacy ratio, assets quality, cost to income ratio, liquidity, and size) to the criterion value (i.e. bank efficiency). The second advantage is the ability to identify outliers, or anomalies (Swanson and Holton, 2005). Hence, the model can effectively explain the extent of variation in the dependent variable that is explained by the dependent variable and would also identify the proportion of 'other factors' that can explain the residual variation (Swanson and Holton, 2005).

Techniques such as the multiple regression and correlation analysis are useful in deriving the causal inferences between the research variables (Hinton, McMurray and Brownlow, 2014). Not only does it outline and suggest the predictive ability of the model but also highlights the whether the outcomes are statistically significant (Hinton, McMurray and Brownlow, 2014). Hence, it allows an effective and efficient testing of the research hypotheses. It is worth noting however that there are fundamental assumptions associated with the use of such models for hypotheses testing. So for example (1) the association must be linear between the independent and outcome variables, (2) the residuals must be

normally distributed (i.e. there must be multivariate normality), (3) there must be no high correlation between the independent variables (i.e. no multicollinearity), (4) and the presence of homoscedasticity (i.e. the variance of error terms are similar across the values of the independent variables) (Berry, 1993).

Other technique such as the use of descriptive statistics is appropriate as it clearly highlights the differences between Islamic and conventional banking when it comes to measuring the determinants of capital adequacy in the GCC region and the influence such variables may have on the efficiency of financial institutions which is the fundamental aim of the study. Furthermore, in order to confirm that the model is most fitted either with fixed effect or random effect, the Hausman test is applied. It is used to select the appropriate test for the static effects model or the random effects model based on the probability value or the probability level of Chi-Square (Ajmani, 2011). Such tests are essential in checking the validity of the data and examined variables (Ajmani, 2011). The basis of the use of such models is evidenced in the existing literature which ultimately enhances the reliability of the research methodology preferred for the study.

5.6.3. Definitions and Measurement of Variables

In accordance with identifying and describing the sampling procedure and modelling problem, the following section provides the definitions and measurement of the variables used in the analysis.

5.6.3.1. Defining the Dependent variable

Capital Adequacy Ratio

The capital adequacy requirement has played a central role in the banking industry for several decades. The capital adequacy requirement refers to a legal obligation set by the authorities that forces banks to hold a certain level of capital that can be used in the instances of financial shortfalls.

The main purpose of setting a capital requirement is to protect the shareholders of the banks by ensuring that all financial obligations can be met in a timely manner to prevent bank liquidation in case of a default (Altman et al., 2002). Therefore,

the capital adequacy requirement ensures that a bank is properly managed and establishes a safe and effective market environment that provides protection not only for shareholders but also to all customers, depositors, the government and the economy as a whole.

The capital adequacy is measured as a ratio, which is calculated as follows:
(tier1+tier2) to risk weighted assets

Measuring the Bank Efficiency

In this study, the data envelopment analysis (DEA) model is used to examine the efficiency of Islamic and conventional banks in the GCC countries. The data envelopment analysis method is applied to distinguish efficient banks from those which are less efficient. The key advantage of using such a method is that it is easy to apply in all institutions, whether financial or otherwise. This method has been widely used in most economic studies in various sectors, including the banking sector. The statistical estimation models used to measure banking efficiency have been varied and focus heavily on input (cost) as an indicator of efficiency while others relied on revenue (output) as an input to measure banking efficiency (Tannenwald, 1995).

Table 5.1. Provides a description of the inputs and outputs used in Data Envelopment Analysis (DEA). The method of analyzing the DEA is non-instructional. Linear programming techniques have been used to evaluate and measure the efficiency of decision-making units using the same inputs and produce the same outputs. DEA was first introduced by Farrell (1957) to measure the production efficiency based on a model depending on one input and one output, which was later evolved to include more than one input and one output (Berger and Humphrey, 1997; Berger, 1993). The study will use a profit efficiency model “Profit efficiency is a more inclusive concept than cost efficiency, because it takes into account the cost and revenue effects of the choice of the output vector, which is taken as given in the measurement of cost efficiency” (Lee and Chih, 2013, p. 711).

Table 5.1. Definition of Inputs and outputs Variables

Variable	Variable name	Description
Input	Fixed assets	The sum of physical capital and remises
	Funds	Total deposits plus total borrowed funds
Input price	Price of fixed assets	Operating expenses divided by the fixed assets
	Price of funds	Interest expenses on customer deposits plus other interest expenses divided by the total funds
Output	Total loans	Total of short-term and long-term loans
	Investment	Includes short and long-term investment
Output price	Price of loans	Interest income on loans divided by total loans
	Price of investment	Other operating income divided by investments

Source: (Lee and Chih, 2013)

5.6.3.2. Defining the Independent Variables

Asset quality

Asset quality is measured by the ratio of non-performing loans to loans unpaid, hence, the increase of this ratio is an indication that the quality of the asset quality management is downgrading. The ratio estimates the part of total loans that may prove to be bad loans that requires an equivalent amount of capital to be reserved. It provides an indication of the extent to which the bank has made provisions to cover credit losses, and in turn to impair net interest revenue on the income statement. The higher the ratio, the larger is the amount of expected bad loans on the books, and the higher the risks of losses that will lead directly to less efficiency (Ayadi and Pujals, 2005).

Benefit

Benefit refers to the ratio of the cost to income and a decrease of this ratio is an indication that the efficiency is improving. In banking theory, this ratio should be

taken into consideration when assessing the operational efficiency (Francis et al; 2004).

Liquidity

The higher level of liquidity ratio, the stronger the bank in absorbing financial risks (Ayadi and Pujals, 2005; Athanasoglou et al., 2006). However, holding a high level of liquidity may directly have a negative impact on profitability (Caprio et al., 2010), hence, the lower level of liquidity could be interpreted as an indicator of improved efficiency.

Bank Size

Many studies have calculated the size of the banks based on the log of total assets (Beck et al., 2005; Akhigbe and McNulty, 2005; Chih (2013), the existing literature suggests that big banks are more stable in the market.

5.6.4. Sample selection

This study takes the GCC countries as the case as they are considered the world leaders in Islamic banking (Wilson, 2009). In addition, Islamic and conventional banks work in similar economic conditions, making the analysis even more comprehensive (Platonova, 2014).

The main driver for selecting these banks in this model is the annual account. The Islamic Bank of each country is as follows: six banks for Bahrain, five banks from the KSA, four banks for Kuwait, four banks for the UAE, three banks for Oman and three for Qatar banks, as well as the conventional banks for each country is as follows ten banks for Bahrain, one banks for the KSA, five banks for Kuwait, three banks for the UAE, two banks for Oman and four banks for Qatar.

The rationale for such a sample choice was determined to keep in view the following the studies that are conducted on the same subject and using the same methodology.

Table 5.2. Studies used the same methodology

Before the Crisis			
Authors	Methodology	Sample	Results
Yudistira(2003)	Data Envelope Analysis(DEA)	18Islamic banks (1997-2000)	The crisis caused lowering of Efficiency
Al-Jarrah and Molyneux(2005)	Stochastic Frontier Analysis (SFA)	82banks Islamic ,Investment and Commercial banks(1992-2000)	Islamic banks obtain higher cost and profit efficiency than commercial and Investment banks
Hasan(2006)	DEA	43Islamic banks (1995-2001)	Islamic banks are less than conventional banks
Bader et al.(2008)	DEA	44 Islamic banks and 37 conventional banks (1999-2005)	-Islamic banks are more efficient in spending resources than in making profit. -No significant difference in cost, profit and revenue efficiency between Islamic and conventional banks.
Before and during the Crisis			
Johnes et al (2014)	DEA	18 Islamic and conventional banks	Islamic banks are less efficient than conventional banks
Mghaieth and Khanchel(2015)	SFA	62 Islamic banks of(Middle East and North Africa 2004-2010)	Islamic banks are more efficient in profit generating than in cost control
Said(2012)	DEA	47Islamic banks (2006-2009)	Small and medium size Islamic banks are more efficient than large Islamic banks during the crisis.

Said(2013)	DEA	Islamic banks in the MENA countries(2006-2009)	-Liquidity risk insignificant correlates with efficiency -credit and operational risk are negative correlated to efficiency
During the crisis			
Rashwan(2010)	Multivariate analysis of variance	15 Islamic and conventional banks(2007-2009)	conventional banks are more efficient and profitable than Islamic banks

Source: Researcher's compilation

This period is characterized by increased globalization and development in the Islamic banking sector, where Islamic banks have expanded to banks outside of Islamic countries. It is therefore important to know whether this development coincides with an increase in the capital adequacy ratio and to know the effect of using the latest data at the time of the research. Data analysis begins in 2006 and the reason for starting the analysis in 2006 is that this year is the beginning of the features of the global crisis of 2007 and 2008, which directly affected the financial institutions, including both Islamic and conventional banks.

The annual reports of the banks are obtained in the sample from the websites of the banks. It is used to collect financial data to measure the impact of the capital adequacy ratio on bank efficiency of Islamic and conventional banks in GCC countries.

It is important to state that the main challenge faced by the researcher in this study was the data collection process, as in some cases the access to the annual reports of both Islamic and conventional banks in the GCC countries was limited.

5.7. Limitations of the research methodology

The research methodology preferred for the study extensively focuses on the quantitative and empirical aspects of data collection and analysis. Whilst it is appreciated that such a research design leads to outcomes that are more objective it does not fully analyse and present the underlying reality given that no qualitative analysis is performed. Such a deficiency in the existing research design could have been mitigated by the use of qualitative data collection and analysis techniques such as the interviews and focus groups. However, given the time, energy, and resource limitations it can be argued that restricting the design of the research to empirical data collection and analysis is justified.

Furthermore, the analysis of data is based on the data obtained for the 2006-2015 period. Findings of the study have been presented as a whole thus diluting the effects of the events that occurred during this horizon. A more robust analysis could have been provided by categorizing the data into pre-recession periods (i.e. 2006-2008) and post-recession periods (2009-2015) which would have resulted in a more fruitful analysis of the underlying phenomenon.

Finally, the sample size of 50 banks (25 Islamic and 25 conventional) do not carry equal country representation.

Table 5.3. The sample size (Islamic and Conventional banks)

Country	Islamic	Conventional
Bahrain	6	10
KSA	5	1
Kuwait	4	5
UAE	4	3
Oman	3	2
Qatar	3	4
Total	25	25

Source: Researcher's compilation

Such a limitation may suggest that the outcomes of the descriptive statistics may not adequately reflect the true reality as data may be skewed because of the

differences in country mix. This shortcoming in the research methodology is addressed through the application of various statistical tests mentioned in the sections above.

5.7. Conclusion

This chapter provides a clear understanding of the methodology framework that will be used in this study. This chapter highlights that due to the research aims, objectives, this research adopts positivism as a philosophical position, and accordingly the quantitative approach is applied. Based on such philosophical stand and methodological approach, this chapter identified the explanatory design and deductive strategy to answer the research questions. The research sample consists of 50 banks from the GCC region over a period between 2006 and 2015. Furthermore, this chapter identifies secondary data as the most appropriate for testing the research hypotheses. As for the data analysis, this chapter highlights that the data will be analyzed by conducting multiple regressions analysis using SPSS software.

CHAPTER SIX
MEASURING THE DETERMINANTS OF
CAPITAL ADEQUACY

CHAPTER SIX

MEASURING THE DETERMINANTS OF CAPITAL ADEQUACY

6.1. Introduction

Although the existing literature abundantly provides evidence of the determinants of capital adequacy requirements, this issue remains controversial among researchers when it comes to the association between the CAR and its key determinants. Many studies support a negative or positive relationship between capital adequacy requirements and some key determinants. In the banking sector, capital adequacy is an important tool for increasing the credibility and sustainability of banking activities (Dietrich and Wensenridge, 2011). For example, Yudistira (2003), Stools and Widow (2005) and Aspal et al. (2014) found that the liquidity and sensitivity variables have positively correlated with capital adequacy, while the loan assets, asset quality and management efficiency negatively correlated with capital adequacy.

The summer of 2007 saw the most severe financial crisis, fueled by many factors such as statements by the US central bank governor, brokers and banks. The main reason for the decline in the advanced stock markets is the losses achieved by the listed institutions on the stock markets because of the acquisition of assets with high risk, To the fear of local investors, which requires the intervention of the state through the reduction of interest rates, guarantee debt and deposits and provide liquidity through the intervention of sovereign wealth funds. (Irdian, 2008, p: 1). Thus, it can be said that the regulations should focus on changing the quality of investment banks, rather than the capital that banks should retain. The capital adequacy requirements are determined by risk level, and the regulator has to make banks equal or exceed risk to meet their obligations by default (Aboham, 2008). In the banking system, the ratio of capital-to-capital ratio for the previous year, the quality of asset management, and cash flow, profit margins, credit risk, net income

and quality of management are important determinants of capital requirements (Al-Ansary and Hafez, 2015).

