Chapter One

Research Basics and Previous Studies

This chapter consists of two sections. The first section provides an introduction to the research by describing the statement of problem and questions, the importance of the research, objectives of the research, research model and hypotheses. It also outlines the methodology and source of data that used in the research. At the end the section the research boundaries and limitations have been addressed. Section two, aims to provides an in-depth literature review of studies that conducted in the area of risk management practices and their impact on banking performance. Additionally, this section provides a review of previous studies that help to explore the gaps in the literature and assist in the research process.

1.1 Section One: Research Basics

1.1.1 Background

The recent financial crises and rapidly changes in the operations' environment where financial institutions operate reveal the paramount importance of risk management, as most likely influential factor on the financial performance. Accordingly, the risk management in financial institutions becomes a challenging area that has been given a considerable attention by various international and regional institutions, governance bodies, scholars and research institutes, business management, and investors. Given that, managing the risk considers at the core of managing any financial business (Coleman, 2011.p1).

Therefore, the central banks, supervisory bodies, and banks' management give a great effort to understand, evaluate, guide and effectively manage the risks that affect the banking industry; which consequently leads to enhance the banking activities in order to achieve their success and development, and also to promote the competition among the banks and other financial institutions.

The best practice of risk management and adequate control are seen as a front defense-line to protect the interest of depositors, shareholders, investors and those who involves in the banking activities. Additionally, the failure to manage the risks in the banking industry (which is the business of risks "*perse*") has been evidently causes to damage the banks' financial stability and negatively impact overall economy.

From another direction, some reports issued by remarkable financial markets' viewers demonstrate that the Islamic financial institutions – with especial emphases on Islamic banking –underscored a rapid growth during the last four dictates. Moreover, the continues improvement of Islamic financial services institutions (IFSIs) concludes to increase their assets size to USD 2.2 trillion by mid of 2018 with an increase of 6.9% compared with year 2017 (USD 2.05 trillion) and 15.9% compared with year 2016 (USD 1.89 trillion) (IFSB, IFSI Stability Report.2018).

The report stated that Islamic banks share of 72% in total the IFSIs' assets' size in 2018. The IFSIs assets' size is reported to increase up to US$ 3.8 trillion by 2023 in accordance to Thomson Reuters (2018). Therefore, the objectives, products' characteristics, and fund's structure model of Islamic financing and banking systems provide great penetrations to compete with its conventional peers in both Islamic regions and some western countries.

Considering the case of Sudan, the idea of Islamic financing started by mid of the 1960s, and formally toke place by 1977 when Faisal Islamic bank officially registered as a first Islamic bank to operate in the country.

Subsequently, further steps toke place in developing the banking industry till it reach to a full-fledge Islamic banking system at the present.

The development of banking industry in Sudan necessitates the central Bank of Sudan (CBOS) and other supportive institutions to guide the operations' practices in banking industry by issuing and controlling different governance rules and mandates. Similar to other countries in the globe, CBOS and operating banks in Sudan tend to give a considerable consideration to the area of risk management and its best practice in order to achieve the banking system's goals in addition to common economics' objectives. Furthermore, the guidelines that issued by the Islamic Financial Services Board (IFSB), and Basel Committee on Banking Supervision (BCBS) provide a basis to CBOS and Sudanese banks to manage different types of risks and tackling the issues that arise toward them. The crucial role of risk management in banking industry and its significant impact that proved by the recent financial crises and witnessed by many scholars' arguments, a wide gate opened for the necessity to investigate the impact of risk management on financial performance of the Sudanese Islamic banks.

Therefore, this research focuses on assessing the relationship between different types of risks with the financial performance of Sudanese Islamic banks. The types of risks have been identified in the current research with reference to what addressed in the guidance of BCBS, IFSB and CBOS, while the financial performance concentrates on the profitability measures.

1.1.2 Statement of Problem and Research Questions

The Islamic banking system in Sudan plays significant roles not only to maximize the returns of their owners and investors, but also in developing the state's economy and improving the social aspects. Accordingly, the history of Islamic banks in Sudan witnessed a remarkable development that associated with several development and challenges.

Such challenges include the increase of risks that exist in the dynamic changes of banking environment, the process and mitigations that are needed to control the risks. Therefore, all operating banks in Sudan have established a dedicated risks management department to support them in managing various types of risks. Despite that, there are numerous reports issued by CBOS and the general audit chamber of Sudan[1] revealed that there is a limited role of risk management practice in Sudanese Islamic banks, and absence of adequate controls pertaining risks' aspects. Consequently, this affects the banks' adversely in achieving their objectives, as the lack of proper risk management practice in Sudanese Islamic banks most likely weaken their financial performance and leads to a failure.

The aforementioned statement of problem drives to the core question of "what is the impact of risk management practice on the financial performance of Sudanese Islamic banks?", and to the following questions:

1. What is the relationship between risk management practices and the financial performance of Sudanese Islamic banks?
2. Does liquidity risk affect the financial performance of Sudanese Islamic Banks?
3. Does credit risk affect the financial performance of Sudanese Islamic Banks?
4. Does operational risk affect the financial performance of Sudanese Islamic Banks?
5. Does market risk affect the financial performance of Sudanese Islamic Banks?
6. Does banks' capitalization affect the financial performance of Sudanese Islamic Banks?

[1] The national audit chamber's report for the audited year 2013 revealed a lack of risk management and internal controls in banking system toward the areas of default in financing, credit policy, rate of return risk and related party transactions

Moreover, the research tends to provide answers to some general questions regarding:

1. What are the most significant types of risks that affect the financial performance of Sudanese Islamic banks?
2. What is the status of the financial performance of Sudanese Islamic Banks during the period of study?
3. What are the risk management policies and controls that are applied by Sudanese Islamic banks?
4. How do the Sudanese Islamic banks mitigate their risks exposure?

1.1.3 Importance of the Research

The issue of risk management has gained an importance consideration in financial industry especially after the financial crises and due to challenges, that associated with such industry. Therefore, banking sector as part of financial industry places a significant importance to risk management in its operations and funds utilization process than any other financial sectors due to its nature of business. So, the risks seem to be a critical matter that should not be neglected by banking sector otherwise the results will be unpleasant. No doubly that the banking sector in Sudan is not immune to the economic transformations that place challenges from the local, regional and global levels. Therefore, it is paramount important for the Sudanese banks to understand, measure and manage the various risks that affect their activity and operations.

Additionally, the global institutions – such as BCSB and IFSB – that in charge with providing sound insights into risk management practice have made this matter of utmost importance to achieve the banks' financial stability and sustainable growth.

Also, there are a number of academic and professional contributions that dealt with the issue of risk management and its impact on several banking areas.

Therefore, the influence of risks and risk management on banking operations and results became an enrich area to be studied within the fact that many literatures provide debatable outcomes and arguments. Accordingly, the importance of this research comes for shedding light on risk management practices in Sudanese Islamic banks and their impact on the financial performance of these banks, and to fill the gap in such area.

1.1.4 Objectives of the Research

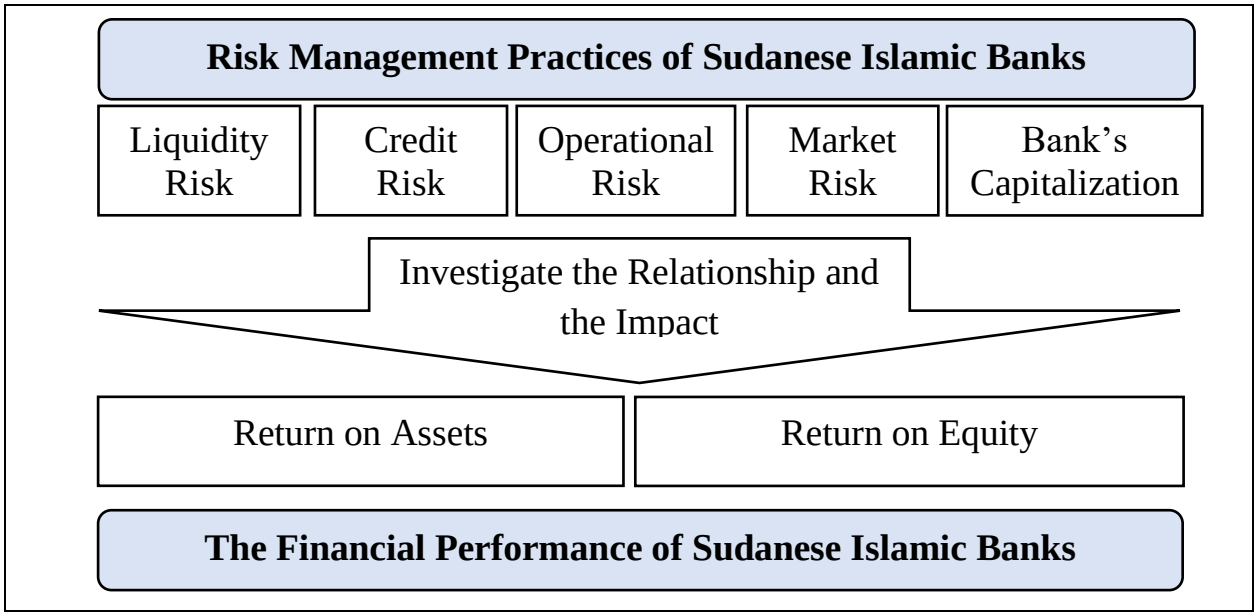
The aim of this study is to assess the risk management practice and its impact on the financial performance of Sudanese Islamic banks. For this purpose, the current research tends to achieve the following objectives:

1. To analyse and empirically investigate the relationship between risk management practices and financial performance of the Islamic banks in Sudan.
2. To explain the Islamic banking system and risk management aspects from different dimensions that provided in the theories and to demonstrate the relationship between Islamic banking system and risk management in an empirical view.
3. To explore and explain the major financial performance and risks management practice of the Islamic banks in Sudan throughout various measures and factors.
4. To define and present the risk management practices and financial performance of Sudanese Islamic banks, using different measures for the purpose of this research.
5. To identify, assess, and present which types of risks that signifyingly affect the Islamic banks in Sudan, and how these risks can be managed?

1.1.5 The Research Model

The model of this research can be depicted in the following figure (1-1) in order to present the variables of the research.

Figure (1-1)
The Research Model



Resource: The Researcher Outputs

The model is based on assessing the direct relationship between risk management practice and the financial performance of Sudanese Islamic banks, during the period of study (2007 -2018).

Given that, the main model can be presented as follows:

FP = *f* RMP (Liquidity Risk, Credit Risk, Operational Risk, Market Risk, Capitalization)

Where:
FP: Financial performance (measures using two variables)

RMP: Risk management practice (measures using five variables).

1.1.6 Hypotheses of the Research

In order to fulfill the research objectives and to answer the aforementioned research questions, following hypotheses have been articulated based on numerous literature and regulators' guidance. Such hypotheses are empirically examined and explained in this research.

The hypotheses are:

1. Liquidity risk has an impact on the financial performance of Sudanese Islamic banks.
2. Credit risk has an impact on the financial performance of Sudanese Islamic banks.
3. Operational risk has an impact on the financial performance of Sudanese Islamic banks.
4. Market risk has an impact on the financial performance of Sudanese Islamic banks.
5. Bank capitalization has an impact on the financial performance of Sudanese Islamic banks.

1.1.7 Methodology of the Research

The methodology of this research was chosen based on the objectives of the study, its constructed variables, and the required tests that were applied to enable the researcher in answering the research questions and testing the hypotheses. Summary of the used methodology can be presented as follows:

1. This research adopts the epistemology-positivism philosophy which supports the scientific process for collecting and analysing the data to assess the relationships between the risk management practice and financial performance of Sudanese Islamic banks. Such philosophy confirms that this research is based on empirical evidence rather than the individuals' opinions in order to achieve the research objective and to answer its questions.

2. This research uses the deductive approach since the research questions and hypotheses are developed based on a theory that explained in the theoretical framework chapters. Given that, the research develops the hypotheses to investigate the impact of risk management practice on the financial performance of Sudanese banks.
3. The research is based on a quantitative data and ratios that analysed using suitable statistical techniques for testing the hypotheses that enable the researcher to either confirm or reject the original theory that was given in the predetermined hypotheses
4. This research follows the longitudinal research design with the type of panel data estimate. The panel study allows the researcher to improve the analysis of causal inferences. The observations in this research take cross-sectional and time series structure.
5. The purpose of this research comprises both the descriptive method and explanatory method. The descriptive method allows to describe characteristics and elements of the risk management practice and financial performance in Sudanese Islamic banks, whereas explanatory method entails to investigate and tests the impact of risk management practices on financial performance of sampled banks.
6. The dataset from sampled banks is analysed by statistical software that named Eviews (version.10). It used to estimate two panel data models (fixed effects and random effects) and various statistical testing methods. The fixed effects and random effects models that applied in the regression analysis have the analytical power in dealing with the specific characteristics of Sudanese Islamic banks.

1.1.8 Source of Data for the Research

Generally, the main sources for obtaining the data are the primary and secondary sources. Primary data refers to data obtained firsthand (new) data by the researcher on the variables of the study using different tools such as questionnaires, and interviews.

While, the secondary data refers to data that gathered from any existing sources which include organizations records and annual reports, publications, analytical reports, official internet sources, books and periodicals, surveys and published official statistics, case studies and academic theses.

This research depends mainly on secondary data which obtained from the audited annual financial reports of ten (10) Islamic banks in Sudan. In addition to that, the publications and annual reports that issued by the Central Bank of Sudan, books, periodicals, official sources from internet, journals and academic publications are constitute part of the data sources that served the purpose of this research.

1.1.9 Period and Geographic Limitations

The research has boundaries that related to the timeframe and geographical area coverage. Accordingly, this study covers the period from 2007 to 2018, and the Islamic banks in country of Sudan.

1.1.10 The Structure and Organization of the Research

The contents of this research have been organised in five chapters, and it ended with a conclusion section.

Chapter one divided into two section. The first section presents the research basics by describing the statement of problem and questions, the importance, objectives, and model of the research. Also, it outlines the research hypotheses and methodology and the research boundaries. The second section aims to provide an in-depth literature review for the risk, risk management practices and their impact on banking financial performance.

Chapter two includes two sections that provide theoretical considerations to the Islamic banking aspects and the risk management. The first section shows the background on Islamic finance and its basic principles and objectives, origins and evolution of Islamic banks, and Islamic financing modes and system.

The second section tackles the issues of risk, risk management framework, and risk management in Islamic banks.

Chapter three covers the case of Islamic banking industry in Sudan. It sheds light on the financial system and economic environment in which the Sudanese Islamic banking industry operates, the Islamic banks evolution, structure, performance facts, the major characteristics of the risk management aspects.

Chapter four intends to outline the research methodology, and it sheds light to the research philosophy, the research design and approaches. Moreover, it explains the chosen method for the current research, data collection process, applied statistical analysis, structured model specification, and variables specifications.

Chapter five presents the empirical analysis and the findings of the research. It presents the analysis of data in order to assess the impact of risk management practice on the financial performance of Sudanese Islamic Banks. It also shows the results of the descriptive statistics, application of panel unit root tests, cointegration tests of the study's variables, and the estimation of panel models that applied in the study.

At the end, the conclusion section provides a summary of the practical and theoretical results, the recommendations, the research contribution, the limitations and it proposes potential further studies.

Section Two

1.2 The Previous Studies

The aim of this section is to provide a literature review of studies of the impact of risk management practices on banking financial performance. Some of these studies covered the impact of specific type of risk management on the financial performance of banks, while others tackled such impact from the view of overall risk management practices.

1.2.1. The Relationship Between Risk Management Practices and Banks's Financial Performance

Yuqi (2007): A dissertation entitled "Determinants of Banks' Profitability and its Implication on Risk Management Practices: Panel Evidence from the UK in the Period 1999-2006": The research problem focused on the identification of the main determinants of banks profitability in UK. The sample consists of 123 UK banks (361 observations) in order to investigate the impact bank's specific factors and macroeconomic factors on bank's profitability during the period from 1999 to 2006. The study applied the unbalanced panel data analysis using STAT software package. The dependent variable of bank's profitability measured by the Return of Assets (ROA). The independent variables in this study were divided into two parts. First part included the bank's specific factors that include liquidity risk that measured by Liquid Assets to Deposit and Borrowings ratio, and credit risk that measured by the ratio of Loan Loss Reserves to Net Interest Revenue.

In addition, the bank's capitalization that measured by the ratio of Equity to Total Assets. The macroeconomic factors comprised of Gross Domestic Products (GDP), Interest Rate and Inflation.

The study findings revealed that the credit risk has a significant and negative impact on UK banks' profitability, while the liquidity risk is not significant and its impact on the profitability is questionable since it has mixed statistical signs. In addition to that the study results showed that bank's capitalization has a positive and strength relationship with profitability. The study argued that capitalized banks face lower costs of going bankrupt, which in return it reduces the banks' cost of funding. Furthermore, the macroeconomic variables of the inflation, interest rate and GDP did not provide a significant impact on the banks performance. The author remarked that bank's internal factors provide further implication on the risk management practice in banks and they are facing multiple sources of risks due to market competition, product innovations, market volatility, and the liberalization of financial environment.

Tafri, et al., (2009): A published article entitled "Impact of Financial Risks on Profitability of Malaysian Commercial Banks": The researchers examined the relationship between financial risks and profitability of the conventional and Islamic banks in Malaysia during 10 years (1996 – 2005). The study questions concentrated on whether a tradeoff between risk and return is well acknowledged and managed by Malaysian banks. the researchers used panel data regressions. The bank profitability measured by the return on assets (ROA) and return on equity (ROE). While the financial risks include credit risk (measured by provision of loan loss to total asset), interest rate risk (measured by Interest Rate Sensitivity), liquidity risks (measured by liquid assets to total liabilities), bank capitalization (measured by equity to total assets) and GDP.

The results of the study found that credit risk and GDP have a negative and significant impact on ROA and ROE for both conventional and Islamic banks, while the liquidity risk has an insignificant impact on both profitability measures.

The study also revealed that the impact of interest rate risk is significant on ROA only for the conventional banks and with no impact on Islamic banks' profitability. The study concluded that the profitability of conventional banks is affected by interest rate risk, credit risk and the off-balance sheet activities of the banks in relation to derivatives. In addition to that the return on assets has a significant relationship with its previous year estimates and capitalization level. Regarding the bank capitalization, the study reached to that the capitalization of bank has a positive and significant effect on Islamic banks' profitability while it has a negative and significant impact on conventional banks in Malaysia. The study remarked that, despite Islamic banking does not deal with interest-based transactions, such banks exposed to interest rate risk indirectly.

Almazari (2013): A published article entitled "Capital Adequacy, Cost Income Ratio and the Performance of Saudi Banks (2007-2011)": the researcher analysed the financial statements data for nine (9) Saudi's banks for a period from 2007 to 2011 to examine the relationship between capital adequacy that measured by total equity to total assets and banks' profitability. The linear regression technique was used to generate the study results.

The results revealed that the return on assets ratio (ROA) as profitability measure was negatively correlated with banks' capitalization ratios (total equity to total assets, core capital to weighted-risk assets) and cost to income ratio. However, a positive correlated is found between leverage ratio and bank's size with the profitability.

Hafez (2015): A published article entitled "Risk Management Practices in Egypt: A Comparison Study Between Islamic and Conventional Banks" The aim of the study was to examine the use of risk management practices and to mitigate the associated risks of Egyptian banks. The study used a questionnaire survey covered a sample of thirty-six (36) Islamic banks, conventional banks with Islamic windows and conventional banks.

Analysis of Variances (ANOVA) and regression analysis have been used in order to test the study hypotheses. The study found that credit and liquidity risks are the types of risks challenging both Islamic and conventional banks in Egypt. Additionally, conventional banks look more efficient in risk management practices and the use of sophisticated techniques.

Ishtiaq (2015): A Thesis entitled "Risk Management in Banks: Determination of Practices and Relationship with Performance": The researcher investigated the impact of risk management practices on banks' performance in Pakistan. The main questions articulated in the study are: How do the risk management systems of banks work to cope with different risks in Pakistan? And, what is the level of understanding risks and risk management by Pakistani banks? The study used the mixed-method research strategy by applying quantitative and qualitative methods in a sample of twenty (20) Pakistani's banks.

The study data was collected from both primary and secondary sources to cover period of 2005 - 2012. The study is carried out in three stages that include a qualitative system dynamics model using a Causal Loop Diagram as first stage. It has been developed based on interview data analysis to articulate the risk management systems of Pakistani banks.

In the second stage the researcher conducted a questionnaire data analysis by using ordinary least squares (OLS) regression for assessing the risk management practices of banks in Pakistan. At last, the Data Envelopment Analysis (DEA) technique and Tobit regression analysis were adopted by the researcher as third stage in order to examine the relationship between the risk management and financial performance. The findings of Ishtiaq (2015) study showed that Capital adequacy ratio has a positive and significant impact on Pakistani's banks performance, while the credit risk that measured by nonperforming loans and loan loss provision have a negative and significant impact.

The liquidity risk that represented by total loan to total deposit ratio showed a positive and significant effect on the financial performance of sampled banks. Moreover, the Value at Risk (VAR) ratio which has been used as a proxy for market risk, found to be insignificant with a negative direction to the banks' financial performance. The study provided an empirical evidence for the significant relationship between risk management and performance of banks in Pakistan. The study highlighted that operational risk, credit risk, liquidity risk, foreign exchange risk, and legal and regulatory risk are important factors to predict the banks performance. At end the researcher recommended that banks have to establish a sound risk management system and framework at first place in order to support the banks' financial objectives.

Ahmed (2016): A Thesis entitled "Credit Risk Management in Islamic Banks: With Special Reference to Non-performing Finance in the Sudanese Banks, 2002-2014": The researcher investigated whether there is an interrelationship between the rising of nonperforming loans (finances) indicator and credit risk management in the Sudanese Islamic banks, and what reasons lead to that if it exists.

The research statement of problem based on the argument that Islamic banks in Sudan are undergoing an enormous risk of nonperforming loan (finance) which may lead to a crisis in the financial system, if not properly managed. The study covered a period from 2002 to 2014, and primary data through questionnaires was collected and analyzed using multiple regression.

The study revealed that the framework of credit risk management in the studied banks is sufficient and did not cause an increase of the nonperforming loans (finances) issue. However, the adverse macroeconomic conditions that associated with various economic sectors in Sudan motivated the increase the nonperforming loans (finances) problem. The researcher recommended that the bankruptcy law needs to be reviewed and amended in accordance to the Islamic shariah rules.

Additionally, further efforts are required to create an innovating and developing new Islamic financial products that can accommodate the needs of various economic sectors.

Yousif (2016) [2] :

A thesis entitled "Operational risks of Musharaka finance mode and the ways to hedge it: A case of the Sudanese banking system (2005-2015)": The study based primary data that analysed using descriptive statistics.

The statement problem in this study questioning the lack of experiences of banks' staff when executing participatory mode of finance, which creates difficulties and inherent risk to banks. The study results revealed that Sudanese banks are differ regarding the application Musharaka methods and most of these banks do not invest significantly on participatory modes of finance. In addition, the study found that there were operational risks facing Sudanese Islamic banks when applying Musharaka financing due to the customer and staff applications risks.

The researcher recommended that Sudanese banks need to train their staff intensively on legal and technical aspects toward participatory finance modes. Also, Central Bank of Sudan need to create an incentive scheme to motivate banks in involving and managing the Musharaka and Mudaraba finance modes.

Elgadi (2016): A thesis entitled "Assessing the Financial Performance of Islamic Banking: The case of Sudanese banks".

The study demonstrated its problem in the essentiality to evaluate the financial performance of Sudanese banks' financial performance; as it has not been clearly investigated in the recent period. The researcher used a panel data estimation models to assess the performance of Islamic banking industry in Sudan during the period from 2005 until 2013.

[2] The study was published in Arabic language.

The sample of study includes all banks in Sudan. The profitability ratios of return on assets (ROA) and return on equity (ROE) are selected to measure the banks' performance. The study empirical evidences indicated that the management of Sudanese Islamic Banks lacks the capability to predict the risk associated with leverage, and the Profit-Loss Sharing (PLS) models of finance (Mudarabah and Musharakah).

The study justified this result as the Central Bank of Sudan policy encourages banks to use the PLS modes to finance all economic activities, and it gives the banks a free-hand to determine their share ratio. Also, the board size and its higher remunerations packages have a negative impact on Sudanese banks' profitability. Also, the results suggested that the significant determinants of Islamic banks' performance on banks' ROA are bank capitalization (measured by total equity to total assets) and assets utilization which they have a positive and significant impact. Additionally, the ROA found to be significantly adversely affected by operation efficiency (measured by total cost to total income), bank age and leverage ratio.

The study went deeper in the analysis of the determinants of banks' performance by distinguishing between state-owned and private banks.

Regarding the state-owned banks; bank's capitalization, credit risk, operation efficiency, overhead and Salam modes of finance are proved to have a negative and significant impact on ROA, while no significant impact was found for bank age, size, liquidity and leverage. In contrast, ROE of state banks is seen to be determined by the positive and significant effect of credit risk and the negative and significant effect of bank age, specialization, bank size, liquidity, leverage, operational efficiency and assets utilization. The study found that assets utilization and PLS in the private sector have a positive and significant impact on ROA, whereas leverage, operational efficiency and PLS have a negative and significant relationship.

Bace (2016): has a published article named "Bank Profitability: Liquidity, Capital and Asset Quality".

The study investigated the impact of liquidity and credit risks to banks' profitability a large number of world's largest deposit-taking banks during 2014-2015. The researcher used the linear regression model showed that the credit risk that indicated by nonperforming loan ration has a negative and significant impact on return of assets (ROA), while the equity to assets ratio found to be a positive and significant relation. The liquidity risk as measured by loan/advances to deposits ratio showed slightly negative relation with banks' profitability. The study observed that liquidity risk and equity capital have implications on managing the banks' performance. Therefore, a soundness strategies and policies should be in place in order to improve the profitability.

Elbahar (2016): A thesis with the title of "Corporate Governance, Risk Management, and Bank Performance in the Gulf Countries' Banking Sector". The study investigated the relationship between the three aspects of the corporate governance, risk management and bank performance within the Gulf Countries' banking sector. It considers the conventional and Islamic banks in a sample included ninety (90) banks of which thirty (30) Islamic banks and sixty (60) conventional banks. The study period covered the years from 2003 to 2012. The researcher used the regression analysis of the Ordinary Least Square (OLS) for four models.

The models structured as follows: the first model applied to investigate the relationship between corporate governance and banks' performance that measured by ROE and ROA for all banks' data Islamic data and conventional data. The second model used to investigate the relationship between risk management variables and bank performance for all banks' data. Third model used to investigate the relationship between both of corporate governance and risk management variables and bank performance for all banks' data.

Finally, in the fourth model the researcher investigated the relationship between corporate governance and risk management that measured by NPL for all banks' data. Also, the study results indicated that capital risk (which measured by capital to total assets) and liquidity risk (which measured by liquid assets to total deposit plus short term funding) are insignificant with banks performance that measured by ROE in all types of banks, however, its positively significant with ROA for both types of banks. The credit risk that represented by non-performing loan and loan loss provision is found to be insignificant to the Islamic banks' performance, while it has a negative and significant impact on conventional banks' performance.

Additionally, both performance measures (ROE and ROA) in all banks found to be positively and significantly affected by the bank capitalization. The researcher recommended that banks need to enhance and maximize the role of audit committees and risk management in the banks in order to positively improve the bank performance. Also, the board committees need to be matured enough to positively affect the banks' risk management positively.

OFOSU-HENE, Eric Dei, and AMOH (2016): The researchers conducted a study to construct an overall risk index to ascertain the level of risk on the listed banks in Ghana Stock Exchange (GSE), and to investigate the relationship between risk management and bank performance. The study used a secondary data of all listed banks on GSE during the period 2007–2014 and it applied the panel data regression. The banks financial performance measured by ROA and ROE, while the independent variables include the bank risk index, bank capitalization (equity to total assets), liquidity risk (total loan and advances to total deposits), credit risk (nonperforming loan ratio), inflation rate and exchange rate.

The findings of the result indicated that the risk index does not have an impact on banks performance when it measured by ROA while it has a significant positive relationship with ROE. The credit risk and operational risk have a negative effect on the banks' financial performance. The study also found that bank capital of the listed banks found to have a significant negative effect, whereas the liquidity has a significant positive relationship with banks' performance.

The study concluded that listed banks in Ghana have weakening risk management index during the study period which suggested that banks may be exposed to uncertainty in the economic situation and this motivate for further capital to cushion bank against insolvency. The researcher recommended that banking regulator in Ghana is encouraged to impose additional prudential requirements to assure banks not going insolvency.

Bagh, Ashif-Khan, and Razzaq (2017): A published article named "The Underlying Impact of Risk Management Practices on Banks Financial Performance: An Empirical Analysis on Financial Sector of Pakistan". The purpose of this study was to examine the impact of risk management practices on the financial performance of banks in Pakistan. The sample size consists of eighteen (18), and their data covered a period from 2004 to 2016. The sampled banks classified into three groups of large, medium and small banks using the market share ratio as threshold. The banks' data was taken from the annual audited financial statements. The financial performance of the banks is defined the ratio of return on equity (ROE), while the risk management practices determined by five independent variables.

The independent were the capital adequacy ratio (CAR), operational risk (measured by operating cost to operating income), nonperforming loan to measure the credit risk, interest rate risk, liquidity risk (measured by Loans to Deposits ratio). The descriptive statistics and multiple regression analysis have been used in this study to analyse the study data.

The study results evidenced that risk management practices have significant impact on financial performance of all banks regardless of their size. The operational risk, credit risk, and interest rate risk provided a negative ad significant impact on all banks' financial performance. Regarding the liquidity risk, it has a significant impact of banks' performance, however, with a negative sign in large sized-banks and a positive sign with other type of banks.

The study recommended the banks to emphasize on loan assessment procedure, quality of these loans and liquidity management. Additionally, Pakistani banks have to promote a balance risk management culture to mitigate risks and shocks with a risk-based strategy.

Al-Rdaydeh, Matar. and Alghzwai (2017): A published article named "Analyzing the Effect of Credit and Liquidity Risks on Profitability of Conventional and Islamic Jordanian".

The study aimed to investigate the influence of financial risks on the banks' profitability Jordan for the period of 2006 - 2015. The study sample comprised of sixteen (16) banks which have been classified as thirteen (13) conventional banks and three (3) Islamic banks. Profitability was measured in this study by the ratios of return on assets (ROA) and return on equity (ROE), whereas the financial risks identified by liquidity risk (measured by total loans to total deposits ratio) and credit risk (measured by provision of loans loss ratio).

Other variables used as control variables that include the bank size, bank capitalization (measured by bank's equity to total assets ratio) and gross domestic production (GDP). The study employed panel data regression for testing the study hypotheses. The study found that credit risks have a negative and significant influence on both ROA and ROE for the Islamic as well as the conventional banks.

The liquidity risk has a negative and significant impact on ROA of both Islamic and conventional banks, while the same measure found to be insignificant on ROE of these banks. The study results realised that the bank's capitalization does not have influence on bank's profitability.

The study evidenced that financial risk is a paramount important for banking management, and care management has to be in place in order to maximize the bank's profitability.

Ibrahim (2017) [3] :

A thesis submitted to award the degree of PhD in banking and finance; entitled "Risks Facing the Islamic Banking Finance and their Impact on the Sudanese Banks Financial Performance and Customers Projects. 2003-2015.

The study investigated risks that impact the funding of Sudanese Islamic banks and their effect on the financial performance as well as the projects of investing customers. The study problem was centered in the main question that "what are the risks that face Islamic Banks' funding and their impact on the Sudanese banks?". The study adopted the historic analytical descriptive approach.

The sample of this study consists of banks in Sudan and data was gathered using questionnaires and some data from financial statements for the funding and the amount of cash and profits during the period of 2003-2015. The study adopted the historic analyses and descriptive approach to answer the research questions. The study results revealed that Islamic funding risks have an impact on the ability of banks' clients to repay their finance. Also, the financing risks have a significant impact on banks' liquidity position. The researcher recommended that Islamic banks in Sudan have to setup active risk management departments that aware with shariah rules and operate by qualified staff.

[3] The study conducted in Arabic language

Amaliah and Hassan (2019): The researchers article titled "The Relationship between Bank's Credit Risk, Liquidity, and Capital Adequacy towards its Profitability in Indonesia".

The researchers analyzed the relationship between Indonesian banks' credit risk, liquidity, and capital adequacy towards their profitability. Banks's profitability measured by the ratios of net profit margin (NPM) and return on asset (ROA). The credit risk measured by nonperforming loan ratio (NPL) while the liquidity risk measured by loan to deposit ratio. The study also used the adequacy Ratio (CAR) along with credit and liquidity risks. This study data gathered from the annual reports of four state-owned banks during the period of 2007-2016. The study applied the multiple regression analysis for the purpose of data analysis. The results found that there is a negative and significant impact of credit risk on both measures of banks' profitability (NPM and ROA), while the liquidity risk has a negative and significant impact on ROA only. The capital adequacy is shown to have not significant to banks' profitability.

Abbas, Iqbal and Aziz (2019): A published article entitled "The impact of bank capital, bank liquidity and credit risk on profitability in postcrisis period: A comparative study of US and Asia".

The researchers explored the influence of bank capital (measured by total equity to risk-weighted assets), liquidity risk (measured by liquid assets to total assets ratio) and credit risk (measured by loans loss provisions ratio) on the bank's profitability (measured by ROA and ROE ratios) during 2011 to 2017. The sample consists of the 174 banks from 10 countries in Asian developed economies in comparison with the USA banking industry. The dynamic panel data estimators using generalized method of moments (GMM) is used in this study. The study results showed that credit risk has a negative and significant influence on the profitability of large size commercial banks and medium banks, while the impact is insignificant for in smaller banks.

The impact of bank capital is shown to be positive on the profitability of large and medium sampled banks during the study period. Additionally, the liquidity has a significant impact on banks' profitability with a positive sign in Asian banks whereas it has negative impact in case of USA banks. The researchers concluded that the impact of bank capital and credit risk is similar in developed economies of Asia and in large commercial banks of the USA, however, the impact of credit risk on profit is greater in the USA than in the commercial banks in Asian developed economies. The liquidity has an impact on the profitability of the USA larger banks is negative and positive on Asian developed economies commercial banks. The study remarked that Asian banks use a tight credit policy and manage loans more efficiently than USA banks.

Kusumastuti and Alam (2019): An article titled "Analysis of Impact of CAR, BOPO, NPF on Profitability of Islamic Banks".

The study aimed to assess the influence of the risk factors that affects the profitability of Indonesian's Islamic banks during the period from 2015 to 2017. The risk factors include the capital adequacy ratio, operational risk as measured by operational cost to operating income, and nonperforming loan (financing) ratio as credit risk indicator. Multiple linear regression analysis method has been applied by the researchers in this study.

The results indicated that the operational risk has an adverse significant effect on banks' profitability in term of ROA. On the other hand, capital adequacy and credit risk have no significant effect on profitability in Islamic banks. The study recommended that Islamic Banks in Indonesia can operate the available capital of the operational activities to increase their profitability. Additionally, banks' management needs to be more cost effective which directly promote the banks' performance.

Batten and Vo (2019): The researchers investigated the determinants of banks' profitability in Vietnam using a sample of thirty-five (35) banks for the period from 2006 to 2014. The researcher employed econometric panel data methods that include fixed effects panel and GMM estimator. The study findings indicated that the size of bank, capital adequacy, credit risk that calculated as provisions of loan loss to total loans ratio, operational risk that measured by the ratio of operational expenses to total assets, and productivity have strong impacts on banks' profitability.

The bank's profitability measured by three ratios as net interest margin (NIM), return on assets (ROA) and return on equity (ROE). The result specified that bank capital is positive and significant to NIM and ROA, while it is negative and significant toward ROE. Moreover, the credit risk and bank operation cost are reflected positively and significantly to NIM but negatively and significantly to ROA. The study implied that Vietnamese banks have not yet reached the maturity level to show good long-term strategy that manage their costs. Furthermore, Vietnamese banks tend to pass the costs of inflation onto customers as the deposit rates and lending rates are quickly adjusted as a reaction to the increase in inflation.

Mustafa (2019): A published article entitled "Assessment of the Financial Performance of Islamic Commercial Banks in Sudan under Credit Risk and Inflation Pressures (1995-2017)".

The study aimed to examine the impact of credit risk and inflation on the financial performance of Islamic banks in Sudan for the period from 1995 to 2017. Data were collected from the annual reports of the Central Bank of Sudan (CBOS). The banks' financial performance measured by the ratio of ROA, whereas the independents variables include the ratios of nonperforming loan to total finance, provision of finance loss from murabaha mode to total finance, capital adequacy and inflation rate.

The results found that the credit risk was negatively affecting the banks' financial performance and the inflation has been observed by the profitability of Sudanese Islamic banks. the researcher recommended that CBOS needs to adopt contractionary monetary policy to control the inflation which in return improving banks' performance. Also, the Sudanese Islamic banks should not totally depend on collateral to mitigate the credit risk.

Fadun and Oye (2020): A published article entitled "Impacts of Operational Risk Management on Financial Performance: A Case of Commercial Banks in Nigeria".

The study aimed to examine the impact of risk management practices on the financial performance of commercial banks in Nigeria during the period of 2008-2017. A quota sampling technique of twenty (20) banks was chosen in this study.

Panel data technique is applied to analyse the collected data for banks' performance that measured by ROA ratio. independent variables include operational risk (operating cost to income ratio), credit risk (nonperforming loan ratio), market risk (net interest margin) and liquidity risk (liquidity ratio and loans to deposits ratio). The results indicated that both operational risk and credit risk have significant negative relationship to banks' financial performance in Nigeria. The findings also showed that both measures of liquidity risk plus the market risk measure provided a positive and significant impact on Banks' financial performance. The researchers recommended that Nigerian banks should comply with the regulator's policies and guidelines and observing the emerging risks through the application of the operational risk management tools. Also, management of operational risk should be prioritized as it is inherent in all banking activities and has significant implications on banks' performance and their continuity.

Mustafa (2020): A published article entitled "Impact of liquidity shortage risk on financial performance of Sudanese Islamic banks).

The study investigated the impact of liquidity risk on the financial performance of Islamic banks in Sudan during the period 1992-2018. Panel data technique was applied by researcher to analyse the secondary data. Liquidity risk measured by three ratios as: liquid assets to total assets, total loan (financing) to total deposits, and current deposits to total deposits. The banks' financial performance as dependent variable is measured by the return on assets (ROA). The findings of the study revealed that current deposits to total deposits, total loan (financing) to total deposits are negatively affected the financial performance. While liquid assets to total assets is shown to be positively influencing the financial performance of Islamic banks in Sudan.

Moreover, the inflation factor as control variable in the study provided a motivation to depositors to highly withdraw cash from their deposits in banks. Therefore, it consequently exposes banks to liquidity risk. The researcher recommended that Islamic banks in Sudan should not deeply depend on current deposits as a major source of liquidity. The researcher explained that the shortage of liquidity that happened in Sudan in 2018 affected banks' financial performance. Such liquidity shortage was associated to monetary policy, money supply, inflation, and people behavior in the country.

Echwa, and Atheru (2020): the researchers examined the impact of risk management on commercial banks' performance in the Kenya. The study collected secondary data from forty (40) Kenyan's commercial for the period of 2013-2017. The specific objective was to assess the impact of credit in term of nonperforming loan ratio, liquidity that measured by total loan to total deposits ratio and sensitivity gap in the interest on banks' performance (it measured by the ROA).

The analysis of data is based panel regression approach. The data examination considered the use of the risk theory, moral hazard theory, modern portfolio theory and agency theory. Findings of the study showed that credit risk and liquidity risk are not key factors to affect the financial performance of commercial banks in Kenya, whereas interest rates have significant impact in subject matter. The study suggested that interest rates should be continually adjusted by banks management in order to be in line with the prevailing economic conditions.

1.2.2. Previous Studies on Managing Specific Types of Risks and Banks' Financial Performance

Liquidity Risk

The relationship between liquidity risk and bank's financial performance has been shown in different studies. The studies of Akhtar, Ali and Sadaqat (2011); and Iqbal (2012) examined the liquidity risk management through a comparative analysis of Islamic and conventional banks in Pakistan. Both studies measured the liquidity risk by cash to total assets ratio. The studies' results found that the financial performance in term return on assets (ROA) has a positive and significant relationship with liquidity risk in Islamic bank.

Chowdhury, Zaman and Alam (2019) conducted a study to investigate the relationship between bank's specific factors with liquidity risk of six Islamic Banks in Bangladesh during the period of 2012-2016. The study found that liquidity risk (which is measured by the ratio of cash and cash equivalent to total assets) has a positive impact to banks' profitability measures in terms of ROA and ROE. Another study conducted by (Ariyibi, Yunusa, and Williams. 2020) for Nigerian banks, demonstrated the loan-to-deposit ratio as a measure of liquidity risk has a positive effect on bank financial performance. Accordingly, the level of deposit to the amount of loan given at a specific interest rate can determine the bank's overall performance.

Iqbal (2012, p.56), Ramzan and Zafar (2014, p.202) and (Mohammad,2015, p. 222) claimed that the main factors that create difficulty in managing the liquidity risk in Islamic banks include that Shariah rules restrict for securitization of the present assets, slow development of Islamized financial instruments, the absence of independent inter-Islamic bank money market, and concentration on asset-backed short-to- medium term investments.

Credit Risk

Most of the banks in the global are responding to the crisis by applying the credit rationing (Viphindrartin., Zainuri., and Anugrah, 2020). Additionally, Al Rahahleh, Bhatti and Misman (2019) assessed the developments of risk management in Islamic banks in Malaysia. The researchers stated that the expansion of loan financing, quality of the loans, and sufficient capital are the major determinants of credit risk in Islamic banks which in return it affects the banks' performance. The study suggested that any deterioration in financing quality forces Islamic banks to allocate more loss provisions, and consequently increase the credit risk level.

Additionally, banks with more equity capital are more likely to be motivated to access more risky financing activities in a comparison with less equity capital's banks, which may result in more credit risk. Furthermore, the study of Li. Fan (2014) investigated whether credit risk management and profitability of commercial banks in Europe have a significant relationship. The study examined data from the largest forty-seven (47) commercial banks in Europe from 2007 to 2012.

The findings revealed that credit risk in has a negative and significant effect on profitability of commercial banks. The researcher advise was that the supervisory body has to strengthen its policy toward the non-performing loans in order to keep the banks operations more efficiently.

Moreover, Alshatti (2015) examined the effect of credit risk management on financial performance of the Jordanian banks during the period from 2005 to 2013 with a sample of thirteen banks. In this study, the banks' financial performance was measured by the ratios of ROA and ROE while the credit risk was measured by the nonperforming loan to total loan, provision of loan loss to loan and the leverage ratios. The study results revealed that the nonperforming and provision of loan loss ratios have a significant effect on financial performance of the Jordanian banks. The recommendations that are given by the researchers is the banks has to establish an adequate credit risk management policy, designing an effective credit risk vetting and maintaining an appropriate credit administration and enough controls over credit risk.

Misman and Bhatti (2020) examined the critical issues that are related to credit risk in a sample of seventy-two (72) Islamic banks from nine countries from South East Asian Nations (ASEAN) and Gulf Cooperation Council (GCC) regions. The study covers the period from 2000 to 2011. The overall results show that quality of loan (financing) has a significant positive effect on credit risk, and the larger Islamic banks have the privilege of maintaining more assets with lower credit risk in a comparison with the smaller banks. Moreover, the study remarked that bank's capital is significantly tends to reduce the credit risk exposure which positively motivate the Islamic banks' financial performance.

Operational risk

Generally, the operational risk in banks causes by the people, systems and procedures, Islamic banks have to look carefully to improve their risk management and standard compliance issues, and effective utilization of technology in order to minimize the operational costs (Hassan and Aliyu. 2018). Given that, the lower the ratio of operational cost to operating income in a bank the higher cost efficiency and better financial performance.

Izhar (2010); Izhara and Asutay (2010); Abdullah, Shahimi and Ismail (2011) argued that the unique features of Islamic banks' contracts, the operational risk in Islamic banks can be substantially different from what is exposed to the conventional banks. Apparently, various techniques can be applied by banks for measuring their operational risk including the banks' capital structure for absorbing the potential operational losses and also the cost effectiveness and efficiency.

Market Risk

The market risk – which is also called a diversifiable risk – of bank considers as one of the kay risks that determines the financial performance of these banks in both long and short run (Singh and Vashisht, 2020. P.2099).

One of the traditional measures that used to assess the market risk is beta for the investment portfolio, and another advanced method that is applicable to measure such risk is the use of Value at risk (VAR) which represent the maximum risk which can occur in the market value of the business unit at a given degree of probability (Singh and Vashisht, 2020. P.2100).

The market risk determinants include the changes in equity prices, interest rates, forex rates, commodity risk and other factors (Chena, Chiub, and Chiuc. 2017).

Furthermore, Milanova (2010) stated that the Value at Risk (VAR) model can be presented as a basic method to analyse market risk, while stress tests as a technique is applicable to assess the impact of changing in financial parameters of the bank's income, capital and economic value. The researcher claims that the main components of market risk include the interest rate risk, currency risk, and price risk.

Also, using a sample of fifty-one (51) banks from six (6) countries in Middle East region, Chakroun, Gallali and Sebai (2016) examined the market risk in Islamic banking (sample of 12 banks) and how it differs with.

The results show that there are no genuine differences between the Islamic and conventional banks in term of systematic (market) risk, and both types of banks response the same way to the market. The study found that during the financial crisis, both Islamic and conventional banks are sensitive to the volatility in the stock prices. The study remarked that conventional banks are riskier than Islamic banks with reference to industry index of average market risk, which in return affect the banks financial performance.

Capitalization Risk

The bank's capital is a key part for absorbing the potential risks and in expanding the bank's risk-bearing capacity.

Given that, the higher the bank's capital adequacy ratio the more liquidity the bank would create which in return will positively support the bank's financial profitability, performance and long-term position. (Muljawan , Dar and Hall. 2004, p.429); (Wahyudi, Rosmanita, Prasetyo and Putri, 2015). In the context equity-based capital structure of Islamic banks it clearly dominants by shareholders' equity and investment deposits that based on profit and loss sharing (PLS) mode of financing. Based on that, Muljawan, et al. (2004) argued that there is no need for capital adequacy regulations if the Islamic banks are structured as pure PLS-based institutions. However, because of informational asymmetry and investors risk's appetite, there are exist fixed claim liabilities in the balance sheet of the Islamic banks. This leads to the necessity of applying capital adequacy requirements to maintain the stability of banks' financial capacity.

Hassan and Aliyu (2018) advocated to the importance of improving risk management strategies by Islamic banks in order to maintain a high level of solvency position. This can be explained by improving the Islamic banks' capital adequacy level.

In the same context, Neves, Gouveia and Proença (2020) stated that better-capitalized banks should be positively affect the banks in term of financial performance. This is because such banks considered to be relatively safer and more flexibility to absorb negative shocks. Also, when Rangkutia, et al, (2020) studied a sample of forty tow (42) listed banks in the Indonesian Stock Exchange during the period from 2012 to 2016, they conclude that: the higher Tire-1 capital (equity capital) positively affect the banks' profitability which it will result in the higher performance of banks in Indonesia. The researchers advised the investors when selecting their investments to consider the banks' ability to generate high return to assets, return to equity and proper risk management as fundamental factors beside the banks' ability to cover losses.

1.2.3. The Benefits from Previous Studies

The above-mentioned previous studies provide the following benefits:

1. An overview on the theoretical and empirical aspects on the impact of risk management on banks' financial performance.
2. Assist the researcher to articulate and develop the study variables, to determine the suitable methodology and statistical methods.
3. A solid theoretical ground and consensus to the descriptive and empirical findings that shown in this research.
4. Such studies allow the researcher to identify the research gap the can be addressed in the current study.
5. To present the development in theories and practice toward risk management and financial performance in banking industry.

1.2.4. The Differences in Current Study from Previous Studies

1. This study includes two models to measure the banks' financial performance, which is a step-ahead comparing with some studies that used only one measure for the financial performance [see: Yuqi (2007) Almazari (2013) Tafri, et al., (2009); Bace (2016); Bagh, et al (2017): Ashif-Khan, and Razzaq (2017) Kusumastuti and Alam (2019) Mustafa (2019) Fadun and Oye (2020) Echwa, and Atheru (2020)]. By using two models for the independent variable, thorough results can be expected.
2. This study aims to comprehensively cover all types of risks that addressed by Basel Accord (liquidity, credit, operational, market risks and capitalization). That is why, it five variables have been selected to measure the risks. By doing this, the study sounds well to measure banking risks comparing with other previous studies that focused on less than five variables as risks' proxies, as well as they did not cover all aforementioned types of risks [see Tafri, et al., (2009); Almazari (2013); Hafez (2015); (Bace (2016); Al-Rdaydeh, et al (2017); Amaliah and Hassan (2019); Abbas, et al (2019); Kusumastuti and Alam (2019); Batten and Vo (2019); Mustafa (2019); Mustafa (2020); Echwa, and Atheru (2020)].
3. The current study introduces the market risk variable into the research models to enrich the assessment of risk practices and its impact on financial performance of Sudanese Islamic banks. Most of the previous studies [see (Yuqi (2007); Almazari (2013); Tafri, et al., (2009); Elbahar (2016); Elgadi (2016); Elgadi (2016) OFOSU-HENE, et al.016); Wijewardana and Wimalasiri (2017); Bagh, et al (2017); Al-Rdaydeh, et al.(2017); Batten and Vo (2019); Amaliah and Hassan (2019); Abbas, et al., (2019); Kusumastuti and Alam (2019)] did not select the market risk as part of risk management practices. However, few studies included market risk in their studies such as Ishtiaq (2015); Fadun and Oye (2020); Echwa, and Atheru (2020).

4. This study measures the market risk using Value at Risk (VAR) approach. Such method is well recommended by Basel Accord and CBOS. All previous studies (excluding Ishtiaq. (2015)) did not use the VAR method as a measure of market risk - if market risk variable included in the study.
5. This study used quantitative approach with econometrics models, mainly the panel data estimation, which is widely beneficial to assess the impact of risk management on financial performance of Sudanese Islamic banks. Some previous studies used either the normal multiple regression or descriptive methods. [see Hafez (2015) Ahmed (2016); Yousif (2016); Ibrahim (2017). Bagh, Ashif-Khan, and Razzaq (2017); Kusumastuti and Alam (2019)]
6. This study covers a period from 2007 to 2018, which it provides an updated timeframe regarding the research subject. In addition to that, the study covers 12 years, which considers longer period comparing with the period the covered in the previous studies, except the studies of Ahmed (2016) for 13 years; Elbahar (2016) for 12 years; and Mustafa (2019) for 12 years].

In light to the reviewed previous studies, following table (1-1) provides a summary of the variables that are used to proxy the risks in banks and how they affect banks' financial performance.

Table 1.1

Summary of the Study Variables in Accordance with the Previous Studies

Variable Name	Proxy of the Variable	Positive and Significant Impact	Negative and Significant Impact	Insignificant Impact
Liquidity Risk	1. Cash to Total Assets 2. Loan to Deposit Ratio. 3. Liquid Assets to Total Assets 4. Liquid Assets to Deposits	1. Akhtar, Ali & Sadaqat (2011); and Iqbal (2012); Chowdhury, Zaman & Alam (2019) 2. Ariyibi, Yunusa, & Williams (2020); Ishtiaq (2015); OFOSU-HENE, Eric Dei, and AMOH (2016); Bagh, Ashif-Khan, and Razzaq (2017): Amaliah and Hassan (2019). Fadun and Oye (2020) 3. Abbas, Iqbal and Aziz (2019). Mustafa (2020) 4. Fadun and Oye (2020)	2. Bace (2016); Elgadi (2016); Mustafa (2020)	4. Yuqi (2007); Tafri, Hamid, Meera and Omar (2009); Ecthwa and Atheru (2020)
Credit Risk	1. Non-performing loans ratio. 2. Provision of Loan Loss. 3. CAR	1. Alshatti (2015)	1.Li and Zou (2014); Ishtiaq (2015); Bace (2016). OFOSU-HENE, Eric Dei, and AMOH (2016); Bagh, Ashif-Khan, and Razzaq (2017): Amaliah and Hassan (2019); Mustafa (2019) Fadun and Oye (2020) 2. Alshatti (2015) Al-Eitan and Bani-Khalid (2019); Yuqi (2007); Tafri,	1.Kusumastuti and Alam (2019); Ecthwa and Atheru (2020) 2. Elbahar (2016) 3. Li and Zou (2014)

			Hamid, Meera and Omar (2009); Ishtiaq (2015); Al-Rdaydeh, Matar. and Alghzwai (2017); Abbas, Iqbal and Aziz (2019). Batten and Vo (2019) Mustafa (2019)	
Operational Risk	Operational Cost to Operating Income	Kusumastuti and Alam. (2019); Fadun and Oye. (2020).	Almazari (2013); OFOSU-HENE, Eric Dei, and AMOH (2016); Elgadi (2016) Bagh, Ashif-Khan, and Razzaq (2017): Kusumastuti and Alam (2019); Batten and Vo (2019); Fadun and Oye (2020)	
Market Risk	1. Interest Rate 2. Value at Risk	1. Fadun and Oye (2020); Ecthwa and Atheru (2020)		2.Ishtiaq (2015)
Bank's Capitalization	1.Capital Adequacy Ratio 2.Total Equity to Total Assets	1. Rangkutia, Suhadakc, Rahayuc & Solimund. 2020); Ishtiaq (2015); Bagh, Ashif-Khan, and Razzaq (2017): Abbas, Iqbal and Aziz (2019) 2. Yuqi (2007); Tafri, Hamid, Meera and Omar (2009); Bace (2016); Elbahar (2016); Elgadi (2016)	2.Muda, Shaharuddin, and Embaya (2013); Almazari (2013); OFOSU-HENE, Eric Dei, and AMOH (2016)	1.Amaliah and Hassan (2019); Kusumastuti and Alam (2019) 2.Al-Rdaydeh, Matar. and Alghzwai (2017)

Source: The Researcher's Outputs from Previous studies

Chapter Two
Theoretical Framework

Section One

2.1 Islamic Banking Aspects

This section of chapter represents the theoretical framework of the Islamic banking aspects and some of its financial performance indicators. It provides the relevant features and aspects of the Islamic banking in terms of its definition, principles, objectives, financing modes, financial performance measures, applicable governance and associated risks management.

2.1.1 Definition and Concept of Islamic Banks

The banks can be defined as: "intermediary financial institutions that accept deposits and make loans". Included under the term banks are firms such as commercial banks, saving and loan associations, mutual saving banks and credit unions" (Mishkin, and Eakins, 2018, p.7).

The provision of deposit and loan products normally distinguishes banks from other types of financial institutions. Deposit products payout money on demand or after some notice. Deposits are liabilities for banks, which must be managed if the bank to maximize profits. Likewise, banks manage the assets created by lending transactions (Heffernan, 2005, p.1).

This definition emphases on the core traditional functions of banks as intermediaries' institutions that accepting the money from the depositors and lending it to the borrowers throughout different forms of investment products.

Then, the banks can obtain profits from the interests that can be generated from managing the assets and liabilities.

Islamic banks differ than other banks that operate in a conventional banking practices, by not to pay interest on deposits or impose charge on loan. They endeavor to eliminate the interest charges by other modes of profitable products by mobilizing the deposits into a productive use based on the Islamic rules and regulations. Hence, the Islamic banking has been defined in a number of ways. It can be defined as "the banking system that is fully comply with *Shariah* rules and regulations. Such rules and regulations prohibited the involvement of interest (*riba*), gambling (*maysir*) and speculation (*gharar*) in the financing business' activities. The central idea of an Islamic bank is given as approved definition by the General Secretariat of the Organization of Islamic Cooperation (OIC) in the following manner: "An Islamic bank is a financial institution, which applies statutes, rules, and procedures that expressly state its commitment to the principles of Islamic Shariah and prohibit the receiving and paying of interest *(riba)* on any of its operations" (Mohd, 2007, p.401). Therefore, it is clearly noticed that Islamic banking shall comply with *Shariah* rules and regulations in its operations, objectives and management.

The Holy Qur'anic verse says: *"Allah will deprive usury of all blessing, but will give increase for deeds of charity: For He loveth not creatures ungrateful and wicked".* (Holly Qur'an, Al-Baqarah, 3:276)

Shariah, or Islamic laws, as Islamic Jurisprudence, is the origin and basis of Islamic banking. It is a path not only leading to *Allah* (the Arabic word for God) but the path believed by all Muslims to be the path shown by *Allah*, the Creator Himself through His Messenger, the Prophet Mohammed (pbuh).
Thus, Muslims believe, it is only "*Shariah"* that liberates humans from servitude to other than *Allah*.

Shariah being the practical aspects of a Muslim's daily life, is divided into two categories: *Ibadat* and *Muamalat. Ibadat* is concerned with practicalities of a Muslim's workshop to *Allah* (man – to – Allah); where Muamalat is concerned with practicalities of a Muslim's mundane daily life (person – to – person relationship). Furthermore, a significant segment of *Muamalat* is the conduct of Muslim's economic activities within the economic system. And within the economic system one finds the banking and financial system, the place where people conduct their banking and financial services (Kettell, 2012).

The sources of *Shariah* are classified as primary and secondary sources as follows:

1. The *Holly Qur'an,* as the first primary source of the *Shariah*.
2. *Sunnah* (the customs and usage of Prophet Mohammed), as second primary source of the Shariah.
3. *Ijma'a* (consensus), as first secondary source of the *Shariah*.
4. *Qiyas* (analogical reasoning), as second secondary source of the *Shariah*.
5. *Ijtihad* (exercise of one's reasoning to arrive at a logical conclusions).

The secondary sources of *Shariah* should be based on Holly Qur'an and Sunnah. The Holy Qur'anic verse says

"*O ye who believe! Obey Allah, and obey the Messenger, and those charged with authority among you. If ye differ in anything among yourselves, refer it to Allah and His Messenger, if ye do believe in Allah and the Last Day: That is best, and most suitable for final determination"*. (Holly Qur'an, An-Nisaa, 5:59)

2.1.2 Basics of Islamic Finance Principles

Abdullah and Chee (2013) state that the basic Islamic finance principles which are applicable to the Islamic banking include the three fundamental prohibitions of interest *(riba),* gambling *(maysir)* and speculation *(gharar).*

Interest (*Riba*) prohibitions

Riba covers any return of money on money, whether the interest is fixed or floating, simple or compounded, and whatever the rate. *Riba* is strictly prohibited and must not presented in any form of contract or transaction in Islamic finance. *Riba* is classified on its sources into two main categories:

a. The first one is the *riba* arising from debt (*riba dayun*): it can happen when interest is charged in relation to the duration of a loan (called *riba qardh*) or in case of default on the repayment and a penalty charge is imposed (called *riba jahaliyyah*).
b. And the second one is the *riba* arising from sales (*riba buyun*). This arising if you exchanged on the spot a specified quantity of goods for more quantity of the same goods, this excess of quantity is considered as *riba* (*riba fadhl*). Another riba in buyun is that stems from the deferment of time, for example if you exchange same quantity of same goods to be received later, this barter times cause riba (*riba an-nasiah*).

Gambling (*Maysir*) prohibitions

Gambling (*maysir*) includes game of chance, such as borrowing money to speculate on currency movement. Gambling represents an unproductive exchange of property or asset. And because of its volatile and highly uncertain outcomes, gambling often leads to arguments, violence, and other crises.

Uncertainty or hazard (*Gharar*) prohibitions

Gharar is uncertainly position, and it considered to be less significant to *riba* in that while the prohibition of *riba* is absolute, some degree of *gharar* is acceptable. Therefore, only excessive *ghara* where uncontrollable risk leads to speculation and gambling must be avoided. The main concepts in which major *gharar* can occur are summarized as follows:

a. Uncertainty of ownership or possession of the goods and there is a doubtful in the delivery of such goods.

b. Inadequacy of information that create lack of knowledge or future performance.
c. Games of chance in achieving the transaction's output.

In addition to that, Greuning and Iqbal (2008) noted that the following elements consider part of the principles of Islamic finance:

Social justice

In principle, any transaction leading to injustice and exploitation is prohibited in Islam. A financial transaction should not lead to exploitation of any party to the transaction.

Risk sharing

Because interest is prohibited, suppliers of funds become investors instead of creditors. The provider of financial capital and entrepreneur share business risks in return for a share of the profit.

***Shariah* approved – activities**

Only those business activities that don't violate the rules of *Shariah* are qualify for investment. For example, any business dealing with alcohol, gambling or casinos is prohibited.

Sanctity of contracts

Islam upholds contractual obligations and disclosure of information as a sacred duty. This feature is intended to reduce the risk of asymmetric information and moral hazard.

2.1.3 Origins and Evolution of Islamic Banks

Although the exact origin of banking is hidden in antiquity, there is evidence to show that the practices of safekeeping and saving banking flourished in temples of Babylon as early as 2000 BC.

Clay tablets discovered in the ruins of Babylonia indicate that credit instrument in the form of promises and orders to pay gold and silver coins were used in the ninth century BC. much as promissory notes and bank checks are used today. Subsequently, many practices common to present-day banking flourished in the Roman Empire, as bankers accepted deposits, purchased drafts drawn on banks and on traders' foreign domestic cities, made commercial loans, bought and sold mortgages, and issue letters of credit.

At end of the sixteenth century was considered as the actual beginning of the emergence of the modern banks, since the first public commercial bank was established in Venice (in Italy) in 1587 under the name "*Banco della pizza dirialto*" and ultimately influenced the establishment of Bank of Amsterdam (in Netherlands) in 1609. The Bank of Amsterdam became the model that followed by European banks, which were established after that (Jacobs, Farwell, and Neave, 1972).

The origins of Islamic finance dates back to the dawn of Islam 1,400 years ago. Historical books written during the early years of Islam indicated that during the first century of Islam (AD 600), some form of banking activities existed that were similar to modern banking transaction. Furthermore, these books revealed that Al-Zubair Ibn Al-Awam – one of the most famous personalities in Islam – was accepting deposits from people as loan and investing the money, and he has several branches in different parts of the Islamic Empire to return deposits to their owners (Alharbi, 2015).

Moreover, the first Islamic institution, known as "*baitulmal"* or public treasury, was established by the Prophet Mohamed (pbuh) himself. After the migration to Medina and was operated from the mosque. However, it was Umar Ibn al-Khatab, the second caliph, who gave the institution of *baitulmal* a distinct entity (in AD 644) and identified its resources of revenue.

Such institution was neither accepting deposits from public, nor granting loans to the needy. However, *baitulmal* did make an exception to the norm by granting loans to the two sons of caliph Umar for the trade purpose during travel and the profit to be shared equally with *baitulmal*. This is the form of *mudarabah* (Hasan, 2014).

There are many scholars and studies literature showed that the origins and development of Islamic banking model in the modern era have passed through several stages.

Therefore, it is possible to make it clear these stages as follows:

a. First stage, represents the ideas and attempts for interest-free banks.
b. Second stage, represents the emergence and origins of Islamic banks.
c. Third stage, represents the development and spread of Islamic banks.

a. First stage: The Ideas and Attempts for Interest-Free Banking

This stage began in the early 1900s after the conventional banks - that deal with riba - established in some Muslim's countries. The Muslims' scholars issued several articles and *fatwas* to prohibit dealing with conventional banks that deal with *riba*. Abul A'la Maududi published many articles in the journal "*interpreter of the Qur'an*" in 1937 adviced "the sanctity of the commercial banks' transactions that include *riba*. These articles and *fatwas* were not limited to just a prohibition of *riba* transactions, but also included Islamic alternative put-forward to eliminate the modes of conventional banks that dominated the Muslims financial transactions. (Shbeir, 2007) [4].

b. Second stage: The Emergence and Establishment of Islamic Banking

This stage involved the real implementation of the Islamic banking system, and it covers the period from 1963 – when the first Islamic bank established – to 1977.

[4] The reference was published in Arabic language

The history shows that the first formal Islamic bank was established by Dr. Ahmed Abdelaziz El Najjar in Egypt, in Delta town of Mit – Ghamr in 1963. The bank took the form of saving bank and based on profit sharing in accordance with Shariah regulations. This particular experiment was short-lived and the bank had to close in 1967.

Then after, the first public sector bank established in 1971 in Egypt named, Nasir Social Bank. This bank aimed to accept the deposits and to use them in investment modes.

The bank operated as interest free institution although it did not declare any commitment to Islamic Law (Hasan, 2014). Subsequently, in 1975 there were two attempts for establishment of two Islamic banks. These were Islamic Development Bank and Dubai Islamic Bank.

The Islamic Development Bank (IDB) considered as an international Islamic financial institution and based in Kingdom of Saudi Arabia. It was established in Jeddah in December 1973, and the bank was formally opened in October 1975. The purpose of the Bank is to foster the economic development and social progress of member countries and Muslim communities in accordance with the principles of *Shariah* regulations.

The functions of the Bank are to participate in equity capital and grant loans for productive projects and enterprises, providing financial assistance to member countries in other forms for economic and social development and to establish and operate special funds for specific purposes including a fund for assistance to Muslim communities in non-member countries, and to setting up trust funds. The Bank is authorized to accept deposits and to mobilize financial resources as per *Shariah* compatible modes.

The second attempt in 1975 was related to the establishment of Dubai Islamic Bank (DIB) in the United Arab Emirates.

DIB was stablished as a joined stock company, and it was considered as the first modern commercial Islamic bank with full – services. The bank's article of association was clearly declared that all banking activities shall be carried on based on *Shariah* regulations.

Alharbi (2015) identifies that following to above attempts, Islamic banks continued to emerge on its way towards progress and flourish.

By the year 1977, three Islamic banks were established in a different Islamic country and the International Association of Islamic Banks was established, these banks as follows:

a. Faisal Islamic Bank of Sudan: this bank was established as a public joined stock capital. The bank's initial capital was 6 million Sudanese Pounds in 1977, and the capital composition of 40% was subscribed by Sudanese's citizens, 40% was subscribed by Saudi's citizens and 20% was subscribed by public in others countries.
b. Faisal Islamic Bank of Egypt: this bank was established as an Egyptian joined stock company. The bank's capital was USD 8 million in 1977, with capital composition of 51% to the Egyptian side and they were authorized to offer 25% of their share to the public, and the Saudi side owned 49% of the capital.
c. The Kuwait Finance House: It was established in Kuwait by a legal decree in 1977 as Islamic financial institution. It was aimed to carry out all banking and Investment activities in accordance to the *Shariah* regulations. Since the 1980s, Kuwait Finance House has showed a multi-activity in international expansion.

c. Third Stage: The Development and Spread of Islamic Banking

This stage covers the period from 1978 to present. During this period many Islamic banks were established not only in the Islamic countries, but also in those countries where the conventional banking regime is a dominant.

So, many conventional banks established Islamic windows, and other conventional banks have fully converted to Islamic banking system. In addition to that, several Islamic bodies were established – during this stage – to regulate, support and promote the Islamic financial industry. The Jordanian Islamic Bank for Financing and Investment was established in 1978, the Bahrain Islamic Bank was established in 1979, Qatar Islamic Bank and Al-Baraka Mauritania Bank were established in 1982.

Then after, Bank Islam Malaysia Berhad was established in 1983, and Al-Rajhi Company for Banking and Investment was established in Saudi Arabia in 1987.

The resounding success of Islamic banks impressed a lot of dealers, depositors, prompting the establishment of Islamic banks in non-Muslim countries such as the Dar Al-mal Al-Islami Group in Switzerland, Cyprus Islamic Bank in the Turkish section and Al- Baraka International Islamic Bank in Britain were established in 1981, and the International Islamic Bank in Denmark was established in 1983 (Neama and Najm, 2010) [5].

We can see that the Islamic finance industry has expanded swiftly in the past thirty years expanding its horizon in terms of operations and territory by reaching out to many parts of the world from Arab countries to Middle-East to Asia and Europe.

The capacity and vigor of the industry has now reached to more than 500 banking and financial entities having operations in over 90 countries with the aggregate gross assets more than 1.6 trillion US dollars which is likely doubling by 2016. And the growth rate stands at a staggering more than 16% a year (Ali, 2015). Recently, Thomson Reuters (2018) report shows that the assets size of Islamic finance industry is increasing to US$3.81 trillion by end of 2023.

[5] The reference was published in Arabic language

It also states that Iran, Saudi Arabia and Malaysia are the largest Islamic markets with a share of 65% of the Islamic assets in the year 2017, while Malaysia, Bahrain and the UAE consider as leading countries for the product development in Islamic economics.

2.1.4 Objectives of Islamic Banks

Islamic banks are driven from the Islamic economics requirements and guidance to support the economic growth and to promote the social development in Muslim communities in accordance with *Shariah* rules. Islamic banks tend to achieve following objectives (Neama and Najm 2010):

Islamic Objectives

a. To avoid dealing with interest-based transactions, and to work actively in compliance with *Shariah* regulations in all banking transactions.
b. Encourage the Islamic banks to involve in risk-sharing activities for generating profits and channel these profits along with the customers' savings to the areas that serve the economic growth and social development.
c. To participate in value-contribution to Zakat fund from the activities and operations results that have been conducted by Islamic banks. And to assist *Takaful* system for serving the interests of Muslim communities.

Financial Objectives

a. To attract deposits from different sources that include restricted and unrestricted investment deposits, demand (current) deposits and saving deposits, and to improve these deposits throughout productive investments opportunities in accordance with Islamic investment modes.
b. To generate profits from investment and banking operations, these profits to be shared with the banks' depositors and owners based on the Islamic rules.

Achieving these objectives will positively reflect to Muslim community, the market-value of the banks, and improving the competition in the banking industry.

c. To contribute positively in the economic growth, sustainable development and social justice in Muslim communities.

Customers' related Objectives

Customers of Islamic banks have their own objectives and interests that should be accommodated by such banks. Customers' related objectives include the following:

a. To provide high quality of banking services in compliance with *Shariah* regulations.
b. The availability and easy access to finance the suitable investment opportunities.
c. To provide a secure position for the depositors through creation of depositors' confidence in the bank, providing sound controls for liquidity and successful operations.

The Bank Internal Objectives:

a. To develop and improve the banks' human resources in Islamic banking aspects in order to qualify them for providing high quality of banking services.
b. To achieve a sustainable growth rate that makes the bank compete in the market.
c. The banks looking to spread geographically and socially as much as possible in Muslim communities to provide banking services in easy and fast ways.

Innovative Objectives

In order the Islamic banks get the ability to compete and maintain with a solid ground in the market, they have to create and innovate different types of financing modes and banking services in accordance with *Shariah* rules and to meet customers' needs.

From this context, Islamic banks shall always keep improving the way that provide the financing and banking services in order not only to maintain the existing customers, but also to attract new ones.

2.1.5 Islamic Financing Modes

Islamic banks, unlike conventional banks, could not depend on lending activities or the extension of credit on interest. Hassan (2014) has illustrated that the modes that Islamic banks use for financing are classified into two broad categories, direct (participatory) and indirect (non-participatory) modes.

a. **Direct (Participatory) Mode:** Participatory modes refer to the direct financing of productive ventures mostly on Profit –and – Loss Sharing (PLS) basis. Essentially these include *Mudarabah* and *Musharakah* for business and *Muzaarah* as counterpart in agriculture.
b. **Indirect (Non-participatory) Modes:** These modes provide finance indirectly to the project, such as by trading. They are based on a generic notion of sale and involve the deferment of one liability under the contract – either the payment of the price or the delivery of goods – to a future date. These modes consist of eight forms that can be grouped into four groups:

1. Asset to debt transformation: it tends to offer customers certainty of price on a clear exchange of money to be received later by bank, for goods to be received by customer immediately. This includes *Murabahah, Bai-al-ainah, and Tawaruq.*

2. Debt to asset transformation: this involves money to be received immediately by customer in exchange for goods or commodities to be received by bank in the future. It includes *Salam* and *Istisna*.
3. Pure asset structure: It requires a bank to own real assets that their customers will use, and may require them at later date. The customers will have options on price and acquisition of assets. It includes *Declining (Diminishing) Musharakah* and *Ijarah* modes of finance.
4. Debt without profit: unlike key business methods, is a rarely applied method, banks use this mode to help clients in specific situations that including commercial purposes. This includes *Qardh-el-hassan*.

These modes of Islamic finance are derived from Islamic jurisprudence. The carpus of juristic or legal maxims provides the guidelines that help to structure these modes and facilitate their validation under varying conditions.

A maxim is something that is established as self-evident truth and it does not need a proof. While, legal maxims are theoretical abstractions in the form of short expressions conveying the *Maqasid* (goals) *of Shariah* (Usmani, 1998).

The legal maxims are five, as follows:

1. Matters will be judged by their objectives (*Al-Umur bi, Maqasidha*). The principle rests on *hadith* that says "*actions are but by intentions*"
2. Haram shall be removed (*Al- Darar Yuzalu*). This maxim follows from the hadith that says *"there must be neither haram nor the imposition of haram"*.
3. Certainty shall not be removed by doubt (Al-Yagin la, Yazulu bi, Al-Shakak). This follows from a major axiom of Islamic law that things are legally assured to remain as they are.
4. Hardship shall bring alleviation (Al-Mashaqqah tajlibu Al-Taysir). This rests on the Qur'anic verse "2:185 in Al-Baqarah" say: (…*God intends for you ease and He does not intend to put you in hardship*…).

5. Custom is the basis of judgement (Al-Aada Al-Muhakkamah). This maxim comes from the ground that, what Muslims – collectively – deem to be good is good in the eyes of God.

Mudarabah Mode

The concept of *Mudarabah:*

Mudarabah is a special kind of partnership where one partner gives money to another for investing it in a commercial enterprise.

The investment comes from the first partner who is called "*rabb-ul-mal*", while the management and work is an exclusive responsibility of the other, who is called "*mudarib*". The *rabb-ul-mal* may specify a particular business for the *mudarib*, in which case he shall invest the money in that particular business only. This is called "*al-mudarabah al-muqayyadah"* (restricted mudarabah). While "*al-mudarabah al-mutlaqah"* (unrestricted mudarabah) is open for the *mudarib* to undertake whatever business, he wishes (Usmani, 1998); (Akkizidis and Khandelwal, 2008).

Rabb-ul-mal can contract *mudarabah* with more than one person through a single transaction – it means that he can offer his money to A and B both – so that each one of them can act for him as *mudarib* and the capital of the *mudarabah* shall be utilized by both of them jointly, and the share of the *mudarib* shall be distributed between them according to the agreed proportion.