Another argument from studies suggests that the difficult capital requirements of the Basel Accord have a positive impact on the Banks efficiency (Parth et al., 2013; Basiuras et al., 2009). After the crisis, accordingly, the main concern of the regulatory body is to create sufficient capital to maintain market stability. Massey and Miller (1995) discuss some of the key factors influencing investors when making decisions that the structure of company capital has been identified as an important factor in this matter.

Demirguc-Kunt and Huizinga (1999) investigated the determinants of bank profits and net interest rates, the results showed a positive relationship between capital adequacy ratio and financial performance.

In contrast, Van Haus (2007) argues that although the main purpose of setting up the capital adequacy is to have a major impact on the risk-taking behavior of the banks, there is no evidence that such regulation reduces the risk incentives of a financial institution. Achijeb et al. (2012) state that high capital requirements did not have a positive impact on the market value of the bank. In fact, they found the opposite that banks with more capital invested heavily in the financial market, while their shares fell sharply compared to those with less capital, which suggests that high capital sent investors a signal that capital was being used as a hedge against high-risk assets.

Kaplansky and Levy (2007) presented another criticism of stringent capital requirements. They argue that the increase in capital requirements after reaching a reference standard will lead to a decrease in the efficiency of banking performance. However, Lee and Hezei (2013) argued that the capital requirements have a direct impact on bank performance. Thus, regulation can have a negative or positive impact on the financial sector. They note that the impact of the ratio of capital on different financial practices depends on the type of financial institution.

The banks following Islamic standards have grown rapidly since their globally acknowledged establishment in the mid-1970s, where Islamic banks have significantly impressed the course of the international monetary market. The principles of Islamic finance that shape the Islamic banks have gained huge attention and credibility internationally and it can be argued that this unique form has led the Islamic financial industry to be one of the fastest emerging sectors in the global market throughout the past three or four decades. Accordingly, Islamic finance has become prominent in many countries across the globe and is therefore no longer restricted to conventional Muslim regions. It has spread across 70 countries from Malaysia to the Middle East with more than 300 Islamic banks and monetary institutions (Mobarek and Kalonov, 2014).

This boom of Islamic finance has not solely produced interest and discussions among the economists but also among the policy makers about the efficiency and feasibility of the Islamic banking style, mainly based on the sponsorship of Islamic countries, where such banks have been some of the major performers.

The conventional banking theories are primarily based on interest income, while Islamic banking follows Islamic *Shariah* as the foundation of their operations (Siraj and Pillai, 2012), that is based totally on three main prohibitions, namely: *Riba* (Interest), *Gharar* (Uncertainty), and *Maysir* (Betting) (Amba and Almkharreq, 2013)

It can be stated that Islamic banking follows a fair and impartial approach more than the interest-based approach in credit and lending institutions as in conventional banking (Shapira, 2007).

Thus, in order to be in a position to contend with conventional banks, Islamic banks have to present such financial products, which are equivalent to the ones provided with the aid of conventional banks, yet which are also *Shariah* compliant. Despite that, Islamic banks have managed to remain stable during the initial stages of the crisis due to the fact that they focus more on current financial realities than on possible future outcomes, these products have rendered Islamic banks susceptible to similar dangers related with credit, liquidity and market instability.

Moreover, while the financial instruments of conventional banks, such as Collateralized Debt Obligation-CDO, Cash Management bill-CMOs and Credit Default swap-CDOs were considered as contributors to the financial crisis, such contraptions have no place in Islamic banks. In addition, the absence of control and a lack of an interbank market to Islamic banks resulted in an extra liquidity requirement. Other predominant aspects of Islamic banks, which stand as a big difference between Islamic banks and their conventional counterparts, is the concept of profit and loss sharing (Elsiefy, 2013).

Given such unique features of Islamic financial products and operations, Islamic banks globally face greater challenges than their conventional counterparts in sourcing high-quality liquid assets (Ahmed, 2011; Basel Committee on Banking Supervision, 2013). The shortage of high-quality liquid assets instruments has critical effects for the Islamic banks, as exemplified by their higher proportion of liquid assets in money and central bank placements. Meanwhile, conventional banks in the GCC region have access to everyday issuance of bonds and treasury payments from the central banks (Basel Committee on Banking Supervision, 2013). Hence, it can be argued that treating Islamic banks in a similar manner to conventional banks in relation to the capital requirement, may result in creating some disadvantage and expose Islamic banks to higher levels of challenges when managing their reserves that may negatively affect their profitability.

It has been argued that the greater the level of capital the bank holds, the more stable the banking system. Capital requirements ensure that adequate funds are available for organizations to grow and have the capacity to develop facilities, and services and meet their financial obligations on a timely manner. Kabila (2006) argues that by setting minimum capital requirements, the regulator ensures that the bank has a healthy financial position to maintain adequate liquidity at the time of major losses and unexpected events.

As explained in Chapter four, this study aims to measure the capital adequacy requirements in Islamic and conventional banks and investigate the key

determinants in the case of Islamic banks and conventional banks in the GCC region over the period between 2006-2015.

As for the structure, this Chapter begins with a brief description of the research hypotheses followed by the critical evaluation of the descriptive statistics reflecting on the overall examined sample as well as the Islamic banks in a comparative manner with conventional banks in the GCC region. Then, this Chapter explains the econometric process of the empirical analysis starting with constructing the regression model and followed by an explanation of examining the nature of the data to assess the existence of any multicollinearity threat. Then, the Chapter tests the developed hypotheses by running the regression analysis by using multiple regressions with a fixed effect test. The Chapter then concludes by providing a reflection on the obtained results.

6.2. Research Hypotheses

Further to what has been presented in Chapter four, with the purpose of having a clear direction, this section provides a brief summary of the research hypotheses that will be tested in the next section. As it has been mentioned earlier, in Chapter Four the relationship between the capital adequacy ratio as the dependent variable, and the determinants of capital adequacy as independent variables has been discussed. Based on the existing literature (Al-Ansary and Hafez, 2015; Naceur and Kandil, 2009; Alexander et al., 2013; Chortareas et al., 2012) and developed arguments, this study proposes the following hypotheses:

H1: Assets Management Quality has significant positive effect on capital adequacy of Islamic and conventional banks.

H2: Liquidity has a significant negative effect on capital adequacy of Islamic and conventional banks.

H3: Credit Risk (CR) has a significant positive effect on capital adequacy of Islamic and conventional banks.

H4: Return on Assets (ROA) has a significant positive effect on capital adequacy of Islamic and conventional banks.

H5: Net Interest Income (NIIC) has a significant positive effect on capital adequacy of conventional banks and Islamic banks.

H6: Management Quality (MQ) has a significant positive effect on capital adequacy of Islamic and conventional banks.

6.3. Descriptive Statistics

It is important to briefly describe the examined research sample to provide a clear platform for the descriptive analysis. The research evaluates the data compiled from the financial statements of 50 banks (25 Islamic and 25 conventional banks) from GCC countries, including Kingdom of Saudi Arabia (KSA), Kingdom of Bahrain, United Arab Emirates, State of Kuwait, State of Qatar, and Sultanate of Oman. The annual reports, balance sheets and income statements of the banks have been used as the primary sources of data needed for the proposed analysis. The distribution of examined banks based on GCC countries can be detailed as follows: six banks from Bahrain, five banks from the KSA, four banks from Kuwait, four banks from the UAE, three banks from Oman and three from Qatar, as Islamic banks. On the other hand, sample consists of six banks from Bahrain, five banks from KSA, five banks from Kuwait, three banks from the UAE, two banks from Oman and four banks from Qatar, as conventional banks. It is worth to mention that the sample consists of 472 observations over period between 2006 and 2015.

Table 6.1 Descriptive Statistics of all Banks-Islamic and Conventional Banks

All banks				
Variables	Min	Max	Mean	Std. Deviation
Capital Adequacy	0.054	0.902	0.13959	0.0744
Asset Quality	0.000	0.138	0.03794	0.1587
Management Quality	0.293	13.48	0.90584	0.9773
Credit Risk(CR)	0.005	3.111	0.1605	0.24
Liquidity	0.064	0.807	0.58785	0.1089
Profitability ROA	-0.054	0.04	0.01528	0.0095
Net Interest income	0.000	26.2	0.4111	1.5759
LOG Assets	3.2759	5.5598	4.188	0.4768

Data Source: Bank scope Database

As presented in Table 6.1, the overall value of capital adequacy scored 0.13 indicating that the GCC banks are keeping a satisfactory rate of reserves based on the global market. Bank Negara Malaysia (Central Bank of Malaysia) (2018) requires that an Islamic financial institution shall hold and maintain, at all times, the following minimum capital adequacy ratios:

Table 6.2 Minimum capital adequacy ratios

CET1Capital Ratio	Tier1Capital Ratio	Total Capital Ratio
4.5%	6.0%	8.0%

Source: (Central Bank of Malaysia, 2018)

Based on such facts it is argued that the capital ratio of 0.13 is quite satisfactory.

This is also another indicator that GCC banks tend to be risk averse. The variation of the capital adequacy ratio that range between 0.05 and 0.9 reveals that the GCC banks are not behaving in an identical manner when it comes to the amount of reserves that they hold. It is an indicator that these banks could take different positions towards their investment behavior. When it comes to capital reserves, the quality of the assets is considered a crucial consideration in setting up an accurate ratio. By looking at the overall ratio of the asset quality, it can be observed that the earning assets consist of a reasonable ratio to total asset that could indicate the asset management of the GCC banks takes into consideration the quality of their assets in a satisfactory manner. This statement is supported by the obtained result of the overall management quality that scored a mean value of 0.9 which is considered a good value for the management quality (Faizulayev, 2011). However, by looking at credit risk presented by loan loss reserves to total loan, it can be stated that the obtained result indicates that GCC banks are slightly close to a negative position in relation to the quality of their loan, yet they are in safe direction. With regards to their liquidity position, as shown in Table 6.1, GCC banks tend to be highly liquid with an overall ratio of 0.59 and ranging between 0.06 and 0.8, indicating that all GCC banks are not similar in terms of liquidity over the period between 2006 and 2015. Profitability is another indicator that needs to be taken into consideration when setting up capital reserves. The results indicate that the GCC banks scored 0.015 on average, which may indicate that the examined banks have to optimize their profitability in order to promote their position and be competitive in the market. The changes in the net interest income, which pays a key role in the determining the capital ratio that the banks hold, and based on the found results, it is clear that there is a volatility as it ranges between 0.0 and 26.2, which is a strong evidence that the examined banks generate different levels of net interest income with an overall score of 0.4. The mean value of the log of total assets indicates that the examined GCC banks are to some extent sizable in the market, yet, the variation among them is considerable which is ranged between 3.2 and 5.5.

In order to have a more meaningful analysis, Table 6.3 and 6.4 provide the data in a comparative manner between Islamic and conventional banks in the case of the GCC region.

As can be seen in Table 6.3 and 6.4, the mean of capital adequacy for Islamic and conventional banks is 0.17 and 0.12 respectively, this indicates that the Islamic banks hold a lesser ratio of capital than conventional banks, which may be evidence that due to the unique nature of Islamic finance, Islamic banks keep more liquid or semi-liquid assets. It is also another indicator that Islamic banks tend to be risk averse compared to their conventional counterparts. The minimum and maximum was 0.054 and 0.027 for conventional banks, and 0.072 and 0.90 for Islamic banks.

Table 6.3 Descriptive Statistics of Islamic Banks

Islamic banks				
	Minim	Maxim	Mean	Std. Deviation
Capital Adequacy	0.072	0.902	0.17176	0.137145
Asset Quality	0.000	0.075	0.03103	0.0237
Management Quality	0.591	13.48	1.276	2.0357
Credit Risk(CR)	1.000	4.33	0.11	0.6158
Liquidity	0.064	0.736	0.59532	0.1005
Profitability ROA	-0.054	0.04	0.01584	0.015
Net Interest Income	-0.73	7.642	4.2	1.5759
LOG Assets	4.272	5.45	3.74	0.47

Data Source: Bank scope Database

The results indicate that the most capitalized bank maintains 0.027 and 0.90 of its total assets at risk for CAR for conventional banks and less capital saved 0.054 and 0.072 of the assets of risk weighted assets. The standard deviations were 0.035 and 0.13 for Islamic and conventional banks, indicating that the Islamic banks present a higher level of volatility than conventional banks. This may mean that Islamic banks are more fit for withstanding any sudden bankruptcy and unexpected occasions, as supported by Samad's (2004) argument that a high CAR will help

the bank in giving a solid pad to build its credit endeavors, bring down the unforeseen dangers. Islamic banks are more able to meet their debt during crises, an indicator that increases the confidence of investors and customers with Islamic banks and increases its competitive power. (Khouri, 2011). A robust capital adequacy ratio indicates the superior stability of a bank and its ability to meet its debt obligations when they fall due. The higher the ratio better are the chances of it meeting its obligations during crisis.