It is necessary for the validity of *mudarabah* that the parties agree at the beginning on a definite proportion of the actual profit to which each one of them is entitled. However, they cannot allocate a lump sum amount of profit for any party, nor can they determine the share of any party at a specific rate tied up with the capital.

If the business has incurred loss in some transactions and has gained profit in some others, the profit shall be used to offset the loss at the first instance, then the remainder, if any, shall be distributed between the parties according to the agreed ratio.

Termination of *Mudarabah***:**

The contract of *mudarabah* can be terminated at any time by either of the two parties. However, the only condition is to give a notice to the other party.

If all the assets of the *mudarabah* are in cash form at the time of termination, and some profit has been earned on the principal amount, it shall be distributed between the parties according to the agreed ratio. Additionally, if the assets of the *mudarabah* are not in the cash form, the *mudarib* shall be given an opportunity to sell and liquidate them, so that the actual profit may be determined.

Musharakah Mode

The concept of *Musharakah:*

Musharakah or *Shirkat-ul-amwal* is a relationship established by the parties through a mutual contract; the contract must take place with free consent of the parties without any duress, fraud or misrepresentation (Usmani, 1998).

There are certain components that are peculiar to the *Musharakah* contract:

1. The proportion of profit to be distributed between the partners must be agreed upon at the time of effecting the contract.
2. The ratio of profit for each partner must be determined in proportion to the actual profit accrued to the business, and not in proportion to the capital invested by him.
3. The ratio of profit may differ from the ratio of investment in normal conditions.

However, if a partner has put an express condition in the agreement that he will never work for the *Musharakah* and will remain a sleeping partner throughout the term of *Musharakah,* then his share of profit cannot be more than the ratio of his investment.

4. In the case of loss, each partner shall suffer the loss exactly according to the ratio of his investment. It is this principle that mentioned in the famous maxim "Profit is based on the agreement of the parties, but loss is always subject to the ratio of investment".

The Nature of Capital:

Most of the Muslim jurists are of the opinion that the capital invested by each partner must be in liquid (money) form and not on commodities. However, if a partner wants to participate in a *Musharakah* by contributing some commodities to it, he can do so according to *Imam Malik* without any restriction, and his share in the *Musharakah* shall be determined on the basis of the current market value of the commodities at the date of the commencement of *Musharakah*. According to *Imam al-Shafi'i,* this can be done only if the commodity is from the category of *dhawat-ul-amthal (i.e., the commodities which, if destroyed, can be compensated by the similar commodities in quality and quantity)* (Usmani, 1998).

Termination of *Musharakah:*

The *Musharakah* is deemed to be terminated in any one of the following events:

1. Every partner has a right to terminate the *Musharakah* at any time after giving his partner a notice to this effect, whereby the *Musharakah* will come to an end.
2. If any one of the partners dies during the period of *Musharakah*, the contract of *Musharakah* with him stands terminated.
3. If any one of the partners becomes incapable of effecting commercial transactions, the *Musharakah* stands terminated.

If one of the partners wants termination of the *Musharakah*, while the other partner or partners like to continue with the business, this purpose can be achieved by mutual agreement. The partners who want to run the business may purchase the share of the leaving partner.

The price of the share of the leaving partner is determined by mutual consent, and if there is a dispute about the valuation of the share and the partners do not arrive at an agreed price, the leaving partner may compel other partners on the liquidation.

Murabahah Mode

The concept of *Murabahah:*

Murabahah is a mode of financing through a particular kind of sale where the seller expressly mentions the cost of the sold commodity he has incurred, and sells it to another person by adding some profit or mark-up thereon (Usmani, 1998), (Akkizidis and Khandelwal, 2008).

Following features should be embedded in the *Murabahah* mode:

1. The financier must have owned the commodity before he sells it to his client and the commodity must come into the possession of the financier in the sense that the commodity must be in his risk, even if for a term.
2. The profit in Murabahah can be determined by mutual consent, either in lump sum or through an agreed ratio of profit to be charged over the cost.
3. All the expenses incurred by the seller in acquiring the commodity.
4. Murabahah is valid only where the exact cost of a commodity can be ascertained. If the exact cost cannot be ascertained, the commodity cannot be sold on Murabahah basis. In this case the commodity must be sold on Musawamah (bargaining) basis.
5. Murabahah is not a loan given on interest. It is the sale of a commodity for a deferred price which includes an agreed profit added to the cost.

6. The commodity is purchased from a third party. The purchase of the commodity from the client himself on 'buy back' agreement is not allowed in Shariah.
7. In the case of default by the buyer in the payment, the price cannot be increased.

The procedures for *Murabahah:*

Firstly, the client and the institution sign an over-all agreement whereby the institution promises to sell and the client promises to buy the commodities from time to time on an agreed ratio of profit added to the cost. This agreement may specify the limit up to which the facility may be availed.

Secondly, when a specific commodity is required by the customer, the institution purchases the commodity directly from the supplier (which is preferable), otherwise the institution appoints the client as his agent for purchasing the commodity on its behalf, and an agreement of agency is signed by both the parties.

Thirdly, the commodity to be purchases by the institution or the client on behalf of the institution and takes its possession as an agent of the institution.

Fourthly, the client makes an offer to purchase the commodity from the institution.

Fifthly, the institution accepts the offer and the sale is concluded whereby the ownership as well as the risk of the commodity is transferred to the client.

Some Issues Involved in *Murabahah:*

Usmani (1998) states some relevant issues with reference to the underlying Islamic principles and their practical applicability in *Murabahah* transaction.

These issues are:

1. The financier purchases the commodity on cash payment and sells it to the client on credit. The financier takes into account the period in which the price is to be paid by the client and increases the price accordingly.
2. In *Murabahah* financing is that the *Murabahah* price is payable at a later date. The seller/financier naturally wants to make sure that the price will be paid at the due date, that is why client being asked for a satisfactory security.
3. The use of the rate of interest for determining the *Murabahah* profit cannot be considered desirable.
4. If a *Murabahah* transaction fulfils all the Islamic conditions and merely using the interest rate as a benchmark for determining the profit of *Murabahah*, this does not render the transaction as prohibited, since the deal itself does not contain interest.
5. The seller in a *Murabahah* financing can ask the purchaser/client to furnish a guarantee from a third party. The guarantee that provides by third party is a voluntary transaction and no fee can be charged on a guarantee.
6. If the client defaults in payment of the price at the due date, the price cannot be increased. In *Murabahah* financing, once the price is fixed, it cannot be increased. No penalty of default to be charged.
7. The *Murabahah* transaction cannot be rolled over for a further period.
8. In a *Murabahah* transaction that effected by an Islamic financial institution, no such rebate on early settlement can be stipulated in the agreement, nor claimable by the client.

Salam Mode

The concept of *Salam:*

Salam is a sale whereby the seller undertakes to supply some specific goods to the buyer at a future date in exchange of an advanced price fully paid at spot. The price is cash, but the supply of the purchased goods is deferred.

The buyer is called "*rabb-us-salam*", the seller is "*muslam ilaih*", the cash price is "*ra's-ul-mal*" and the purchased commodity is termed as "*muslam fih*", but for the purpose of simplicity. Salam was allowed by the Holy Prophet Mohammed (pbuh) subject to certain conditions. The basic purpose of this sale was to meet the needs of the small farmers who needed money to grow their crops and to feed their family up to the time of harvest. The permissibility of *Salam* was an exception to the general rule that prohibits the forward sales, and therefore, it was subjected to some strict conditions (Usmani, 1998).

Conditions on Salam:

1. The buyer pays the price in full to the seller at the time of effecting the sale, in order to avoid sale of sale of a debt against a debt.
2. Salam can be affected in those commodities only the quality and quantity of which can be specified exactly.
3. It is necessary that the quality of the commodity is fully specified leaving no ambiguity which may lead to a dispute.
4. It is also necessary that the quantity of the commodity is agreed upon in unequivocal terms (such as weight or measure)
5. The exact date and place of delivery must be specified in the contract.
6. Salam cannot be affected in respect of things (such as gold, silver, etc) which must be delivered at spot.

The price in *Salam* may be fixed at a lower rate than the price of those commodities delivered at spot.

In this way, the difference between the two prices may be a valid profit for the banks or financial institutions. After purchasing a commodity by way of *Salam*, the financial institutions may sell it through a parallel contract of *Salam* for the same date of delivery.

However, there are some rules for the validity of this arrangement of parallel contract of *Salam*, as follows:

a. In an arrangement of parallel Salam, the bank enters into two different contracts. In one of them, the bank is the buyer and in the second one the bank is the seller. Each one of these contracts must be independent of the other. Each contract should have its own force and its performance.
b. Parallel *Salam* is allowed with a third party only. The seller in the first contract cannot be made purchaser in the parallel contract of *Salam,* because it will be a buy-back contract, which is not permissible in *Shariah*

Istisna Mode

The concept of *Istisna:*

Istisna refers to order a manufacturer to manufacture a specific goods for the purchaser. If the manufacturer undertakes to manufacture the goods for the purchaser with material from the manufacturer, the transaction of *Istisna* comes into existence. But it is necessary for the validity of *Istisna* that the price is fixed with the consent of the parties and that necessary specification of the goods (intended to be manufactured) is fully settled between them.

The contract of *Istisna* creates a moral obligation on the manufacturer to manufacture the goods, but before he starts the work, any one of the parties may cancel the contract after giving a notice to the other.

However, after the manufacturer has started the work, the contract cannot be cancelled unilaterally.

Istisna as a mode of financing

Istisna' can be used for providing the facility of financing in certain transactions, especially in the house finance sector. Since it is not necessary in *Istisna* that the price is paid in advance, nor it is necessary to be paid at the time of delivery, and therefore, the time of payment may be fixed in whatever manner parties agree on.

The financier can enter into a parallel contract of *Istisna* with a third party, or may hire the services of a contractor (other than his client). In both cases, he can calculate his cost and fix the price of *Istisna* with his client in a manner which may give him a reasonable profit over his cost. The payment of installments by the client may start from the day when the contract of *Istisna* is signed by the parties, and may continue during the construction of the property and after it is handed over to the client. So, in order to secure the payment of the installments, the title deeds of the property or land, or any other asset of the client may be kept by the financier as a security, until the last installment is paid by the client.

The modern Buy, Operate and Transfer (BOT) agreements may also be formalized on the basis of *Istisna*. If a government wants to construct a highway, it may enter into a contract of *Istisna* with a contractor. The price of *Istisna*, in such case, may be the right of the contractor to operate the asset for a specified period (Usmani, 1998).

Ijarah (Leasing) Mode

The concept of Ijarah:

Ijarah' in the context of Islamic finance means "to transfer the usufruct -the right to use- of a particular property to another person in exchange for a rent claimed from him".

In this case, the term '*Ijarah*' is analogous to the term 'leasing'. Here the lessor is called '*mu'jir*', the lessee is called '*musta'jir*' and the rent payable to the lessor is called '*ujrah*'. Furthermore, the rules of *Ijarah*, in the sense of leasing, is very much analogous to the rules of sale, because in both cases something is transferred to another person for a valuable consideration. The only difference between *Ijarah* and sale is that in the case of sale the property is transferred to the purchaser, while in the case of *Ijarah*, the property remains in the ownership of the transferor, but only its use is transferred to the lessee.

Rules and condition on *Ijarah:*

The basic rules and conditions that governing the *Ijarah* (i.e. lease) as follows:

1. *Ijarah,* like leasing, is a contract whereby the owner of a property transfers its usufruct to another person for an agreed period and at an agreed consideration.
2. It is necessary for a valid contract of lease that the corpus of the leased property remains in the ownership of the seller, and only its usufruct is transferred to the lessee.
3. All the liabilities emerging from the ownership shall be borne by the lessor, but the liabilities referable to the use of the property shall be borne by the lessee.
4. The period of lease must be determined in clear terms, and the lessee cannot use the leased asset for any purpose other than the purpose specified in the lease agreement.
5. The lessee is liable to compensate the lessor for every harm to the leased asset caused by any misuse or negligence on the part of the lessee.
6. The leased asset shall remain in the risk of lessor during the lease period.
7. The lease period shall commence from the date on which the leased asset has been delivered to the lessee.
8. The property jointly owned by two or more persons can be leased out, and the rental shall be distributed between all the joint owners according to the shares proportion.
9. The rental amount must be determined at the time of contract for the whole period of lease. It is permissible that different amounts of rent are fixed for different phases during the lease period, provided that the amount is specifically agreed upon at the time of effecting a lease.
10. The rent or any part thereof may be payable in advance before the delivery of the asset to the lessee, but the amount so collected by the lessor shall remain with him as ‘on account’ payment and shall be adjusted towards the rent after its being due.

11. If the leased asset has totally lost the function for which it was leased (not due to misuse or negligence of the lessee), and no repair is possible, the lease shall terminate on the day on which such loss has been caused.

Termination of lease:

The lessee pays the rent as due up to the date of termination. If the termination has been affected due to the misuse or negligence on the part of the lessee, he can be asked to compensate the lessor for the loss caused by such misuse or negligence. But he cannot be compelled to pay the rent of the remaining period of the rental contract.

Decreasing (Diminishing) *Musharakah* Mode

According to this concept, a financier and his client participate either in the joint ownership of a property or an equipment, or in a joint commercial enterprise. The share of the financier is further divided into a number of units and it is understood that the client will purchase the units of the share of the financier one by one periodically.

This arrangement allows the financier to claim rent according to his proportion of ownership in the property and at the same time allows him periodical return of a part of his principal through reducing the units of his share.

Tawarruq and *Bai-al-ainah* Modes

Tawarruq is one of the distinguished *Shariah* transactions that is predominant in Islamic finance nowadays. This is because many Islamic banks introduce financial product related to *tawarruq* based on the fatwa that were issued by their *Shariah* boards. Tawarruq is the purchasing of a commodity on credit (i.e. deferred payment) by the *mutawarriq* (seeker of cash) and selling it to a party other than the initial seller (third party) for a lower price on cash.

Then, *tawarruq* becomes a sale contract, however, if the *mutawarriq* sells the commodity to the first seller, it then becomes the prohibited sale (*Bai-al-ainah*) (Dabu, 2011).

Many researchers have mixed up the term *tawarruq* and *tawriiq*. The concept of *tawarruq* has been mentioned above, while *tawriiq* means documentation (*taskiik*). This means transferring existing commodities into *sukuk*, which are subject to circulation.

In addition to that, according to the Islamic jurists, it has been shown that there is a difference between *"bai-al-ainah" or 'ainah*" and tawarruq. "*Ainah"* consists of two parties; the seller is the party who sells the commodity at a certain price, and the buyer is the second party who buys the commodity at a higher price, and on deferred payment. But in *tawarruq*, there are three parties, the seller, buyer and the third party. The first party buys the commodity from the seller, and then sells it to the third party who is not the first seller. "*Ainah*" is prohibited by majority of the jurists, because it leads to *riba*. It falls within the prevention of things that causes prohibited actions (*saddu-el- zhara'i*).

Types of Tawarruq:

The Islamic banking system runs two types of *tawarruq* contracts:

1. The real tawarruq**:** It happens when a person buys a commodity from a bank on deferred basis. He then sells it to another person or bank for cash, in order to get his needed liquidity.
2. The organized tawarruq: This is when a person buys a commodity from a bank on deferred basis. He then makes the bank his agent to sell this commodity on behalf of him.

Qardh-el- hassan Mode

Qardh-el- hassan is a voluntary loan, with zero return that the Qur'an encourages lender to make it for community members who are under financial distress and therefore, has special purpose in the Islamic economic system. However, Banks are allowed to charge a service fee to cover the administrative and transactions costs of such loan. Such costs are not related to the maturity or amount of the loan (Iqbal and Shafiq, 2015)

Iqbal and Shafiq (2015) summarize the key characteristics of *Qardh-el- hassan* as follows:

1. It is a non-rewarding loan (with no expectations of any monetary return) but the borrower is under moral obligation to repay the principal depending on the borrower's financial capacity to do so. The lender would forego the demand for payment of principal if despite best efforts and good intentions by the borrower; he/she cannot repay the principal due to economic hardships.
2. The incentives for lenders to extend credit based on *Qardh-el- hassan* are clearly benevolent and spiritual as they are abiding by Allah's Command to supply such loans for benevolent purposes.
3. The primary objective of *Qardh-el- hassan* is to help poor community members to get on their feet to become part of economic activities in a dignified and cost-effective manner. This also provides an incentive to poor to perform and be able to have access to such credit in the future.
4. The practice of *Qardh-el- hassan* has also been associated with enhancing harmony among poor and rich segments of the society which leads to more cooperative, collaborative, and caring society.
5. *Qardh-el- hassan* can serve as tool to enhance financial and social inclusion in the society. By extending credit to poor, they can be brought into the formal financial sector and as they come out of poverty, they are better integrated in the society.

2.1.6 Conceptual Differences Between Islamic and Conventional Banking Systems

Ahmad and Hassan (2007); Al Rahahleh et al. (2019) identify and report the most features' differences between Islamic and conventional banking industries. Following summary address the main differences.

a. Conventional banking finances profitable projects with interest charges under a given collateral security, while Islamic banking system prohibits dealing with interest (*riba*) to invest on a profit or loss sharing projects.
b. Islamic banks consider the social and ethical factors in their business operations as compared to conventional banks that can finance projects on businesswise cases.

Islamic banking seems to have an active role throughout its ability to share the loss in the invested projects, whereas, conventional banking looks to secure the interest charge and principal of finance regardless the status of financed clients.

c. Shariah rules governs the Islamic banking system and encourage to create friendly, collaborative and partnership relationship between the banks and their clients. On other hand, conventional banks deal with their clients on lender and borrower basis.
d. The sources and uses of funds in Islamic banking also differ from those of conventional banks. Islamic banks acquire their funds from savings accounts, current accounts, and restricted or unrestricted investment accounts. These funds are used in PLS or Non-PLS contracts in order to generate the Islamic banks income.
e. The depositors or investors in Islamic banks are shouldering the risk and return equally with the shareholders. From other hand, conventional banks obtain their funds from depositors that using different account, with an annual interest charge, and financing different projects on loan financing basis. The income for the conventional banks comes from the difference between the receiving interests and paying interests.

Accordingly, the structure and presentation of the banks' financial statements are differed between the two types of banking systems. This is due to the different characteristics of funds' resources and their uses by each of these systems.

Additionally, there are many evidences brought out by scholars that Islamic banking is different from conventional banking in terms of its mission and objectives. Islamic banking tends to show a greater obligation toward society than conventional banks.

Following table (2-1) provides a comparison between Islamic and conventional banks in terms of their financial statements' structures

Table (2-1)

Comparison of Financial Statements Structure Between Islamic and Conventional Banks

Conventional Banks	**Islamic banks**
Assets o Cash and liquid assets (including treasury bills and notes) o Investments & deposits o Loan portfolios o Fixed and other assets	Assets • Cash and cash equivalents • Sales receivable (Murabahah and others) • Islamic financing assets (including Mudarabah, Musharakah, Ijarah, Istisna, and Salam) • Fixed and other assets
Liabilities and Equity o Deposit (current & saving accounts) o Promissory notes o Minority interest o Borrowing and other liabilities o Shareholders' equity	Liabilities and Equity • Saving and current accounts • Salam and Istisna payables • Other liabilities (Zakat and tax payable) Depositors' share of profit • Shareholders' equity

Source: Al Rahahleh, Bhatti and Misman (2019)

2.1.7 Supportive Institutions for Islamic Banking

The rapid growth of Islamic finance industry around the globe and the different types of stakeholders' requirements and expectations creates the need to establish supportive institutions to meet these requirements and different stakeholders' expectations. Therefore, there are many institutions have been established and each one is tackling an area in the Islamic finance industry aiming to support, promote, provide solutions, develop and monitor different issues. Those institutions include the following.

a) The Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI)

This organization, formerly known as Financial Accounting Organization for Islamic Banks and Financial Institutions. It was established in accordance with the Agreement of Association which was signed by Islamic financial institutions in February, 1990 in Algiers. The AAOIFI was registered in March, 1991 in the State of Bahrain as an international autonomous non-profit making corporate. Such organization carries professional duties to prepare and develop the accounting, auditing, governance, ethics and Shariah standards for the Islamic financial institutions, and harmonize the accounting policies and procedures adopted by such Islamic financial institutions. Professional qualification programs that are carried by AAOIFI are the Certified Shariah Adviser and Auditor "CSAA", the Certified Islamic Professional Accountant "CIPA", corporate compliance programs, and various training programs in order to enhance the industry's professionalism and governance structures. (AAOIFI, 2016).

b) The Islamic Financial Services Board (IFSB)

This organization was officially opened in November 2002 and started operations in March 2003. It is based in Kuala Lumpur and serves as international standard-setting organization aiming to promote and enhance the soundness and stability of the Islamic financial services industry.

To achieve these aims, IFSB issue global prudential standards and guiding principles for the industry (manly the body of regulatory and supervisory agencies), broadly defined to include banking, capital markets and insurance sectors.

In advancing the mission of the IFSB, it promotes the development of a prudent and transparent Islamic financial services industry through introducing new, or adapting existing international standards consistent with Shariah principles, and recommend them for adoption. To this end, the work of the IFSB complements that of the Basel Committee on Banking Supervision, International Organization of Securities Commissions and the International Association of Insurance Supervisors. (IFSB, 2016).

As at April 2020, the 187 members of the IFSB comprise 78 regulatory and supervisory authorities, 9 international inter-governmental organizations, and 99 market players (financial institutions, professional firms and associations) operating in 57 jurisdictions. The ISFB issued twenty-two (22) standards, seven (7) guidance note and three (3) technical notes for the Islamic financial institutions as of 2020 (IFSB, 2020).

c) International Islamic Financial Market (IIFM)

The IIFM was founded in 2002 by the collective efforts of the Islamic Development Bank, Autoriti Monetari Brunei Darussalam (formerly Ministry of Finance Brunei Darussalam), Bank Indonesia, Central Bank of Bahrain, Central Bank of Sudan and the Bank Negara Malaysia as a neutral and non-profit organization.

Besides the six (6) founding members, IIFM is also supported by sixty-four (64) members – as of August 2020 – from certain regulatory and government bodies, banking institutions, international and regional financial institutions and other market participants.

The IIFM plays its role in market unification by developing best practices at the global level and achieving *Shariah* harmonization through its efforts for creation of a robust, transparent, and efficient Islamic finance industry.

The IIFM also contributes to creating industry awareness by organizing specialized seminars and workshops as well as publishing research reports.

The IIFM principal activities and current focus on addressing the documentation standardization needs of the industry in the areas of capital and money market, corporate and trade finance, beside to facilitate unification, *Shariah* harmonization and legal reforms in Islamic financial markets (IIFM,2020).

d) General Council for Islamic Banks and Financial Institutions (CIBAFI)

CIBAFI is an international organization established in 2001 and Headquartered in the Kingdom of Bahrain. CIBAFI is affiliated with the Organization of Islamic Cooperation (OIC). CIBAFI represents the Islamic financial services industry globally, defending and promoting its role, consolidating co-operation among its members, and with other institutions with similar interests and objectives.

With nearly hundred thirty (130) members over thirty-four (34) jurisdictions, representing market players, international intergovernmental organizations and professional firms, and industry associations, CIBAFI is recognized as a key institution in the international architecture of Islamic finance. It is guided by its strategic objectives that include policy, regulatory advocacy, research and publications, and professional development (CIBAFI, 2020).

e) Liquidity Management Centre B.S.C. (LMC)

Liquidity Management Centre B.S.C. (LMC) is an Islamic Investment Bank incorporated in July 2002 and regulated by the Central Bank of Bahrain.

It aims to provide optimal Islamic Financing and Investment solutions which contribute to growth of the Islamic capital market. LMC tends to play a key role in the creation of an active and geographically expansive Islamic inter-bank market which will assist Islamic financial institutions in managing their short-term liquidity. It plays a vital role in the Islamic financing market delivering innovative, adaptable and tradable Islamic *Shariah* compliant short term and medium-term financial instruments to Islamic financial institutions. The LMC has proven to be a leading arranger of Islamic sukuk instruments. (LCM, 2018).

f) The Islamic Research and Training Institute (IRTI)

IRTR was establishment in 1981, as an affiliate of the Islamic Development Bank Group responsible for the research and training and leading the development and sustenance of a dynamic and comprehensive Islamic Financial Services Industry that supports socio-economic development in member countries. (LMC, 2018).

g) Islamic International Rating Agency (IIRA)

IIRA is the sole rating agency established in 2001 in State of Bahrain and started operations in July 2005 to provide capital markets and the banking sector in Islamic countries with independent assessments to issuers and issues that conform to principles of Islamic finance, and to enhance the level of analytical expertise in Islamic markets. This shall facilitate to develop and deepen the capital markets in countries which IIRA wishes to serve. It worth to note that, IIRA is sponsored by multilateral development institutions, leading banks, other financial institutions and rating agencies.

Its shareholders operate from eleven countries which constitute the agency's primary marketing focus (IIRA, 2018).

h) International Islamic Centre for Reconciliation and Arbitration (IICRA)

IICRA is an international, independent, non-profit organization, and one major infrastructure institutions of the Islamic finance industry. Its establishment being resulted from the agreement that signed between United Arab Emirates, the Islamic Development Bank, and the General Council of Islamic Banks and Financial Institutions in 2004, then after, the center began its actual activity in 2007. IICRA settles in all financial and commercial disputes that arise between financial or business institutions that choose to apply the provisions of Islamic law and *Shariah* principles. It resolves disputes arise between these institutions and their clients or between them and third parties through reconciliation or arbitration (IICRA, 2018).

2.1.8 Financial Performance Measures in Islamic Banks

The financial performance of Islamic banks considers as a vital factor for the banks' stakeholders in general, and for the depositors, investors, shareholders, management and regulators in particular.

This is because such measures determine and detect any deficiency or weakness that require the bank to make a corrective action, in order to improve its financial performance to achieve the targets.

Profitability indicators have been expressed by numerous scholars as the most important measures of the success of a business and.

Such indicators measure the extent to which a business generates earnings from the factors the business resources, efficiency of production; quality of management and proper utilization of capital.

Therefore, the higher the profitability, the better the business' financial performance. (Islam, 2014); (Elgadi, 2016); (Hassan and Aliyu. (2018); (Mishkin and Eakins, 2018); (Kusumastuti and Alam (2019); (Oganda. Mogwambo and Otieno. 2020).

The use of profitability indicators come by the application of ratio analysis for the financial and accounting data that in most of the cases in the financial statements and periodical reports. Therefore, many studies and researchers used the ratio analysis technique to measure the Islamic banks' performance in the form of profitability ratios.

This is because the main advantage of these ratios is to remove disparity based on the banks size of deposits, advances, and network and brings the banks at par status (Hassan, and Bashir, 2005); (Khaskhelly, 2015). Notably, the ratios shall be compared to a predefined standard or benchmark in order to provide their significant results.

Another way for assessing the performance system of banks is through CAMEL rating. CAMEL model is widely used by banks and regulatory bodies evaluate five (5) core areas that include: Capital Adequacy, Asset Quality, Management, Earnings, and Liquidity. The aim of the evaluation is to give rating pertaining banks' financial performance and soundness operations (Babar and Zeb, 2011); (Desta, 2016).

For the purpose of the evaluation, the data and information have to be gathered from financial statements, budgets and cash flows projections, portfolio aging schedules, funding sources, board of directors' information, operations and staffing, and macroeconomic indicators (Sarker, 2005). CAMEL rating based on scale of 1 to 5. The assigned scale of 1 represents a strong financial performance of bank and it sounds in every respect; scale 2 gives the bank a satisfactory performance status with modest correctable actions; scale 3 puts the banks in a fair position toward the financial performance however a close supervision is required; scale 4 shows a marginal performance of bank with some risk of failure, and finally scale 5 represents unsatisfactory performance and high degree of failure evident (Sarker, 2005); (Babar and Zeb, 2011); (Desta, 2016).

Accordingly, the common ratios that are used to assess the banks' performance can be presented is the following measures of bank's profitability and performance.

a. Profitability Ratios

The most common measures for the bank's profitability include the ratios of Return of Assets (ROA), Return of Equity (ROE), and/or Net Interest Margin (NIM). Since the Islamic banking does not deal with interest, the ratio of Net Interest Margin (NIM) is not applicable, therefore, a modified ratio of Non-interest Margin is considered (Hassan and Bashir, 2005); (Elgadi, 2016); (Aliyu and Yusof, 2016); (Mehta and Bhavani, 2017).

1. Return on assets (ROA):

this ratio is a basic measure of bank profitability that is a useful measure because it indicates how well a bank's resources are being used to generate profits and also uses to measure the managerial efficiency (Mishkin and Eakins, 2018). The ROA ratio can be expressed as follows:

$$ROA = \text{Net Profit/Total Assets}$$

2. Return on equity (ROE):

This ratio evaluates efficiency at generating profits from the equity. The bank's owners (equity holders) care about this ratio as they are more concerned about how much the bank is earning on their equity investment (Mishkin and Eakins, 2018). The ROE ratio can be calculated as follows:

$$ROE = \text{Net Profit / Total Equity}$$

3. Net Profit Margin (NPM):

It represents the net profit (after tax) over the annual income that earn by the bank. NPM is a good indicator to assess the operational efficiency that reflected into bank's assets management. NPM is calculated by dividing the net profit to the gross income (revenue) for a given period as below formula:

$$NPM = \text{Net Profit / Gross Income}$$

4. Non-interest Profit Margin (NIM):

This ratio represents the bank's earnings from non-interest activities (i.e., fee, commission and share in investment's profit less non-interest expenses) over total earning income, for a concerned period (Hassan and Bashir, 2005).

NIM = Net of (non-interest income and expenses) / gross non-income

Other ratios for partially assessing the performance of bank as follows

b. Capital Risk and Performance Ratios

The most common ratios to assess the risk and performance of bank's capital are the capital adequacy ratio (CAR) and the equity to total assets ratios (Khaskhelly, 2015). The Capital Adequacy Ratio (CAR) measures banks' capital against its Risk Weighted Assets (RWA). The higher ratio does not always mean good performance but indicates that large amount of capital is kept to meet risks arising out from bank's risk exposures, whereas these risks are credit, market and operational risks. CAR can be calculated as:

CAR = Regulatory Capital (Tier.1 +Tier.2 + Tire.3) / Risk Weighted Assets.

On other hand, equity to total assets (ETA) ratio measures the capital position and it shows to which extend bank protects against its assets and investments. It tells about capacity of shock absorbance arising out from potential losses of loaned assets and investments. Generally, higher ratio is better indicator of maintaining the existing loan losses. A simple calculation is as that:

ETA = Equity / Assets

c. Management Efficiency

Income Expense Ratio (IER):

This ratio measures the amount of income earned in comparison to operating expenses.

It is very common ratio used by bank management to improve efficiency by controlling operating expenses which results in better income generation. Usually, higher ratio means better performance in terms of profit with respect to operating expenses. Calculation of such ratio as follows:

IER = Total Income / Total Operating Expenses

d. Management Ability

1. Asset Utilization (AU):

This tells how effectively bank's management uses its assets for revenue generation. The higher ratio is indicator of better use of assets to generate income. AU is shown as following formula.

AU = Total Revenue / Total Assets

2. Loan to Deposits Ratio (LDR):

This ratio indicates that how a bank utilizes its deposits by extending loans. A relatively low ratio contributes higher liquidity and results in low profits, while low ratio creates stress for managing liquidity but higher profits.

A simple calculation of this ratio as follows:

LDR = Total Loans / Total Deposits

3. Loans to Assets Ratio (LAR):

This ratio measures that what percentage a bank has invested in shape of loans; the higher ratio indicates less liquidity. But it is worth to mention that high ratio leads to better profitability with risker of its liquidity and solvency. The ratio can be calculated as below:

LAR = Total Loans/Total Assets

Section Two

2.2 Risk Management Practices

2.2.1 Introduction

The philosophy of banks in creating a successful business and for maintaining a market sustainability depends on how effectively the banks use and manage various types of financial resources in a dynamic environment. This situation leads the banks' management to tackle different decisions concerning the future of the business in order to maximize the business outcomes and achieving their goals. It is inevitable that these decisions are associated with risky positions that create a challengeable factor affecting the business operations. Accordingly, the banks have been motivated to establish a system that provide an awareness and reasonable assurance to avoid such risky position and to support in mitigating negative outcomes may arise from the business process and operations.

Therefore, risks consider an important component by which the banks operations get affected. Hence, managing these risks properly is a successful factor especially in banking industry where risk attached with most of the process and resources. Banks tend not only to establish a separate risk management function to ensure proper practicing of the risk management role, but also to acknowledge the awareness of risk management in all business' operations for the purpose of reasonable confirmation that their values in the market, productivity and profitability status are appreciating.

Islamic Banks likewise conventional banks, they face common major types of risks although some of these risks have different dimensions in Islamic Banks (Ahmed. and Khan,2007; Salem, 2013).

In addition to that, Islamic Banks face further types of unique risks due to the characteristics of their financial products, and the jurisdiction of business operations. As conventional banks' operations are based on interest rates, where as in Islamic Banks' operations are based on the principle of sharing profits and losses between counterparties.

2.2.2 Risk Management Framework

The risk management framework is a general perspective of a system composed of risk management components, process and activities in the business integrated environment. Risk is defined as "uncertainties potentially resulting in adverse variations of profitability or in losses". However, risk is not identical to uncertainty. Uncertainty refers to the randomness of outcomes, whereas, risk refers to the adverse effect on wealth that such outcomes have. Risk exists only when uncertainty can have a potential adverse effect which is a possibility of loss (Bessis, 2010).

Another definition for the risk has been given by Islamic financial Services Board as: "Risk is the consequence of a choice that contains uncertainty, with the potential to generate an unwanted result or other negative consequence experienced by decision maker" (Wahyudi, et al., 2015).

The Concept of Risk Management

Risk management is an important part for both individuals and organizations as long as there are many decisions related to anticipated outcomes in future, and these outcomes are not isolated from risks. In the context of banks, managing the risk refers to the process of reducing the negative impact or loss between the expected and actual results, and this process shall be rooted in all banks' activities.

There are many definitions given for the risk management based on different situations and people perception and there is no a single agreed definition for risk. However, following attempts provide the definition of risk in the context of business. The Institute of Risk Management (IRM) defined the risk management as: "It is the process whereby organizations methodically address the risks attaching to their activities with the goal of achieving sustained benefit within each activity and across the portfolio of all activities". The IRM highlighted that the risk management should be a continuous and developing process, address methodically all the risks surrounding the organization's activities, and integrated into the culture of the organization with an effective policy and a program led by the most senior management (IRM, 2015).
Furthermore, risk management is defined in the context of Islamic banking as a process with a number of interconnected phases of activities that complete and complement each other. And this risk management process is an inseparable part of Islamic Bank process and must be integrated into each and every business activity. (Wahyudi, et al., 2015, p.47).

Risk management practices become a paramount important function to reduce the agency costs of equity and debts, prevent distortions in banks' investment policy and avoid the financial distress.

This clearly evidences that risk management practices are significant factors in banks' performance (Zouari and Abdelmalek. 2020).

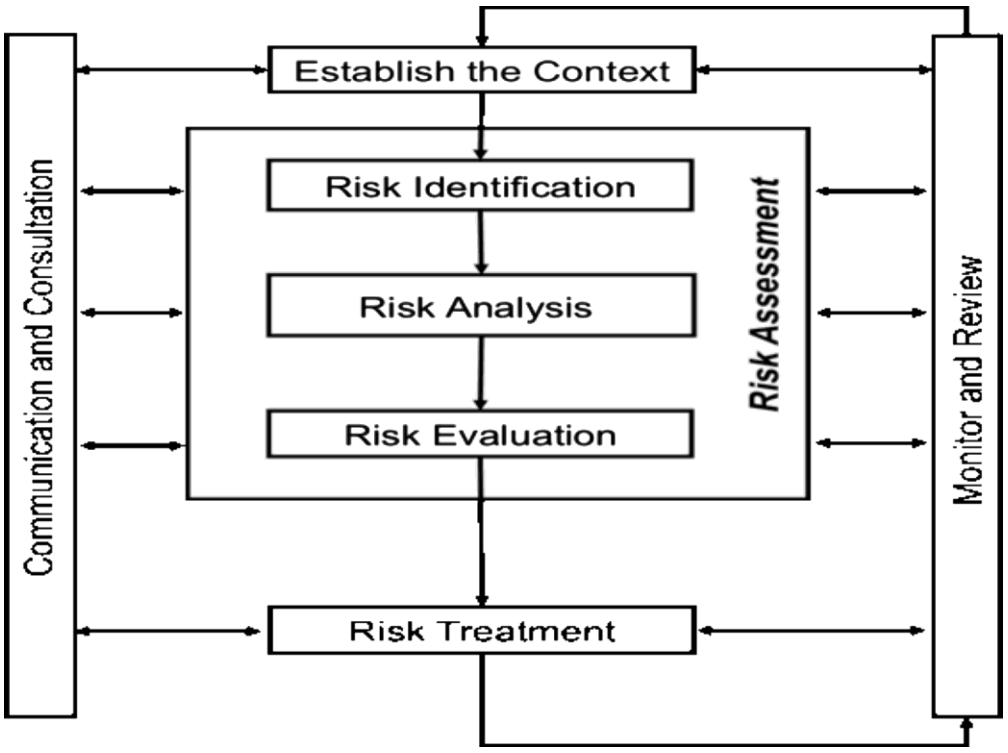
2.2.3 Risk Management Process

Risk management process refers to the steps underlying any risk management system, which are identifying risks, going through having consistent and understandable measures for each risk, then choosing among risk mitigation strategies, and conclude by establishing appropriate procedures to monitor the results, which is very important step in any risk management process as it allows for constructive analysis (Salem, 2013).

The International Organization for Standardization (ISO) issued standard ISO31000:2009 provides generic guidelines for the design and implementation of risk management processes throughout an organization. It is largely adopted for managing risk as shown in Figure 2-1, (Purdy, 2010, p.883).

Figure (2-1)

The Risk Management Process from ISO 31000:2009



Source: Purdy (2010) "ISO 31000:2009. Setting a New Standard for Risk Management", p.883

There are two elements of the process that shall be actively working on a continuing basis. These elements are:

a) Communication and consultation with internal and external stakeholders in order to obtain their input to the process and their ownership of the outputs.
b) Monitoring and review the appropriate action occur with respect to existing risks and new risks emerge as a result of changes in either the organization's objectives or the internal and external environment in which the origination operates.

As per figure (2-1), the process starts through defining the context as the step called “Establishing the Context”. Such step refers to what the organization wants to achieve and the external and internal factors that may influence success in achieving those objectives.

Furthermore, Purdy (2010) states that the risk assessment comprises the following steps that include:

a) Risk identification: It refers to finding, recognizing and describing risks that might affect the organization’s outcomes. It involves the identification of risk sources, events, their causes and their potential consequences. Risk identification requires an application of a systematic process and historical data, theoretical analysis, and stakeholder's needs.

b) Risk analysis: It is the process to comprehend the nature of risk and to determine the level of risk. It is concerned with understanding and developing risk estimation of each risk type within the organization, its consequences, and the likelihood of those consequences.

c) Risk analysis: This step requires a detailed data and information in order to fulfill its needs although it depends on the context, risk, the purpose of the analysis, and the availability of data and information resources. The analysis expresses in either or both qualitative and quantitative measures, based on the circumstances without preference bias. Risk analysis provides the basis for risk evaluation and decisions about risk treatment.

d) Risk evaluation: It concerns with assessing probability and impact of each type of risk in the organization, taking into account any interdependencies or other factors outside the underlying context. Risk evaluation involves making a decision about the level of risk and the prioritization to assist the decision-making process.

e) Regarding the risk treatment; it defines as the process to modify the risk by which improving the existing controls or developing new controls. It also

involves valuation and selection of practicable options to handle the risk that may affect the organization.

It is worth to mention that, risk treatments that deal with negative consequences are sometimes referred to as “risk mitigation”, “risk elimination”, “risk prevention” or “risk reduction”.

Finally, the standard gives a set of options for risk treatments as follows:

a. Avoiding the risk by not to continue with the activity that gives rise to the risk.
b. Taking the risk as an opportunity for the organization.
c. Removing the source(s) of the risk.
d. Changing the likelihood of the risk occurrence.
e. Changing the risk consequences;
f. Sharing the risk with another party or parties.
g. Retaining the risk to an acceptable level that can be managed by the organization.

Risk-Based Analysis of Banks

Despite the fact that Islamic banks and conventional banks are differ in their financial instruments, and structure of financial statements, both have a similar framework for analyzing their risk and exposures. Therefore, the analytical framework for assessing risk should be similar. The central technique for analyzing bank’s financial risk is the detailed review of a bank’s balance sheet considering the bank as single entity and on a consolidated basis, if any, in order to consider the exposures of subsidiaries.

The risk-based bank analysis includes the necessary qualitative metrics and financial ratios that provide a broad framework of risk assessment and management (Greuning and Iqbal, 2008).

Moreover, the analysis of banks' risk takes different tools for obtaining the qualitative and quantitative data which include: questionnaires and data tables, financial ratios, graphs and charts for events/process. The common analytical techniques include the ratio analysis, common-size analysis, cross-sectional analysis, trend analysis, and regression analysis.

Greuning and Iqbal (2008) stated that ratios are a useful in expressing relationships in the following areas of risk:

a. Activity (operational efficiency) that related to bank efficiency.
b. Liquidity: it covers bank's ability to repay its short-term liabilities.
c. Profitability that shows the relation between a company's profit margins and sales, average capital, and average common equity.
d. Debt/ leverage that shows the risk and return characteristics of the bank.
e. Solvency: it looks into the impact of changes in capital structure.
f. Earnings, share price, and growth and profitability.

2.2.4 Risk Management in Islamic Banks

Islamic finance has grown strongly in recent years and has reached systemic significance in a considerable number of countries. It continues to expand in Muslim economies jurisdiction and start its operations throughout windows in countries that dominant by conventional banking (Wahyudi, et al. 2015). Therefore, this rapid growth has brought the risk profiles of Islamic banks into sharp focus.

The General Council for Islamic Banks and Financial Institutions "CIBAFI" survey which published in 2015, revealed considerable concerns about the risks that Islamic banks are facing today and probably in the future (CIBAFI, 2015. p2).

Adding to that, the survey questioned about how the Islamic banks have a capacity to deal with such risks? Considering that, Islamic banks face a triple struggle in the changing world of risk management (CIBAFI, 2015).

The Islamic finance standard-setting bodies (such as Islamic Financial Services Board (IFSB), Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI) and others have made strong progress in developing specific standards. Despite that these standards have not been applied in all jurisdictions and regulatory regimes overseeing financial systems have generally not caught up with the evolution of Islamic products and approaches (CIBAFI, 2015).

Additionally, the assets and liabilities sides in the Islamic banks have unique characteristics. The Islamic banking model has evolved to one-tier Mudarabah with multiple investments tools. On the liabilities side, saving and investment deposits take the form of profit/Loss sharing (PLS) investment accounts. And the investment accounts can be further classified as restricted and un-restricted according to the maturity of withdrawal. Demand deposits or current accounts in Islamic banks take the nature of "*Gard-hassan"*, and are returned fully on demand. On the assets side, banks use Murabahah, bai-muajjal (price deferred sales), Istisna, Salam, (object deferred sale), and Ijarah plus the "PLS" modes including Mudarabah and Musharakah.

Ariffin, et al., (2009) remark that Islamic banks are seen to use less technically advanced risk measurement techniques in the analysis and assessment stages. These include maturity matching, gap analysis and credit ratings, Value at Risk (VaR), simulation techniques, and estimates of Risk-Adjusted Return on Capital (RAROC), which are not widely used by Islamic banks.

The main reason for that is that Islamic banks are still growing and their resources and systems are not sufficient to use more technical advanced techniques. Moreover, Islamic banks are not fully using the Sharia'-compliant risk mitigation methods that are different from the ones used by conventional banks. The justification of this argument is that these methods are still subject to many objections by *fiqh* scholars which may lead to speculation practices.

Classifications of Risks in Islamic Banking

Risk in Islamic banks can be classified into four major categories. Al Rahahleh, et al., (2019) identified the first three types that include (i) financial risk. (ii) business risk. (iii) treasury risk, while Salem (2013) added the fourth type to include (iv) governance risk.

These categories are summarized as follows:

a. Financial risk: It refers to the possibility of incurring a direct financial loss of assets and liabilities. The financial risk is divided into three sub-types to include: credit risk, market risk, and equity investment risk.

b. Business risk: It is associated to organization's business activities, operational environment, changes in macroeconomics or policy, legal and regulatory factors, and the financial sector's infrastructure such as payment systems and the auditing professions. In this context, the Islamic banking exposes to a particular risk that is the rate of return risk.

c. Treasury risk: It is related to asset and liability management (ALM), short-term liquidity management, and cash and equity management. Generally, Islamic banks face liquidity risk and hedging risk, however, the liquidity risk is considered one of the most critical risks due to:

(i) Limited liability of the *Shariah*-compatible money market and inter-bank market

(ii) Slow development of Islamized financial instruments and the weakness of their secondary market.

(iii) High concentration on short to medium term investments in banks' portfolios.

d. Governance risk: This refers to the risk arising from a failure on the part of the governing institution, negligence in conducting a business, and meeting contractual obligations and from a weak internal and external institutional environment. The governance risk comprises the parts of legal and *Shariah* risks (Salem, 2013. p.34).

Moreover, Salem (2013) provides a comprehensive picture for the types of risks that affect Islamic banks. They have been generally divided into two main categories that include:

(i) Financial risks category, and

(ii) Operational risks category.

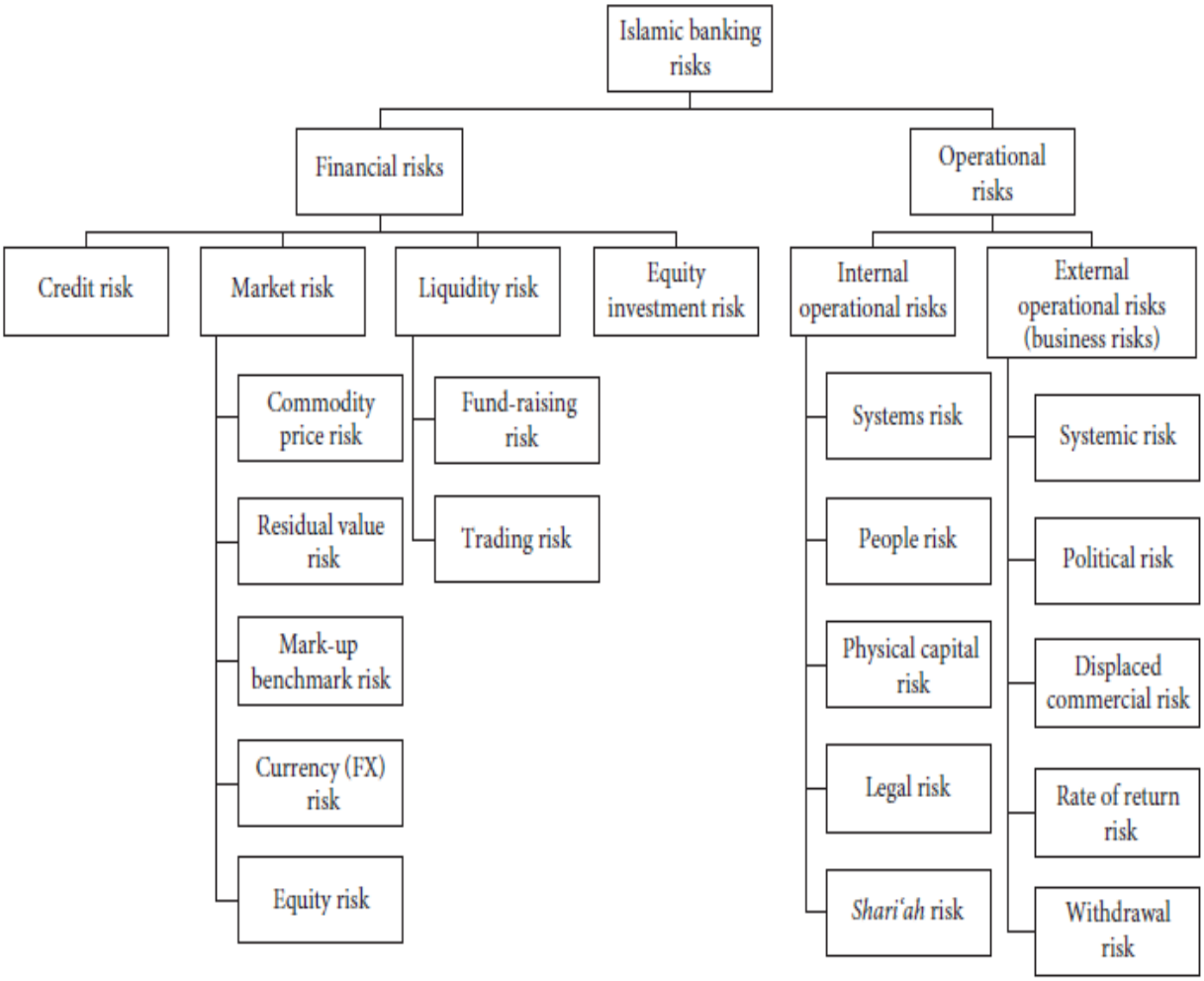
The financial risks include credit, market, liquidity and equity investment risks. Whereas, the operational risks include those risks arising as a result of internal factors and external factors.

The operational risks arising from internal sources are systems risk, people risk, physical capital risk, legal risk and *Shariah* risk. The operational risks arising as a result of external sources – sometimes called as business risks – include the systemic risk, political, displaced commercial risk (DCR), withdrawal risk and rate of return risk.

The following figure (2-2) provides a clear structure of different types of risks that influence the Islamic banks' operations

Figure (2-2)

An Overview of Islamic Banks Risks



Source: Salem (2013), Risk Management for Islamic Banks (p.35)

2.2.5 Risk Management Practicing in Islamic Banks

Scholars and risk management standards emphasize the participation of the board of directors (BOD) in the risk management of an organization.

With reference to the Basel Committee on Banking Supervision-BCBS [(2000); (2011)] there are three important components to be used in risk management systems.

These components are:

a. Risk management process.
b. Appropriate overview by the BODs and management.
c. Internal control.

Align to the BCBS, the Islamic Financial Services Board - IFSB (IFSB-1, 2005) has set out the general requirements of risk management practices to provide a comprehensive risk management and reporting process to be adopted by Islamic financial institutions, banks are one of them. This includes appropriate board and senior management oversights to identify, measure, monitor, report and control relevant categories of risks and to hold adequate capital against these risks. The process should take into account appropriate steps to comply with *Shari'ah* rules and to ensure the adequacy of relevant risk reporting to the supervisory authority.

Due to the unique nature of risks in Islamic finance, risk management practices are broadly defined to include the following:

a. General requirements of risk management practice.
b. Risk management (i.e., risk identification, measurement, monitoring, control and reporting).

The IFSB issued a comprehensive document of the standards that are concerned with risk management on Islamic financial institutions, in December 2005. The standard's guidelines explain fifteen (15) principles to include the general requirements for risk management and six (6) major risk areas, namely; credit risk, equity investment risk, market risk, liquidity risk, rate of return risk/displaced commercial risk and operational risk.

The Role of Board of Directors (BOD) and Senior Management in Risk Oversight

The IFSB (IFSB-1, 2005) states that risk management activities of Islamic banks require an active oversight by the BOD and senior management.

The BOD shall approve the risk management objectives, strategies, policies and procedures that are consistent with the Islamic banks' financial condition, risk profile and risk tolerance. Such approvals shall be communicated to all levels in the banks involved in the implementation of risk management policies. The BOD shall ensure the existence of an effective risk management structure and adequate systems for measuring, monitoring, reporting and controlling risk exposures in order to conduct the bank's activities.

Also, the BOD shall approve limits on aggregate financing and investment exposures to avoid concentration of risk and ensure that the bank holds adequate capital against these exposures. Moreover, the BOD shall review the effectiveness of the risk management and Shariah compliance activities periodically and make appropriate changes as and when necessary.

Senior management shall execute the strategic direction set by the BOD on an ongoing basis and set clear lines of authority and responsibility for managing, monitoring and reporting risks. The senior management shall ensure that the financing and investment activities are within the approved limits and must obtain approval from the BOD.

Also, senior management shall ensure that the risk management function is independent from the risk-taking activities and is reporting directly to the BOD or senior management outside the risk-taking unit.

It is worth to mention that the role of different stakeholders in the risk management system in Islamic banking has been defined by Ahmed (2011) in the following table (2-2).

Table 2.2. The Role of Different Stakeholders in the Risk Management System

Body/Unit	Function	Duties and Role
Board	Setting overall strategy and policies	Define overall objectives and ensure its implementation by management.
Management	Set up an institution - wide risk management	Identify the risks and implement the objectives and policies of the board
Risk Management Dept./Unit	Identify and measure risks	Set up standards, limits, and rules, guidelines, and procedures related to risks. Publish various risk reports periodically (for both current situations and expected future
All operational units/employees	Identify and control the risks	Follow the standards, limits and rules, guidelines, and procedures related to risk.
Internal Audit	Monitor risk management process	Ensure that risk related guidelines and policies are followed and implemented at different levels of operations.

Source: Ahmed (2011), "Risk Management Assessment Systems: An Application to Islamic Banks". Journal of Islamic Economic Studies, Vol. 19, No. 1

2.2.6 Risk Management Process in Islamic Banking

IFSB (IFSB-1, 2005) acknowledges the needs of a sound process in Islamic banks for executing all elements of risk management process, including risk identification, measurement, mitigation, monitoring, reporting and control.

This process requires the implementation of appropriate policies, limits, procedures and effective management information systems (MIS) for internal risk reporting and decision making that align with the scope, complexity and nature of banks' activities. Moreover, an adequate system of controls with appropriate checks and balances shall be in maintained by Islamic banks in order to comply with *Shariah* rules, applicable regulatory and internal policies and procedures.

A formal standardized reporting system shall be applied by Islamic banks to communicate the regulatory authorities and to ensure the quality and timeliness of risk reporting. Additionally, Islamic banks shall provide additional and voluntary information needed to identify emerging problems possibly giving rise to systemic risk issues.

The banks shall make appropriate and timely disclosure of information to Investment Account Holders so that the investors are able to assess the potential risks and rewards of their investments and to protect their own interests in their decision-making process. The IFSB recommends to use applicable international financial reporting and auditing standards for this purpose (IFSB-1,2005).

Internal Control

Internal control in bank aims to guarantee achieving the bank objectives in its operational efficiency, productive efficiency and preparing reliable financial reports. Internal control includes all what control the risks that the bank might go through.

The Committee of Sponsoring Organizations (COSO) defined the internal control as all the means and procedures used by the entity to protect its assets and to ensure the accuracy and completeness of accounting and statistical data to raise the productive efficiency in the company and achieve effectiveness.

It is a system consists of policies and procedures designed to provide management with reasonable assurance that the company achieves its objectives and goals (Al-Rawashdeh, 2018).

In reference to COSO, internal control components include:

a. **The control environment:** It represents the culture, discipline and action of BOD and management toward the internal controls and how they see the importance of controls to capture the entity's activities and its role.
b. **The control activities:** These are the policies, procedures and internal controls that help to ensure the implementation of management directives and take action to address risks and meet the business' objectives. Also, such activities include that management, their staff, and internal auditors test to ensure compliance.
c. **Risk assessment:** It identifies the risks that facing the entity, analyze them, the reasons for their occurrence, and assess the degree of their seriousness and impact on the financial data.
d. **Information and communication:** they refer to the process for obtains, generates and uses relevant and quality of information, policies, and compliance matters in order to support the functioning of internal control. Communication can be through internal and external communication methods.
e. **Monitoring activities**: Are the periodic and continuous assessment of the various internal control components by the management in order to determine deficiencies and communicate those parties in charge.

2.2.7 The Types of Risks in Islamic Banks

As mentioned early, the IFSB (IFSB-1, 2005) standard No-1 named "Guiding Principles of risk management for institutions (other than insurance institutions) offering only Islamic financial services" outlies six (6) categories of risk that affect Islamic banks in general.

These (6) categories of risk that affect Islamic banks are:

a. Credit risk.
b. Equity investment risk.
c. Market risk.
d. Liquidity risk
e. Rate of return risk.
f. Operational risk.

Following briefs highlight an explanation that given by the standard:

a. Credit Risk

Credit risk is generally defined as the potential that a counterparty fails to meet its obligations in accordance with agreed terms. It includes the risk arising in the settlement and clearing transactions. Islamic banks concern themselves with the risk of a counterparty's failure to meet their obligations in term of receiving deferred payment (such in *Mudarabah, Diminishing Musharakah* and *Ijarah*) and making or taking delivery of an assets (such in *Salam* and *Istisna*). Therefore, credit risk shall be assessed separately for each financing mode due to its unique characteristics (IFSB-1, 2005).

Furthermore, Salem (2013) noted that credit exposures take the forms of credit concentrations, credit processing and market/liquidity sensitive credits. Credit concentrations refers to the consequences from the potential losses that are significant in volume comparing with bank's capital. Whereas, credit processing emphasizes with the challenging, time consuming and required data for credit assessment. Finally, market/liquidity-sensitive credits impose more challenges to credit processes in a bank and thus increase credit exposure.

In addition to that, credit risk can also be seen as settlement risk and as counterparty risk that results from the non-performance of a trading partner.

In case of default of counterparty, some jurisdictions prohibit the Islamic banks from imposing any penalty except in the case of deliberate procrastination. Given that, any imposed penalty amount, it is prohibited to be used by the bank for its own benefits, it has to be donated to charity.

The guiding principles of credit risk that issued by IFBS (2005, p.7) include:

1. Islamic banks shall have a strategy for financing whereby it recognizes the potential credit exposure in different stages of the agreements.
2. Islamic banks shall carry out due diligence review in respect of counterparties prior to deciding on the appropriate financing instruments.
3. Islamic banks shall have in place appropriate methodologies for measuring and reporting the credit risk exposures.
4. Islamic banks shall have in place Shariah compliant credit risk mitigating techniques appropriate for each Islamic financing instruments.
5. Islamic banks shall have appropriate credit management system and administration to undertake early remedial action in the case of financial distress of a counterparty.
6. Islamic banks shall have in place an appropriate policy to determine and allocate provisions for doubtful debts including counterparty exposures and estimated impairment in value of leased assets.

Helmy (2012) argue that the unique characteristics of the financing modes that are provided by Islamic banks result in the following special credit risks:

1. In Murabahah transactions; the bank is exposed to credit risk in case of the bank does not receive the payment from the client in time. In addition, in non-binding Murabahah, the bank exposed to price and market risks.
2. In bay's al-salam or Istisna contracts; the bank is exposed to the risk of failure to supply on time, to supply at all, or supply the quality of goods as contractually specified. Such failure could result in a delay or default in payment, or delivery of the product.

Consequently, Islamic banks negatively being affected by financial losses of income as well as capital.

3. In case of Mudarabah investment; where the bank enters into Mudarabah contract as *Rab-al-mal* with external *mudarib*, the Islamic bank is exposed to enhanced credit risk on the amounts advanced to the *mudarib* since the bank does not have a right to management this project under mudarabah.

b. Equity investment risk

IFSB-1 (2005) defined the equity investment risk as the risk arising from entering into a partnership for in order to undertake or participate in a particular financing or general business activity as agreed by between the bank and its client. The type of equity investment is exposed to a confluence of risks associated with *Mudarabah* and *Musharakah* partner and operations.

IFSB (2005) gave operational considerations as principles to guide the Islamic banks in tackling the Equity investment risk. These principles include:

1. Bank has to undertake a due diligence exercise to the risk profile of potential partners for the profit-sharing instruments of Mudarabah or Musharakah. Such due diligence is essential to fulfilment the Islamic banks' fiduciary responsibilities as an investor of Investment Accounts Holders (IAH) and funds provider for Profit-Loss-Sharing (PLS) basis contracts. Therefore:

(i) Islamic banks shall maintain appropriate strategies, risk management and reporting processes in respect of the risk characteristics of equity investments.

(ii) Islamic banks shall ensure that their valuation methodologies are appropriate and consistent, and assess the potential impacts on their methods – that agreed with the depositors – on profit calculations and allocations.

(iii) Islamic banks shall define and establish the exist strategies in respect of their equity investment activities, including extension and redemption conditions for Mudarabah and Musharakah, subject to the approval of institution's *Shariah* Board.

2. Equity investment risk should not be mixed up with equity risk. Equity investment can lead to distortions of bank's profit as a result of high concentration of risks represented in credit, market and liquidity risks accompanying the invested instruments.

c. Market Risk

Market risk is the risk of losses in on and off-balance sheet position arising from movements in market prices such as fluctuations in values of tradable, marketable or leasable assets and off-balance sheet individual portfolios. Also, the impact of price changes may cause to fluctuation in the markup or benchmark rate, foreign exchange rates, equity prices, commodity prices, and residual value of leased assets (IFSB-1, 2005, p.16).

According to Ahmed (2007), Helmy (2012) and IFSB-1 (2005) guidelines, the market risk in Islamic banks can be categorized into the sub-risks that explained in the following part.

1. Markup or Benchmark Risk

It is specific to Islamic financial contracts. Islamic banks use a benchmark (such as market interest rate) to price different financial instruments such as Murabahah. Murabahah contract including markup that determines by adding the risk premium to benchmark rate (usually LIBOR)[6]. Then, markup will be fixed and non-adjustable during Murabahah contract regardless the changes in the benchmark.

[6] LIBOR refers to London Interbank Offered Rate

2. Commodity Asset Price Risk

This type of risk is specific to Islamic financial contracts, and it arises as a result of bank holding commodities or durable assets as in Salam, Istisna, Ijarah, Mudaraba and Musharakah. Islamic banks are exposed to commodity asset price risk during the period of the sale and delivery of the commodity.

3. Residual Value Risk

It is specific risk to Islamic Banks contracts. In case of an operating Ijarah, the bank is exposed to market risk due to a fall in the residual value of the leased asset at the expiry of the lease term or, in case of early termination due to default of lease, over the life of the Ijarah contract.

4. Foreign Exchange (FX) Risk

This risk arising from general FX spot rate changes in both cross-border transactions and the resultant foreign currency receivables and payables. Such risk is identical to the FX risk in conventional bank.

5. Equity risk

Such risk is identical to the securities price risk in conventional bank. With a growing market for Islamic securities such as "sukuk" which defined as Islamic bonds, Islamic banks invest a portion of their assets in marketable securities. However, the prices of such securities are exposed to current yields in the market. Similar to a fixed-income security, the prices go down as yields go up and vice versa. Islamic banks holding such securities are exposed to volatility in yield, unless they hold the security until maturity. Furthermore, the secondary market for such securities may not be very liquid.

d. Liquidity Risk

The IFSB-1 (2005) defined the liquidity risk as the potential loss to Islamic financial institutions arising from their inability either to meet their obligations or to fund increase in assets as they fall due without increasing unacceptable costs or losses.

Another liquidity risk related definition is a bank's inability to settle all of its liabilities maturing in a year or less, regardless the fact that a bank is seen to be liquid enough if its current assets greater than its current liabilities (Wahyudi, et al., 2015, p.268). Accordingly, there are two dimensions of liquidity risk in Islamic banks as follows:

a. To deal with the availability of liquid assets (liquidity of assets).
b. Ability to raise liquid funds at a reasonable cost (fund raising).

The major two types of funds providers in Islamic banks, the current account holders and unrestricted investment accounts holders (IAH). These accounts holders require a degree of liquidity to be available by the banks to meet their requirements for demanding withdrawals (IFSB-1, 2005).

The Islamic banks may rely heavily on funds provides by current account holders due to the nature of this account, however, a sound repayment capacity by the banks is necessary to be ready in order to meet fully cash withdrawal requests when they arise. In another hand, the unrestricted IAHs usually they make withdraws as a result of lower rates of returns than expected by IAH and concerns about the banks financial position.

Therefore, the Islamic banks are concerned with matching their investment policies with IAHs and shareholders' risk appetites. This is to avoid a liquidity crisis may occur due to withdrawals of funds by IAHs, particularly the unrestricted IAHs. Therefore, the liquidity risk management in Islamic banks represents a significant challenge as maintaining large amounts of idle cash has negative impact on the profitability position and banks' financial performance (Salem, 2013).

Additionally, Shariah rules impose certain limitations on trading financial claims unless such claims are linked to a real asset.

Hence, Islamic financial system started to develop some instruments to deal with the liquidity risk in Islamic banks, the early acts such as (Helmy, 2012):

- The introduction of *Shariah* compatible securities to provide liquidity in the market, such as the case of Central Bank of Sudan.
- Establishing Islamic Inter-bank Money Market (IIMM), as in case of Bank of Negara Malaysia since early 1994.

e. Rate of Return Risk

The IFSB defined the rate of return risk in Islamic banks as the risk that results from the difficulty of predetermined return of an investment that invested by the investment account holder (IAH), as an increase in benchmark rates may result in IAHs' having expectations of higher rate of return. This position creates stress on Islamic banks in managing their investments (IFSB-1, 2005).

Helmy (2012) stated that rate of return risk differs from interest rate risk due to many facts, as follows:

1. Interest rate uses by conventional bank is fixed and there is less uncertainty in the return on the investment held to maturity. While Islamic bank have a mix of markup-based and equity-based investments which are associated with high uncertainty ground.
2. Return on deposits in conventional banks is predetermined; in contrast, the return on deposits in Islamic banks is anticipated, but not agreed beforehand.
3. This risk has a consequence results in another type of risk named as: Displacement commercial risk.

Displacement commercial risk drives from competitive pressure on Islamic banks to attract and retain their funds providers (depositors). Such risk occurs when IAHs funds are invested by the Islamic bank in assets (mostly Mudarabah/Musharakah) with long term maturity and the rate of return may not be competitive with alternative investments. The Islamic bank may be pushed to a decision to waive their rights to part of all of their Mudarib/Musharakah share in profits infavour to the IAHs.

f. Operational Risk

IFSB stated that the operational risk in Islamic Banks is arising from failures in their internal controls that involve processes, people, systems and from external events. In such case, the controls couldn't be able to provide reasonable assurance of the soundness of operations and reliability of reporting, governance, and business process. Moreover, Salem (2013) addresses other sources of operational risks which include legal risk, systems risk and human risk.

Regarding the legal risk, Islamic banks should be able to identify legal risk based on the environment in which the bank operates, as most of the countries do not have specific statutes that support the unique features of Islamic products. The legal risk may have a substantial impact on Islamic banks because the lack of reliable legal systems and the uncertainty in the interpretation of financial contracts, among other factors.

From other hands, human capital in Islamic banks should have Shari'ah and financial knowledge, because the lack of knowledge will increase the likelihood of operational errors. Currently, human risk contributes highly to operational risk because of lack of adequate personnel, knowledge and adequately of trained in both areas *Shari'ah* and financial issues.

In addition to above types of risks, Islamic banks are exposed to risks relating to *Shari'ah* non-compliance and risks associated with the bank's fiduciary responsibilities towards different fund providers.

Shari'ah Non-compliance Risk arises from Islamic banks' failure to comply with the *Shari'ah* rules and principles that are determined by the Shari'ah Board of the Islamic banks or the relevant body in the jurisdiction in which the banks operate. No doubt that *Shari'ah* compliance is critical to Islamic banks' operations and such compliance requirements must permeate throughout the banks and their products and activities.

Therefore, *Shari'ah* compliance is considered as falling within a higher priority category in relation to other identified risks. If Islamic banks do not comply with *Shari'ah* rules and principles, their transactions must be cancelled and income generated from them shall be considered as illegitimate.

2.2.8 Risk Management Practices in Islamic vs. Conventional Banks

In many studies that conducted by the Islamic finance scholars, argued that Islamic banks not only face the type of risks that conventional banks face but they also identified new and unique risks as a result of unique finance modes of Islamic banks in comparison with conventional banks.

The nature of risks that affect the Islamic banks is complex and difficult to mitigate, for many reasons, including the following:

a. Given the trading-based instruments and equity financing, there are significant market risks along with credit risks in the banking transactions of Islamic banks.
b. Risks intermingle and change from one kind to another at different stages of a transaction. Taking the trade-based contracts "such as Murabahah, Salam and Istisna and leasing" are exposed to both credit risks during the transaction period of contract and to market risks at the conclusion of the contract.

c. The rigidities and deficiencies in the infrastructure, institutions and instruments, the risks faced are magnified and/or difficult to mitigate. This including:
   (i) Objections to the use of foreign exchange futures to hedge against foreign exchange risk.
   (ii) There are no *Shari'ah*-compatible short-term securities for liquidity risk management in most jurisdictions. (Ahmed & Khan, 2007).

Salem (2013) claims that Islamic banking operations serve as the basis to differentiate between risk management practices between Islamic banks and conventional ones. Although same sources as risks existing in conventional banks, they show a higher severity within the Islamic banking model due to the structure of these risks and Shariah compliances.

The following figure (2-3) depicted the changes in risk profile of Islamic banks due to these banks' nature and operations.

Figure (2-3)

Changes to the Risk Profile Due Distinct Features of Islamic Banks

Distinct features of Islamic banks compared to conventional banks		Changes to Islamic banks risk profile
Islamic banks	Conventional banks	
1- *Shari'ah* compliance	Non-existent	1- *Shari'ah* risk
2- Prohibition of *riba*	Based on interest rates	2- Rate-of-return risk 3- Mark-up benchmark risk
3- Lending facilities must be backed by a physical asset (PLS or salebased)	Facilities are only based on lending money based on interest rates	4- Commodity price risk 5- Increase operational risks for delivering/holding asset
4- Having PLS contracts	Non-existent	6- Equity investment risk 7- Increase operational risk (and asymmetric information)
5- Restrictions in requesting collaterals and penalties	No restrictions imposed	8- Increase credit risk
6- Investment accounts (deposits) are based on a *mudaraba* contract	All deposits are determined by interest rates	9- Displaced commercial risk (DCR)
7- Restrictions on secondary markets and interbank activities	Secondary markets witness continuous innovations	10- Increase liquidity risk

Source: Salem (2013), Risk Management for Islamic Banks, p.45

2.2.9 Basel Committee on Banking Supervision

Overview on Basel Committee

The Basel Committee – initially named the Committee of Banking Regulations and Supervisory Practices – was established by the central bank Governors of the Group of Ten countries (G-10) at the end of 1974 in the aftermath of serious disturbances in international currency and banking markets.

The Committee, headquartered at the Bank for International Settlements (BIS) in Basel, was established to enhance financial stability by improving the quality of banking supervision worldwide, and to serve as a forum for regular cooperation between its member countries on banking supervisory matters. The Committee's first meeting conducted in February 1975 (BCBS, 2015).

The Basel Committee started with the Basel Concord, first issued in 1975 and revised several times since, the Committee has established a series of international standards for bank regulation, most notably its landmark publications of the accords on capital adequacy which are commonly known as Basel I, Basel II and, most recently, Basel III.

At the outset, one important aim of the Committee's work was to close gaps in international supervisory coverage so that no banking establishment would escape supervision and supervision would be adequate and consistent across member jurisdictions. The Basel Committee (BC) from 1974 to 2015 works on developing banking regulation include five following regulatory steps. Such regulatory steps are proposed to reflect the dominating core document that intended for central and/or commercial banks (Penikas, 2015). These steps descried in the following part.

1974 – 1986: Concordat:

It was the first regulatory wave by the Basel Committee and it started to deal with supervisors' interaction a cross-border to resolve weak banks. It was driven by publication of the very first document '*Concordat*', followed by discussions and document preparation on other issues including Basel I and liquidity risk regulation.

1987 – 1998: Basel I:

The initial Basel Capital Accord (known as Basel I) was concluded in 1988 and introduced the basic capital adequacy ratio as the foundation for banking risk regulation. It was a ratio of bank capital to risk-weighted assets for credit risk only, with the aim of developing standardized risk-based capital requirements for banks across countries. Some deficiencies in Basel I were found and subsequent amendments were introduced during the period of 1996-1998, with additional focus on market risk that covered: interest rate related instruments, equities, foreign exchange risk and commodities risk.

1999 – 2008: Basel II:

Basel I Accord was replaced by a new capital adequacy framework named Basel II which has been published in June 2004, with several major differences to amended Basel I document. It tailored to introduce internal models for credit risk (internal ratings based "IRB" approach). It added quantifiable risk charge for operational risk. Basel II also introduced pillar-framework where Pillar I stood for minimum capital requirements, Pillar II as a supervisory review of Pillar I results and Pillar III summarizing approach to information disclosure that names as market discipline.

The main goals of the Basel II framework are to make the capital allocation more risk sensitive and align the economic and the regulatory capital among others. In addition to that Basel II introduced two new pillars making a total of three pillars. Basel II kept a minimum capital adequacy ratio (CAR) of 8% as an indication that a bank is adequately capitalized.

And Most subsequent enhancements to Basel II relate to the composition of this ratio, as the regulators try to adjust capital requirements to better capture banking business models (Akkizidis and Khandelwal, 2008).

Basel II does not intend to ensure compliance with a new set of rules rather than to enhance supervisory role and to improve response to risk management from four different perspectives. These are:

1. It provides improved risk measurement methodologies by incorporating the latest innovations in financial engineering.
2. It provides improved risk monitoring by providing a wide range of indicators which can be used by the regulators.
3. It attempts to bring to the forefront the importance of reporting by including the third Pillar, which is market disclosure.
4. It bridges the gap in risk management by introducing the role of supervision at the centre of risk management in Pillar 2.

2009 – 2011 – Basel III:

The result of this wave is 'Basel III' that was brought as a remedy and a response to 2007-2009 crisis with several innovations to banking risk regulation. Basel III proposes quantification for liquidity risk and redefined capital with extra capital buffers that were introduced beside the unweighted capital that shall be monitored in parallel to risk-weighted one. It proposes unified rules for remuneration of risk-taking staff. Therefore, Basel III seems to be an extension of the Basel II Framework with addition of new capital and liquidity standards to strengthen the regulation, supervision, and risk management of the whole of the banking and finance sector (Penikas, 2015).

The implementation of Basel III began in 2013. All banks would be required to strengthen their capital reserves by increasing the total amount of their minimum common equity plus capital conservation buffer (core reserves) from 2 percent to 7 percent.

By 2015, it is mandatory for banks to reserve an amount of core capital (Tier 1) equal to at least 4.5 percent of the value of risk-weighted assets (RWA).