Table 6. 4 Descriptive Statistics of Conventional Banks

Conventional banks				
	Mini	Maxim	Mean	Std. Deviation
Capital Adequacy	0.054	0.276	0.1277	0.035
Asset Quality	0.008	0.138	0.039	0.022
Management Quality	0.293	1.375	0.802	0.178
Credit Risk(CR)	0.261	0.634	0.127	1.034
Liquidity	0.255	0.807	0.585	0.111
Profitability ROA	-0.006	0.029	0.015	0.007
Net Interest Income	0.653	5.719	3.554	1.017
LOG Assets	3.995	4.897	4.181	0.334

Data Source: Bank scope Database

By observing the obtained results of the mean of the assets quality of Islamic and conventional banks with values, 0.031 and 0.039, respectively, with the minimum and maximum of 0.008 and 0.13 for conventional banks, and 0.00 and 0.075 for Islamic banks and the standard deviations scored 0.023 and 0.022 for Islamic and conventional banks, respectively. Therefore, it can be argued that conventional banks performed better than Islamic banks in relation to quality of assets during the analysis period in the GCC region. This shows that they have less advance loan loss reserves as an extent to their gross credits, which generally implies that Islamic banks have more dependable and better quality resources in connection than conventional banks. Such a statement is consistent with findings of

Momeneen et al. (2012), as they declare Banks should be more concerned with the management of loans, especially on doubtful loans, because this will be more risky in the future.

Comparing the credit risk of the Islamic banks with their conventional counterparts assists in promoting the understanding of the quality of their debts, which may provide crucial insight of the ratio of the capital required to be held by banks. The obtained findings reveal that Islamic banks scored a lower debt quality compared to conventional banks with an average value of 0.11 percent and 0.127 per cent, respectively, with a minimum and a maximum value of 1 and 4.33 percent for Islamic banks and 0.634 and 2.616 per cent for conventional banks and with the standard deviations was 0.6158 and 1.034 percent for Islamic and conventional banks respectively. Such a comparison assists in confirming that credit risk antagonistically influences the monetary productivity of conventional banks more than that of Islamic banks, which is supported by the evidence generated by AlKulaib et al. (2013).

The mean value of the liquidity ratio of Islamic and conventional banks was recorded as 0.595 and 0.585, respectively, with the minimum and maximum value of 0.255 and 0.807 for conventional banks, and 0.064 and 0.73 for Islamic banks and the standard deviations of a value of 0.10 and 0.11 for Islamic and conventional banks, respectively. Subsequently, it can be stated that conventional banks are more liquid than Islamic banks during the period covered by this investigation. Such results prove that the nature of Islamic financial products and operations exposes Islamic banks to more liquidity risk compared to conventional banks, which can come as a result of the attachment of Islamic financial products to tangible assets directly or indirectly (Ahmet, 2011; Iqbal et al., 2011; Merchant, 2012). Therefore, it can be stated that the lower level of the average securities to total loans ratio in conventional banks shows that they are more liquid since they have fewer resources occupied with advances. Iqbal et al. (2011) and Merchant (2012) found that the securities average to total loans ought to be as low as could be expected under different circumstances, in light of the fact that a high securities average to total loans implies that bank is exceedingly occupied with loaning and

this may have inappropriate impacts as this may lead the bank to confront the danger of defaulters (Momeneen et al., 2011).

The return on assets of Islamic and conventional banks scored a mean value of 0.0158 and 0.0151, per cent respectively, with the minimum and maximum values of - 0.06 and 0.029 per cent for conventional banks and -0.054 and 0.040 for Islamic banks and with the standard deviations value of 0.01 and 0.007 per cent for Islamic and conventional banks, respectively. Subsequently, based on such evidence, it can be argued that Islamic banks scored a higher level of profitability than their conventional counterparts showing that administrative productivity in Islamic banks is higher. It can be stated that the higher level of profitability of Islamic banks could be due to their greater involvement into interest-free economic activities than conventional banks. However, it is important to state that operating based on such an attitude may cause greater levels of risk exposure to Islamic banks compared to conventional ones.

With regards to the management quality, it can be stated that the results show that Islamic banks scored higher levels of management quality than conventional banks in the GCC region during the examined period with a mean value of 1.27 and 0.80 per cent, respectively, with the minimum and maximum values of 0.29 and 1.37 per cent for conventional banks and 0.59 and 13.48 for Islamic banks and the standard deviations recorded a value of 0.035 and 0.17 per cent for Islamic and conventional banks, respectively. Therefore, based on the obtained findings, it can be stated that Islamic banks performed better than conventional banks in relation to management quality in the GCC region during the period of analysis. Therefore, it can be argued that the total loan to total assets ratio indicates the level of bank advances supported through deposits; the higher the proportion, the more compelling and prevalent the bank administration is in procuring more funds from depositors. Such findings are in line with evidence revealed by AlKulaib et al. (2013).

The net interest income of Islamic banks ranges between a minimum value of - 0.73 and a maximum value of 7.64 per cent, with an overall value of 4.20 per cent

and standard deviations of 1.57 per cent. However, conventional banks scored a minimum value of 0.65 and maximum value of 5.71 per cent, with a mean value of 3.55 per cent and standard deviation 1.01 percent. Such results indicate that Islamic banks performed at a higher level than conventional banks by 0.7 per cent, which can be considered as a high level as supported by Faizulayev (2011). On the other, the results revealed that conventional banks are bigger in size than Islamic banks in the GCC region during the assessed period. Such results can be an indicator supporting the argument that the larger bank size is not an indicator of its profitability as stated by AL-Ansary and Hafez (2015).

6.4. Measuring the Determinants of CAR: Empirical Results

In order to assess the determinants of the capital adequacy ratio, this section will provide the empirical results through conducting the regression analysis using the fixed effects model. The following regressions model is applied to test the developed hypotheses.

The panel data regression model to measure the determinants of capital adequacy requirements (AL-Ansary and Hafez 2015):

$$CAR_{it} = \alpha + \beta_1 AMQ_{bit} + \beta_2 LR_{bit} + \beta_3 CR_{bit} + \beta_4 P_{bit} + \beta_5 MQ_{bit} + \beta_6 NIIC_{bit} + \beta_7 Size_{bit} + \epsilon_i$$

Where:

CAR: refers to the capital adequacy ratio is calculated by (tier1+tier2) to risk weighted assets of bank b in country i during the period t .

α : the intercept;

$\beta_1 \dots \beta_n$: the regression coefficients;

ϵ : the error term;

AMQ_{bit} refers to assets quality and calculated by earning assets to total assets of bank b in country i during the period t ;

LR_{bit} refers to Liquidity ratio which is calculated by securities average to total assets of bank b in country i during the period t ;

CR_{bit} refers to Credit risk and is calculated by loan loss reserves to total loans of bank b in country i during the period t ;

P_{bit} refers to Profitability and measured by return on assets (ROA) is calculated by Net income to total average assets of bank b in country i during the period t ;

MQ_{bit} refers to management quality which is calculated by total loans to total average assets of bank b in country i during the period t ;

$NIIC_{bit}$ refers to net interest income is calculated by change in interest received – interest expenses of bank b in country i during the period t ;

$Size_{bit}$ is calculated by log of total assets of bank b in country i during the period t .

In order to have robust results, it is important to follow the process of empirical analysis by, first, checking the nature of the assessed data to be able to assess the correlation among the examined variables to detect any existence of high multicollinearity. Testing whether the data are normally distributed or not determines the tool that is required to examine the multicollinearity, which can be either the Spearman or Pearson correlation matrix. Accordingly, this research will apply the Skewness and Kurtosis coefficients to detect the nature of the data. According to Gujarati (2006), the data are normally distributed if the Skewness coefficient values between +1.96 and -1.96 and the Kurtosis coefficient values between +3 and -3.

6.4.1. Testing the Nature of the Data

Based on the presented results in Table 6.5, it can be stated that data are normally distributed as the values of Skewness are within the range of +1.96 and -1.96 and the values of coefficient Kurtosis is within the range of +3 and -3 (Gujarati, 2006; Garson, 2012).

Due to the nature of the results of the analysis and the non-normal distribution of the data, the Pearson correlation matrix was used to test and examine the multicollinearity threats between the assessed variables.

Table 6.5. The Results of Skewness and Kurtosis Tests

	CAR	AQ	MQ	CR	LIQ	ROA	NII	Size
Skewness	0.174	1.155	1.86	0.77	-1.001	-1.686	-1.084	0.007
Kurtosis	2.336	1.122	2.66	2.431	1.661	2.942	2.875	1.229

In addition, the VIF test is applied to further examine the standing of multicollinearity among the tested independent variables to avoid using some variables that represent the same proxy.

6.4.2. Testing the validity of the variables

Given that the regressions analysis will be conducted for the whole sample and for Islamic banks and conventional banks separately, to test the validity of the assessed variables, the Pearson matrix and VIF test will be applied separately according to the identified categories. Taking into account that the data are not normally distributed, the Pearson correlation matrix is used to evaluate the existence of multicollinearity between examined independent variables (Haniffa and Cooke, 2005; Jing et al., 2008).

Table 6.6 Pearson Correlation Matrix Test –Islamic and Conventional Banks

Variables	VIF	CAR	AQ	LIQ	MQ	CR	ROA	NII	SIZE
CAR		1.00							
AQ	1.81	0.199	1.00						
LIQ	1.33	-0.074	0.139	1.00					
MQ	2.54	0.298	0.499	-0.401	1.00				
CR	3.72	-0.078	-0.308	-0.009	-0.254	1.00			
ROA	1.02	0.278	0.189	-0.061	0.158	0.284	1.00		
NII	1.25	-0.044	-0.058	-0.021	-0.030	0.071	-0.086	1.00	
SIZE	2.98	-0.498	-0.180	-0.287	-0.292	-0.254	-0.032	0.07	1.00

Data Source: Bank scope Database

As it can be seen in Table 6.6, the Pearson matrix did not detect a high correlation

equivalent to or higher than 0.8 (Brooks, 2008), the tested variables appear to pass the threat of the existence of any high multicollinearity. In addition, the VIF test confirms the same result as its value did not exceed 10 (Haniffa and Cooke, 2005).

By looking at the Table 6.7, similar results are obtained confirming non-existence of any threats of the multicollinearity among the assessed variables in the case of Islamic banks in the GCC region.

Table 6.7 Pearson Correlations Matrix Test -Islamic Banks

Variables	VIF	CAR	AQ	LIQ	MQ	CR	ROA	NII	SIZE
CAR		1.000							
AQ	1.22	0.189	1.000						
LIQ	1.32	-0.072	0.130	1.000					
MQ	2.00	0.279	0.491	-0.387	1.000				
CR	2.07	-0.076	-0.361	-0.009	-0.340	1.000			
ROA	1.00	0.266	0.195	-0.011	0.162	-0.243	1.000		
NII	1.01	-0.048	-0.057	-0.025	-0.041	0.071	-0.086	1.000	
SIZE	1.97	-0.499	-0.187	-0.303	-0.271	0.222	-0.032	0.078	1.000

Data Source: Bank scope Database

As for the assessed conventional banks in the GCC region, Table 6.8 confirms the results similar to previous and proves that there is no existence of any threats of the multicollinearity among the assessed variables in the case of Islamic banks in the GCC region.

Table 6.8 Spearman Correlations Matrix Test- Conventional Banks

Variables	VIF	CAR	AQ	LIQ	MQ	CR	ROA	NII	SIZE
CAR		1.000							
AQ	1.34	0.199	1.000						
LIQ	1.32	-0.069	0.129	1.000					
MQ	2.39	0.282	0.398	-0.377	1.000				
CR	2.79	-0.071	-0.309	-0.004	-0.299	1.000			
ROA	1.1	0.260	0.201	-0.021	0.153	-0.242	1.000		
NII	1.2	-0.039	-0.051	-0.017	-0.039	0.068	-0.081	1.000	
SIZE	1.74	-0.484	-0.154	-0.298	-0.266	0.211	0.028	-0.077	1.000

Data Source: Bank scope Database

Based on the obtained results, it can be stated that there is no threat of multicollinearity between the assessed variables.