Later on, by 2018, the bank will have to reserve another 2.5 percent in conservation capital as a fund reserve. Thus, the total percentage of high-quality capital reserve (minimum Total capital) the bank should gather by 2019 is 8 percent. Then by including the additional conservation buffer and countercyclical buffers, regulatory capital requirements will rise to 10.5%.

It is worth to mention that, Basel III increased the required minimum total capital gradually to reach ten and half percent (10.5%) by 2019 and setting a leverage limit at three percent (3%). As regards to the amendments relevant to liquidity standards, two regulatory liquidity standards were introduced by Basel committee to address the liquidity risk arising from shortage of liquid assets "liquidity coverage ratio" and to address the balance sheet mismatching risk "net stable funding ratio" (Salem, 2013).

These two standards for funding liquidity named: the liquidity coverage ratio (LCR) that issued on 2013 and the net stable funding ratio (NSFR) that issued on 2014. The LCR standard aims to ensure that a bank has an adequate stock of unencumbered high-quality liquid assets to meet its liquidity needs for a month liquidity stress scenario (BCBS 2013, p2). Whereas, the NSFR standard requires banks to maintain a stable funding profile in relation to the composition of their assets and off-balance sheet items (BCBS, 2014, p.1).

Basel III's suggestions to strengthen of global banks' capitalization as follows:

- to increase the quality, consistency, and transparency of capital.
- to extend the coverage of capitalization ratios.
- to increase risk-based minimum capital requirements according to leverage ratio.
- to reduce procyclicality and increase countercyclical buffers; and
- to mitigate the systemic risk of interrelations between financial institutions.

The implementation timeframe for Basel III (2013–2019) allows both policy makers and financial institutions plenty of preparation time to fulfill the main points of Basel III regulations, particularly in terms of capital requirements (Wahyudi, et al., 2015).

Moreover, Basel III (BCBS, 2017) seeks to restore credibility in the calculation of risk-weighted assets (RWAs) and improve the comparability of banks' capital ratios by:

- Enhancing the robustness and risk sensitivity of the standardised approaches for credit risk, credit valuation adjustment (CVA) risk and operational risk.
- Introducing a leverage ratio buffer to further limit the bank's leverage.
- replacing the existing Basel II output floor with a more robust risk-sensitive floor based on the Committee's revised Basel III standardised approaches.

In December 2017, BCBS issued an update with subsequent explanatory documents and refinements issued as late as early 2019. Accordingly, banks internationally are expected to finalize the process of phasing in the revised Basel III requirements by January, 2019, and considering that some of the latest changes are effective from 2022 only (Greuning and Bratanovic, 2020, p.129).

Following table shows Basel III quantitative requirements and initial timelines up to 2019.

Table (2-3)

Basel III Phases-in Arrangements

	2011	2012	2013	2014	2015	2016	2017	2018	2019
Leverage Ratio	Supervisory monitoring		Parallel run 1 Jan 2013 –1 Jan 2017 Disclosure starts 1 Jan 2015					Migration to Pillar 1	
Minimum common equity capital			3.5%	4.0%	4.5%	4.5%	4.5%	4.5%	4.5%
Capital conservation buffer						0.625%	1.25%	1.875%	2.5%
Minimum common equity plus capital conservation buffer			3.5%	4.0%	4.5%	5.125%	5.57%	6.375%	7.0%
Phase-in deducting from core equity Tier 1				20.0%	40.0%	60.0%	80.0%	100.0%	
Minimum Tier 1 capital			4.5%	5.5%	6.0%	8.0%	6.0%	6.0%	
Minimum Total capital			8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	
Minimum total capital plus conservation buffer			8.0%	8.0%	8.0%	8.625%	9.25%	9.875%	10.5%
No longer qualifying non-core Tier 1 and 2 capital instruments			Phased out over 10-year horizon beginning 2013						
Liquidity coverage ratio	Observation period starts				Introduce minimum standard				
Net stable funding ratio	Observation period starts							Introduce minimum standard	

Source: Basel Committee on Banking Supervision (2017) "High-level summary of Basel III reforms".

2012 – 2014 – Post Basel III

As Basel III is mostly finalized in terms of minimum requirements and implementation deadlines, recent years are marked by certain proposals that are still not associated with Basel III and are significant with respect to a latter one. The regulatory wave is characterized by significant changes in some other areas. These changes including the following: introduction of intraday liquidity management, revision of capital charge with respect to securitizations, adding capital charge for purchased credit protection, revision of approaches to managing credit concentration risk, revision of information disclosure standards (Penikas, 2015).

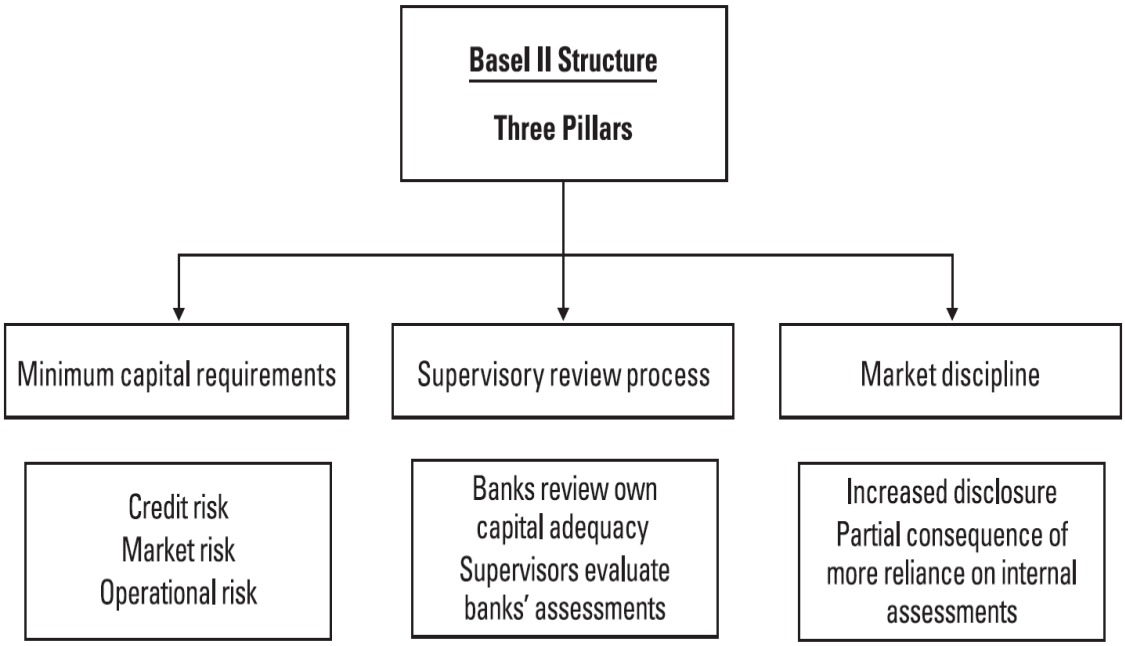
Characteristics of the Three Pillars of Basel II

Promotion of adequate bank's capitalization and improving risk management in banking industry are the overarching goal for Basel II. This goal was accomplished through the introduction of 'three pillars' that mutually reinforce each other for the purpose of enhancing the quality of bank's control processes. The first pillar represents the minimum capital requirements that set out in the 1988 Accord, while the second and third pillars represent innovative additions to capital supervision introduced in 2004. Nevertheless, the most advanced methods of Basel II being viable by 2007/2008 in the European Union and United States (Eid &Asutay, 2019).

The framework of Basel II can be depicted in the following figure (2-4).

Figure (2-4)

Conceptual Framework for the Basel II Accord



Source: Greuning and Bratanovic (2009), Analyzing Banking Risk - A Framework for Assessing Corporate Governance and Risk Management, (3rd edition), p.125

Pillar I: Minimum capital requirement under Basel II:

The components for the minimum capital requirement can be addressed using Basel II approach since it's a superior of Basel I and it considers the base for Basel III. (BCBS, 2017)

The minimum capital requirement is the regulatory capital and it is presented as the capital adequacy ratio (CAR), which is defined as a ratio with the numerator representing the amount of available capital and the denominator a measure of the risk faced by the bank. The CAR is a ratio of the bank's capital (called Tier I and Tier II) to its risk-weighted assets (RWA) and it should not be lower than 8%.

As compared to Basel I, there is no change in the numerator and the value of the ratio (8%). The change is in the denominator, by assigning the risk weights to different business activities faced by the bank (Moody's Analytics, 2011). Following is the Basel II formula to calculate CAR:

$$\frac{\text{Capital (Tier 1, 2,3 and deductions)}}{\text{RWA(Credit risk + Market risk + Operational risk charge)}} = \text{Bank's capital ratio} \geq 8\%$$

Source: Eid &Asutay (2019). Mapping the Risks and Risk Management Practices in Islamic Banking

The Tier 1 is the main measure of a bank's financial strength from a regulatory point of view and must be at least 50% of the total capital. It includes paid-up share capital, disclosed reserves from post-tax retained earnings, noncumulative perpetual preferred stock (goodwill to be deducted). Banks must hold 4% of Tier 1 capital of which a minimum core capital ratio of 2%.

Tier 2 capital considers as the second most reliable form of capital from a regulatory point of view. It consists in capital that is redeemable at a given date in the future or that may be difficult to value which can be a maximum 100% of Tier 1. it includes undisclosed reserves, asset revaluation reserves, general provisions and general loan-loss reserves, hybrid capital instruments, and subordinated term debt (a minimum maturity of five years).

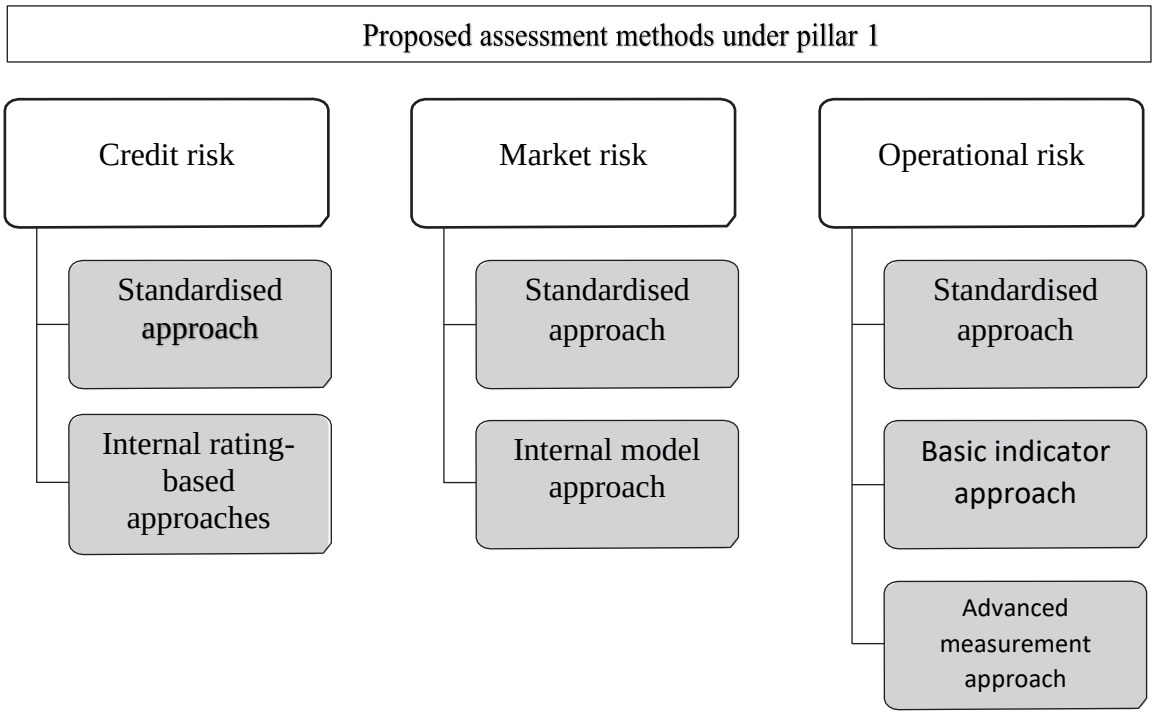
Tier 3 capital consists of short-term subordinated debt. A bank may only use this capital for covering market risk.

Risk-weighted assets (RWA) comprise the total of all those assets held by the bank which are weighted for credit risk according to a formula determined by the regulator (e.g., commercial loans are 100% weighted, residential mortgage are 50% weighted, some other assets would be 20% etc.) (Moody's Analytics, 2011)

The regulatory capital requirement covers market risk, credit risk and operational risk within the asset-based measure of risk. Basel committee proposed the necessary methods for quantifying the risks as shown in following figure (2-5) (Salem, 2013).

Figure (2-5)

Proposed Assessment Methods under Pillar 1



Source: Salem (2013), Risk Management for Islamic Banks, p.171

Credit Risk Measurement

The BCBS proposed the Internal-Rating-Based approach (IRB) and the standardized approach (SA) as prime methodologies to assess the credit risk (Akkizidis & Khandelwal, 2008). The IRB is an internal rating assessment of the credit facilities provided by the bank by estimating the bank's probability of default (PD) which measures the likelihood that the borrower will default over a given time horizon. While, the loss given default (LGD) which measures the proportion which will be lost from exposure in case the default occurs.

Additionally, the exposure at default (EAD) which for a loan commitment measures the amount of the facility that is likely to be drawn if a default occurs and the loan maturity (LM) which measures the remaining economic maturity of the exposure. And such approach requires explicit approval of the bank's supervisors.

Furthermore, The BCBS provides two types of IRB approaches:

a. The foundation approach (measures banks account only for the PD).
b. The advanced approach (banks estimate all the credit risk components).

Aforementioned two types of IRB have some fundamental differences. The foundation IRB is based more on values set by the Committee, whereas the Advanced IRB largely uses estimates drawn by the bank.

The second credit risk assessment method is the standardized approach (SA). This calculates risk weights of assets based on the credit worthiness of counterparties and provide fixed-risk weights for each supervisory category. Banks may use external ratings if approved by the national supervisory body.

Market Risk Measurement

The BCBS provides two market risk assessment approaches for the calculations of capital charges for interest rate risk, equity position risk, foreign exchange risk and commodities risks that remain unchanged from the 1996 Basel I amendments. The capital charge for interest rate is applied to the current trading book items. The capital charge for foreign exchange risk may exclude structured foreign exchange positions.

The market risk measurement has prescribed two alternative models as:

a. The Internal Model Approach (IMA)

It uses models that capture valuation, sensitivity and correlation effects. It is subject to the approval of the bank's supervisors. There are several qualitative criteria prescribed by the Committee for using IMA.

These include: a regular back-testing programme, on-going validation of internal risk models and a routine and rigorous programme of stress testing.

For interest rate, the risk measurement system should model the yield curve using one of the generally accepted approaches and it must incorporate separate risk factors to capture spread risk. For foreign exchange, the risk measurement system should incorporate risk factors corresponding to the individual foreign exchange currencies. For commodity prices, risk factors should correspond to each commodity market. Financial institutions using IMA must compute 'Value at Risk' on a daily basis using 99th percentile.

b. The Simple Standardized Approach

It deals with the mentioned market risks and it also provides guidelines for the treatment of options. The minimum capital requirement for interest rate and equity exposures is based on two different charges calculated for 'specific risk' and 'general risk'.

Regarding the foreign exchange risk exposures, there are two processes which are prescribed by the Committee. The first measures the exposures in a single currency and the second measures the risk inherent in long and short positions in different currencies.

Operational Risk Measurement

Recognition of operational risk as an important category of risk is one of the major changes in the Basel II accord due to the increasing reliance on technology in banks' activities. Such risk concerns are the losses resulting from internal processes, people and systems and those resulting from external events. Although operational risks measurement is crucial to financial risk management, it is very difficult to agree on a specific method to quantify such risks or to what extent they should be considered.

As stated by Salem (2013), the BCBS stresses the need for adequate data collection to manage operational risk and proposes the following three approaches to measure the operational risks:

a. Basic Indicator Approach (BIA)**:** it requires banks to set aside a certain percentage of capital for operational risk.
b. The Standardized Approach (SA): it measures operational risk of a bank based on the performance of the bank's business lines.

   Both BIA and SA are recommended for banks with no international exposures with less significant operational risk exposures.
c. The Advanced Measurement Approach (AMA): it is considered the most complex operational risk measure in which banks are allowed to develop their own empirical measurement methods. It is recommended for banks with a developed risk management framework.

Under the principles for the sound management of operational risk, the Bank for International Settlements, BCBS (2011) states that there is no criterion prescribed under Basel II for using BIA except that banks use BIA are encouraged to comply with the Committee's guidelines on operational risk. It is recommended that for banks those are using BIA should attempt to move on to SA or AMA in the future.

Eid and Asutay (2019) explain that Basel II align the capital charges closely to the bank's measures of its risk exposures from credit, market and operations by providing the form of lower capital requirements. They added that the core elements of supervision (Pillar 2) and market discipline (Pillar 3) are also equally important as of capital adequacy requirement (Pillar 1). In fact, a well-designed capital requirement standard cannot be achieved effectively in the absence of strong and prudent supervision.

Pillar 2: Supervisory Review Process

Basel II recognizes the necessity of exercising an effective *supervisory review* of banks' internal assessments of their overall risks. The main reasons behind that are to ensure that bank management is acting effectively to create a sound judgement and is maintaining an adequate capital to manage the existing and potential risks.

The standard encourages the supervisory body to evaluate the banks' risk profiles and their activities in order to determine whether those banks should hold higher levels of capital than what stated in Pillar 1, and also to see if remedial actions are required or not.

Basel committee tends to improve the engagement of supervisory bodies with respective banks about their internal processes, and measuring and managing their risks in order to develop sound control structures. Furthermore, banks have to understand that an increase in required capital should does not act as the only option for addressing risks or being treated as a substitute for adequate control or risk management processes.

It is necessary for banks to use other means of control and processes to manage their risk, such: applications of internal limits, strengthening the level of provisions and reserves, and improving internal controls.

Supervisory bodies must take care to carry out their obligations in a transparent and accountable manner. Also, the criteria to be used in the banks' review for internal capital assessments are encouraged to be available publicly. Additionally, Basel committee requires a high level of cooperation between supervisors, especially for the cross-border supervision of complex international banking groups (BCBS, 2006).

Pillar 3: Market Discipline

The goal of market discipline is to motivate prudent management to enhance the degree of transparency and frequency in banks' public reporting. By the set of disclosure requirements that called for by Basel committee, these should allow market participants to assess key factors and information on the banks' capital, risk exposures, risk assessment processes, and the capital adequacy. The level of disclosure requirements is based on the materiality judgement (Eid and Asutay, 2019).

Banks' disclosures are normally made on quarterly or semiannually basis. Banks are expected to have a formal disclosure policy approved by the BODs which include the disclosable areas of credit, market, operational, and equity and internal controls (Greuning and Bratanovic, 2020, p.162).

2.2.10 Capital Adequacy Framework for Islamic Banks

The Islamic banks have an equity-based capital structure, dominated by shareholders' equity and investment deposits based on profit and loss sharing (PLS). Obviously, there is no need for capital adequacy regulations if the Islamic banks are structured as pure PLS-based organizations. However, due to informational asymmetry and risk aversion by investors, there currently exist fixed claim liabilities on the Islamic banking financial position. This necessitates the imposition of capital adequacy requirements (CAR), which aim at maintaining systemic stability by achieving two fundamental objectives (Penikas, 2015, p.17). These two fundamental objectives are:

1) CAR should protect risk-averse depositors. This requires a minimum equity capital cushion and an optimal assets-liabilities composition.
2) CAR should give incentives to shareholders to promote prudent behaviour in banks.

AAOIFI [7] Approach for Minimum Capital Adequacy Requirements

The Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI) released a statement on the purpose and calculation of the capital adequacy ratio (CAR) for Islamic banks in 1999 despite its need for further review and development.

According to AAOIFI, the methodology of calculating the CAR in Islamic banks has to be differ than what in conventional banks since the sources and nature of their funds are not identical, as shown in below table (2-4).

Table (2-4)

Sources and Nature of Funds in Islamic and Conventional Banks

Islamic bank	**Conventional bank**
Current Accounts	Current Accounts
Savings Accounts	Saving Accounts
Unrestricted Investment Accounts	Time Deposits, Certificate of
Equity: Share	Equity: Share
capital+ Reserves - Tier 1	Capital+ Reserves - Tier 1
Donated Land	Cumulative Preferred
Reserve1 (No Preferred Shares or Subordinated Debt allowed): Tier	Shares+ Subordinated Debt-Tier 2
No Tier 3	Tier 3 portion of subordinated debt available only for market risk

Source: Helmy (2012) *"Risk Management in Islamic Banks*" p.53

As presented in above table (2-4), the funding sources of owners' equity, currents deposits, saving deposits are similar in both Islamic and conventional banks. However, restricted and unrestricted investment account holders' funds are specific to the Islamic banks.

[7] The Accounting and Auditing Organization for Islamic Financial Institutions. Bahrain

The contractual agreement between Islamic banks and investment account holders is based on the concept of sharing profit and loss, which makes investment account holders a unique class of quasi-liability holders. In other words, they are neither depositors nor equity holders.

Other than that, these accounts are expected to absorb all losses on the investments made through their funds, unless there is an evidence that the Islamic bank neglect in the contractual use. (Helmy, 2012).

The argue arise from the point of whether to consider the funds of investment account holders same as shareholders equity and to be part of CAR calculation or not. AAOIFI approach considers a weight of fifty percent (50%) for the funds from unrestricted investment accounts in the CAR calculation. The explanation that given by AAOIFI is that the unrestricted investment accounts holders do not have voting rights and their funds cannot be considered as same as equity fund, however, such accounts holders share part of the risks with shareholders. On the other side, the AAOIFI recommends that restricted investment accounts should be included as off-balance sheet items rather than to be included in the formula of capital adequacy ratio. Hence, the AAOIFI's framework for capital adequacy in Islamic bank is calculated as follows (Greuning and Iqbal, 2008):

$$CAR = \text{Total Capital} / \text{RWAC\&CA} + 50\% \text{ (RWAUIA)}$$

Where:

RWAC&CA: Average Risk weighted assets of owners' equity and current accounts

RWAUIA: Average Risk weighted assets of unrestricted depositors' investment accounts.

The limitations of the AAOIFI's approach are that it focuses on the sources of funds for Islamic banks whereas overlooking the importance of detailed calculation of risk weighted assets.

AAOIFI also formulated the CAR based upon accounting principles instead of systematic risk considerations. The discounting of the risk assets held against investment accounts by 50% provides an opportunity for capital arbitrage.

IFSB [8] Principles for Minimum Capital Adequacy Requirements

Based on the Basel II, the Islamic Financial Services Board (IFSB) issued a capital adequacy standard (IFSB – 2) in December 2005 with a similar approach for the risk weights. The IFSB aims to generalize this approach for acceptable applications for both types of Islamic and conventional financial institutions. So, the minimum capital adequacy requirements (CAR) for Islamic banks shall be not lower than eight percent (8%) of total capital. Tier 2 capital is limited to hundred percent (100%) of Tier 1 capital. Additionally, in calculating the CAR, the regulatory capital as the numerator shall be calculated in relation to the total risk-weighted assets as the denominator. The total of risk-weighted assets is determined by multiplying the capital requirements for market risk and operational risk by 12.5 (which is the reciprocal of the minimum CAR of 8 percent) and adding the resulting figures to the sum of risk-weighted assets computed for credit risk.

The *Shariah* rules whereby investment account holders provide funds to the Islamic bank on the basis of profit and loss sharing contracts instead of debt-based deposits mean that investment account holders would share in the profits of a successful operation but could lose all or part of their investment. Given that, the liability of investment account holders is limited to the capital provided, and the potential loss of the Islamic bank is restricted to the value or opportunity cost of its work.

[8] The Islamic Financial Services Board (in Malaysia) issued a capital adequacy standard (IFSB-2) for institutions offering Islamic financial services (other than insurances) in December 2005, and it revised the standard by (IFSB-15) in December.2013

Furthermore, the Islamic bank is financially liable for the capital of the account holders in case of negligence, mismanagement, or fraud that can be proven.

Therefore, account holders normally bear the credit and market risks of the investment, while the Islamic bank bears the operational risk (Greuning and Iqbal, 2008).

As a way-forward in the issue of minimum capital requirement for Islamic banks, Smolo and Hassan (2010, p.64) argue that the proposed capital adequacy framework for Islamic banks by AAOIFI addresses only the liabilities side of the bank's balance sheet, which does not offer comprehensive guidelines for CAR calculation in Islamic banks.

Nevertheless, AAOIFI approach combined with the IFSB's standards and guidelines established a solid ground for Islamic banks toward the minimum capital requirement. Accordingly, further development step in such matter has been done by IFSB in December 2013 when the IFSB issued a revised standard on capital adequacy standard (IFSB-15, 2013) to improve the (IFSB-2, 2005) standard and guidelines. The IFSB-15 adopted the Basel III proposals on capital components and macroprudential devices for Islamic banks.

Such standard would assist Islamic banks in implementing a capital adequacy framework that would guarantee the effectiveness of the banks' risk exposure coverage and the appropriate capital allocation for covering such risks, although the coverage is still based upon the standardized approach of (IFSB-2, 2005).

The (IFSB-15, 2013) standard provides new guidelines on macroprudential devices such as capital buffers, leverage ratios, and methods to measure the systemic significance of domestic banks; in order to help supervisory bodies in achieving the aim of protecting the banking system and the economy from system-wide shocks.

Additionally, this standard provides more detailed guidelines on the maintenance of capital adequacy with the addition of new components to Tier 1 and Tier 2 capital against the various risk exposures faced by Islamic banks. The (IFSB-15, 2013) standard promotes the many measures that include the revision for the treatment of funding contracts based on PLS modes (*Mudarabah* or *Musharakah*), guidelines for credit risk mitigation techniques, and the ratification of various models to calculate capital charges on market and operational risks.

IFSB determined the implementation of the standard (IFSB-15, 2013) by its members jurisdictions by 1 January 2015. This shall help Islamic banks to increase their loss absorption capacities and develop more comprehensive risk-weighting frameworks for the underlying risk exposures (Wahyudi, et al. 2015).

Under the revised standard, the total eligible capital comprises of the sum of Tier 1 and Tier 2 capital. Tier 1 capital consists of Common Equity Tier 1 (CET1) and Additional Tier 1 (AT1). CET1 consists of common equity share capital, retained earnings and some other reserves (including interim profit or loss), whereas, AT1 capital consists of *Sharaiah*-compliant instruments and some reserves. Together with CET1, AT1 capital is considered as "going concern" capital which absorbs losses while the Islamic Institution is solvent. It is worth to highlight that the eligible capital requirements shall always be not less than 8% of total RWA.

Accordingly, the Islamic financial institutions (excluding Islamic insurance /*Takaful* institutions and Islamic collective investment schemes) shall always maintain CET1 capital of at least 4.5% of RWA. Tier 1 capital (CET1 plus AT1) must always be at least 6.0% of RWA. The total capital (Tier 1 capital plus Tier 2 capital) must be at least 8.0% of RWA at all times (IFSB-15, 2013).

In addition, the Islamic financial institutions are required to maintain a capital conservation buffer (which is a specific percentage of common equity capital to absorb losses during periods of financial and economic stress) of 2.5% of RWAs on January 2019; and a countercyclical buffer (which causes by the influence of various micro-level factors on the bank's behaviour due to aggravation of the economic cycle) as stipulated by respective supervisory bodies (IFSB-15, 2013).

IFSB-15 recommends the IIFS to use either of the following formulas for calculation of its CAR, depending on the circumstances (IFSB-15, 2013).

Following are the two formulas recommended by IFSB for CAR calculation

a. The standard formula:

$$\frac{\text{Eligible Capital}}{\left\{\begin{array}{l}\text{Total risk-weighted assets (Credit + Market risks) Plus: Operational risks} \\ \text{Less:} \\ \text{Risk-weighted assets funded by PSIA (Credit + Market risks)}\end{array}\right\}}$$

b. The supervisory discretion formula

$$\frac{\text{Eligible Capital}}{\left\{\begin{array}{l}\text{Total risk-weighted assets (Credit + Market risks) Plus: Operational risks} \\ \text{Less:} \\ \text{Risk-weighted assets funded by restricted PSIA (Credit + Market risks) Less:} \\ (1-\alpha)\,[\text{Risk-weighted assets funded by unrestricted PSIA (Credit + Market risks)}] \text{ Less:} \\ \alpha\,[\text{Risk-weighted assets funded by PER and IRR of unrestricted PSIA (Credit+ Market risks)}]\end{array}\right\}}$$

Where:

- PSIA refers to profit sharing investment accounts.
- PER refers to profit equalization reserve.
- IRR refers to investment risk reserve.
- Alpha (α)" refers to the proportion of assets funded by unrestricted PSIA which is to be determined by the supervisory authorities.

The standard formula is applicable in the absence of any smoothing of the profit payouts to investment account holders (IAHs) by Islamic financial institutions. It is not required to hold regulatory capital in respect of credit or market risks arising from assets funded by profit-sharing investment account (PSIA).

The supervisory discretion formula is applicable in jurisdictions where Islamic financial institutions practice the type of income smoothing for IAHs (mainly unrestricted ones) that gives rise to displaced commercial risk (DCR). The supervisory body should require regulatory capital to be held to cater for DCR. In this approach, commercial risks of assets financed by unrestricted IAHs are considered to be borne proportionately by both the unrestricted IAHs and equity shareholders.

2.2.11 Risk Mitigation in Islamic Banks

The nature and characteristics of Islamic banking operations create a complexity in risks' mitigation process. The first step for mitigating the risks by the Islamic banks is to scrutinize the characteristics of every risk for its causes, mechanisms, and impacts before the risk mitigation measures can be defined.

Risk mitigation measures are varying since they must be designed to suit the characteristics of each risk, the severity of the risk's impacts, and the risk policies in use.

As stated early, the difference in fundamental operational principles between conventional and Islamic banks lead to that some of risk mitigation strategies which are available to conventional banks are not applicable to Islamic banks; such using derivative transactions (i.e., forward, future, option, and swap) for heading the risks. Obviously, these forms of risk mitigation are forbidden to Islamic banks due to the high degree of *gharar* (speculation), riba (usury), and *maysir* (gambling) elements in these derivative contracts (Wahyudi, et al. 2015).

From another view, Eid and Asutay (2019) explain that Islamic banks may be able to enter into hedging arrangements under the conditions that the hedging tool is in itself structured in a Shari'ah-compliant way, and that the trade is being entered into to protect against a genuine exposure or liability, rather than solely for speculative purposes. Given that, there are two schools of scholars' thought about hedging strategies in Islamic finance: a very conservative view that prohibits hedging in all its forms, and a more liberal view that is looking to develop Shari'ah-compliant hedging tools.

This conservative school of thought accuses derivatives of causing volatility in the market through speculation without being involved in real economic transactions (Khan, 2010).

Likewise, conventional banks, Islamic banks can manage and control some risks through appropriate risk policies, and traditional risk management tools like risk diversification, credit ratings, on balance sheet netting, GAP analysis, stress-testing, and others as long as these tools do not have a conflict with the Shari'ah principles. However, there are other risks that Islamic banks cannot eliminate and that can be reduced only by transferring or selling those risks in well-defined markets (Eid and Asutay, 2019).

Wahyudi, et al. (2015) remark that when a risk becomes materialize, there are several possible responses and actions available for the management to deal with such risk. These actions include:

a. the bank could choose to avoid the risk if this course of action would cost less than any others.
b. the bank could opt to share the risk to a third party, such as a *takaful* (insurance) firm, especially if the loss caused by the risk is purely physical in nature.
c. the bank could perform risk mitigation if the risk cannot be avoided or transferred away. The bank may not be able to avoid the risk since it is indelibly attached to business processes.
d. the bank could simply ignore the risk if its impact is quite low and has very little effect upon the bank's business activities.

According to Khan (2010); Eid and Asutay (2019), the needs for permissible financial derivatives and hedging techniques are necessary to mitigate a significant part of risks that associated with Islamic banks. Some steps for this area being shown by International Islamic Financial Market (IIFM) on developing a *Tahawwut* (Hedging) Master Agreement which will lead the way in risk minimization of Islamic economic activity.

2.2.12 Challenges for Risk Management in Islamic Banking

Greuning and Iqbal (2008) address the specific challenges that face Islamic banks in the application of sounds risk management in the following areas:

a. The need to establish collaborative and supporting institutions such as a lender of last resort, a deposit insurance system, a liquidity management system, secondary markets, and legal infrastructure.
b. The need to create a uniformity in and harmonization of Shariah standards across Islamic institutions markets with centralized Shariah board.

c. Developing systems that are customized to accommodate the needs of Islamic financial institutions and to tackle the issue of Islamized instrument modeling. This is in order to achieve cost efficiency for developing risk management systems.

d. The need for integrating Islamic financial institutions with global financial markets by enhancing transparency in financial reporting and develop accounting and reporting standards align with Shariah rule and to match the global needs.

e. The lack of highly skilled human resources in Islamic financial institutions. Such institutions should make a great effort to develop customized research and training programs on risk management.

Chapter Three

The Sudanese Economy, Banking Industry and Risk Management

3.1. Introduction

As the subject of this research is to assess the impact of risk management practices in the financial performance of Sudanese Islamic banks, a general outlook is given in this chapter for the Sudanese banking industry and its environment. This chapter sheds light on the financial system and environment in which the Sudanese Islamic banking industry operates, their evolution, structure, performance facts, the major characteristics of the banking industry and its risk management aspects.

3.2. Overview of the Republic of Sudan

Sudan is a country that located in Northeast Africa bordering the Red Sea. It is used to be the largest country in Africa (encompassed an area of almost one-million-mile square) prior the cessation of southern Sudan in 2011. Now it occupies 728.2 thousand square mile as the third-largest country in Africa and also the third-largest country in the Arab world. Sudan neighboring countries include Central African Republic, Chad, Egypt, Eritrea, Ethiopia, Libya, and South Sudan and its geography in general looks as flat with mountains that locate in the east and west. Sudan gained independence in 1956 and Arabic was by far the most widely spoken language in the country. Capital of the country is Khartoum where it locates in intersection of the White and Blue Nile Rivers. The country administration through 18 states' government with a federal authority.

The population of Sudan is 43 million as of 2018 with annual growth rate of 2.4%, which shows a significant increase from the 34.8 million from 2013.

Sudanese population that practices Islam around 97%, specifically the Sunni Sufi branch and the Maliki school Islamic jurisprudence (World Population Review, 2020). Sharia Law is the basis of the legal system in Sudan with accompany with English common law system as of 1991 (Ahmed, 2007).

The major political challenge in Sudan was the civil war breaks out in the south between government forces and the Sudan People's Liberation Movement (SPLM) between 1983 to 2005 when the Comprehensive Peace Agreement (CPA) signed between the parties. Subsequently, in 2011 the secession of South Sudan toke place and it was significantly affected the country's economy because the south contained over 80% of the nation's oilfields.

3.3. Macroeconomic and Financial Indicators of Sudanese Economy (2007-2018)

A general overview of Sudan's economic growth during the period of 2007 to 2018 (i.e., the period of this research) is given in following part. Evidences show that these indicators are important to be addressed as they influence the Sudanese banking performance and management.

3.3.1. Major Economics Sectors

Agriculture and Animal Stock

The agricultural sector includes plant and animal production (livestock and fisheries). This sector has a paramount important role in the Sudanese economy since it was organised under the British colonial administration in1899. It contributes an average of 30.1% to the country's GDP during the period of 2007-2018 with an evidence that shows a declining rate from 2007 (36.2%) to 2018 (23.9%).

However, the agriculture sector provided an amount of US Dollar 8.94 billion (represents of 48.8%) to the country's exports during the last five years (from 2014 to 2018), of which the agricultural products contributed almost 51.8% while the animal products provided 48.2%. Plant production in Sudan includes both rain-fed agriculture, irrigated agriculture and forests. The major production comprises of cotton, gum Arabic, food crops (Corn, wheat and millet), oilseeds (peanuts, sesame and sunflower), watermelon seeds and forage.

From other hand, animal production includes livestock of all kinds, fish and poultry that produce in all parts of Sudan by both Pastoral community and agropastoral. Its production increased during recent years because of better veterinary treatment, more liberal credit policies, and higher market prices (CBOS Annual Reports, 2007-2018).

Industrial Sector:

The industrial sector in Sudan includes oil, mining, quarrying, electricity, water and gas, manufacturing and manual industries. The industrial sector's contribution to the GDP was recorded an average of 22.8% during the period of 2007-2018.

This sector supported the country's exports by US Dollar 9.23 billion (represents of 50.5%) during 2014-2018, of which 95.6% contributed by oil and mineral products in the exports from industrial sector. In addition to the oil and mineral (mainly gold) products; the industrial sector provides other exported products that include sugar, ethanol, cement and raw bean (CBOS Annual Reports, 2007/2018).

Despite the fact that Oil exploration in Sudan was started in 1959, the first oil discovery was made by Chevron in the south of Sudan in 1979. Then after decades, the actual production of oil in Sudan started in the late 1990s and the first shipment of Sudan crude oil loaded aboard on August 1999 (Ziada, 2007).

The actual production was rapidly increased from 1993 to 2009 when reached its boom of 475 thousand barrels a day. After the cessation of South of Sudan, two third of the oil reserves no longer becomes part of Sudan resources and it stands to 150 thousand barrels a day. While the actual production during the period from 2014 to 2018 not exceeded 119.6 thousand barrels a day (BP Statistical Review, 2019).

Moreover, the mineral resources, especially gold resources have attracted several national and international (such as companies from Canada, Egypt, Morocco, Russia, Qatar, and Turkey). The Government's plan is to offset lost revenue from oil and gas production that moved to South Sudan in 2011. Furthermore, there are several mineral districts in the country identified as having potential for mining operations. These districts were, the Red Sea Hills, the Beyoda desert, the Jebel Marra volcanic field, the Jebel Rahib region, the Jebel Abyad region, the Ingessana polymetallic complex, the Nuba Mountains, and the Hofrat An-Nuhas (Taib, 2018).

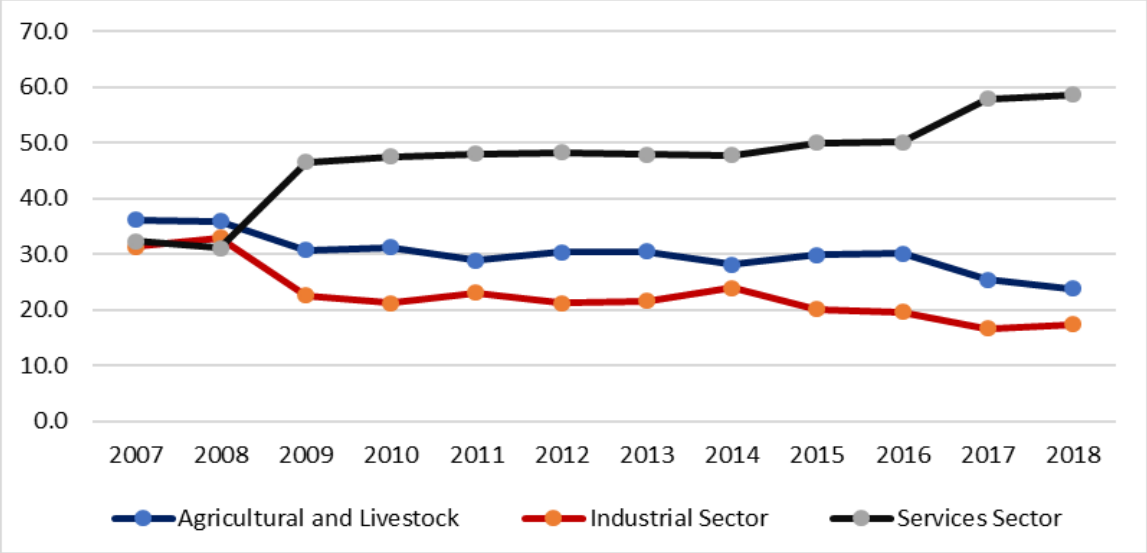
Services Sector:

This sector includes health, education, transportation, communication, tourism and hotels, roads, bridges, construction and other services. The service sector witnessed steady growth during the period 2007 to 2018 with a contribution to the GDP with an average rate of 47.2% during aforementioned period (CBOS Annual Reports, 2007/2018).

Figure (1-3) depicts the trend of the main sectors that constitute a significant part of the Sudanese economy, and shows their contributions in the annual GDP during the research period of 2007-2018.

Figure (3-1)

The Main Sectors of Sudanese Economy During 2007 – 2018



Source: Researcher Output from Central Banks of Sudan – Annual Reports 2007-2018

3.3.2. Financial Indicators of Sudanese Economy (2007-2018)

Moreover, table (3-1) provides an overview for some of the selected indicators for the Sudanese economy during the research period (2007-2018), while the figure (3-1) depicts the trends for these indicators. The table shows that the services sector has the highest contribution to the GDP since 20019, after declining of agricultural and livestock sector.

The reduction of oil and gas contribution seems to be relatively substituted by the mineral product to maintain the steady level of the industrial sector contribution to the GDP. Moreover, in most of the aforementioned period, the trade balance either has a defect balance or slightly positive. Whereas the exchange rate of local currency is continuing its rapidly deflation against hard currencies, especially US Dollar currency.

The average annual inflation rate in 2007 was 8.1% and increased on annual basis till it reached 36.9% by the year 2014. Subsequently, it has been dropped in 2015 and 2016 to 17.3% and 17.6% respectively. However, the average inflation rate jumped drastically to 32.4% in 2017 and to 63.3% in 2018 (CBOS Annual Reports, 2007/2018).

Table (3-1)

Selected Indicators for the Sudanese Economy (2007 -2018)

Year	Agricultural and Livestock	Industrial Sector	Services Sector	Growth in GDP	Average Inflation%	Exchange Rate - US$ to SDG	Trade Balance (Million US$)
2007	36.2	31.4	32.4	103.0	8.1	2.0	(2,416.90)
2008	35.9	33.0	31.1	4.6	14.3	2.2	103.80
2009	30.8	22.6	46.6	6.2	11.2	2.4	2,319.00
2010	31.3	21.2	47.5	6.5	13.1	2.5	(1,433.80)
2011	28.9	23.1	48.0	2.1	18.0	2.9	1,359.50
2012	30.4	21.3	48.3	2.4	35.1	4.4	957.40
2013	30.5	21.6	47.9	6.8	37.1	5.7	(5,163.80)
2014	28.2	24.0	47.8	7.0	36.9	6.0	(5,128.30)
2015	29.9	20.1	50.0	3.7	17.3	7.5	(4,757.60)
2016	30.1	19.7	50.2	3.8	17.6	15.2	(6,340.10)
2017	25.4	16.7	57.9	5.3	32.4	21.6	(5,229.80)
2018	23.9	17.4	58.7	5.7	63.3	47.6	(5,102.00)

Source: Central Bank of Sudan – Annual Reports (2007-2018).

It is worthy to mention that, in 1993 the United States put Sudan on its list of states sponsoring terrorism. Additionally, the United States imposed diplomatic sanctions on Sudan by 1996, moreover in 1997 the it imposed comprehensive trade sanctions on Sudan which it has ended by October.2017. Such facts created a negative impact for country's economy and political sides.

3.4. Overview to the Sudanese Banking Industry

The banking system in Sudan has experienced a dramatic development since the country's independence in 1956. Prior to independence the Sudan banking system possessed all the earmarks of colonial banking. The commercial banks were branches of foreign institutions, there was no central bank and local currency (Egyptian banknotes and British coins circulated side by side as legal tender). Within this environment there existed a banking and credit system, consisting mainly of expatriate banks, to serve the needs of both export and import trade and also serve as deposit takers for the expatriate and indigenous firms operating in Sudan.

By 1957 the Sudan Currency Board was established to issue the new Sudanese currency and in 1959 the Bank of Sudan Act was passed. Accordingly, the central bank became one of the first operational central banking institutions in independent Africa with the responsibility for administration of foreign exchange and related currency matters including; regulation of the issue of notes and coins, development of a sound credit and banking system, and serving as the banking and financial adviser to the government. In May 1970, a fundamental change took place in the banking arrangements in Sudan as the government decided to apply the nationalization regime.

Therefore, many Sudanese and foreign financial enterprises became as national entities, which affected the financial institutions' structure (Al-Harran, 1990).

In 1978 the emergence of Islamic banks in Sudan started with Faisal Islamic Bank (FIB) establishment that led to an unusual growth of Islamic banks which were able to attract new depositors who had been previously reluctant to deal with the existing interest-based banks.

The Nimeiri government to apply Islamic Shariah in September 1983 gave a great boost to Islamic banking and by 1984 a law was issued changing the whole banking system to obligatorily operate according to the *Shariah* guidance. However, up to 1990 the Islamization was not taken seriously in the banking nature and practices. This position has motivated the government to issue the new Act in 1991 issued as Banking Business (Organization) for organizing the banking system's transactions. The act was very instrumental in changing the nature of the banking system away from its colonial nature and it onwards the Islamic direction in all financial transactions especially the banking System. Later, this act has been replaced by a new revised act in 2004 to enhance the banking business organization.

The aforementioned changes in the banking systems in Sudan were a direct result of frequent changes in the political system as well as the economic and financial policies adopted to follow the ideological beliefs that existed within these political systems. One of these major changes is the rotation between democratic and military governments since independence.

Consequently, changes in economic policies occurred ranging from relative freedom and federal economic types to intervention and outright central economic ones (Ahmed, 2007).

3.5. History of the Sudanese Banking Industry

The Sudan provides remarkable attempts to establish a banking system to support overall socio-economy arena and to contribute to the financial industry. In this section the researcher attempts to shed light on the history of the banking industry in Sudan, gives a basic background on the its structure and performance and to demonstrate the contributions of such industry in the Sudanese economy.

According to the Central Bank of Sudan (CBOS) documentation series issued in 2006 for the banking industry experience in the country, by which, the history of banking industry in Sudan passed through different phases. These include: the emerging of the banking institutions in Sudan, the establishment of CBOS, the startup of national banks, the nationalization *(Sudanisation)* of financial industry, the openness of banking industry and then after, the emergence and development of Islamic banks *(Islamization)* in Sudan (CBOS, 2006.a, p.9)[9] . Moreover, the changes in political situations in Sudan from signing the peace agreement in 2005 to referendum of Southern Sudan in 2011, led to restructuring of the banking system in Sudan.

This devoted additional two phases to the history of Sudanese banks to include dual banking system and re-Islamization.

3.5.1. Phase one: Emerging of the banking institutions (1903-1958)

Banking industry in Sudan began in 1903 following the dual-colonialism (Egyptian and British) when a branch of National Egyptian Bank (NEB) opened in Sudan in order to meet the emerging demand for banking services.

The steady growth in the sector of foreign trade motivated other foreign banks to open branches in Sudan, such as Barclays DCO opened in 1913 as it was established as the Anglo-Egyptian Bank at early stage, Ottoman Bank in 1949, Banque Misr in 1953 and Credit Lyonnais Bank in 1953, which was converted in 1964 to a Sudanese company under the name of the El Nilein Bank by owning the Sudanese government 60% of its shares. The trend of entry of foreign banks' branches has continued After the independence of Sudan, where the branch of the Arab Bank (Jordanian) was opened in 1956 and Commercial Bank Ethiopia in 1958.

[9] The reference was published in Arabic language.

The main characteristics of banking structure during this phase as follows:

a. The absence of the unified monetary authority in the country and the National Bank of Egypt performed part of the Central Bank's functions as a custodian of the Government and the banks' accounts, carry out the clearing-room process, in addition to play a role the last lender (resort).
b. After the independence, the Sudanese Currency Committee was establishment (from 1956 to 1959) and the functions of the Central Bank have been divided between the Ministry of Finance, the Currency Committee and the National Bank of Egypt. The Ministry of Finance and Currency Committee retained the function of managing the country's foreign assets, while the committee was appointed to issue and manage the national currency and to ensure the stability of the local currency exchange rate. The National Bank of Egypt was continued to practice the rest of central bank's functions.
c. The monopoly of the foreign banks in the Sudanese banking industry. This led the banks concentrated their efforts to finance the foreign trade (Export and import) that negatively affect the growth of some sectors such as industrial sector, despite the contribution of these banks in the economic activity and banking awareness.
d. The lack of independence in the banks' decisions if we exclude El Nilein bank, since these banks operated in Sudan as branches of foreign banks. (COBS, 2006.a, p10).

3.5.2. Phase Two: The Establishment of Central Bank and National Banks (1959-1969)

This phase seems one of the most important periods within the development of the banking industry in Sudan as it reflected the national perception of the importance of banking role in economic life.

The Bank of Sudan Law was issued in 1959 and the Bank of Sudan commenced its functions its functions "as The Central Bank" in February 1960 to become one of the first operational central bank in Africa.

Accordingly, the assets of the National Bank of Egypt have been liquidated. In the same year (1960), the Commercial Bank of Sudan was established as the first commercial bank.

This period also witnessed the establishment of specialized banks owned by the Government: the Sudanese Agricultural Bank in 1959, the Sudanese Industrial Bank in 1961 and the Sudanese Real Estate Bank in 1967.

In addition to that, in 1969, the National and Grindleys Bank (a British bank) started its operations with the acquisition of the Ottoman Bank in Sudan.

The main characteristics of banking structure during this phase as follows:

a. The establishment of the central bank to help in regulating the banking system in the country, and to achieve economic development in a systematic and a balanced manner, and to be the bank of the government and its advisor in financial affairs.
b. Changing the banking structure since more national commercial banks have been established beside the central bank.
c. Liquidation of some foreign branches of the National Bank of Egypt and the Ottoman Bank and establishment of a new foreign branch of National and Grindleys Bank.

3.5.3. Phase Three: The Nationalization "*Sudanisation"* (1970-1975)

This period also witnessed developments in the structure of the banking system throughout the nationalization of commercial banks in one hand and mergers arrangements between some banks from other hand. On 22nd May 1970 *Nimeiri's* government declared the nationalization of all banks and foreign branches, firms and business of many members of the foreign communities as well a famous Sudanese business family.

Accordingly, Barclays Bank (DCO) branch in Sudan became the State Bank for Foreign Trade, National and Grindleys Bank became *Omdurman* National Bank, the Ethiopian Commercial Bank became Juba Commercial Bank, the Arab Bank became Red Sea Commercial Bank, and Banque Misr became Peoples' Cooperative Bank. Moreover, both, El Nilein Bank and the Commercial Bank of Sudan have retained their names during this nationalization. The main objectives of the nationalization decision at that time were to promote exports and enhance their proceeds, attract the savings of Sudanese working abroad, promote competition-among banks to improve banking services in rural and distant areas, and ending of foreign control over national capital and to support the central bank in controlling the monetary policy.

The Banking Regulation and Savings Act was issued in 1973 and during this period also witnessed a merger arrangement of some banks, whereby in Juba Commercial Bank and Omdurman bank merged as Juba-Omdurman Bank, and Red Sea Commercial Bank merged at El Nilein Bank. Also, the Sudanese Savings Bank was established at 1973 in *Medani* town with the aim of spreading the awareness of savings. During the year 1975 witnessed the change of some banks' names, where Juba-Omdurman Bank renamed to Unity Bank and the State Bank for Foreign Trade renamed to Bank of Khartoum. Other banks remained as they were; Sudan Commercial Bank, Peoples' Cooperative Bank, Agricultural Bank of Sudan, Industrial Bank of Sudan, Real Estates Bank (CBOS, 2006.a, pp.12-13).

The main characteristics of the nationalization period shows the state-ownership of banks, shrinking of in the commercial banks' numbers due to merger and acquisition decisions, and reluctance of foreign banks to enter into the Sudanese banking industry due to the facts of nationalization and the great dominance of the public sector on the country's economic activity.

The Sudanese banking structure has been changed during this phase, as the banks are wholly owned by the state. The following table (3-2) shows the structure of Sudanese banks during the *nationalization* period.

Table (3-2)

The Changes in Sudanese Banks Structure As of 1975

No.	Bank Name Before 1970	Bank Name from 1970	Bank Name from 1975
1		Bank of Sudan	Bank of Sudan (1960)
2	Barclays Bank DCO (1913)	State Bank for Foreign Trade	Bank of Khartoum (1975)
3	Credit Lyonnais Bank (1953) Arab Bank (1956), and El Nilein Bank (1964)	El Nilein Bank (after merge of El Nilein Bank and Red Sea Commercial Bank in 1973)	El Nilein Bank (1964)
4	National and Grindleys Bank (1969) Ottoman Bank (1949), and Ethiopian Commercial Bank (1958)	Juba Omdurman Bank (1973) (after merge of Omdurman Bank and Juba Commercial Bank)	Unity Bank (1975)
5	Commercial Bank of Sudan (1960)	Commercial Bank of Sudan	Commercial Bank of Sudan (1960)
6	Banque Misr,1953	Peoples' Cooperative Bank	Peoples' Cooperative Bank (1970)
7	Sudanese Agricultural Bank (1959)	Sudanese Agricultural Bank	Sudanese Agricultural Bank (1959)
8	Sudanese Industrial Bank (1961)	Sudanese Industrial Bank	Sudanese Industrial Bank (1961)
9	Sudanese Real Estate Bank (1967)	Sudanese Real Estate Bank	Sudanese Real Estate Bank (1967)
10		Sudanese Savings Bank	Sudanese Savings Bank (1973)

Source: Central Bank of Sudan Publication (BOS, 2006, pp.13-14).

3.5.4. Phase Four: The Economic Openness (1976-1983)

Government of Sudan realised the importance of private and foreign investments in the country in order to improve the economic and financial status. Therefore, it hardly worked to improve the investment environment for attracting these investments by adoption a policy of "*opening-up*" the economy and issuing the Investment Promotion Act in 1976 within the package other economic reforms.

Such transformations have created a positive impact to the banking structure as it resulted in a largest number of joint banks and branches of foreign banks.

This stage shows a significant development to the banking system in Sudan by an emergence of the first model of Islamic bank in the country (Faisal Islamic Bank), return of foreign banks to the Sudanese banking industry, an increase in the number of private banks, and the total number of banks has reached its highest level since the independence (CBOS, 2006.a, pp.14-16).

Below table (3-3) shows the new banks that were established in Sudan during the years 1976 -1983.

Table (3-3)

The New Established Banks During 1976 – 1983

Joint Banks		Branches from Foreign Banks			Governmental Banks	
1	Sudanese French Bank, 1978	1	National Bank of Abu Dhabi, 1976	Emirati	1	National Export and Import Bank
2	Faisal Islamic Bank, 1978	2	International Credit and Trade Bank, 1976	Emirati	2	Islamic Cooperative Development Bank, 1983
3	National Bank of Sudan, 1982	3	Citi Bank, 1978	USA		
4	National Bank for People's Development, 1982	4	Oman Bank, 1979	Omani		
5	Tadamon Islamic bank, 1983	5	Habib Bank, 1982	Pakistani		
6	Sudanese Islamic Bank, 1983	6	Middle East Bank, 1982	Emirati		
7	Blue Nile Bank, 1983					

Source: Central Bank of Sudan Publication (BOS, 2006, p.15).

3.5.5. The Emergence and Development of Islamic Banks in Sudan

The first step in applying the idea of Islamic banking in Sudan was in 1966 at the Department of Economics, Islamic University of Omdurman. At that time, the University introduced an article on Islamic Economics as a major subject in the Department of Economics. This launched the idea of establishing an Islamic Bank in Sudan.

Over the time, the Sudanese political system changed, and Prince *Mohammed Al Faisal A'l Saud* met Sudanese President *Gaafar Nimeiri* in February 1976 and asked him to allow the creation of an Islamic Bank in Sudan. As a result, the Faisal Islamic Bank (FIB) was officially registered in 1977 with eighty-six founders who were Sudanese, Saudi, and from some other Muslim countries. FIB was recorded as a public shareholding limited-company, in accordance with the Companies Act of 1925 and the bank commenced its operations in May 1978. After the FIB was established, many Islamic banks adopted the same approach, and three Islamic banks had been founded; the Tadamon Islamic Bank, the Sudanese Islamic Bank, and the Islamic Co-operative Development Bank during 1983. In 1984, three more Islamic banks were founded; the Islamic Bank for Western Sudan, Saudi Sudanese bank, and Al-Baraka Sudanese Bank, followed by Al-Shamal Islamic Bank that was founded in 1985 and started its operations by 1990, National Workers' Bank in 1988 (Ebrahim, 2011).

The adoption of the *Shariah* Law was realized in September 1983, but the Islamization of the banking system in Sudan was announced in October 1984 on the basis of the Civil Transactions Act *(sections 82, 281, 285-1).* Accordingly, the Bank of Sudan issued a circular No. BS/11 dated 10th of December,1984 which prohibit the dealing in the interest rate *(Riba)* and immediate transformation to deal with Islamic finance rules. In fact, the immediate transformation to an Islamic finance regime has not been preceded by any studies to determine its route and requirements for the organizational structures of the Bank of Sudan and the commercial banks, and in terms of training to qualify the manpower in dealing with *Shariah* aspects.

Notably, the experience and knowledge of commercial banks and the Bank of Sudan have not changed; and there was a lack of *Shariah* oversight bodies for these banks.

As a result of absence of directives from the Bank of Sudan during this period, most of the commercial banks tried to replace the interest transactions with *Murabaha* Islamic finance mode despite no committee conversed in *Sharia* guidance was formed. Also, there was a lack of carefulness was also noticed by the incident that no supervisory techniques for Islamic banks were designed by the Bank of Sudan (CBOS, 2006.a).

After the 1985 popular revolt that ended *Nimeiri*'s government, the transitional government had given over the country after ruling for one year to the political parties. The political parties, especially the *Umma* Party, were very critical of the application of *Shariah* laws in September 1983.

As a result of that, the banking system was prohibited from using the concept of interest. Therefore, banks were given the choice to use the Islamic formula or a1tefmitively, what was innovated, by the *Umma* party as, the Compensatory Return. Upon the reassessing of the banking law from the new Government's prime minister, the Governor of the Bank of Sudan issued a circular called The Banking Tariff - the compensatory rates on October 1987, by which some banks reverted back to dealing with interest. The brief circular contained neither a technical definition of compensatory rates nor an explanation of how such rates were different from interest rates, and created a controversial Islamic practice.

This period was characterized by political and environmental crises, that led to structural changes in the country, Islamic banks were forced to operate in an extremely hostile environment characterized by negative media coverage, lawsuits, and heavy regulations beside that many of the traditional banks reverted back to their conventional practices. So, a two-tier arrangement in Sudanese banking industry (Ahmed, 2007).

In the 1990s the new military government tried to be more principled in the application of the Islamic laws in the banking sector. So, the first effort was to

supplement the Company Law of 1925 with the new Banking Regulation Law of 1991 and the Compendium of Administrative and Financial Penalties against Banking Violations of 1992. However, these laws and regulations did not address the issue of Islamic finance as such, even though several paragraphs established that no banking law or practice could contradict the *Sharia*. The new laws gave the Bank of Sudan the right to fix profit margins, fees and commissions, and to decide procedure for the calculation and distribution of profits.

A more comprehensive attempt by the government to detail proper Islamic financial procedures came in March 1993 when the Bank of Sudan's Supreme Board for *Sharia* Supervision issued a circular setting out requirements of legal *Murabaha* contracts. The circular was meant to settle the widespread uncertainty regarding whether the banks could demand down payments *(hamish al-jiddiyya*) before they purchased commodities on behalf of clients, and how the mark-up (i.e., profit) should be calculated (Endre, 1991).
In order to spread Islamic Shari 'ah culture, all the commercial banks followed Bank of Sudan in establishing their own *Shariah* Supervisory Unit.

In 1991 two steps were carried out; one was the privatization of the Commercial Bank of Sudan that came under the ownership of the Farmers' Bank for Rural Development as a holding company and Banking Business (Organization) Act – that later has been revised in 2004 – was passed under the Bank of Sudan's supervision. Moreover, the Securities Market was established in August 1992 for the first time in Sudan's recent history. It was formally started its operation in January 1995 in an effort to mobilize resources for development activities. The Banking Deposits Guarantee Fund was established in 1996 and the Sudan Financial Services Company was established in 1998 (jointly by the Central Bank of Sudan and the Ministry of Finance and National Economy) to operate in the area of issuing and marketing of Islamic securities (*Sukouks)*, (Ahmed, 2007).

In the year 1992 Nima Bank was established, followed by three more banks came into existence in 1993, namely; AI Safa Investment bank, Omdurman National Bank, and Animal Resources Bank which aims to develop and promote the animal resources of the country. Subsequently, Ivory bank was establishment 1995, Investment Bank in 1995 and Al-Gedaref Investment Bank in 1996.

Moreover, during this development phase, a number of local banks were merged and some banks were liquidated. Both, Unity Bank and National Export and Import Bank were merged into Bank of Khartoum and renamed Bank of Khartoum Group, The Sudanese Industrial Bank was also incorporated in Al-Nilein Bank and renamed Al-Nilein Industrial Development Bank Group.

The banks that have been liquidated are Middle East Bank, International Credit and Trade Bank, NEMA Bank (although it was established in 1992), Al-Safa Investment Bank and Citi Bank. Also, Sudanese Savings Bank was converted into the Savings and Social Development Bank, Oman Bank to Masheq Bank, and the Islamic bank for Western Sudan to Export Development Bank (CBOS, 2006.a, p.17).

It worth to mention that in 1994, Sudanese Banks were required by Central bank of Sudan to rearrange their financial structure to comply with the recommendations of Basel Committee with respect to the capital efficiency within three years, starting in the same year, in order to reorganize these banks. Also, by Aug.1999 the bank arranged changing the local currency from Sudanese pound to Sudanese Dinar as part of the monetary regulation.

In 2006, the Comprehensive Peace Agreement (CPA) toke place between the Sudanese government and the Sudan People's Liberation Movement (SPLM), a representative for South Sudan.

In accordance with the agreement, the regulations of Central Bank of Sudan have been restructured and the Central Bank of Sudan Act 2002 was amended in 2006, wherein the nature of the banking system has been revised as it shall consist of dual banking system; one of which is Islamic, in Northern Sudan, and the other Conventional, in Southern Sudan.

The headquarters of the Central Bank of Sudan shall be in Khartoum, and may establish branches, or agencies inside the Sudan, and appoint correspondents outside the Sudan and the Bank of Southern Sudan shall be established as a branch of the Central Bank of Sudan to render, in addition to its other tasks, conventional banking services, in Southern Sudan (CBOS official website, 2018).

During the period 2004 to 2006 a number of banks joined the system of banking in the Sudan as witnessed the establishment of Sudanese Egyptian Bank, Al Salam Banks, Sahel- Saharan States Bank, Emirates and Sudan Bank, Industrial Development Bank and United Capital Bank. By end of 2006 a remarkable development in banking technology occurred under the lead of the Central Bank of Sudan including the establishment of the Payment Systems, the Electronic Cheque Clearing System and the Electronic Returns System. Also, the Sudanese pound readopted instead of the Sudanese dinar. (CBOS-Annual Report 46, 2006).

In 2007, Nile Bank and Kenya Bank joined the banking system in Sudan followed by Al-Jazeera Sudanese Jordanian bank, Family bank and Qatar national bank in 2008. Also, during the year 2008, the biggest merger process was completed between Bank of Khartoum and Emirates and Sudan Bank and created a new bank structure with the biggest paid capital in the country. The new bank maintained the name of bank of Khartoum.

Also, the Central bank of Sudan managed to create five alliances between the operating banks based on different standards that include the similarity in the banks' nature, capital composition, investments strategies and directions.

This in order to share the necessary information between the banks within the alliance for the customers, financing and defaults, and coordination for the investment portfolios. In addition to that a circular No 8/2018 issued by Central Bank of Sudan to provide incentives for the banks those adapting merger and acquisition mechanisms, so as to strengthen the banking capital (CBOS- Annual Report 48, 2008).

Also, in 2009 another three banks joined the banking system, namely: Sudanese Arab Bank (in North), Ethiopian Bank and Kuwaiti Bank (in South), (CBOS- Annual Report 49, 2009).

After the secession of Southern Sudan, the Bank of Southern Sudan became the central bank of the State of Southern Sudan on the 9th of July 2011 and all branches of Central Bank of Sudan in the previously southern states became affiliated to it. Accordingly, all circulars of the Central Bank of Sudan that were related to the dual system has been suspended, until the amendment of the law toke place in 2012 in the Bank of Sudan Act (2002).

Although the separation of southern Sudan was negatively affected overall Sudanese economy, the performance of Sudanese Islamic Banks did not have a big impact as the Islamic financial institutions were allowed to operate only in the north of Sudan. Accordingly, the banking industry in Sudan country returned to a single Islamic banking system and the number of operating banks reduced to 33 banks after the separation instead of 39 banks that were in 2010, (CBOS- Annual Report 51, 2011).

The years after the secession of southern Sudan witnessed the establishment of Egyptian National Bank and Abu Dhabi Islamic Bank in 2012 and Qatar Islamic Bank in 2013, which are foreign banks, and Al Rowad Bank for Development and Investment in 2013, which is a national bank established for the purpose of investment and Development.

Subsequently, Al Rowad Bank restructured as commercial bank instead of joint-bank, and renamed to Al-Khaleej Bank end of 2016, (CBOS- Annual Report 56, 2016). Hence, the number of banks that operate in Sudan stands on 37 banks from 2013 up to end of 2019 (CBOS- Annual Report 58, 2018).

3.6. The Structure of the Sudanese Banking

The following part of this research shows the main features of Sudanese banking structure, its objectives and functions within interest-free financing modes, the size of banking system, and economic indicators which are redeleted to the consolidated banks' activities.

The banking structure in Sudan consists of the Central Bank as a supervisory and regulatory body, along with the banks that operate under Islamic regime that comply with economics, ethical and social controls. Hence, the banking system along with CBOS it includes: state-owned banks; banks owned jointly either by local, foreign capital, or/and the government investors; branches of foreign banks, specialized, and investment banks.

3.6.1. Central Bank of Sudan

After the independence of Sudan, a committee of three experts (Oliver Weale, Alan R. Holmes and Andrew F. Primer) from the USA Federal Reserve was formed in December 1956 to conduct a study on the possibilities of establishing a Central Bank in Sudan. This is due to the need of having a Central Bank to issue the national currency, to formulate and direct monetary and finance policies, to build up a strong and efficient banking system that meet the development requirement in the country, and to act as an adviser for the government.

The Committee submitted its report in March 1957 then followed by the issuance of the Bank of Sudan Act of 1959. The Bank of Sudan opened for business in February, 1960. (CBOS, 2019).

The Bank of Sudan Act of 1959 was replaced by a new at on 2002, which has been amended in 2005, 2006 and 2012 due to the especial nature and purpose of the strategic directions. The act stipulated that the Bank shall have an independent corporate personality, legal personality and a perpetual succession and a common seal and may litigate in its own name as a plaintiff defendant. In reference to the Central Bank of Sudan Act (amended) in 2012, in chapter II section No (6); it mentions that the Bank shall take the following responsibilities:

a) Strive to achieve economic and prices stability, the stability of the value of the local currency and efficiency of the banking system. Also, to issue the currency in different types, organize, control and supervise the same.
b) To formulate and implement the monetary policy in such a way to achieve the national objectives of the macro economy in consultation with the Minister of Finance and National Economy.
c) To organize the banking business, monitor and supervise it, to promote and develop the same to achieve the balanced economic and social development.
d) To act, in its capacity as a bank of the Government, as an it is advisor and agent thereof, in the monetary and fiscal affairs,
e) supervision and control of the banking system in accordance with of Islamic Sharia and banking practice.
f) To organize and develop the payments systems, and supervise of the same, in such way, as to secure their safety, stability and efficiency.

The Central Bank of Sudan head-quarter is located in Khartoum town, and it has seventeen (17) branches operate within the country and they are divided in different states of Sudan. The main branch is located in Khartoum and there is a new branch in Al-Fula city that is under establishment. The organizational structure of the Central Bank of Sudan consists of senior executive management, and seventeen departments. (CBOS, 2019).

3.6.2. Supervision Role by Central Bank of Sudan

The central bank of Sudan implemented many measures to reform the banking system in the Sudan. The reform program was processed in three phases. The first was during 1994-1997, the second in 2002, and the third in 2005. Since 1997 the CBOS started to enhance the bank supervision and prudential regulation, the introduction of market monetary policy instruments, the promotion of interbank markets.

In 1998, the CBOS introduced Central Bank Musharakah Certificates (CMCs), and in the same year the CBOS followed the Accounting and Auditing Organizations for Islamic Financial Institutions (AAOIFI) in introducing uniformed Islamic accounting principles for all financial institutions.

By 1999, a monitoring program for credit management was established and the banks' compliance with capital adequacy requirements improved. By 2002, the capital adequacy, asset quality, earning, liquidity (CAEL) measure applied by the CBOS (Kireye, 2001).

In 2006, the CBOS implemented of Basel II Accord for the capital adequacy, and then in the year 2008 the CBOS directed the operating banks to implement the requirements of the IFSB standards for the capital adequacy, risk management and Shariah compliance. (CBOS Annual Report 48, 2008).

Furthermore, CBOS regulate and supervise the financial institutions in accordance to many laws, policies and rules and. The most current laws include: Bank of Sudan Act, 2002 (amendment of 2012), Banking Business (Organization) Act 2004, The Property Mortgaged to Banks Act 1990, Deposit Guarantee Fund Act 1996, Foreign Exchange Dealing Act 1981, Regulating Dealing in Cash Act 1981, The Electronic Transactions Act 2007, Credit Rating and Inquiry Act 2011 and Money Laundering and Terrorism Financing Act 2014 (CBOS Annual Report 55, 2015). In line with the CBOS aims for promoting the financial sector especially the banking industry, Khartoum Securities Exchange (KSE) commenced to operate in Sudan by 1995.

This market plays an essential role in the economy through its function of accumulating saving funds and investing them through the mechanism of trading equity shares and Islamic sukuks. Given that, the Sudan Financial Services Company (SFSC) started to operate in 1998 upon its establishment by the CBOS and the Ministry of Finance and the National Economy.

The SFSC responsible for the issuance and marketing of Islamic securities and sukuks such as government participation certificates and certificates of participation of the CBOS.

Moreover, The Bank Deposits Guarantee Fund was established in 1996 (under CBOS supervision) for the purpose of enhancing the confidence in the banking system, as it provides a protection the depositors' rights by shouldering the damages when a bank goes into collapses (CBOS Annual Report 44, 2004).

A new liquidity mechanism found in 2014 when a Liquidity Management Fund (LMF) was established in accordance to the Funding Sukuks Act as an open-ended fund with variable capital contribution. Its capital comes from the operating banks' contributions as 40% in cash and 60% in Gov. sukuk and the IMF is subject to the CBOS supervision.

The IMF started its operation in 2015 with the purpose of providing liquidity coverage for any contributing bank within the limits of the amount of the deficit, provided that the amount of the deficit is refunded to IMF within five working days. Otherwise, the COBS shall become a last resort in case the bank fails to return the amount of the deficit (CBOS Annual Report 58, 2018).

3.6.3. Operating Banks in Sudan

The Central Bank of Sudan classifies the banks that operate in the country into two main categories: Specialized Islamic banks and commercial Islamic banks based on their set-up purpose, nature of business and objectives. Furthermore, each category divided into different sub-categories in accordance with the capital structure and composition.

The specialized Islamic banks include both the government and joint banks, whereas the commercial Islamic banks include the governmental, joint and foreign banks. The following table (3-4) shows the numbers of operating banks in Sudan during the period that covers this research (2007-2018), as reported in the CBOS annual reports.

Table (3-4)

Operating Islamic Banks in Sudan in Numbers (2007-2018)

Year	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Total Number of All Banks	32	35	38	39	33	35	37	37	36	37	37	37
Banks' Number of Branches	532	564	585	617	589	629	655	650	679	732	778	801
Bank of Sudan -Number of Branches	12	12	14	14	10	15	16	17	17	17	17	17

Source: Researcher Outputs from CBOS Annul Reports (2012-2018)

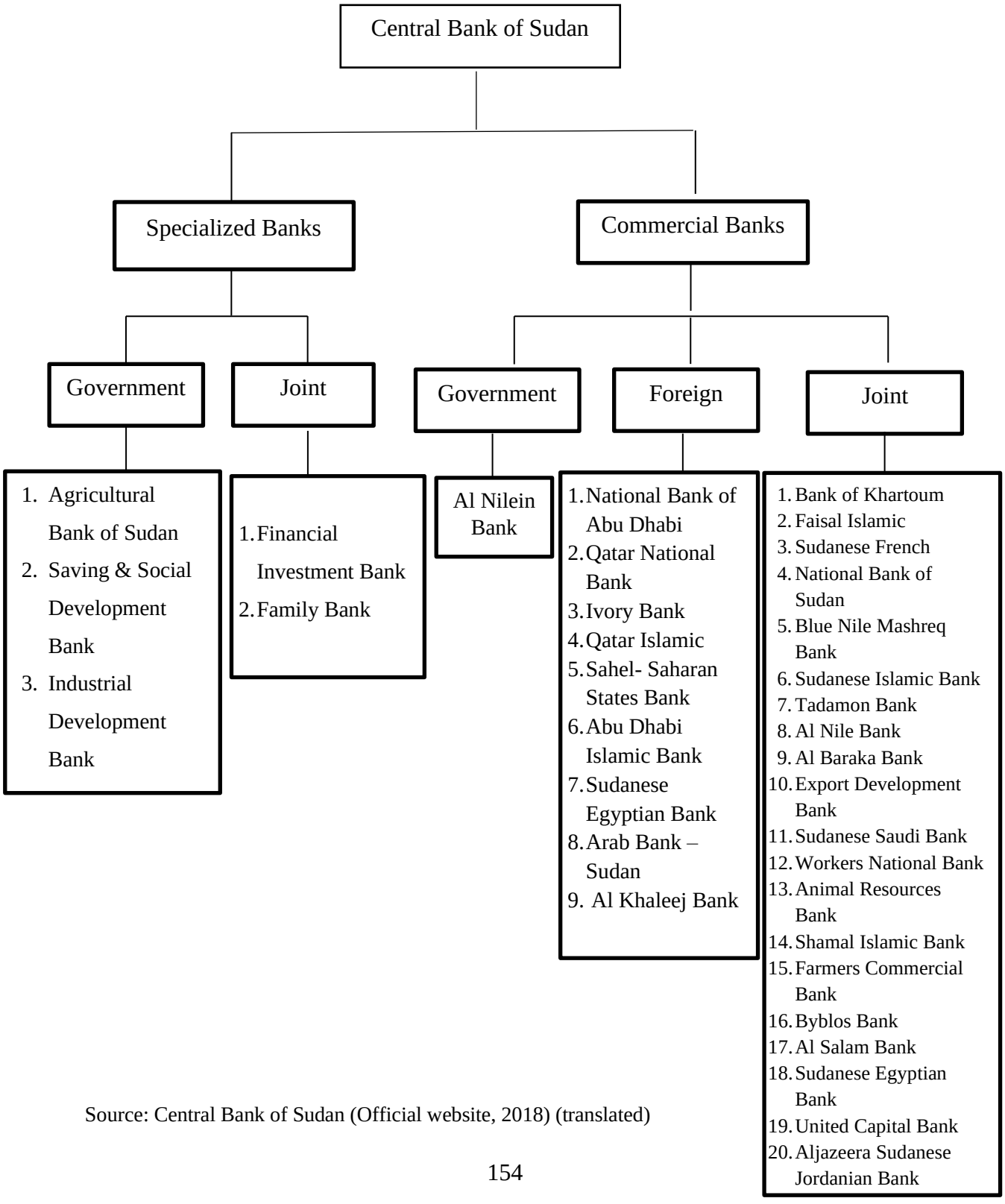
The table (3-4) shows that there was a development in the banking industry with respect to the number of banks' branches spread in Sudan. Also, the separation of the South of Sudan in 2011 affected the number of the operating banks as it reduced by six (6) banks with their relevant thirty-two (32) branches and four (4) branches of Central Bank of Sudan. Despite this fact, new banks (such as National Egyptian Bank, Abu Dhabi Islamic Bank, Qatar Islamic Bank and Al Rowad bank) joined the industry between 2012 to 2013. This step led to increase the number of to thirty-seven (37) operating banks.