6.4.3. Assessing the Association between CAR and its Determinants

After conducting all necessary tests to check the nature of the data and examine the validity of the assessed variables, this section tests the association between the capital adequacy ratio and the key hypothesized variables. In other words, this section measures the determinants of the capital adequacy ratio using panel data regression with fixed effects. Table 6.9 illustrates the results of the relationship between the capital adequacy as a dependent variable and asset quality, liquidity, credit risk, ROA, management quality, and net interest income as independent variables of the Islamic and conventional banks in the GCC countries by using the fixed effects panel regression. The research sample consisted of 500 observations and then a number of observations were deleted due to the unavailability of the data and so, it became 472 observations.

In order to confirm that the model is most fitted with fixed effects the Hausman test is applied. As can be seen, the p-value of Hausman test scored a value of 0.0000 which is significant at 1 per cent. Thus, it rejects the null hypothesis and confirms that the coefficient is systematic, which confirms that the fixed effects is most fitted for the examined data.

The obtained results of the association between the CAR and its determinants are reported in Table 6.8. The results indicate that the overall model is significant at $p < 0.01$ (F-test = 0.000) with adjusted R -square equal 0.4290.

As can be seen in Table 6.8, the results show that the assets management quality does not have a significant association with the capital adequacy ratio in conventional and Islamic banks, which is inconsistent with the developed hypothesis H1.

Table 6.9 Panel Data Regressions with Fixed Effects Model: Measuring the Determinants of the CAR (Islamic and Conventional Banks)

Independent Variables	Coefficient	t- value
Asset Quality	0.9870	0.047
Liquidity	0.0930	1.987*
Management Quality	0.0940	1.677*
Credit Risk (CR	0.5980	0.668
Return on Assets	0.0100	2.731*
Change in net interest income	-0.1840	0.987
Log Assets (Asset Size)	0.0000	-9.789***
Constant	12.0600	0.009***
Adjusted R2		0.4290
Hausman		0.0000
Prob. (F-statistics)		0.0000
Bank No		50
Obs No		472

Note: * Significant 0.01, **significant 0.05, ***significant 0.10

It can be stated that this outcome is consistent with the findings of AL-Ansary and Hafez (2015), where they found that the asset management quality does not have any impact on capital adequacy level, which means that when the asset quality increases, there is a corresponding increase in the capital adequacy level. According to Akinwale (2011), such insignificant impact could be due to the trust that shareholders have in the banks and leave more space for the banks to take riskier activities in order to generate more profit. This indicates that the portfolio of the examined banks could be a blend of business apportioned between business credits, retail or even securities. In fact, capital adequacy requirements for the GCC banks are mainly affected by capital adequacy ratio rules forced by global administrative experts and administrative authority rather than any other internal factors.

With regards to the association between liquidity ratio and capital adequacy requirements, the obtained results revealed a significant negative association,

which confirms the developed hypothesis H2. Such results confirm that the liquidity ratio of the bank depicts the capability of the bank in meeting its liabilities when they mature, as supported by Almeida et al. (2014). Accordingly, it can be stated that having sufficient liquidity indicates the capability of the bank to transform its non-cash assets into cash as and when the need arises. Thus, it can be argued that liquidity depicts the cash position of the banks. In other words, it is the capability of the banks in meeting the day-to-day needs of its customers (Goldmann, 2017). These needs can be met either by drawing cash out of the stock of cash holdings, or by making use of the current cash inflows or even by converting liquid assets into cash form (Bianchi and Bigio, 2014). The current ratio is considered the determinant of the company's liquidity. It helps in showing the ability of the company in meeting its short-term liabilities as it evaluates if the company has enough assets to meet its liabilities for a year. On the other hand, more specifically, the quick ratio is considered as the determinant of the ability of the company in meeting its short-term liabilities which are due before the end of a year. These covers the quick or liquid assets of the company which are readily convertible into cash form without making a significant decrease in their book value (Subrahmanyam et al., 2017). Thus, the liquidity of the examined banks indicates the ability of the banks to meet their financial obligations on time and, therefore, when the banks hold a high level of liquidity their capital reserves are minimized (Faysal, 2005).

Consistent with hypothesis H3, Table 6.9 confirms that the credit risk has a significant positive association with capital adequacy requirements. These empirical results confirm that it is crucial to take into consideration the level of potential credit risk which setting up the capital requirements (Jiménez et al., 2014). Based on the existing literature in banking, it can be argued that credit risk implies that the risk-taking attitude of the management and their behavior towards the shareholders, which may lead to agency problems that need to be minimized in order to prevent reputation related risks.

Accordingly, it can be stated that the higher the credit risk that banks potentially could have, the higher the capital adequacy requirement applied to banks.

Consistent with hypothesis H4, Table 6.9 shows that the obtained results reveal that the association between bank profitability and capital adequacy requirements is positive and statistically significant at $t = 2.7$, $p < 0.01$. Such a result confirms that when bank profitability is high the earning income is high as a result. Hence, it can be said that having a high level of profitability leads to sustainability as well as progress of the earning capacity of a bank in future that will positively affect the liquidity position of the banks, which in turn will play a crucial role in determining the capital requirement as it shows the capability of the bank of earning consistently as it shows its current productivity (earnings) (Damodaran, 2016; Haslem and Longbrake, 2015). It can be stated that such results came as a result that profitability is generally assumed that a bank is expected to raise asset risk with a view to gain higher returns. Thus, it is observed that there is a positive relationship between profit and capital reserves that banks hold.

With regards to the association between the net interest income and capital adequacy requirements, the results indicate, consistently with hypothesis H5, a positive association, yet, statistically not significant. This could be due to the social nature of the societies, where the examined banks are operating and also it could be due to the nature of the data being obtained from the Islamic banks that do not deal with interest-based products. With regards to the control variable, the results revealed that the bank size has a negative and significant impact on the capital adequacy requirements as shown in Table 6.9.

In order to have a more meaningful analysis, two further regression models are applied on Islamic and conventional banks separately to be able to identify between both industries in relation to the factors that affect the capital adequacy requirements.

As it can be seen in Table 6.10, the empirical results show a similarity between the capital requirements and the key determinants among Islamic banks and conventional banks, except for credit risk, which does not have a significant

impact on capital adequacy requirements in the case of Islamic banks; whereas it is significant in the case of conventional banks.

Table 6.10 Panel Data Regressions with Fixed Effects Model: Measuring the Determinants of the CAR of Islamic Banks Compared to Conventional Banks

Independent Variables	Islamic Banks		Conventional Banks	
	Coefficient	t- value	Coefficient	t- value
Asset Quality	0.948	0.043*	0.9880	0.048
Liquidity	-0.098	-1.987*	-0.0950	-1.797*
Management Quality	0.077	2.011*	0.0870	1.223*
Credit Risk (CR	0.499	0.694	0.4930	0.697*
Return on Assets	0.009	2.755*	0.0100	2.907
Net interest income	0.943	-0.19	0.0650	1.542
Log Assets (Asset Size)	0.003	-8.675 ***	0.0000	-9.765***
Constant	0.002	-10.023***	0.0000	-13.121***
Adjusted R2		0.4380		0.4420
Hausman		0.0000		0.0000
Prob. (F-statistics)		0.0000		0.0000
Bank No		50		50
Obs No				472

Note: * Significant 0.01, **significant 0.05, ***significant 0.10

In addition, the return on assets has a significant impact on capital requirements in the case of Islamic banks; whereas this is insignificant in the case of conventional banks. These differences provide a clear evidence of the impact of the unique nature of Islamic financial products and operations, which could be the reason for the low level of credit risk in the case of Islamic banks. In addition, the nature of Islamic banks results in boosting the impact of bank profitably on capital adequacy requirements, which could be due to the illiquid nature of Islamic financial

products or due to the lack of highly liquid assets (for example see: Barth et al., 2004, Koch and MacDonald, 2014, Ibrahim et al., 2015, Banna et al., 2016, AL-Ansary and Hafez, 2015, Samad, 2004, Akhtar et al., 2011). As a summary, the overall results are consistent with the most of the developed hypotheses indicating that liquidity has a significant negative effect on capital adequacy of Islamic and conventional banks. The results also confirmed that credit risk has a significant positive effect on capital adequacy of Islamic and conventional banks. The results confirmed that the bank profitability has a significant positive effect on capital adequacy of Islamic and conventional banks together, yet, significant only in the case of Islamic banks when the industry-based regressions were conducted. Net interest income remains in an insignificant association with capital adequacy requirements of the examined banks. The results confirmed that the management quality stays in a positive significant association with capital adequacy requirements in the case of both Islamic and conventional banks in the GCC region over the period between 2006 and 2015.

6.5. Sensitivity Analysis

In addition, to check that the examined variables are exogenous, the statistical relationship among variables is examined by using a Durbin-Wu-Hausman test, after running the regression using 2SLS instrumental variable regression test to confirm the non-existence of endogeneity threat.

In order to test the robustness of the empirical results of this study, two additional tests are performed. First, Two-Stage Least - Squares (2SLS) regression analysis is applied as an alternative test to control for endogeneity among the examined variables. In addition, to check for endogeneity, the Durbin-Wu-Hausman test is applied. As it can be seen in Table 6.11, 2SLS regressions present similar results to the initial model with fixed effects test for both Islamic and conventional banks, except for the credit risk, which does not have a significant effect on the capital adequacy requirements. The Durbin-Wu Hausman F -test scores insignificant p -value = 0.9, which indicates that the null hypothesis cannot be rejected. Hence, the null hypothesis of the Durbin-Wu-Hasuman test is accepted,

which confirms that there is no threat of endogeneity among the examined variables (Gujarati, 2004).

Table 6.11 Panel Data Regressions with 2SLS and Endogeneity Test

Independent Variables	Coefficient	t- value
Asset Quality	0.890	0.038
Liquidity	0.089	2.010*
Management Quality	0.076	1.765*
Credit Risk	0.491	0.608
Return on Assets	0.006	2.600*
Net interest income	0.871	-0.169
Log Assets (Asset Size)	0.000	-9.387***
Constant	0.000	10.016***
Adjusted R2		0.338
Prob. (F-statistics)		0.000
Durbin –Watson		0.930
Bank No		50
Obs No		472

* Significant 0.01, **significant 0.05, ***significant 0.10

6.6. Conclusion

This Chapter provides empirical evidence of the association between the capital adequacy requirements and its determinants, including asset quality management, liquidity, management quality, credit risk, profitability, changes in net interest income and bank size. The overall results are consistent with most of the developed hypotheses indicating that liquidity has a significant negative effect on capital adequacy of Islamic and conventional banks. The results also confirmed that credit risk has a significant positive effect on capital adequacy of Islamic and conventional banks, however, the results confirmed an insignificant association in the case of Islamic banks when the regressions conducted on industry. The

results confirmed that bank profitability has a significant positive effect on capital adequacy of Islamic and conventional banks together. Net interest income remains with insignificant association with capital adequacy requirements of the examined banks. The results confirmed the management quality stays in a positive significant association with capital adequacy requirements in the case of both Islamic and conventional banks in the GCC region over the period between 2006 and 2015.

CHAPTER SEVEN
ASSESSING THE IMPACT OF CAPITAL
ADEQUACY ON THE BANK EFFICIENCY

CHAPTER SEVEN

ASSESSING THE IMPACT OF CAPITAL ADEQUACY ON THE BANK EFFICIENCY

7.1. Introduction

There is an abundance of literature discussing the importance of the capital adequacy requirements in the banking sector (Dinser and Haseoglu, 2013.). In financial theories, a firm can increase efficiency by expanding the units of output per unit of input. In order to measure the efficiency of banks, such an approach can be applied by characterizing measures of output and input (Farrell, 1957). The banking regulations that are applied by Islamic banking industry are rather difficult compared to their conventional counterparts, due to the nature of Islamic financial principles that Islamic banking industry operates based on which are derived from Islamic *Shariah*, and hence, it can be stated that their efficiency may be adversely affected (Ahmed, 2011). Despite the vast amount of literature analyzing and evaluating the impact of capital adequacy on the efficiency of conventional banks, there is scarce literature on how and to what extent these standards can influence and impact the efficiency of Islamic banks (Hadriche, 2015). In addition, taking into consideration that efficiency is one of the most important issues for banks to maintain their competitiveness in the market, it is important to understand the impact that capital adequacy may have on the efficiency of Islamic banks compared to conventional banks, which is the aim of this research.

This chapter starts by providing a theoretical framework on the possible association between capital adequacy requirements and bank efficiency. After that, it highlights the regression models with a brief explanation of the assessed variables. The Chapter, then, provides a critical descriptive analysis of the data followed by the empirical analysis. Before proceeding to regressions analysis, this Chapter explains the econometric procedure for testing the validity of assessed

data and variables. The Chapter comes to an end with a brief reflection on the findings.

7.2. Theoretical Understanding of the Association between Capital Adequacy and Efficiency

The existing literature suggests three ways of association between capital adequacy and bank efficiency. Some researchers found that capital adequacy does not have a significant impact on the bank efficiency. For instance, Allen et al. (2012) found that the Basel capital requirements will not have a direct impact on the efficiency of banks. The results of Demirguc-Kunt and Detragiache (2011) showed that there is no statistically significant impact of the capital requirements on the efficiency and risks of banks.

On the other hand, Naceur and Kandil (2009), who are the supporters of the greater regulation of capital requirements, suggest that compliance with Basel requirements in emerging economies and the stringent application of capital regulations have had a positive impact on the financial efficiency of banks. Alexander et al. (2013) also noted the positive effects of the Basel regulations on Capital on financial performance and efficiency. Similarly, Chortareas et al. (2012) found positive effects from a stricter regulation of capital requirements in European banks by applying a panel regressions approach with data envelopment analysis. These methods have shown that the most stringent capital requirements relate to the increased efficiency of banks. Fiordelisi et al. (2011) conducted research on the relationship between capital adequacy and efficiency and their results were found to support the positive relationship between capital adequacy and efficiency. Alexander et al. (2013), hence, stated that the capital adequacy ratio, risk and efficiency are all interrelated variables that need to be taken into consideration collectively (Berger, 1997). This suggests that any experimental approach used to model the relationships between capital and risk needs to take account of the efficiency of banks.

The most important results of these studies are that financial reform leads to increased efficiency and the important objective of eliminating regulatory barriers is competition in the financial markets, for example after deregulation, the efficiency of Turkish and Norwegian banks has improved significantly in their banking efficiency (Berg et al., 1992). In addition, the relationship between deregulation and performance has an impact on the efficiency of banks. These results have derived from the study conducted by Das and Ghosh (2006) using the data of financial institutions in the Indian sector. Their empirical analysis proved that the efficiency of the commercial banking sector has improved as a result of the reforms in India (Das and Ghosh, 2006) and more specifically, the banks have achieved high levels of efficiency and performance, in medium-sized banks (Brissimis et al., 2008). In addition, the performance and efficiency of banking in the Indian banks has been increased due to deregulation, which led to an increase in competition in the financial markets, especially the lending market during the period 1992-2004. (Flynn et al. 2010). According to Jacques and Nigro (1997), the regulators play a key role in establishing a positive association between capital adequacy ratio and bank efficiency through their activities. Banks could react to administrative activities constraining them, to expand their capital adequacy by expanding resources. The need to control the high rate of credit default occasioned by expanded loaning exercises was a prevalent thought process in changes in money related frameworks in creating economies. As indicated by Ezeoha (2011), sound regulations guarantee adherence to a set of principles that may improve the banks risk taking behavior which may consequently improve their efficiency.

Despite the previous arguments, in the existing literature, there is abundant evidence of negative effects of capital requirements on the efficiency of banks (Lee and Chih, 2013; VanHoose, 2007; Lee and Hsieh, 2013; Akhgbe et al., 2012, Adams et al., 1998, Aggarwal and Jacques, 1998). Barth et al. (2004) argue that applying more restrictions on banks increases the probability of the banking crisis and reduces the efficiency of the bank. Hakenes and Schnabel (2011) also, discuss that the relationship between capital adequacy requirements and bank performance and their results are different for small and large banks that small banks have been

found to be more sensitive to such regulations. In a similar manner, when Tan and Floros (2013) examined the effect of capital adequacy requirements on bank efficiency, they found that efficiency was positively related to the provision for credit losses and that it was negatively related to the total capital of the banks. In contrast, other studies found that financial reform had no or mixed effects on efficiency or lead to a decline in operating efficiency. For instance, banking efficiency in the US was relatively unchanged by deregulation (Elyasiani and Mehdiian, 1995). Halkos and Salamouris (2004) employ DEA to examine the performance of the Greek banking sector during 1997–1999, a period of various financial reforms. They found a decrease in average efficiency level in 1998, followed by a significant increase and maximum attained performance in 1999. Similarly, Fukuyama and Weber (2002) found that the efficiency of Japanese banks during 1992–1996 declined and Park and Weber (2006) also found declines in efficiency for Korean banks during 1992–2002. More recently, Fu and Heffernan (2009) find that efficiency declined significantly and most banks operated below scale efficiency levels in the Chinese banking system during 1985–2002 as a result of deregulation. The administrative and effective market-checking theory expressed that regulators urged that the banks should expand their reserves equivalent to the hazard taken by banks (Sathye, 2001; Saad and El-Moussawi, 2009). Such a claim could be tolerated in a market, where access to liquid financial instruments is available for banks that may aid in facilitating the capital we need (Calomiris and Kahn, 1991; Berger, 1995).

It has been discussed in the previous Chapter and based on such arguments, it can be stated that a negative relationship between capital adequacy and efficiency is expected, and therefore, this Chapter intends to test the following hypothesis:

Hypothesis 7: The capital adequacy ratio has a significant negative effect on the efficiency of Islamic and conventional banks.

7.3. Modeling

We used the regression model to determine the relationship between capital adequacy ratio and efficiency. The explained variables in the regression model were obtained from the efficiency in the profit model. The efficiency scores (as the explained variable) from DEA are limited to value between 0 and 1.

The model given below will be used to measure the impact of the capital adequacy on bank efficiency (Lee and Chih, 2013).

$$BE_{bit} = \alpha + \beta_1 CAR_{bit} + \beta_2 NPL_{bit} + \beta_3 CIR_{bit} + \beta_4 LIQ_{bit} + \beta_5 Size_{bit} + \varepsilon_i$$

Where:

BE_{bit} : refers to efficiency of bank b in country i during the period t .

α : the intercept;

$\beta_1 \dots \beta_n$: the regression coefficients;

ε : the error term;

CAR_{bit} : refers to the capital adequacy ratio and is calculated by (tier1+tier2) to risk weighted assets of bank b in country i during the period t .

NPL_{bit} : refers to assets quality and is calculated by non-performing loans to loan unpaid.

CIR_{bit} : refers to Benefit and is calculated by cost to income ratio.

LIQ_{bit} : refers to Liquidity and is calculated by current assets to current liabilities.

$Size$: refers to total asset of bank b in country i during the period t and calculated by the log of total assets.

It is important to highlight the purpose of the regressions analysis, it is to measure the association between the banks efficiency and capital adequacy requirements and the remaining variables, asset quality, benefit, liquidity and size, are taken as

control variables, the financial regulatory variables have been divided into four categories.

As it has been mentioned earlier, the research data has been collected from the financial statements of 50 banks; 25 Islamic banks and 25 conventional banks, from the GCC countries, namely: Bahrain, Kuwait, Qatar, Saudi Arabia, United Arab Emirates and Oman. As mentioned in the previous chapter, the annual reports, balance sheets, and income statements have been used as the primary source of data needed for the proposed analysis.

With a purpose of having flow in reading, as it has been mentioned in the Research Methodology Chapter 5, in this study, the data envelopment analysis (DEA) model is used to examine the efficiency of Islamic and conventional banks in the GCC countries. The data envelopment analysis method is applied to distinguish the efficient banks from those which are less efficient. The key advantage of using such a method is that it is easy to apply in all institutions, whether financial or otherwise. This method has been widely used in many economic studies in various sectors, including the banking sector. The statistical estimation models used to measure banking efficiency have been varied and focus heavily on input (cost) as an indicator of efficiency while others relied on revenue (output) as an input to measure banking efficiency (Tannenwald, 1995).

The method of analyzing the DEA is non-instructional. Linear programming techniques have been used to evaluate and measure the efficiency of decision-making units using the same inputs and produce the same outputs. DEA was first introduced by Farell (1957) to measure production efficiency based on a model dependent on one input and one output, which was later evolved to include more than one input and one output (Berger and Humphrey, 1997; Berger, 1993). The study will use a profit efficiency model “Profit efficiency is a more inclusive concept than cost efficiency, because it takes into account the cost and revenue effects of the choice of the output vector, which is taken as given in the measurement of cost efficiency” (Lee and Chih, 2013, p. 711). Table 7.1 provides a description of the inputs and outputs used in Data Envelopment Analysis (DEA).

Table 7.1 Definition of Inputs and Outputs Variables

Variable	Variable name	Description
Input	Fixed assets	The sum of physical capital and remises
	Funds	Total deposits plus total borrowed funds
Input price	Price of fixed assets	Operating expenses divided by the fixed assets
	Price of funds	Interest expenses on customer deposits plus other interest expenses divided by the total funds
Output	Total loans	Total of short-term and long-term loans
	Investment	Includes short and long-term investment
Output price	Price of loans	Interest income on loans divided by total loans
	Price of investment	Other operating income divided by investments

Source :(Lee and Chih, 2013)

With regards to the control variables, this study proxied the asset quality by the ratio of non-performing loans to loans unpaid, hence, the increase of this ratio is an indication that the quality of the asset quality management is downgrading. The ratio estimates the part of total loans that may prove to be bad loans that requires an equivalent amount of capital to be reserved. It provides an indication of the extent to which the bank has made provisions to cover credit losses, and in turn to impair net interest revenue on the income statement. The higher the ratio, the larger is the amount of expected bad loans on the books, and the higher the risks of losses that will lead directly to less efficiency (Ayadi and Pujals, 2005). Benefit refers to the ratio of the cost to income and a decrease of this ratio is an indication that efficiency is improving. In banking theory, this ratio should be taken into consideration when assessing the operational efficiency (Francis et al; 2004). With regards to liquidity, it can be argued that the higher level of liquidity ratio, the

stronger the bank in absorbing financial risks (Ayadi and Pujals, 2005; Athanasoglou et al., 2006). However, holding a high level of liquidity may directly have a negative impact on the profitability (Caprio et al., 2010), hence, the lower level of liquidity could be interpreted as an indicator of improved efficiency. In addition, this study has taken bank size as a control variable to proxy for any impact that it may have while measuring the association between the efficiency and capital adequacy requirements.

7.4. Descriptive Statistics

This section provides descriptive statistics including the dependent and independent variables for 472 observations for both Islamic and conventional banks.

As shown in Table 7.2, the results reveal that the assessed banks have scored a considerable level of efficiency with an average value of 0.98 and ranging between 0.97 and 1. Having obtained such results evidences that the examined banks in the GCC region have been managing their efficiency in a satisfactory manner. However, the value of the standard deviation coefficient reveals the dispersal degree between the sampled banks, which indicates that there are considerable differences among them in efficiency levels.

Table 7.2 Descriptive Statistics of all Banks and Islamic and Conventional Banks

Variables	Min	Max	Mean	Std. deviation
Efficiency	0.978	1.000	0.98	0.765
Capital Adequacy	0.05	0.989	0.13	0.198
Asset Quality	0.234	0.89	0.543	0.987
Benefit	0.16	0.99	0.44	0.18
Liquidity	0.154	0.876	0.654	0.134
Size	3.2759	5.5598	4.188	0.4768

Data Source: Bank scope Database

As Table 7.2 illustrates, the overall value of capital adequacy scored 0.13 indicating that the GCC banks are keeping a satisfactory rate of reserves based on the global market. This is also another indicator that GCC banks tend to be risk averse. The variation of the capital adequacy ratio that ranges between 0.05 and 0.9 reveals that the GCC banks are not behaving in an identical manner, when it comes to the amount of reserves that they hold. It is an indicator that these banks could take different positions towards their investment behavior. By looking at the asset quality, it can be stated that the assets of the banks are in an acceptable position with a mean value of 0.03 which can be considered as a low level of bad assets and ranging between a maximum value of 0.07 and minimum value of 0. With regards to the ratio of cost to income, the revealed results suggest that the GCC banks tend to be in a moderate position with a mean value of 44.8 and ranging between 0.16 and 0.99 which indicate the variety among the assessed banks. As mentioned earlier, the GCC banks confirm once again that they are highly liquid with a mean value of 0.65 and ranging between 0.1 and 0.9 indicating the variation among them. The results also reveal that the GCC banks have variety in their sizes ranging between 3.3 and 5.5 with a mean value of 4.2.

By looking at the descriptive data of Islamic banks compared to conventional banks, as can be seen in Tables 7.3 and 7.4, the results suggest that conventional banks are more efficient than Islamic banks with a mean value of 0.82 and 0.8, respectively. This suggests that due to the nature of Islamic financial products and operations, the efficiency of Islamic banks is negatively affected compared to conventional banks. Having said that, it can be stated that the Islamic banks face higher challenges in maintaining a competitive position in the market. Therefore, it can be stated that Islamic banks are more exposed to different types of risks compared to conventional banks, such as withdrawal risk that may occur due to lower performance in the market.