Also, the central Bank of Sudan opened new seven (7) branches between the years 2012 and 2014 in different states. These were at Kassala, Genena, Damazin, Sinar and Kadogli in 2012, plus at Zalinja in 2013 and at Al-Deain in 2014. (CBOS, Annal Reports 2007-2018).

The CBOS provided a structure of the banking system in Sudan as shown in the below figure (3-2). Such structure represents the status as of end of 2018.

Figure (3-2)

The Structure of the Banking System in Sudan as end of 2018



Source: Central Bank of Sudan (Official website, 2018) (translated)

3.7. Financial Performance of the Sudanese Banks (2007-2018)

3.7.1. The size of the banking system

Total assets and equity capital represent the indicators which regulators and academics use most frequently to measure the bank size. The total asset measures the gross nominal volume of a bank's resources at end of financial period, while equity is relatively stable and mostly is last resort for problems in business problems (Schildbach, 2017).

Given that, Sudanese banks are very small in term of size in comparison with international standards. The total assets and equity for the banks operate in Sudan as a whole at end of 2018 was 447,850.5 million Sudanese pounds (US$ 9,405.9 million) comparing with 211,245.8 million Sudanese pounds (US$ 30,111.7 million) by end of 2017, which it shows a nominal increase of 112%. Despite that, the significant devaluation of Sudanese Pound currency toward the US. Dollar currency (by 578% from 2017 to 2018) is clearly caused a reduction in the value of total assets by 220% when it counted in US$ currency. In term of banks equity, it reached to 31,058.5 million Sudanese pounds (US$ 652.2 million) by end of 2018 while in 2017 it was 22,847.2 million Sudanese pounds (US$ 3,256.7 million). This shows a nominal increase of 36% in 2018, which again represent a reduction by 4 times from 2017 banks' equity due to above reason. (CBOS, 2018).

3.7.2. Selected Financial Statements' Ratios

Table (3-5) provides a summary for some of selected performance indicators regarding the Sudanese Banks during the period of this research, (2007-2018). Also figure (3-3) depicts the trend of these indicators.

The table shows that the size of banks in total assets, equity, deposits and financing increased during 2007 to 2018 when they measured in Sudanese pounds.

The total assets of whole banks in Sudan were 26,197.4 million Sudanese pounds in 2007 and it increased by almost 17 times in 2018 as it reached to 447,850.5 million Sudanese pounds.

Regarding the equity of the aggregated banks in Sudan it increased by 574.2% from 4,606.9 million Sudanese pounds in 2007 to 31,058.5 million Sudanese pounds in 2018.

The total deposits followed the same trend of the increase as it was 13,942.4 million Sudanese pounds in 2007 and it reached 302,979.3 million Sudanese pounds by 2018 which shows an increase by 2037%.

Moreover, the size of financing that done by whole banks in Sudan in 2007 was 12,582.5 million comparing with 143,187.5 million Sudanese pounds in 2018 that indicates an increase by 1038%. The significant increases in the aforementioned parameters seems to be occurred during the years 2017 and 2018.

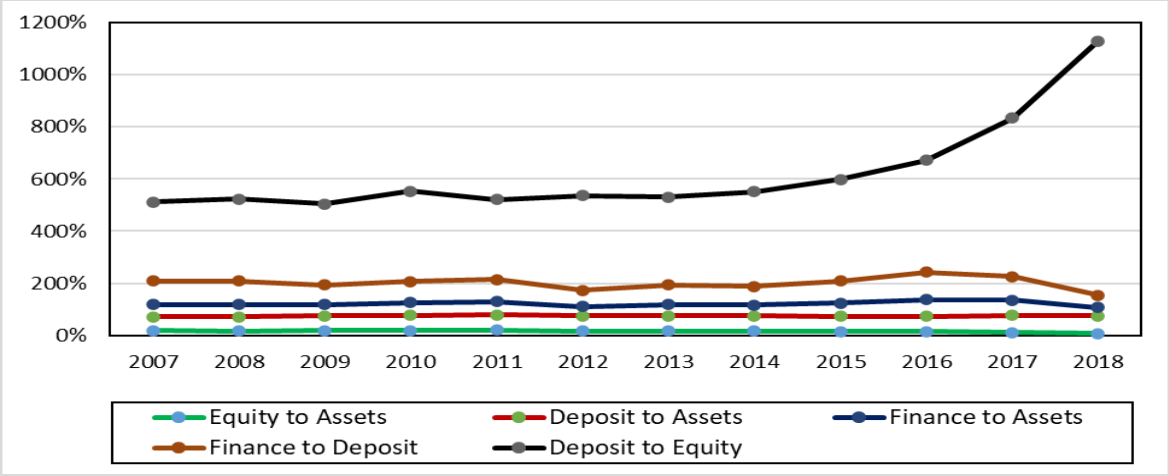
This resulted mainly from the change in the exchange rate of the dollar against the local currency (defalcation of Sudanese Pounds) in addition to the increase in the size of the issued currency (CBOS Annual Reports, 2007-2018).

Table (3-5)
Selected Performance Indicators of the Sudanese Banks (2007-2018)

Year	Assets	Equity	Deposits	Finance	Equity to Assets	Deposit to Assets	Finance to Assets	Finance to Deposit	Deposit to Equity
	In Million Sudanese Pounds								
2007	26,197.4	4,606.9	13,942.4	12,582.5	18%	53%	48%	90%	303%
2008	30,650.0	5,248.5	16,508.5	14,681.2	17%	54%	48%	89%	315%
2009	36,666.9	6,678.0	20,848.0	15,659.8	18%	57%	43%	75%	312%
2010	43,107.7	7,477.9	25,874.4	20,992.8	17%	60%	49%	81%	346%
2011	46,504.1	9,036.0	27,775.6	23,329.2	19%	60%	50%	84%	307%
2012	67,049.6	10,830.7	39,544.3	24,102.9	16%	59%	36%	61%	365%
2013	77,479.8	13,149.1	44,133.1	33,822.5	17%	57%	44%	77%	336%
2014	92,317.0	14,739.4	53,469.3	38,678.6	16%	58%	42%	72%	363%
2015	108,937.6	16,254.4	63,419.5	54,193.2	15%	58%	50%	85%	390%
2016	132,713.5	18,423.0	79,459.6	83,355.3	14%	60%	63%	105%	431%
2017	211,245.8	22,847.2	139,106.1	124,596.2	11%	66%	59%	90%	609%
2018	447,850.5	31,058.5	302,979.3	143,187.5	7%	68%	32%	47%	976%

Source: Researcher Outputs from CBOS Annual Reports (2007-2018)

Figure (3-3)
Trend of Selected Financial Performance Indicators of the Sudanese Banks (2007-2018)



Source: Researcher Outputs from CBOS Annual Reports (2007-2018)

From other hand, the indicators of banks' unified (consolidated) financial statements during the study period reveals to the following status:

a. Equity to assets ratio ranges between 14% to 19% during the period 2007 – 2016, while it dropped to 11% and 7% in 2017 and 2018 respectively. Also, maintaining of part of the assets in hard currency while the shareholders equity in local currency a reason of this reduction during the last five years (20014 to 2018) with the consideration of devaluation of local currency, and the bank increased its assets size.
b. The deposits to assets ratio lay between 53% to 60% in most of the years, with the a relatively increase to 66% and 68% in the years 2017 and 1028 respectively. Whereas, the financing to assets ratio is vary between32% and 63% during the study period. This is due to fluctuation in banks' financing and credit policies.
c. The ratio of financing to deposit shows a relatively good utilization of deposits in financing activities during 2007-2018 with the exceptions for years 2012 (61%) and 2018 (47%). The highest utilization ratio of deposits funds occurred in 2016 as it indicates that banks used their maximum capacity of deposits to finance customers.
d. Deposits to equity ratio has a growth carve from 2007 (303%) with its maximum in 2018 (976%). As general banking industry, the depositors fund is higher always from shareholders' funds. However, the years 2017 and 2018 indicates a possible high gearing level and an aggressive growth strategy by Sudanese banks.

3.7.3. The Financial Stability and Soundness of Sudanese Banks

The CBOS adopted the recognised measures and regulatory standards that issued by Islamic Financial Standards board (IFSB) and BCBS guiding principles that are aiming to achieve financial stability and soundness in banking system.

While using the financial ratios analysis, the financial soundness indicators for the Sudanese Islamic banks during the period of 2010 to 2018 are shown in table (3-6) and figure (3-4).

The main results from the CBOS reports during the period 2010 – 2018, shows the following summary:

a. The capital adequacy ratio (CAR) for the whole Sudanese banks during 2011 to 2017 vary between 12% (2012) to 20% (2015) while in 2010 and 2018 the ratio stood at 10% each, which is below the standard CAR ratio.
b. The non-performing loan (financing) ratio (NPL) was decreased from 14% in 2010 to 3% in both year 2017 and 2018. This indicates a significant improvement in credit risk policy and management the apply by banks.
c. The ratio of financing provision for bad-debts to nonperforming loan (FPR) has increased during the period 2010 to 2018. The higher provision was built by the banks' management during 2017 (81%) and 2018 (72%). Despite these increase in FPR, the non-performing loan (which is the denominator of FPR) was decreased in aforementioned period.
d. The Pre-tax return on assets (ROA) ratio was relatively stable between 3.7% to 4.7% during the period of 2010 to 2018, while the pre-tax return on equity (ROE) ratio was varied between 27% (2010) to 95% (2018).
e. Regarding the liquidity ratio, it ranged between 35% to 52%. This ratio falls within the standard liquidity ratio (30% to 40%) in most of the time.

Table (3-6)

Financial Stability and Soundness Indicators of Sudanese Banks (2010-2018)

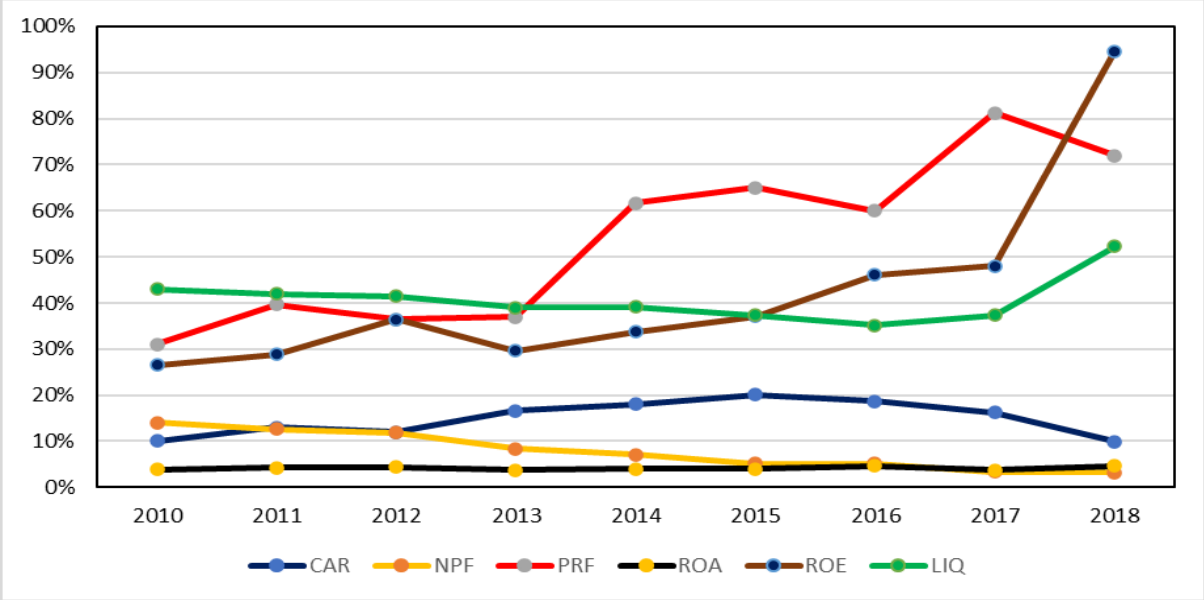
Symbol	2010	2011	2012	2013	2014	2015	2016	2017	2018
CAR	10%	13%	12%	17%	18%	20%	19%	16%	10%
NPF	14%	13%	12%	8%	7%	5%	5%	3%	3%
PRF	31%	40%	36%	37%	62%	65%	60%	81%	72%
ROA	3.9%	4.2%	4.4%	3.7%	4.0%	4.0%	4.7%	3.8%	4.7%
ROE	27%	29%	37%	30%	34%	37%	46%	48%	95%
LIQ	43%	42%	42%	39%	39%	37%	35%	37%	52%

Symbol	Indicator	Symbol	Indicator
CAR	Capital Adequacy Ratio	ROA	Return on Assets-(Pre-Tax)
NPF	Total nonperforming debt to total financing	ROE	Return on Equity (Pre-Tax)
PRF	Bad debts provisions to nonperforming loan	LIQ	Liquid Assets to Total Assets

Source: Researcher Outputs from CBOS Annual Reports (2010-2018)

Figure (3-4)

Trend of Financial Stability and Soundness Indicators for Sudanese Banks (2010-2018)



Source: Researcher Outputs from CBOS Annual Reports (2010-2018)

3.7.4. The Financing Modes of Sudanese Banks

The financing modes that applied by Sudanese banks during the years 2007 to 2018 are shown in the following table (3-7) and also figure (3-5) for their trend's movement. The table indicated that Mudaraba mode was dominant financing mode and it comprised of almost 50% of the total investment portfolio. Furthermore, Mudaraba financing mode has a fluctuated ratio between 4% to 7.8% during 2007 and 2018. Musharaka financing mode – as another profit-loss sharing (PLS) mode along with Mudaraba – has a fluctuated ratio during the study period with a significant reduction from 2012 (10.9% to 2018 (6.4%). This indicate that the banks' management in Sudan were not willing to participate in managing projects under both Mudaraba and Musharaka types of finance.

The fact is that the Sudanese banks during the study period were concentrated on Murabaha mode of financing more than the PLS financing modes. In fact, this is exposing more risk to the banks due to investment concentration on a dominant investment method. In addition to that, the it may create a diversion from the main principle of Islamic financing which is based on the sharing the risk and management of an asset or product (Ariff, 2010, p.23).

The table (3-7) also shows that Mugawala type of financing was generally increased from 7.6% in 2008 to 26% in 2017, with relatively decline to 18.4% in 2018. This shows that banks in Sudan showed an interest to finance the construction and building projects as banks keep them as collateral that packed the customer's debt.

The interesting part is that Salam financing mode has a minor portion (not more than 3.8%) of the banks' investment portfolio despite that Sudan history shows that the country has a comparative advantage in agricultural sector. This direction of banks may be due to the bundled risks that associated with financing agriculture such as credit, market and operations risks.

Table (3-7)

Sudanese Banks' Financing Modes During 2007 to 2018

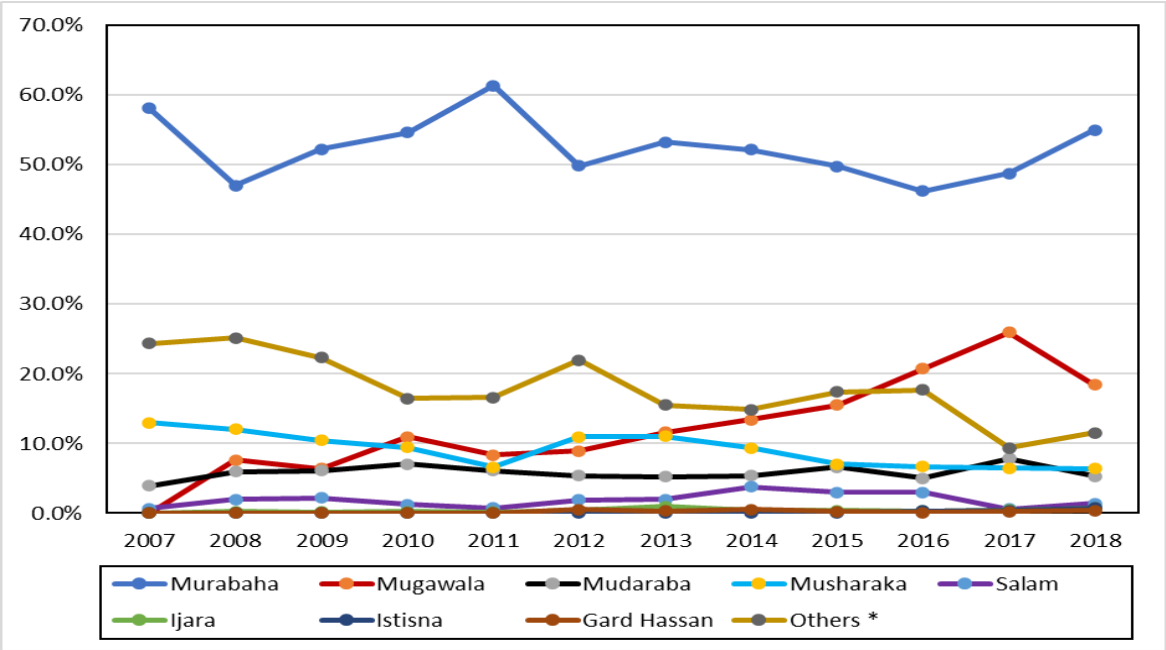
Year	Murabaha	Mugawala	Mudaraba	Musharaka	Salam	Ijara	Istisna	Gard Hassan	Others*	Total	Total (Million SDG)
2007	58.1%	0.0%	4.0%	13.0%	0.6%	0.0%	0.0%	0.0%	24.3%	100%	12,583
2008	47.0%	7.6%	6.0%	12.1%	2.0%	0.2%	0.0%	0.0%	25.1%	100%	14,681
2009	52.3%	6.4%	6.1%	10.5%	2.2%	0.2%	0.0%	0.0%	22.3%	100%	15,660
2010	54.7%	10.9%	7.1%	9.4%	1.2%	0.2%	0.0%	0.0%	16.4%	100%	20,993
2011	61.4%	8.4%	6.1%	6.6%	0.7%	0.2%	0.0%	0.0%	16.6%	100%	23,329
2012	49.9%	9.0%	5.4%	10.9%	1.9%	0.4%	0.1%	0.5%	22.0%	100%	24,103
2013	53.3%	11.6%	5.2%	11.1%	2.0%	1.0%	0.1%	0.3%	15.5%	100%	33,823
2014	52.2%	13.4%	5.4%	9.4%	3.8%	0.4%	0.1%	0.5%	14.9%	100%	38,679
2015	49.8%	15.5%	6.6%	7.1%	3.0%	0.4%	0.1%	0.2%	17.4%	100%	54,193
2016	46.2%	20.7%	5.0%	6.7%	3.0%	0.3%	0.3%	0.1%	17.7%	100%	83,355
2017	48.7%	26.0%	7.8%	6.5%	0.6%	0.4%	0.4%	0.2%	9.4%	100%	124,596
2018	55.0%	18.4%	5.3%	6.4%	1.4%	0.7%	0.8%	0.4%	11.6%	100%	143,188

* Mugawala and Ijara for 2007, plus Istisna and Gard Hassan up to end of 2011 were included in Others.

Source: Researcher Outputs from CBOS Annual Reports (2007-2018)

Figure (3-5)

Trend's Movement of Sudanese Banks' Financing Modes During 2007 to 2018



Source: Researcher Outputs from CBOS Annual Reports (2007-2018)

3.8. Risk Management Practices in Sudanese Islamic Banking

CBOS continues its efforts to governance the banking practices in Sudan by the application of the recognised international supervision standards and measures. In this context, CBOS first attempt was on 1994 to impose the application of the Basle Accord – for capital adequacy standard – on banking sector in Sudan. CBOS adjusted the standard to accommodate and comply with the Islamic financial structure.

Then after, CBOS applied the CAEL (refers to capital, asset quality, earnings and liquidity) measure at end of year 2002 which followed by adding the management measure to represent CAMEL measure.

The efforts of the CBOS extended in 2006 by implementation of Basel II Accord for the capital adequacy, and then in the year 2008 the CBOS directed the operating banks to implement the requirements of the IFSB standards for the capital adequacy, risk management and Shariah compliance (CBOS, annual report. 48, 2008).

It is worth to mention that, since 1998 the operating banks in Sudan follow the accounting and *Shariah* standards that issue by the Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI). The CBOS circular No (13/98) issued on 15th June. 1998 directed all Islamic banks to apply AAOIFI standards for preparing and presentations of financial statements, as well as the rules of calculation and application toward the Islamic financing modes. Additionally, CBOS issued a number of circulations during the years 2001-2005 for detailed standards' guidance for most of the Islamic financing modes. This is for the purpose to enhance and control the Islamic financing practices.

Additionally, CBOS regulate and supervise the financial institutions in accordance to many laws, policies and rules and. The most current laws include: Bank of Sudan Act, 2002 (amendment of 2012), Banking Business (Organization) Act 2004, The Property Mortgaged to Banks Act 1990, Deposit Guarantee Fund Act 1996, Foreign Exchange Dealing Act 1981, Regulating Dealing in Cash Act 1981, The Electronic Transactions Act 2007, Credit Rating and Inquiry Act 2011 and Money Laundering and Terrorism Financing Act 2014. Each act has its own aims that support improving the operations of Islamic banks in Sudan, including that the risk management, governance and compliance issues, depositors' fund security, and organizing the operations (CBOS, official website, 2018).

In the context of banks' liquidity management, the CBOS allowed the Islamic banks to use 10% as a benchmark (from the current and saving accounts, 10% from IAHs accounts, sundry current liabilities, and weighted percentages from off-balance sheet items) as a level of their internal liquidity ratio, while maintaining no more than 25% in the form of Ijara and Musharakah Sukuks (CBOS, annual report 2011).

In early 2019, the CBOS obliged the banks to maintain a statutory liquidity reserve of 20% instead of 18% (in 2018) from deposits that include current and saving accounts, margins of letters of guarantee and other deposits excluding IAHs accounts (CBOS, Circular No. 1/2019). Such reserve is reviewed by CBOS on a weekly basis. Adding to that, CBOS encourages banks to cooperate and coordinate together to unify their financing and exchange rate policies and inter-bank market.

Khartoum Securities Exchange (KSE) commenced to operate in Sudan by 1995. This market plays an essential role in the economy through its function of accumulating saving funds and investing them through the mechanism of trading equity shares and Islamic sukuks.

Given that, the Sudan Financial Services Company (SFSC) started to operate in 1998 upon its establishment by the CBOS and the Ministry of Finance and the National Economy. The SFSC responsible for the issuance and marketing of Islamic securities and sukuks such as government participation certificates and certificates of participation of the CBOS.

Moreover, The Bank Deposits Guarantee Fund was established in 1996 (under CBOS supervision) for the purpose of enhancing the confidence in the banking system, as it provides a protection the depositors' rights by shouldering the damages when a bank goes into collapses.

A new management mechanism of liquidity risk is found in 2014 when a Liquidity Management Fund (LMF) was established in accordance to the Funding Sukuks Act as an open-ended fund with variable capital contribution. Its capital comes from the operating banks' contributions as 40% in cash and 60% in Gov. sukuk and the IMF is subject to the CBOS supervision. (CBOS, Circular No, 7, 2014).

The IMF started its operation in 2015 with the purpose of providing liquidity coverage for any contributing bank within the limit of the deficit amount, provides that the amount of the deficit is refunded to IMF within five working days. Otherwise, the COBS become a last resort in case the bank fails to return the amount of the deficit (CBOS, Annual Report 58, 2018).

3.9. Application of the Basle Accord in Sudanese Banks

As mentioned early, CBOS imposed the application of the Basle Accord on all the authorized banking units operating in the country. By February 2006, CBOS issued its instruction to the Islamic banks that operate in the country to announce the beginning of application of Basel II based on IFSB standard of capital adequacy requirements, and the guidance for risk management practice (CBOS, Circular (1/2006).

The CBOS advised to implement these requirements by early 2007, with intensive training, workshops and support to all Islamic banks in Sudan. The CBOS made some adjustments to Basel II Accord in order to cater the requirements of Islamic banking. CBOS specifies risk weights in Basel II as per the appendix No (1). The main adjustments include:

a. Cheques under collection are a assigned a zero weight. Primarily because drawings against uncleared effects is not allowed in the Sudanese banking system. In addition, CBOS plans in to transfer this item from being an on balance-sheet to an off-balance-sheet item.
b. Goods received in settlement of Salam finance are assigned risk weights within a range from 25% to 100%. This aims to motivate the banks to realize such goods in cash as quickly as possible.
c. Durable goods are assigned risk weights ranging from 30% to 100%. This is to motivate quick realization of those goods.
d. Regarding off-balance sheet items, and as for the Islamic bank these items should include letters of guarantee, letters of credit and restricted investment deposits. Considering that Islamic banks do not deal in derivatives (Hassan, 2004).

In the same context, CBOS issued a detailed and comprehensive guidance on measuring Capital adequacy ratio (on Basel II) in August, 2008 for operating Islamic banks in the country. The guidance concentrated on how to measure the regulatory capital, calculation of risk weighted assets, common mitigations of credit, operational and market risk, and measuring the capital adequacy ratio (CAR) for the bank (CBOS, 2008.a).

Moreover, the minimum CAR ratio that should be maintained by Islamic banks in Sudan sets at 12% (CBOS, 2009.a, Circular No. 6).

From other hand, CBOS recognizes the critical role of banks' Board of Directors (BOD). Therefore, CBOS issued some guidelines for the effectiveness of the role of BOD in these banks [(CBOS, 2007, Circular No. 22); (CBOS, 2010, Circular No. 6); and (CBOS, 2020, Circular No. 2)] to assure that there is an effective application of the Corporate Governance practice in each bank. In addition to the role of policies and strategic makers, the BOD is responsible to assure an effective control, and reporting system are in place. The BOD also has to assure that effective controls and decisions are taken toward the position of financing requirement, nonperforming financing (loan), profitability, operating costs, deposits and liquidity matters. Additionally, the BOD has to be aware of information technology and operations needs for the purpose of enhancing the banks' activities and mitigate the risks.

3.10. Guidelines on Risk Management in Sudanese Islamic Banking

As mentioned early, the CBOS adopted the IFSB standards and guidance for the Islamic banking and institutions, as well as recognised the directions of Basel committee which have been adjusted for the Islamic financing sector.

Given that, CBOS issued guidelines on risk management for the operating banks in Sudan in August 2008 (CBOS, 2008.b) [10] and then followed by regular circulations. The main purposes of this guidelines are to support the Sudanese Islamic banks to establish an effective risk management that promote and strengthen the bank's operations, to assure the financial soundness of banks' financial positions, protect the shareholders and depositors' interests and to build a public trust on banking sector.

Additionally, the guidelines of risk management comprehensively cover the areas of risk management definition, types of risk that face Sudanese Islamic

10. The reference was published in Arabic language.

banks, risk management process and procedures, the roles of bank's BOD and management toward managing the risk, risk management integration with other activities, bank's contingency plane, and roles of both risk management committee and department of risk management.

The main types of risk that identified by CBOS guidelines include the credit, market, liquidity, equity, rate of return and operational risks. Furthermore, to manage these types of risks, the bank needs to consider the three levels named: The strategic, the comprehensive, and the micro levels. The strategic level deals with the BOD and senior management roles in defining the risks, designing and setting of strategies and policies; determining of limits; and setting the internal regulations and controls to manage the risks. Whereas, the comprehensive level implies all activities run by individuals or departments to review and follow up the risks in the bank (in most of the case a dedicated risk management officer or department). Finally, the micro level of managing the risk concerned with all activities' that create a risk in the bank, such as investment and financing activities. The micro level is limited by following the predefined procedures and controls to manage the associated risks.

The risk management guidelines direct the banks to setup an active and flexible risk management framework in order to capture not only current risk management practices but also the future development in such area. The framework should include clear policies and procedures for risk management and well-established structure for the responsibility and accountably of each staff and departments, as well as internal controls.

Moreover, the risk management guidelines clearly state that an independent department of risk management is necessary in the bank. Its role has to be consultation rather than executive. This department has to be reviewed and assessed by independent party, either the internal or/and external auditors.

Additionally, for an effective risk management, the bank needs to established different committees in supporting the BOD and senior management to manage and control risks. Such committees may include; risk management committee which constitute a BOD consultancy; asset and liabilities committee to act for the senior management in monitoring the liquidity and market risks. Further regulations issued by CBOS to enhance the risk management and controls in Sudanese banks [(CBOS, 2009.b, Circular No.18); (CBOS, 2010, Circular No. 6); (CBOS, 2020, Circular No.2).

The following table (3-8) provides a matrix that shows the required procedures that Sudanese Islamic banks have to consider in managing their risks (CBOS, 2008.b).

Table (3-8)

The Minimum Requirement of Internal Controls and Procedures for Risk Management in Sudanese Islamic Banks

Type of Risk	Internal Controls and Regulations	Main Procedures for Controlling Activity
Credit Risk	• BOD has to set a clear policy for credit management. • Customer due diligence and collaterals. • Feasibility assessment of the project under financing. • Assessing the customer's financial capability. • Identify the potential risks of the investment and how to mitigate them. • Real evaluation of collaterals by an expert with a regular review. Collaterals shouldn't be the only guarantee to cover credit risk. • Periodical review and assessment of customer's financial position and the viability of the credit facility. • Regular assessment of the customers' business environment and its changes. • Review and analysis of nonperforming finance (loan), and reporting the same to concern management. • Continuing follow up, reporting, feedback and action toward a single and overall credit facilities.	• Review and follow up of the credit facilities, and assure they are aligning with banks' policies and regulations. • Continuing evaluation and classification of investments and financed customers, as per regulations. • Make appropriate special and general provisions, with reference to CBOS regulation. • Periodic review for the financing that given to BOD members, VIP customers and bank's related parties. Ensure their transaction on arm length basis. • Review and amend the bank's policies toward granting and controlling the credit facility and obtainable and liquation of collaterals. • Application and development of credit limits on the basis of financing type, and periods
	• BOD has to set a clear policy for liquidity management and how to balance it with bank's profitability. • Identify appropriate tools to assess, evaluate and control the bank's liquidity risk, with continuing review and amendment.	• Conduct a comprehensive analysis of liquidity position (cash flows, liquidity gap, short term and long-term positions), and setup an emergency plan for different liquidity scenarios.

Liquidity Risk	• The bank has to set an active plan to deal with liquidity crisis. • The bank's liquidity policy has to consider the qualitative (i.e. staff training, management skills, IT infrastructure, etc.) and quantitative (i.e. reserves, fund raising, concentration, etc.) factors. • Diversification of liquidity resources and balancing the financing and funds sourcing should be in place all the time.	• Ensure of matching the assets and liabilities duration, assess the factors that affect it, and determine the surplus or deficit status. • Follow up, review and manage the liquidity resources and aging of financing (loan) in the manner that promote the bank's profitability and assure soundness of liquidity control. • Application and development of liquidity measures and ratios for assessing the liquidity changes.
Market Risk	• The BOD shall set an appropriate market risk framework for its assets including assets that do not have an active market, and the assets that are sensitive to price-fluctuation. • The bank should have the capability to identify and to measure all drivers of market risk (i.e. price, FX rates, commodities, etc.) • Bank has to consider Value at Risk (based of profit or loss level), and the present value (based on market-to-market) are the most appropriate methods to measure the market risk that driven by change of prices. • The banks should establish a closed monitoring and reporting system for mitigating the market risk and its exposure.	• The necessity of effective internal controls that include responsibility and accountability on each bank's level. • Periodic review and modification of the measurement tools that use to assess the market risk, and ensure that reliable data is used in the statistical models and scenario analysis. • Application and development of limits for market exposure (i.e. dealing in hard currencies, assets held for trade, Sukuk portfolio, etc.)
Equity Risk	• The bank should make feasibility study prior involving in PLS investment modes in order to assess their associated risks. • Bank should have full awareness of the operation's environment and management of PLS partners, in addition to the marketability of the products.	• Approved strategy for involving in equity investments should be in place which is supported by the know-how, timely evaluation of the investments, and appropriate exit strategy. • Maintain of clear procedures during all levels of equity investment's activities.

	• Bank should have full awareness of the legal framework, Gov. regulations and internal control that are associated to the investments under PLS contracts. • The banks should establish a closed monitoring and reporting system for mitigating the equity risk.	• An appropriate and complete system to manage, control and sharing the profit and risk of the PLS investment between the bank and partner(s). • Assign an independent consultant to evaluate and report on the PLS investment. • Agree on a suitable management approach and profit-sharing mechanism for each PLS investment.
Rate on Return and Commercial Displacement Risks	• The bank's management has to be capable to assess the rate on return risk and report on it through an effective system. • Closed monitoring of deposits and the deals on foreign currencies to assess and manage their impact of bank's profitability and liquidity position. • The bank should maintain a well-trained staff to deal with such type of risk	• A clear policy and framework to predict the expected rate of return for both equity holders and IAHs, and to control the GAP analysis. • Maintain an approved base to create the reserve from the profit after obtaining the acceptance from Shariah committee and IAHs
Operation Risk	• The bank's BOD should assure that a clear policies and procedures in place to control the human resources, technology and operating procedures. • The bank must keep an effective and strong internal control system to strengthen the operations and administration issues. • Activate the role of internal audit to assure full compliance and adherence to the internal controls and to enhance the operations. • Maintaining an appropriate system for staff recruitment.	• Periodical evaluation of bank's policies, internal controls, information technology and procedures. • Train the staff, acquire technical experts, conduct regular appraisals and create a healthy working environment. • Assure that all bank's activities are in compliance with Shariah rules and regulatory body. • Assure there is a clear system for the reward and accountability in the work-environment.

Source: Central Bank of Sudan (2008.b). Guidelines on Risk Management

Chapter Four

Research Methodology

4.1 Introduction:

Research methodology refers to the systematic approach to solve the research problem and the theoretical analysis of applied methods in the research that conducting in a scientific manner. This chapter introduces different research philosophies, outlines the research approach, and shed light to methodology that applied to this research which includes the research design and research strategies. Then it explains the chosen method for the current research, data collection, statistical analysis, model specification, and variables specifications.

4.2 Research Philosophy

The research philosophy deals with aspects of knowledge's nature and its source and development. The adopted philosophy in the research contains important assumptions about the perception and the way in which researcher view the world. The three common ways of thinking about research philosophy are Epistemology, Ontology and Axiology. Epistemology is concerned with acquisition of knowledge and what constitutes acceptable knowledge in a field of study; while ontology is concerned with the nature of social phenomena as entities and in how a researcher being a neutral observer during the assessment of a phenomenon. The Axiology is a branch of philosophy that studies judgements about value. It advocates that the values of researcher during the research process are important for generating remarkable research results (Saunders, Lewis, and Thornhill, 2009).

4.2.1 Epistemology

Bryman and Bell (2007) explain that epistemology is interested with two research philosophies; positivism and interpretivism. Positivism is "an epistemological position that advocates the application of the methods of the natural sciences to the study of social reality and beyond". It focuses on causality and law-like generalizations, beside simplified the phenomena. Positivism entails elements of both a deductive and inductive approaches.

On the other hand, interpretivism research philosophy – as an opposite to the positivism – interprets the social world in a subjective manner and the research is mainly based on the researcher's experience and interests. Interpretivism advocates that it is necessary for the researcher to understand the differences between humans in our role as social actors. (Bryman and Bell, (2007); Saunders, Lewis, and Thornhill (2009).

4.2.2 Ontology

The ontology has two aspects; objectivism and subjectivism research philosophies. Objectivism holds that social phenomena and their meanings have an existence that is independent of social actors and are beyond our influence. Whereas the subjectivism (also called constructionism) claims that the perceptions and actions of social actors are create the social phenomena, and these social phenomena are in a constant state of revision. It implies that individuals attach to social phenomena (Saunders, Lewis, and Thornhill, 2009).