The results in Tables 7.3 and 7.4 reveal that the mean value of assets quality of Islamic and conventional banks scored, 0.031 and 0.039 per cent, respectively, with the minimum and maximum values of 0.008 and 0.138 percent for conventional banks and 0.00 and 0.075 percent for Islamic banks and with a

standard deviation value of 0.023 and 0.022 per cent for Islamic and conventional banks. Therefore, it can be stated that Islamic banks performed better than conventional banks in relation to quality of assets during the period of analysis. Which generally implies that Islamic banks have more dependable and better resource quality in comparison to conventional banks. Such results are supported by similar findings of Momeneen et al., (2012).

Table 7.3 Descriptive Statistics of Islamic Banks

Variables	Minim	Maxim	Mean	Std. deviation
Efficiency	0.65	1.000	0.800	0.20
Capital Adequacy	0.07	0.902	0.17	0.13
Asset Quality	0.000	0.075	0.03	0.02
Benefit	0.14	0.92	0.39	0.15
Liquidity	0.064	0.736	0.59	0.10
Size	4.272	5.45	3.74	0.47

Data Source: Bank scope Database

Table 7.4 Descriptive Statistics of Conventional Banks

Variables	Minim	Maxim	Mean	Std. Deviation
Efficiency	0.63	1.00	0.82	0.21
Capital Adequacy	0.05	0.28	0.13	0.04
Asset Quality	0.01	0.14	0.04	0.02
Benefit	0.15	0.97	0.36	0.11
Liquidity	0.26	0.81	0.59	0.11
Size	3.995	4.897	4.181	0.334

Data Source: Bank scope Database

The results also show that the mean value of Benefits of conventional and Islamic banks reached 0.39 per cent and 0.36 per cent, respectively, with the minimum and maximum values of 15.99 per cent and 97.37 per cent for conventional banks and

14.28 and 0.92 per cent for Islamic banks and with the standard deviations value of 0.15 per cent and 0.11 per cent for Islamic and conventional banks, respectively. Subsequently, it can clearly be observed that conventional banks performed better than Islamic banks in terms of benefit during the period of analysis. Therefore, it can be argued that the lower the cost to income ratio in conventional banks suggests that they are less costly than Islamic banks, which can be due to the complexity of Islamic financial products.

Tables 7.3 and 7.4 reveal that the mean value of liquidity of Islamic and conventional banks scored 0.595 and 0.59 per cent, respectively, with minimum and maximum values of 0.255 and 0.807 per cent for conventional banks and 0.064 and 0.736 per cent for Islamic banks and with the standard deviations value of 0.100 and 0.111 per cent for Islamic and conventional banks, respectively. Accordingly, it can be argued that Islamic banks are more liquid than conventional banks during the sample period. This can be interpreted as the risk averse attitude of Islamic banks which comes as a result of their lack of access to short-term liquid instruments. However, holding a high level of liquidity does not favor their profitability as argued by Iqbal et al. (2011) and Merchant (2012). On the other hand, the results revealed that conventional banks are of a bigger size than Islamic banks in the GCC region during the assessed period. Such results can be an indicator supporting the argument that states the larger bank size is not an indicator of its efficiency.

7.5. Empirical Analysis: Examining the Impact of Capital Adequacy Requirements on Bank Efficiency

In finance related research, in order to obtain robust results, researchers are strongly advised to follow the process of empirical analysis, as mentioned in Chapter Six, by first, checking the nature of the assessed data to be able to examine the correlation among the examined variables to detect, if any, the existence of high multicollinearity. Testing whether the data are normally distributed or not determines the tool that is required to examine the multicollinearity, which can be either the Spearman or Pearson correlation matrix depending on the nature of the

data. Accordingly, this research will apply the Skewness and Kurtosis coefficients to detect the nature of the data. According to Gujurati (2006), the data are normally distributed if the Skewness coefficient value is between +1.96 and -1.96 and the Kurtosis coefficient value is between +3 and -3.

7.5.1. Testing the Nature of the Data

As shown in Table 7.5, the results indicate that the data are not normally distributed, as the values of Skewness are bigger than +1.96 and -1.96 and the values coefficient Kurtosis is greater than +3 and -3 (Gujurati, 2006; Garson, 2012) in the case of most of the variables.

Table 7.5 The Results of Skewness and Kurtosis Tests

	Efficiency	NPL	CIR	LIQ	CAR	Size
Skewness	0.876	0.543	3.233	-4.877	3.887	1.916
Kurtosis	3.89	2.231	1.893	3.992	1.982	2.651

Given that data are not normally distributed, the Spearman correlation matrix has been used to test and examine the multicollinearity threats between the assessed variables. In addition, the VIF test is applied to further examine for multicollinearity among the tested independent variables to avoid using some variables that represent the same proxy.

7.5.2. Testing the Validity of the Variables

Having said that this research will run the regressions analysis for the whole sample consisting Islamic and conventional banks together and, in addition, will run regressions analysis for Islamic banks and conventional banks separately, in order to examine the validity of the assessed variables, the Spearman matrix and VIF test will be applied separately according to the identified categories to detect the existence of a multicollinearity threat, if any.

Given that the data are not normally distributed, the Spearman correlations matrix is used to test for the existence of multicollinearity between examined independent variables (Haniffa and Cooke, 2005; Jing et al., 2008).

Table 7. 6 Spearman Correlations Matrix Test –Islamic and Conventional Banks

Variables	VIF	Efficiency	Assets Quality	Benefits	Liquidity	CAR	Size
Efficiency		1.000					
Assets Quality	2.250	0.187	1.000				
Benefits	3.890	-0.307	0.414	1.000			
Liquidity	1.016	0.251	0.320	0.491	1.000		
CAR	2.201	-0.345	0.097	0.408	0.099	1.000	
Size	2.265	0.197	0.766	-701.0	-0.040	0.520	1.000

Data Source: Bank scope Database

As it can be observed in Table 7.5, the Spearman matrix did not identify high correlation equal to or greater than 0.8 (Brooks, 2008), the examined variables seem to be clear of the threat of any high multicollinearity. In addition, the VIF test verifies the same result as its value did not exceed 10 (Haniffa and Cooke, 2005).

Table 7.6 shows similar results and confirms the absence of any threat of multicollinearity among the measured variables in the case of Islamic banks in the GCC region.

Table 7. 7 Spearman Correlations Matrix Test –Islamic Banks

Variables	VIF	Efficiency	Assets Quality	Benefits	Liquidity	CAR	Size
Efficiency		1.000					
Assets Quality	1.021	0.190	1.000				
Benefits	2.660	-0.297	-0.188	1.000			
Liquidity	1.089	0.299	0.540	-0.077	1.000		
CAR	2.002	-0.302	0.387	-0.371	0.343	1.000	
Size	1.976	0.186	-0.290	-0.076	-0.042	0.107	1.000

Data Source: Bank scope Database

As for the assessed conventional banks in the GCC region, based on the results presented in Table 7.7, it can be confirmed that there is no existence of any threats of the multicollinearity among the examined variables in the case of Islamic banks in the GCC region.

Table 7. 8 Spearman Correlations Matrix Test –Conventional Banks

Variables	VIF	Efficiency	Assets Quality	Benefits	Liquidity	CAR	Size
Efficiency		1.000					
Assets Quality	1.408	0.187	1.000				
Benefits	2.988	-0.307	-0.199	1.000			
Liquidity	1.966	0.251	0.575	-0.078	1.000		
CAR	1.999	-0.345	0.399	-0.400	0.333	1.000	
Size	1.859	0.197	-0.300	-0.087	-0.040	0.130	1.000

Data Source: Bank scope Database

The obtained results confirm that the examined variables are clear of multicollinearity issues, which confirms that the chosen variables are fit to be examined in one regression model.

7.5.3. Regressions Analysis: Examining the Impact of Capital Adequacy Requirements on Bank Efficiency

In previous sections, the results confirmed the fitness of the data and the examined variables, this section provides testing the association between the capital adequacy ratio and banks efficiency through panel data regressions using fixed effects.

Table 7.8 illustrates the results of the relationship between capital adequacy as the independent variable and bank efficiency as the dependent variable of the Islamic and conventional banks in the GCC countries by using a fixed effects panel regression. The research sample consisted of 472 observations gathered from 50 banks from the GCC region covering the period between 2006 and 2015.

In order to confirm that the model is most fitted with fixed effects, the Hausman test is applied. As it can be seen, the p-value of Hausman test scored a value of 0.04 which is significant at 5 per cent that can be interpreted as a rejection of the null hypothesis and confirms that the coefficient is systematic that ratifies that the fixed effect is most fitted for the examined data.

The obtained results of the association between the CAR and its determinants are reported in chapter six Table 6.8. The results indicate that the overall model is significant at $p < 0.01$ (F-test = 0.000) with adjusted *R*-square equal 0.4290.

The empirical results in Table 7.9 show that, consistently with hypothesis H7, the capital adequacy ratio is negatively associated with bank efficiency and is statistically significant at $t = 0.66$, $p < 0.10$ per cent with the coefficient value of -0.96. Such results indicate that an increase of 1 per cent in capital adequacy ratio leads to a decrease of bank efficiency by 0.96 per cent.

Table 7.9 Panel Data Regressions with Fixed Effects Model: Measuring the Impact of the CAR on Efficiency of GCC Banks

Independent Variables	Coefficient	t- value
Capital Adequacy Ratio	-0.966	-0.668*
Asset Quality	0.098	0.212*
Benefit	-0.009	-3.498***
Liquidity	-0.005	- 2.921***
Size	-0.000	-10.992***
Constant	-0.008	-4.190***
Adjusted R2		0.456
Hausman		0.000
Prob (F-statistics)		0.000
Bank No		50
Obs No		472

Note: *** Significant at 0.01, ** Significant at 0.05, * Significant at 0.10

The obtained results provide evidence that higher capital requirements leads to higher agency costs between shareholders and managers due to the discipline rendered by debt repayment on manager behavior (Salem, 2013; Jarrow, 2013; Büyükşalvarcı, 2011). Supporting these findings, similar results were reached by Berger and Udell (2006). According to Barth et al. (2004), imposing restrictions on banks increases the probability of a banking crisis and also lowers bank efficiency. Despite the main aim of enacting financial regulation is to improve solvency and improve liquidity that may lead to a greater bank stability in response to strict regulation, however, at the expense of bank efficiency.

Furthermore, within this context, VanHoose (2007) argues that even though the Basel requirements on capital adequacy significantly affect the lending behavior of banks, there is no substantial indication that such regulation decreases the risk of the financial institutions. Akhigbe et al. (2012) made an interesting observation that those banks that had more capital experienced larger losses as their shares fell more compared to the banks with lower capital. This is explained by the signaling hypothesis which implies that higher capital sends a signal to investors that this capital is used as a protection against higher risk of the assets (Akhigbe et al., 2012). In addition, Kaplanski and Levy (2007) state that having high capital requirements could lead, after reaching a certain benchmark, to a reduction in the efficiency of the bank. Hence, it can be stated that further tightening of the regulation may bring even more disadvantages to the financial industry. Accordingly, it can be argued that the empirical evidence provided by this research is strongly supported by the existing literature and confirms that having more restricted capital adequacy requirements leads to lower levels of bank efficiency of the GCC banks.

With regard to the control variables, the empirical results suggest that the asset quality is positively associated with bank efficiency and statistically significant at $t = 0.2$, $p < 0.10$ per cent with coefficient value of -0.09 . Such results indicate that an increase of 1 per cent in assets quality ratio leads to a decrease in bank efficiency by 0.09 per cent. The results in Table 7.8 also reveal that the ratio of cost to income is negatively associated with bank efficiency and is statistically

significant at $t = -3.4$, $p < 0.01$ per cent with a coefficient value of -0.009 . Such results indicate that an increase of 1 per cent in the cost to income ratio leads to a decrease of bank efficiency by 0.009 per cent.

Furthermore, results suggest that the liquidity ratio is negatively associated with bank efficiency and is statistically significant at $t = -2.9$, $p < 0.01$ per cent with a coefficient value of -0.005 . Such results indicate that an increase of 1 per cent in liquidity ratio leads to a decrease in bank efficiency by 0.005 per cent. The results also suggest that bank size is negatively associated with bank efficiency and is statistically significant at $t = -10.99$, $p < 0.01$ per cent with a coefficient value of -0.008 . Such results indicate that an increase of 1 per cent in bank size leads to a decrease of bank efficiency by 0.008 per cent.

To have a better understanding of the association between capital adequacy requirements and bank efficiency and to highlight the research objectives, further examination is conducted in the case of Islamic banks compared to conventional banks in the GCC region. The comparative analysis is presented in Table 7.10.

The regressions results provided in Table 7.10 present similar results presented in Table 7.9 for Islamic and conventional banks with little variations in the level of significant association and the value of coefficient between the examined variables. The results show that capital adequacy requirements are negatively associated with bank efficiency in the case of Islamic and conventional banks. However, the results reveal that the impact of capital adequacy requirements is less significant in the case of Islamic banks compared to conventional banks with $t = -0.15$, $p < 0.10$ per cent with coefficient value of -0.67 for Islamic banks and $t = -0.16$, $p < 0.05$ with coefficient value of -0.73 for conventional banks.

Table 7.10 Panel Data Regressions with Fixed Effects Model: Measuring the Impact of the CAR on Efficiency of Islamic Banks Compared to Conventional Banks in the GCC Region

Independent Variables	Islamic Banks		Conventional Banks	
	Coefficient	t- value	Coefficient	t- value
C A R	-0.676	-0.15*	-0.733	-0.167**
Asset Quality	0.081	0.792*	0.078	0.627
Benefit	-0.006	-2.048***	-0.004	-2.134***
Liquidity	-0.002	-3.269***	-0.002	-4.451***
Size	-0.001	-10.049***	-0.002	11.322***
Constant	-0.001	-4.256***	-0.003	-3.981***
Adjusted R2		0.373		0.339
Hausman		0.000		0.030
Prob (F-statistics)		0.000		0.000
Bank No		50		50
Obs No		472		472

Note: *** Significant at 0.01, ** Significant at 0.05, * Significant at 0.10

Obtaining such results could be due to the complexity of the Islamic financial products and operations that may reduce the correlation between capital adequacy and bank efficiency. This could be interpreted as a cause of that the Islamic financial products and operations are attached to real assets that are long term oriented unlike the conventional banks that deals with interest based products which are mostly short term. This can be explained as the reason that Islamic financial products and operations are linked to long-term assets, unlike conventional banks that deal with interest-based products that are often short-term.

Therefore, any increase in the capital requirements could have more negative impact in the short-term in the case of conventional banks than the long-term products in the case of Islamic banks, such an argument could be supported by Kaplanski and Levy (2007).

With regards to the control variables, the empirical results suggest that asset quality is positively associated with bank efficiency and, while in the case of Islamic banks it is statistically significant at $t = 0.7$, $p < 0.10$ per cent with a coefficient value of -0.08 , it is not significant in the case of conventional banks. Such results indicate that an increase of 1 per cent in assets quality ratio leads to a decrease of bank efficiency by 0.08 per cent in the case of Islamic banks. The results in Table 7.9 reveal that the ratio of cost to income is negatively associated with bank efficiency and is statistically significant, in the case of Islamic and conventional banks at $t = -2.04$, $p < 0.01$ per cent with coefficient value of -0.006 . Such results indicate that an increase of 1 per cent in the cost to income ratio leads to a decrease of bank efficiency by 0.006 per cent and in the case of conventional banks it is significant at $t = -2.13$, $p < 0.01$ per cent with a coefficient value of -0.004 . Such results indicate that an increase of 1 per cent in the cost to income ratio leads to a decrease of bank efficiency by 0.004 per cent and again, it can be stated that such a difference is due to the unique nature of Islamic financial principles.

The results are similar to the results related to the association between liquidity ratio and bank efficiency in the case of Islamic and conventional banks. In the case of Islamic banks, the results suggest that the liquidity ratio is negatively associated with bank efficiency and is statistically significant at $t = -3.3$, $p < 0.01$ per cent with a coefficient value of -0.002 . Such results indicate that an increase of 1 per cent in liquidity ratio leads to a decrease of bank efficiency by 0.002 per cent. While in the case of conventional banks, the obtained results show that the liquidity ratio is negatively associated with bank efficiency and is statistically significant at $t = -4.4$, $p < 0.01$ per cent with a coefficient value of -0.002 , such results indicate that an increase of 1 per cent in the liquidity ratio leads to a decrease of bank efficiency by 0.002 per cent.

In addition, the empirical results suggest that the bank size is negatively associated with bank efficiency and is statistically significant, in the case of Islamic banks, at $t = -10.04$, $p < 0.01$ per cent with a coefficient value of -0.001 . Such results indicate that an increase of 1 per cent in bank size leads to a decrease of bank efficiency by 0.001 per cent. On the other hand, in the case of conventional banks, the results suggest that bank size is negatively associated with bank efficiency and is statistically significant, in the case of Islamic banks, at $t = -11.3$, $p < 0.01$ per cent with a coefficient value of -0.002 . Such results indicate that an increase of 1 per cent in bank size leads to a decrease of bank efficiency by 0.002 per cent.

7.5.4. Sensitivity test

In order to test the robustness of the empirical results of this study, an additional two tests were performed. First, Two Stage Least - Squares (2SLS) regression analysis was applied as an alternative test to control for endogeneity among the examined variables. In addition, to check the endogeneity, the Durbin-Wu-Hausman test is applied. As it can be seen in Table 7.10, 2SLS regression presents almost similar results, as in the initial model with fixed effects test for both Islamic and conventional banks. The Durbin-Wu Hausman F -test scores insignificant value of p -value = 0.8, which indicates that the null hypothesis cannot be rejected and therefore is proven. Hence, accepting the null hypothesis of the Durbin-Wu-Huasman test confirms that there is no threat of endogeneity among the examined variables (Gujarati, 2004).

The results in Table 7.11 show that, consistent with hypothesis H7 and the results of fixed effects model, the capital adequacy ratio is negatively associated with bank efficiency and is statistically significant at $t = -0.23$, $p < 0.10$ per cent with a coefficient value of -0.86 . Such results indicate that an increase of 1 per cent in the capital adequacy ratio leads to a decrease of bank efficiency by 0.86 per cent. Furthermore, with regards to the control variables, consistent with the results of fixed effect presented in Table 7.9, the results in Table 7.11 show that asset quality do not have any significant association with bank efficiency. The results show that the ratio of cost to income is negatively associated with bank efficiency and is statistically significant at $t = -0.02$, $p < 0.10$ per cent with a coefficient value of -

0.004. Such results indicate that an increase of 1 per cent in capital adequacy ratio leads to a decrease of bank efficiency by 0.004 per cent.

Table 7.11: Panel Data Regressions with 2SLS and Endogeneity Test

Independent Variables	Coefficient	t- value
Capital Adequacy Ratio	-0.860	-0.231*
Asset Quality	0.005	0.788
Benefit	-0.004	-2.023**
Liquidity	-0.007	-4.424*
Size	-0.001	9.901**
Constant	-0.000	3.793***
Adjusted R2		0.441
Hausman		0.050
Prob (F-statistics)		0.000
Durbin – Wu Hausman		0.840
Bank No		50
Obs No		472

*** Significant at 0.01, ** Significant at 0.05, * Significant at 0.10

In addition, the results reveal that the ratio of liquidity is negatively associated with bank efficiency and is statistically significant at $t = -2.02$, $p < 0.05$ per cent with a coefficient value of -0.007 . Such results indicate that an increase of 1 per cent in the capital adequacy ratio leads to a decrease of bank efficiency by 0.007 per cent. Moreover, the results reveal that bank size is negatively associated with bank efficiency and is statistically significant at $t = -9.9$, $p < 0.05$ per cent with a coefficient value of -0.001 . Such results indicate that an increase of 1 per cent in capital adequacy ratio leads to a decrease of bank efficiency by 0.001 per cent, as presented in Table 7.11.

7.6. Conclusion

This chapter assesses the impact of capital adequacy regulation on the efficiency of 50 banks, 25 Islamic banks and 25 conventional banks, in the GCC countries over the period between 2006 and 2015. Based on the results delivered through the DEA method, the empirical results reveal that the Islamic banks are less efficient than conventional banks in the GCC region. Such results could be due to the unique nature of Islamic financial principles that impose more complexity to the Islamic financial products and operations that in turn lead to lower levels of efficiency compared to the conventional banks. The empirical results are consistent with Hypothesis H7, and reveal that the capital adequacy negatively affects the efficiency of the examined GCC banks. However, the results show that such an effect is lower in the case of the Islamic banks compared to the conventional banks. The obtained results could be due to financial operations that are based on Islamic financial principles.

With regards to the control variables, the empirical results suggest that asset quality is positively associated with bank efficiency and, while in the case of Islamic banks it is statistically significant, it is not significant in the case of conventional banks. The results also reveal that the ratio of cost to income is negatively associated with bank efficiency and is statistically significant, in the case of Islamic and conventional banks. Similar results related to the association between liquidity ratio and bank efficiency in the case of Islamic and conventional banks are achieved. In addition, the empirical results suggest that bank size is negatively associated with bank efficiency and is statistically significant, in the case of Islamic banks and conventional banks in GCC region over the period between 2006 and 2015.

CHAPTER EIGHT
CONCLUSION

CHAPTER EIGHT

CONCLUSION

8.1 Introduction

This study aimed to examine capital adequacy and to measure the factors that determine the capital adequacy ratio of the GCC Islamic and conventional banks. Furthermore, it aimed to assess the impact of capital adequacy requirements on the efficiency of Islamic banks in a comparative manner with conventional banks in the case of the GCC countries over the period between 2006 and 2015. The investigations were carried out in this study through DEA and regression analysis. Following the existing literature related to banking, this study developed two regressions models; the first one was applied to examine the determinants of the capital adequacy ratio. The Data Envelopment Analysis (DEA) was used to investigate the level of efficiency, and then, the second regression model was used to examine the relationship between the capital adequacy ratio and the efficiency of the banks.

As for the structure, this Chapter starts with providing the theoretical considerations followed by a summary of the research findings. In addition, the main policy impacts and practical recommendations to improve the current practice of the GCC countries are delivered in this chapter followed by outlining the limitations and recommendations for future research.

8.2. Summary of the Research Findings

This study, in the first empirical part in Chapter Six, provided empirical evidence of the association between capital adequacy requirements and its determinants, including asset quality management, liquidity, management quality, credit risk, profitability, changes in net interest income and bank size of 50 banks, 25 Islamic banks and 25 conventional banks, in the GCC countries over the period between 2006 and 2015. The overall results are consistent with most of the developed hypotheses indicating that liquidity has a significant negative effect on capital adequacy of Islamic and conventional banks. The results also confirmed that credit

risk has a significant positive effect on the capital adequacy of Islamic and conventional banks, however, the results confirmed an insignificant association in the case of Islamic banks when the regressions conducted were industry based. The results confirmed that bank profitability has a significant positive effect on capital adequacy of both Islamic and conventional banks, yet, it is significant only in the case of Islamic banks when the industry-based regressions were conducted. Net interest income remains in an insignificant association with capital adequacy requirements of the examined banks. The results confirmed the management quality stays in a positive significant association with capital adequacy requirements in the case of both Islamic and conventional banks in the GCC region over the period between 2006 and 2015.

In addition, this research, in Chapter Seven, investigates the assessment of the capital adequacy regulation on the efficiency of 50 banks, 25 Islamic banks and 25 conventional banks, in the GCC countries over the period between 2006 and 2015. Based on the results delivered through the DEA method, the empirical results reveal that the Islamic banks are less efficient than conventional banks in the GCC region. Such results could be due to the unique nature of the Islamic financial principles that impose more complexity to the Islamic financial products and operations where that in turn leads to lower efficiency compared to the conventional banks. The empirical results, consistent with the Hypothesis H7, reveal that the capital adequacy negatively affects bank efficiency of the examined GCC banks. However, the results show that such effect is lower in the case of the Islamic banks compared to the conventional banks. The obtained results could be due to financial operations that are based on Islamic financial principles.

With regards to the control variables, the empirical results suggest that asset quality is positively associated with bank efficiency and, while in the case of Islamic banks it is statistically significant, it is not significant in the case of conventional banks. The results also reveal that the ratio of cost to income is negatively associated with bank efficiency and is statistically significant, in the case of Islamic and conventional banks. Similar results related to the association between liquidity ratio and bank efficiency in the case of Islamic and conventional

banks are achieved. In addition, the empirical results suggest that the size of banks is negatively associated with bank efficiency and is statistically significant, in the case of Islamic banks and conventional banks in the GCC region over the period between 2006 and 2015.

8.3. Critical reflections on the findings

At the beginning of the research process five research questions were set out. The first research question sought to answer whether or not there are there any differences in the regulations regarding capital adequacy between Islamic and conventional banks. Findings of the study show that whilst the same banking regulations are applicable to both banks, Islamic banks are subject to additional rules. The conventional banking theories are primarily based on interest income, while Islamic banking follows Islamic *Shariah* as the foundation of their operations. Given such unique features of Islamic financial products and operations, Islamic banks have to comply with additional requirements. The second research question explored whether or not there are any differences in the ratio of capital requirements between Islamic banks and conventional banks. Findings show considerable differences. For all banks, the mean capital adequacy was 0.139. For Islamic banks, specifically, this ratio was 0.171 whereas the ratio for conventional banks was 0.127 which suggests that Islamic banks hold greater capital and can therefore be regarded as more stable. However, that being said, it is the quality of the assets and the capital that is arguably more important rather than the absolute value.

The third research question sought to answer if there are any factors/problems that could affect the efficiency of Islamic banks compared to conventional banks. The banking regulations that are applied by Islamic banking industry are rather difficult compared to their conventional counterparts, due to the nature of Islamic financial principles that Islamic banking industry operates based on which are derived from Islamic *Shariah*, and hence, it can be stated that their efficiency may be adversely affected and / or may be difficult to accurately measure. The fourth research question explored the factors that could affect the ratio of capital requirements in Islamic and conventional banks. To this end it was found that collectively,

variables such as Asset Quality, Liquidity, Management Quality, Credit Risk, Return on Assets, Change in net interest income, and Log Assets (Asset Size) explain approximately 43% variation in CAR with Liquidity, Management Quality, Return on Assets, and Log Assets (Asset Size) being statistically significant. Moreover, in the case of Islamic banks, Asset Quality is also statistically significant in explaining the movements in CAR.

The final research question sought to understand to what extent the ratio of capital requirements affects the efficiency of Islamic and conventional banks. Findings of the study show that the capital adequacy ratio is negatively associated with bank efficiency and is statistically significant. Such results indicate that an increase of 1 per cent in capital adequacy ratio leads to a decrease of bank efficiency by 0.96 per cent. The results reveal that the impact of capital adequacy requirements is less significant in the case of Islamic banks as compared to conventional banks. Despite the fact that the fundamental aim of enacting financial regulation is to improve solvency and improve liquidity such outcomes are attained at the expense of bank efficiency. The empirical evidence provided by this research is strongly supported by the existing literature and confirms that having more restricted capital adequacy requirements leads to lower levels of bank efficiency of the GCC banks.

The principal aims and objectives of the study were to measure the capital requirements ratio of Islamic banks in comparison with conventional banks in the case of the sampled banks, to measure the efficiency of Islamic banks in comparison with conventional banks in the case of the sampled banks, to investigate the determinants of capital adequacy ratio of the examined banks, and to examine the impact of the capital adequacy ratio on bank efficiency of the assessed banks. With respect to the first research objective it is found that of the 50 sampled banks chosen for the study, the Islamic banks enjoyed a higher capital adequacy ratio for the period 2006 – 2015. With respect to the second research objective and based on the results delivered through the DEA method, the empirical results reveal that the efficiency of Islamic banks are less efficient than conventional banks in the GCC region. Such results could be due to the unique nature of the Islamic financial principles that impose more complexity to the

Islamic financial products and operations that in turn leads to lower efficiency compared to the conventional banks. With respect to the fourth research objective it is found that variables such as Asset Quality, Liquidity, Management Quality, Credit Risk, Return on Assets, Change in net interest income, and Log Assets (Asset Size) explain significant variation in CAR with Liquidity, Management Quality, Return on Assets, and Log Assets (Asset Size) being statistically significant. Such variables influenced the capital adequacy ratio for Islamic and conventional banks almost in the same way. With respect to the fourth research objective the empirical results, consistent with the developed hypothesis, reveal that the capital adequacy negatively affects the banks efficiency of the examined GCC banks. However, the results show that such effect is lower in the case of the Islamic banks compared to the conventional banks. The obtained result could be due to financial operations that are based on Islamic financial principles.

The hypotheses set out at the start of the research process and the subsequent tests conducted on them have yielded the following outcomes. The assets management quality does not have a significant association with the capital adequacy ratio in conventional and Islamic banks, which is inconsistent with the developed hypothesis H1. With regards to the association between liquidity ratio and capital adequacy requirements, the obtained results revealed a significant negative association, which confirms the developed hypothesis H2. Such results confirm that the liquidity ratio of the bank depicts the capability of the bank in meeting its liabilities when they mature. Consistent with hypothesis H3 the credit risk has a significant positive association with capital adequacy requirements. Furthermore, consistent with hypothesis H4 the obtained results reveal that the association between bank profitability and capital adequacy requirements is positive and statistically significant. Such a result confirms that when bank profitability is high the earning income is high as a result. Moreover, with regards to the association between the net interest income and capital adequacy requirements, the results indicate, consistently with hypothesis H5, a positive association, yet, statistically not significant. This could be due to the social nature of the societies, where the examined banks are operating and also it could be due to the nature of the data being obtained from the Islamic banks that do not deal with interest-based

products. Lastly, with regards to the control variable, the results revealed that the bank size has a negative and significant impact on the capital adequacy requirements.

Summing up the impact of capital requirements on bank efficiency the findings of the study show that, consistently with hypothesis H7, the capital adequacy ratio is negatively associated with bank efficiency and is statistically significant. Accordingly, it can be argued that the empirical evidence provided by this research is strongly supported by the existing literature and confirms that having more restricted capital adequacy requirements leads to lower levels of bank efficiency of the GCC banks (both Islamic and conventional). Simply put, the results show that capital adequacy requirements are negatively associated with bank efficiency in the case of Islamic and conventional banks. However, the results reveal that the impact of capital adequacy requirements is less significant in the case of Islamic banks compared to conventional banks.

With regards to the control variables, the empirical results suggest that asset quality is positively associated with bank efficiency and, while in the case of Islamic banks it is statistically significant it is not significant in the case of conventional banks. The results reveal that the ratio of cost to income is negatively associated with bank efficiency and is statistically significant, in the case of Islamic and conventional banks. Furthermore, in the case of Islamic banks, the results suggest that the liquidity ratio is negatively associated with bank efficiency and is statistically significant whereas in the case of conventional banks, the obtained results show that the liquidity ratio is negatively associated with bank efficiency and is statistically significant. In addition, the empirical results suggest that the bank size is negatively associated with bank efficiency and is statistically significant, in the case of Islamic banks. On the other hand, in the case of conventional banks, the results suggest that bank size is negatively associated with bank efficiency and is statistically significant, in the case of Islamic banks.

8.4. Theoretical Considerations and Policy Implications

It is a well-established understanding that what constitutes adequate capital is prescribed by the regulatory bodies or central banks, however, the Basel Accord

lays down an international standard of capital adequacy (Babihuga, 2007). Though the Accord does not lay down what the exact capital adequacy ratio must be, it emphasizes that ratio must be held as a percentage of risk-weighted assets (Benli, 2010). It argues that the setting of such limits ensures that excess leverage is not assumed by the bank that may unduly increase its risk of insolvency (Zhou, 2011). It should be noted that the ratio of equity to debt is covered by the capital requirements and is different to the reserve requirements that are to be fulfilled by the bank. The key purpose of the regulation is to ensure that the bank prudently manages its risk to protect itself, its customers, and the government, which may need to take an action to bail the bank out in the case of bankruptcy. Hence, holding sufficient capital helps a bank to withstand foreseeable problems and promote the continuation of an efficient and safe market. Hence, it can be stated that, in the banking sector, capital adequacy is an important tool for increasing the credibility and sustainability of banking activities.

Given that the results revealed that liquidity has a significant negative effect on capital adequacy, Islamic and conventional banks should take into consideration that despite the fact that having high level of liquidity boosts solvency, it may affect their efficiency and financial performance negatively. Therefore, banks can learn from this research that they should keep an accurate balance between their efficiency and financial stability. In addition, it can be learnt from this study that banks with risk taking incentives should take into consideration that the degree of risk they take has a negative impact on their returns indirectly through the increases in their capital requirements.

However, it should have been observed that the amount of capital held in order to reduce potential losses, but the main reason was the quality of assets that they invest in (Kalimli-Ozkan et al., 2012). Thus, it can be said that the regulations should focus on changing the quality of investment, rather than on the level of capital that banks should retain. The capital adequacy requirements are determined by risk level, and the regulator has to make banks equal or exceed risk to meet their obligations by default (Aboham, 2008). In the banking system, the ratio of capital-to-capital ratio for the previous year, the quality of asset management, and

cash flow, profit margins, credit risk, net income and quality of management are important determinants of capital requirements (Al-Ansary and Hafez, 2015).

While it has been accepted that the asset management quality has a significant impact on capital adequacy level, the investigation conducted in this research proved otherwise, which means that when the asset quality increases, there is a corresponding increase in the capital adequacy level. Such insignificant impact could be due to the trust that shareholders have in the banks and leave more space for the banks to take riskier activities in order to generate more profit. It is also understood from the examination that while the banks with a high liquidity ratio can easily absorb financial shock in a timely manner, such a position may result in a negative impact on their capability in maintaining competitiveness in the market in relation to their revenues.

Theoretically, it can be argued that credit risk indicates the risk-taking attitude of the management and their behavior towards the shareholders, which may lead to agency problems that need to be minimized in order to prevent reputation related risks. Therefore, having a well trusted management in place, banking regulators would ensure to take into consideration the level of credit risk when setting up the capital requirement of the bank (Bluhm et al., 2016).

Despite the abundance of literature on the importance of capital adequacy requirements in the banking sector, investigating its impact on bank efficiency is still debatable among researchers and practitioners. What makes it more complicated are difficulties in measuring the extent to which capital standards influence efficiency. For instance, the higher capital requirements may lead to higher agency costs between shareholders and managers, as imposing restrictions on banks increases the probability of a banking crisis and also lowers bank efficiency. Despite the main aim of enacting financial regulation being to improve solvency and liquidity that may lead to greater bank stability in response to strict regulation, however, it may cause greater expenses for the banks. Therefore, it is crucial for regulators to take into consideration not only the solvency of the banks, but also their financial revenue that could positively influence their efficiency.

Furthermore, it can be argued that the banking regulations that are applied to the Islamic banking industry have more impact rather difficult compared to conventional counterparts, due to the nature of Islamic financial principles based on which the Islamic banking industry operates and that are derived from Islamic *Shariah*, and hence, it can be stated that their efficiency may be adversely affected. For instance, one of the key challenges for Islamic banks to remain competitive in the market, is they need to have high liquid assets. As a result, it can be stated that when setting up the regulations related to capital, the unique nature of Islamic Banking should be taken into consideration, to facilitate a fair market for Islamic banks so that they can maintain as competitive a position as possible with their conventional counterparts. On the other hand, Islamic banks should make more efforts to develop an accessible market to short-term liquid instruments which will assist them in increasing their financing operations. Such efforts could be delivered by expanding their funding to the students and senior researchers in the field of product development.

Finally, this study provides bankers with information on cost, profit in the market. In this regard, the results of this study are useful for stakeholders to assist them in making better decisions.

8.5. Research Limitations and Future Research

One of the critical limitations faced by the study is the lack of access to required data from the examined banks, and from Islamic banks in particular. It can also be stated that due to the recent establishment of some banks, there are limited publications on the questions under investigation. Therefore, it should be noted that investigating the issues related to capital adequacy and banks efficiency is not a new topic, when it comes to Islamic banks it is more challenging compared to conventional banks. Another limitation that hinders the research in carrying out a more comprehensive approach in conducting this study is that the limited time that given to complete the research. On the researcher side, one of the critical challenges faced during the PhD journey was having family members in difficulties in conflicts back home, which had a negative effect on the progress of the research.

Throughout the journey of this study, it can be argued that there are several gaps in the literature related to banking in general and to capital adequacy requirements and bank efficiency in particular. For instance, measuring the impact of credit risk on bank efficiency needs further research in order to assess the impact of bad loans on bank efficiency with particular reference to the costs resulting from the defaults. It can also be stated that examining the impact of liquidity risk on bank efficiency and profitability is another key topic that needs further research in banking and more importantly in the Islamic banking sector. Based on an in-depth review of the literature related to Islamic banking, it can be stated that there is a critical gap in relation to the capital adequacy requirements. Given the specific nature of Islamic banks, the regulations related to capital requirements should be specially tailored to fit the purpose of setting them up to achieve financial stability and not the opposite where they may turn to additional challenges that may expose them to different types of risks. Therefore, there is a gap related to understanding the nature of Islamic financial products and operations in relation to the capital adequacy requirements and bank efficiency.

8.6. Epilogue

This study aimed at studying the factors that determine the capital adequacy ratio and assessing the impact of the capital requirement on the efficiency of Islamic banks in a comparative manner with conventional banks in the case of the GCC countries. The research findings provide empirical evidence that supports the theoretical argument that due to the unique nature of Islamic financial products and operations, Islamic banks are exposed to more challenges in relation to capital adequacy requirements and bank efficiency. Having said that, it can be concluded that further efforts are required from researchers, bankers and regulators to promote the banking performance, whether Islamic or conventional, in a positive manner that will boost the wellbeing of the societies they operate in.

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