4.2.3 Other Aspects on Research Philosophy

In fact, it is difficult to state that there is a single research philosophy can accommodate the whole research process and conclusions. This argument has motivated a moderate philosophy to be emerged. It is the realistic research philosophy which is based on the mixed assumptions of both positivist and interpretivist research philosophies. It focuses on the contextual explanation (Žukauskas, Vveinhardt, and Andriukaitienė. 2018).

There is a modern position that cannot be overlooked in the area of research philosophy; that view does neither commit to any one system of philosophy and reality nor see the world as an absolute unity. This view is called a pragmatism which becomes a branch of philosophy itself. Pragmatism philosophy entails attention on the research problem and then using pluralistic approaches to derive knowledge about the problem. Here, the researcher has a freedom of choice for the methods, techniques, and procedures to conduct a research that best meet their needs and purposes (Creswell, 2014).

4.2.4 The Chosen Research Philosophy

Considering the research problem and questions of this study; this research adopts the epistemology-positivism philosophy. This methodology supports the scientific process for collecting and analysing the data to assess the casual and relationships between the variables in the selected sample.

This research entails to gain an understanding and to examine the risk management practices and their impact on the financial performance of Islamic banks in Sudan. This confirms that this research is based on empirical evidence rather than the individuals' opinions in order to achieve the research objective and to answer its questions.

4.3 Research Approaches

Generally, scientific research takes two approaches as deductive reasoning and inductive reasoning when it deals with a subject matter.

4.3.1 Deductive Reasoning Approach

The deductive reasoning tends to test a theory about a topic of interest, as it begins with a general theory and then narrow down that theory into specific hypotheses that are subject for a rigorous testing in order to confirm or reject the original theory.

Deductive approach possesses several important characteristics that include; the search to explain causal relationships between variables, measures the facts in a quantitative manner, and the necessity of sufficient sample-size to generalize the findings in social behaviour.

The sequential stages through which a deductive research will progress include the deducing hypotheses from the theory, expressing and testing these hypotheses, examining the specific outcome and modifying the theory in the light of the findings, if necessary. (Saunders, Lewis, and Thornhill, 2009).

4.3.2 Inductive Reasoning Approach

The inductive reasoning has an opposite direction from deductive reasoning. Inductive approach goes from an observed specific phenomenon to reach a general conclusion. It concludes that the theory is the outcome of research. The research usually has no hypotheses at its initial stage and the researcher is not sure about the characteristics of the research findings until the study is completed. Inductive approach entails a process in which starts with observation, followed by the findings then generalization of theory.

Moreover, the inductive approach characterized with its association to the qualitative type of research that is linked with narrative description or comparisons [(Bryman and Bell, 2007); (Saunders, et al., 2009)].

4.3.3 Chosen Research Approach

This research uses the deductive approach since the research questions and hypotheses are developed based on a theory that explained in the theoretical framework chapters. Given that, the research develops the hypotheses to investigate the impact of risk management practice on the financial performance of Sudanese banks, as well as to examine the relationship between them.

Moreover, the research is based on a quantitative data that analysed using suitable statistical techniques for testing the hypotheses that enable the researcher to either confirm or reject the original theory given the predetermined hypotheses.

4.4 Research Design

The research design includes the areas which are concerning to the purpose of the research, research strategy, the types of investigation and analysis, the extent of researcher interference, and the time covering the study. In fact, there is no a single research design that is agreed on or suitable in all circumstances.

Therefore, it is the researcher choice to create a design that suits the study and takes into its account the research objectives and questions, challenges of data collection, and data analysis. (Sekaran and Bougie, 2016).

Bryman and Bell (2007, p.44) classify five different designs for a research. These are:

First; experimental design: its aim is to study causal relationships between variables. This design is determined by the way the researcher manipulates or treats the independent variable or group in order to determine its influence on the dependent variable or group. This type of research design takes three forms, as pre-experimental, quasi-experimental, or true experimental research. Generally, experimental designs are less useful or appropriate for answering exploratory and descriptive research questions, as stated by Sekaran and Bougie (2016. p97).

Second; the cross-sectional (social survey) design which entails the collection of data on more than one case and at single point of time in order to gather quantitative or qualitative data in connection with two or more variables that are examined to detect the form of relationship. This kind of survey is relatively quick to conduct in order to investigate what is happening at present.

Third; longitudinal research design measures the characteristics of the particular variables on at least two occasions over time for the purpose of studying the variables change and variation.

In addition, it has a significant advantage in comparison to cross-sectional research for understanding the casual influences and permitting the direct assessment of within-variables change over the time. Additionally, the longitudinal design has two types that include the panel surveys where the data collection from different types of cases within a panel study framework (heterogeneous); and cohort study as the sample has same characteristics (homogeneous), (Salkind, 2010).

Forth; case study design where it entails a detailed and intensive analysis of a single case. Such design may also incorporate longitudinal element from historical data. The case study design is useful in developing and testing of the theories (Williams, 2007).

Fifth; comparative design that it embodies the comparison of two or more contrasting cases. It may be applied in either quantitative or qualitative research.

4.4.1 Purpose of the Research

Based on the purpose, the research is classified into three types. These comprises an exploratory research, descriptive research and explanatory research. (Sekaran, 2003) ; (Sekaran and Bougie, 2016).

Exploratory research – also called formulative research – is undertaken when there is ambiguity about certain situation, or a lack of information on a previous resolution that can be applied to solve similar problems at present. This type of research is suitable in dealing with new problem areas that not yet explored well. Exploratory research is also necessary when some facts are known, but more information is needed for developing a viable theoretical framework, (Kothari, 2004).

From other hand, the descriptive research and diagnostic research. It is used for ascertaining and describing the characteristics and behaviour of the variables under the study. It is also undertaken to understand the characteristics of organizations that follow certain common practices.

Addition to that, the explanatory research (sometimes called hypothesis testing) deals for providing explanations of the nature of certain relationships between the variables that are related to a particular problem. The explanatory research generates an understanding of the relationships, establishes cause-and-effect, and explains the nature of this relationships, or establish the variances among variables in a particular situation.

4.4.2 Strategies and Types of Research

The selection of a specific research strategy depends on the research objectives, the type of research questions, the access to data sources and time constraints. Researcher shall choose between the experiment, survey research, observation, case studies, grounded theory, action research or mixed methods to articulate the research strategy (Sekaran and Bougie, 2016).

Williams (2007) distinguishes between three approaches that determined the type of a research. These approaches are determined by the data collection and analysis procedures that are used in responding to the research questions. They are classified as: quantitative, qualitative, and mixed methods.

Firstly, the quantitative approach is used when the research questions require numerical data, the study involves a numeric or statistical approach for the research design, and the applied methodology tends to maintain the assumption of an empiricist paradigm. Consequently, quantitative approach supports the independent of the researcher and objectivity of result as long as the used data is real and selected objectively. In addition to that, the quantitative approach takes further sub-classified into inferential, experimental and simulation approaches to research (Kothari, 2004. p.5).

Secondly, the qualitative research which is a holistic approach that requires textural data in responding to research questions. It is conducted within a poststructuralist paradigm, whereas it involves five areas that are case study, ethnography study, phenomenological study, grounded theory study, and content analysis. Generally, in the qualitative research, the techniques of focus group interviews, projective techniques and depth interviews are applicable.

Finally, the mixed methods approach is a combination of both numerical and textural data that can be collected and analysed for the purpose to response to the research questions.

4.4.3 The Chosen Research Design

This research tends to provide an in-depth understanding of the risk management practice and to describe its paramount important and its impact on the banks' financial performance in Sudan.

Given that, the methodology and design that are followed by this research can be summarized as follows:

a) As aforementioned, the appropriate philosophy for this research is the positivism philosophy (provided in section 4.2.4), and the suitable approach is the deductive reasoning (defined in section 4.3.3).
b) With respect to the design, this research follows the longitudinal research design with the type of panel data estimate. The panel study allows the researcher to improve the analysis of causal inferences. The observations in this research take cross-sectional and time series structure.
c) The purpose of this research comprises both the descriptive method as it describes the risk management practice and financial performance in Sudanese Islamic banks, in addition to the explanatory method as it investigates and tests the impact of risk management practices on financial performance of the sampled banks and also it tests their relationship.

d) The identified type for this research is a quantitative approach. Such approach is based on numerical and rating data structure. It lends statistical techniques that can be used to determine various relationships between variables. Besides that, research investigation is based on causal study and correlation methods. These methods are used for the purpose of establishing a cause-effect of risk management practice on the financial performance in the sampled banks, and to investigate the relationship between risk management factors and financial performance measures on Islamic banks in Sudan.

In the next sub-sections of this chapter, the researcher explains the remaining elements that constitute part of this research methodology. process.

4.5 Research Method

Research methods refer to those methods and techniques that are used by the researcher to answer the research questions and to arrive at a solution for the given problem. Therefore, the research methods include three main areas that are concerned with data collection; the statistical techniques that applied to analyse the data, to test the hypotheses and to provide results; and the methods which are used to evaluate the accuracy of the research results. Following are the elements that constitute the method of this research.

4.5.1 Data Collection

The main sources for obtaining the data are the primary and secondary sources. Primary data refers to data obtained firsthand (new) by the researcher on the variables for the purpose of the study using different tools such as questionnaires, and interviews. Secondary data refers to data gathered from any existing sources that include organizations records and annual reports, publications, analytical reports, official internet sources, books and periodicals, surveys and published official statistics, case studies and academic theses.

Primary data is useful to researcher whenever appropriate secondary data is not available, especially it allows researcher to create a new data as the study is looking for it. On other hand, the secondary data provides an appropriate source for the research if it is available since it has been checked by others, provides the possibility to undertake longitudinal studies with the opportunity to conduct quantitative analysis, and relatively is less costly and time effective in comparing with the primary data.

This research depends mainly on secondary data which is obtained from the audited annual financial reports of the sampled banks and the publications and annual reports that issued by the Central Bank of Sudan.

In addition to that, books, periodicals, official sources from internet, journals and academic publications are form part of the secondary data that are serve the purpose of this research.

For the purpose of this research and to meet its objective and to answer the relevant research question; the necessary secondary data is sourced from the audited annual financial reports of the sampled Islamic banks in Sudan during the period from 2007 to 2018 (12 years). The study mainly uses the balance sheet, income statements and the financial notes from the audited annual financial reports of the banks. This, in order to extract the data for the variables that represent the risk management practice and financial performance of the sampled banks.

4.5.2 Population and Sampling

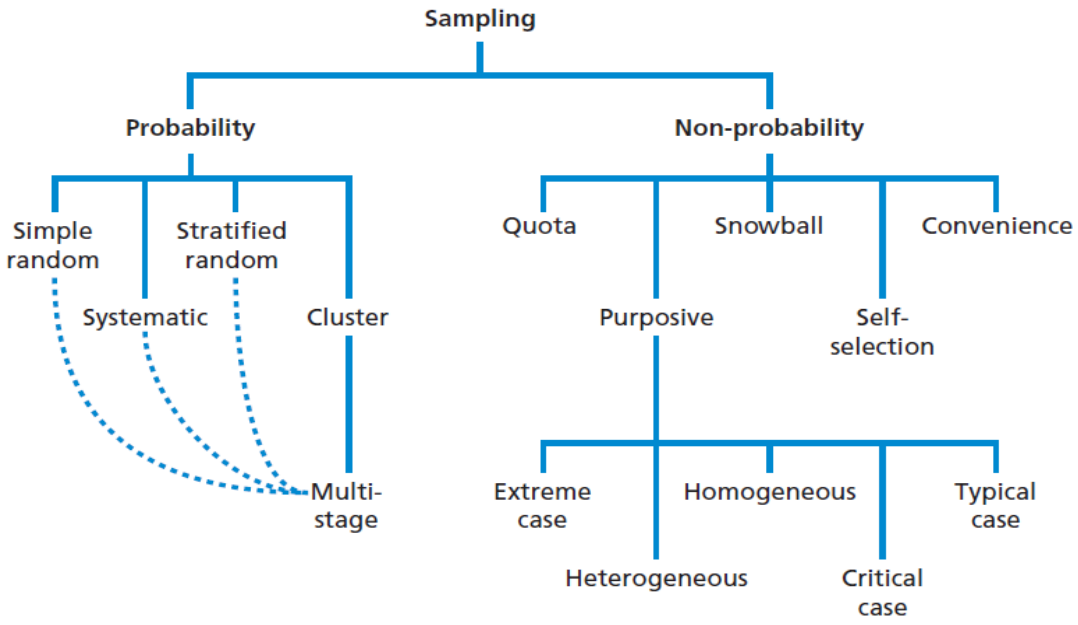
Sampling is a process of selecting subset of cases (sample) from full set of cases (population) likely to be based on a probability or a non-probability approach. Probability sample (representative sample) is the sample that being selected using random selection process, whereas non-probability sample (judgmental sample) implies that the sample being selected from the population has unknown probability.

The random sample is most commonly associated with survey-based research where researcher can make inferences from the sample about a population to answer research questions and to meet its objectives. From other hand, a researcher that uses non-random sample still has a possibility to answer research questions and address its objectives, but without the application of statistical inferences (Bryman and Bell, 2007); (Saunders, et al., 2009).

The below Figure (4-1) depicts the sampling techniques and their subdivisions.

Figure (4-1)

Sampling Techniques



Source: Saunders, Lewis, and Thornhill (2009. p.213)

This research used simple random sampling technique as each bank within the population is given the same chance of selection considering the availability of data that covers the study period.

The sample comprises of ten (10) Islamic banks out of a population of thirty-seven (37) Islamic banks that operate in Sudan. The researcher follows the process that is suggested by Saunders, et al., (2009, p.214); Sekaran and Bougie (2016, p.240) for the selection of the probability sample for this research.

For the purpose of the study, the researcher excluded those banks don't have a complete published data during the period of 2007-2018; data from the foreign-banks branches is neither available at a subsidiary-level nor accessible for the purpose of study; data from some years is not available for some banks; and some banks were only established very recently with no sufficient historical data. Obviously, the researcher faced a challenge in obtaining the relevant secondary data from all population, as such challenge is a common issue in third world countries as it was addressed by Eljelly and Elobeed (2013).

4.6 The Research's Analysis Technique

Broadly, the quantitative analysis of financial problems employs three types of data that are time series data, cross-sectional data, and panel data. Time series data refers to data that has been collected over a period of time on one or more variables, whereas cross-sectional data is data on one or more variables collected at a single point of time. In contrast, panel data is combination of time series and cross-sections, and it deals with more variables over a period of time. Furthermore, quantitative data takes either continuous or discrete pattern.

Continuous data can take on any value and is not confined to take specific values, whereas discrete data can only take on certain values and are often defined to be count numbers. (Brooks, 2014, pp.4-7).

In order to answer the research questions and tackles its problem, this study uses panel data (also, it called longitudinal data) technique given the structured data time series and cross section. Panel data is widely applied in financial modelling and research. Such econometric technique involved the process of assessing the suitable model from pooled, fixed effects, and random effects regressions; which shall be explained in the following part.

Panel data has the advantages mainly because it is robust to some violations of the Gauss Markov assumptions, namely heteroskedasticity and normality (Wooldridge, 2010). Moreover, Hsiao (2003); Baltagi (2005); Cameron and Trivedi (2005); and Brooks (2008) argue to these advantages by stating that panel data increases precision in estimation when investigating the relationship between variables, it gives the researcher more informative data and it improves the efficiency of econometric estimates and it allows controlling for individual heterogeneity that shall reduce risk of obtaining biased results. It is worth mentioning that Panel data is a well-known technique and now is being increasingly used in economic research (Gujarati, 2009).

In contrast, Baltagi (2005) highlights the limitations of panel data in respect to the challenges that affect the design of panel survey and data collection, and the sample selectivity problems.

Park (2011) explains that a panel data set contains number (*n*) of entities or subjects, each of them includes observations (*T*). Hence, the total number of observations in the panel data is *nT*. The panel data takes either long or short panel data in regards to the numbers of entities and time period. A short panel has many cross-sectional entities (large n) with few time series (small T), while a long panel has few cross-sectional entities and many time series. In addition, the data may either be a balanced panel or unbalanced panel. The balanced panel data refers to that each cross-sectional entity has the same number of time series observations (*nT*). Whereas, unbalanced panel data shows that each cross-sectional entity in a data set has different numbers of observations.

By using panel data technique, the researcher analyses quantitative data with dimensions of cross sectional and time series which obviously has a capacity for modeling the complexity of factors behavior, and it captures the dynamic changes as it is studying the repeated cross section of the observations. This research examines 120 observations from the sampled banks that take a forms of balanced panel data (nT) as well as short-panel (n>T).

4.7 Panel Data Techniques

4.7.1 Model Specification

The model of this research can be formulated in a panel regression model to find the relationship between various variables that measure the risk management practice in the financial performance of Sudanese Islamic banks.

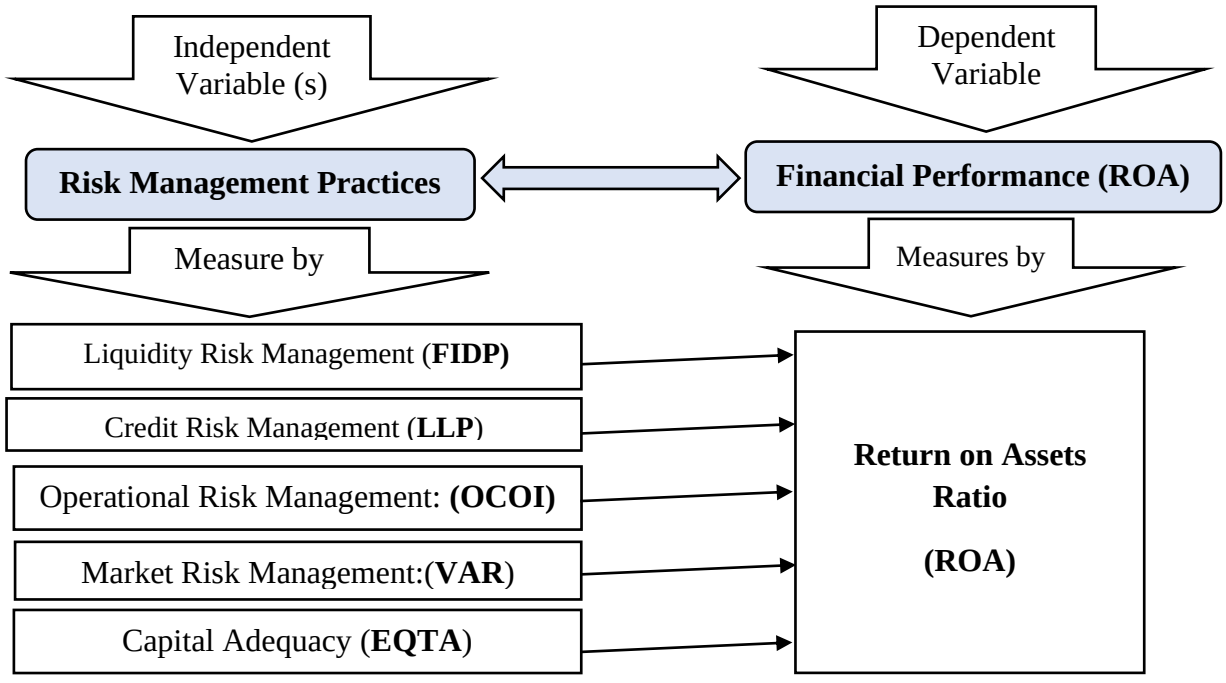
Financial Performance = f Risk Management Practice (Liquidity Risk, Credit Risk, Operational Risk, Market Risk, Bank's Capitalization)

Then, the main model can be expressed into two sub-models as follows:

Model No. 1: ROA

Figure (4-2)

The Research Model (1) with the Dependent Variable ROA



Source: The Researcher Outputs

Return of Assets (ROA) = Liquidity Risk (FIDP), Credit Risk (LLP), Operational Risk (OCOI), Market Risk (VAR), Bank's Capitalization (EQTA)

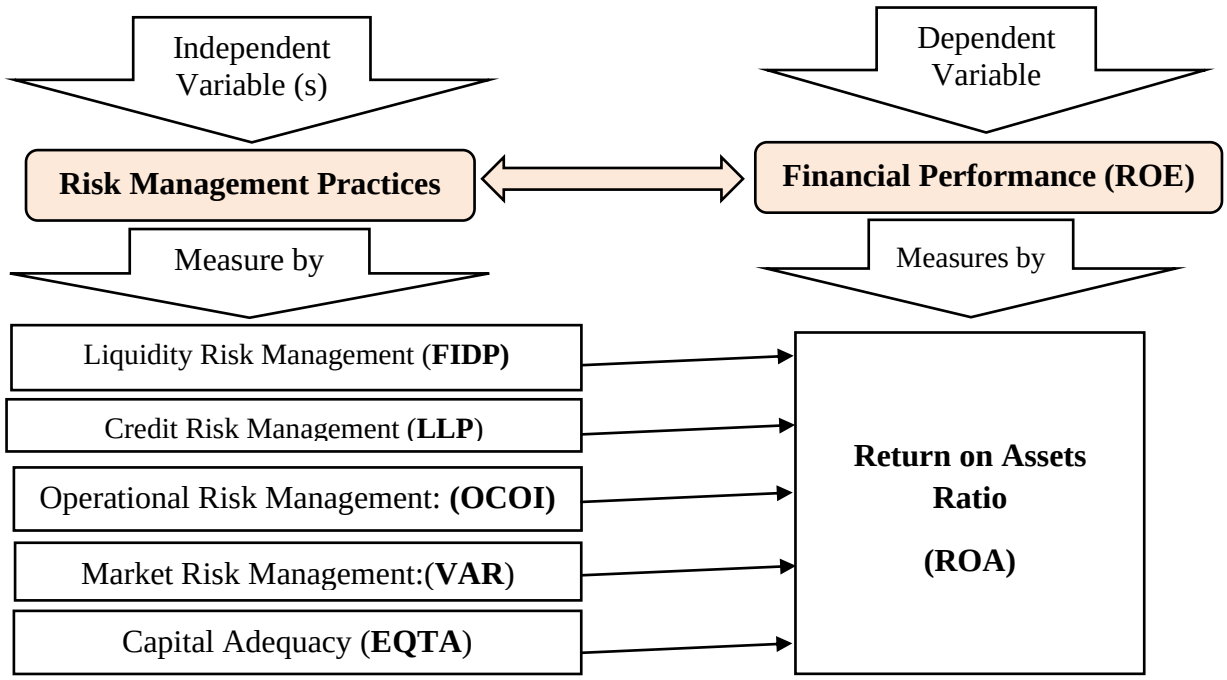
The model can be expressed in panel regression model as follows:

$$\mathbf{ROA}it = \beta 0 + \beta 1\ \mathbf{FIDP}it + \beta 2\ \mathbf{LLP}it + \beta 3\ \mathbf{OCOI}it + \beta 4\ \mathbf{VAR}it + \beta 5\ \mathbf{EQTA}it + \mathbf{u}_{it} \ldots\ldots(1)$$

Model No. 1: ROE

Figure (4-3)

The Research Model (2) with the Dependent Variable ROE



Source: The Researcher Outputs

Return of Equity (ROE) = Liquidity Risk (FIDP), Credit Risk (LLP), Operational Risk (OCOI), Market Risk (VAR), Capital Adequacy (EQTA)

The model can be expressed as follows:

$$\mathbf{ROE}it = \beta 0 + \beta 1\ \mathbf{FIDP}\ it + \beta 2\ \mathbf{LLP}\ it + \beta 3\ \mathbf{OCOI}\ it + \beta 4\ \mathbf{VAR}\ it + \beta 5\ \mathbf{EQTA}\ it + u_{it} \ldots (2)$$

Where:

ROA: Return of Assets

ROE: Return on Equity Ratio

FIDP: Total Financing to Total Deposits Ratio

LLP: Loan Loss Provision Ratio

OCOI: Operating Costs to Operating Income Ratio

VAR: Value at Risk Indicator

EQTA: Equity to Assets Ratio

All above variables have been widely used in the literature of such study. Additionally, the following table (4-1) presents the further details regarding the selected variables in this research.

Table (4-1)

Summaries of the Variables of This Study

Type of Variable	Variable Name	Components	Symbol	Variable Calculation Method	Expected sign
Dependent	Financial Performance	Return on Asset Ratio	ROA	Net Income/ Total Assets	
Dependent	Financial Performance	Return on Equity Ratio	ROE	Net Income/ Total Equity	
Independent	Liquidity Risk	Financing to Deposits Ratio	FIDP	Total Financing/ Total Deposits	Negative
Independent	Credit Risk	Loans Loss Provision ratio	LLP	Loans (Financing) Loss Provision/ Gross Loans (Financing)	Negative
Independent	Operational Risk	Efficiency Ratio	OCOI	Operating Cost/ Operating Income	Negative
Independent	Market Risk	Value at Risk (VAR)	VAR	Absolute VAR to Sample's Mean	Positive
Independent	Bank Capitalization	Equity to Assets Ratio	EQTA	Total Equity/ Total Assets	Positive

Resource: The Researcher Outputs

4.7.2 Data Cleaning and Preliminary Examination

Stationarity and Unit Root Tests

Time-series data variables are characterized with respect to the stationary of their underlying data generation processes. Accordingly, a particular data series can be categorized as being one of the following:

a. Stationary: The data series has a constant mean and variance that are independent of time. In other words, the series fluctuates around its mean value within a finite range, and does not show any distinct trend over time.

b. Trend-stationary: The data series has a constant variance around a deterministic (i.e., fixed) time trend. The series fluctuates around the time trend within a finite range.
c. Non-stationary: The data series does not have a constant mean or a constant variance, but follows a stochastic (i.e., random) time trend, drifting either upwards or downwards over time, without being confined within a finite range. The variance increases with sample size.

Most economic time-series are not stationary, but trend upwards over time. It is important to control for such trends in regression analysis, otherwise spurious regressions can result. The results of such spurious regressions would suggest that there is a statistically significant long-term relationship between the variables in the regression model, when all that is being reflected is a correlated time trend rather than a meaningful causal relationship. It is therefore important to test time-series data for non-stationary, and if it is present, to apply the appropriate econometric techniques (such as co-integration regression) to control for it.

Unit Root Test:

Most of time series have unit root as many studies indicated that including Nelson and Plosser (1982), and as proved by Campbell and Perron (1991), and Stock and Watson (2011) and among others that most of the time series are non-stationary. The presence of a unit root in any time series means that the mean and variance are not independent of time. Conventional regression techniques based on non-stationary time series produce spurious regression and statistics may simply indicate only correlated trends rather than a true relationship (Granger and Newbold, 1974).

A unit root is defined as where the value of a variable is equal to its previous level plus or minus a random error. Unit roots are often present in data which trends over time. More technically:

$y_t = y_{t-1} + \varepsilon_t$ …….……. (3)

Where y_t is the variable of interest at time t and ε_t is a random error term.

One of the most widely used unit root test is the Augmented Dickey-Fuller (ADF) unit root test (Dickey and Fuller, 1979, 1981).

Alternatively, Phillips (1987) and Phillips and Perron (1988), PP, have proposed a nonparametric method to correct a wide variety of serial correlation and Heteroscedasticity. Perron (1989, 1990) demonstrates that if a time series exhibits stationary fluctuations around a trend or a level containing a structural break, then unit root tests will erroneously conclude that there is a unit root.

Recent literature suggests that panel-based unit root tests have higher power than unit root test based on individual time series – a per Levin, Lin and Chu (2002), Im, Pesaran and Shin (2003), and Bruiting (2000) – to mention a few of popular test purchasing power parity (PPP) and growth convergence in macro panels using country data over time.

This research focuses on five types of panel unit root tests such as Levin, Lin and Chu -LLC (2002); Im, Pesaran and Shin – IPS (2003); Breitung (2000); Fisher-Type tests using ADF and PP-tests (Maddala and Wu (1999) and Choi (2001)), Hadri (1999). Accordingly, the first two tests [LLC (2002); and IPS (2002)] are used to test the unit root in this research.

a. Levin, Lin and Chu (2002)

Levin, Lin and Chu (2002) start panel unit root test by considering the following basic ADF specification:

$DY_{it} = aY_{it-1} + \Sigma^{pi}_{j=1} ß_{it} DY_{it-j} + X^{*}_{it} \delta + e_{it}$ ……..…(4)

Where;

DY_{it} = difference term of Y_{it}
Y_{it1} = Panel data
a = ρ-1
pi = the number of lag order for difference terms
X^{*}_{it} = exogenous variable in model such as country fixed effects and individual time trend
e_{it} = the error term of equation

Define DY^{*}_{it} by taking DY_{it} and removing the autocorrelations and deterministic components from. LLC (2002) shows that under the null hypothesis, a modified t-statistics for the resulting $a^{\wedge}$ is asymptotical normally distributed as well as it has been presented by equation.

$t^{*} = [t- (N \check{T})S_N\sigma^{\wedge -2} Se(a^{\wedge})\mu mT^{*}] / [\sigma mT^{*}] \rightarrow N(0,1)$ ……...(5)

Where ;
t^{*} = the standard t-statistic for $a^{\wedge} = 0$
$\sigma^{\wedge 2}$ = the estimated variance of the error term η
Se ($a^{\wedge}$) = the standard error of $a^{\wedge}$
$\check{T}$ = T-(S_i pi / N)-1

LLC (2002) panel unit root test has null hypothesis as panel data has unit, and alternatively panel data has no unit root, as it can be presented in below:

H_0: null hypothesis as panel data has unit root (assumes common unit root process)
H_1: alternative hypothesis as panel data has not unit root

If *t** is significant then conclusion that reject null hypothesis or panel data has not unit root. Otherwise, if *t** is not significant then conclusion that accept null hypothesis or panel data has unit root. This test assume that all cross-sections have or do not have a unit root is restrictive.

b. Breitung (2000):

Breitung (2000) suggests the use of the following equation to test a unit root.

$(DY_{it})^{*} = S_t [DY_{it} - (1/T-t) (DY_{it+1} +.....+ DY_{iT})]$ ……..(6)

Where;

t = 1,……,T-1

S_t = (T-t) / (T-t+1)

Y^*_{it} = $Y_{i\,t-1}$ - Y_{i0} - ((t-1)/T)(Y_{iT} - Y_{i0})

DY_{it} = panel data has been differenced

i = cross-section data

t = time series data and t = 2,….,T^2

The panel unit root test for null hypothesis proposed by Breitung (2000) is to reject the null for small values of the following statistic: The B_{nT} (Breitung (2000) t-statistic has non-stationary as null hypothesis as well as to show below that:

H_0: null hypothesis as panel data has unit root (assumes common unit root process)

H_1: alternative hypothesis as panel data has not unit root

If B_{nT} is significant then conclusion that reject null hypothesis or panel data has not unit root. Otherwise, if B_{nT} is not significant then conclusion that accept null hypothesis or panel data has unit root.

c. Im, Pesaran and Shin (2003)

Im, Pesaran and Shin (2003) suggest a test for unit root hypothesis in heterogeneous panels. Such test proposes a standardized t-bar test statistic based on the (augmented) Dickey–Fuller statistics averaged across the groups.

Let Y_{it} be the observation on the i^{th} cross-section unit at time t and suppose that it is generated according to following simple dynamic linear heterogeneous panel data model that can be written in equation as follows:

$Y_{it} = (1-f_i) + f_i Y_{i\,t-1} + e_{it}$ …………………………………………..…(7)

Where;

i = 1,….,N are cross-section unit or series

t = 1,….,t are observed over periods

e_{it} = error term of equation 10I

Y_{it} = panel data

And $e_{it} = g_i f_t + e_{it}$ in which f_t is the unobserved common effect as well as e_{it} is the individual-specific error.

It is convenient to rewrite above equation to be equation follow up:

$DY_{it} = a_i + b_i Y_{i,t-1} + g_i f_t + e_{it}$ ……………………………………………….(8)

Where,

DY_{it} = differential into Y_i

a_i = $(1- f_i)$

b_i = $-(1- f_i)$

g_i = coefficient of f_t

e_{it} = error term of equation

The null hypothesis or unit root hypothesis of interest, $f_i = 1$, can now be expressed as:

H_0 : $b_i = 0$ for all i and against the null hypothesis as H_1 : $b_i < 0$,

$i = 1,2,\ldots,N_1$, $b_i = 0$, $i = N_1 +1, N_2 +2, \ldots, N$.

The average of the t-statistics for a_i received from above equation by estimated also this t-statistics can show below:

$t^*_{NT} = (S^N_{t=1} t_i \, x_i \, (p_i)) / N$ ……………………………………………..….(9)

Also, this technique has non-stationary as null hypothesis shows below that:

H_0: null hypothesis as panel data has unit root (assumes individual unit root process).

H_1: alternative hypothesis as panel data has not unit root

If Wt_{*NT} is significant then conclusion that reject null hypothesis or panel data has not unit root. Otherwise, if W_{t*NT} is not significant then conclusion that accept null hypothesis or panel data has unit root.

d. Fisher-Type Test using ADF and PP-Test (Maddala and Wu(1999) and Choi(2001))

Maddala and Wu(1999) and Choi(2001) independently suggested test for homogeneity alternative H_{1b} based on p-value of individual statistics. The test allows different deterministic and lag order for each panel unit.

Such test is sometimes called Fisher-type test as Madala and Wu (1999) proposed the use of the Fisher (P_l) test which is based on combining the P-values of the test-statistics for unit root in each cross-sectional unit. Let p_i are U[0,1] and independent, and $-2\log_e p_i$ has a χ^2 distribution with 2N degree of freedom and can be written in equation.

$$P_l = -2 \Sigma^{N}_{i=1} \log_e p_i \quad \text{...(10)}$$

Where,

P_l = Fisher (P_l) panel unit root test

N = all N cross-section

$-2 \Sigma^{N}_{i=1} \log_e p_i$: it has a χ^2 distribution with 2N degree of freedom.

In addition, Choi(2001) proposes Z-statistics that is defined by the following equation.

$$Z = (1 / \sqrt{N_{i=1}})[\Sigma^{N}_{i=1} f_i^{-1}(p_i)] > N(0,1)$$

Where,

Z = Z-statistic panel data unit root test

N = all N cross-section in panel data.

f_i^{-1}= the inverse of the standard normal cumulative. distribution function.

p_i = it is the P-value from the i^{th} test

Both Fisher (P_l) Chi-squire panel unit root test and Choi Z-statistics panel unit root test have non-stationary as null hypothesis shows that:

H_0: null hypothesis as panel data has unit root (assumes individual unit root process).

H_1: alternative hypothesis as panel data has not unit root.

If both Fisher (P_l) Chi-quire panel unit root test and Choi Z-statistics panel unit root test are significant then conclusion that reject null hypothesis or panel data has not unit root. Otherwise, both if Fisher (P_l) Chi-squire panel unit root test and Choi Z-statistics panel unit root test are not significant, then conclusion that accept null hypothesis or panel data has unit root.

e. Hadri (2000)

The Hadri (2000) panel unit root test is similar to the KPSS unit root test, and it has a null hypothesis of no unit root in any of the series in the panel data. Like the KPSS test, the Hadri (2000) test is based on residual-based Lagrange multiplier (LM) from the individual OLS regressions of Yit on a constant, or on a constant and trend. For example, if both the constant and a trend are included, the derive estimates as following equation:

$Y_{it} = d_i + \eta_{it} + e_{it}$ ……..……..(11)

where

Y_{it} = panel data,

i = 1,2,….,N are cross-section unit or series

t = 1,2,…,T_i are observed over periods.

D_i = constant term of equation

η_{it} = co-efficient of t or trend

e_{it} = the residuals term.

In case the applied unit root test provides nonstationary problems, the researcher can remedy this and avoiding unit roots by the following methods:

- using cointegration techniques. (see below), or
- modelling the variable in differences, which would result in the loss of one year of data for each cross-sectional observation.

Panel Cointegration Test

Kao (1999) uses both DF-type and ADF tests statistics to develop a test for counteraction in panel. Such test also is similar to the standard approach adopted in the EG-step procedures.

In addition, this test start with the panel regression model as set out in equation:

$Y_{it} = X_{it}ß_{it} + Z_{it}g_0 + e_{it}$ ……(12)

Where;

Y and X are presumed to be non-stationary, and

$e^{\wedge}_{it} = \rho e^{\wedge}_{it} + n_{it}$ ……..(13)

where;

$e^{\wedge}_{i\,t} = (Y_{i\,t} - X_{i\,t}ß^{\wedge}_{i\,t} - Z_{i\,t}g^{\wedge})$ are the residuals from estimating equation (12).

To test the null hypothesis of no cointegration amounts to test: $H_0 : \rho = 1$ in equation (13) against the alternative that Y and X are cointegrated (i, e., $H_1 : \rho < 1$).

Moreover, Pedroni (1995) provides a pooled Phillips and Perron-Type test. These tests have the null hypothesis of no cointegration. The panel autoregressive coefficient estimator, $g^{\wedge}_{N,T,}$ can be constructed as follow:

$$G^{\wedge}_{N,T}{}^{-1} = [\Sigma^{N}_{i=1}\ \Sigma^{T}_{t=2}\ (e^{\wedge}_{i\,t-1}\,\Delta e^{\wedge}_{it-1} - \lambda^{\wedge}_{i})] / \Sigma^{N}_{i=1}\ \Sigma^{T}_{t=2}\ (e^{\wedge 2}_{i,\,t-}) \quad \ldots\ldots\ldots\ldots\ldots(14)$$

where;

N = cross-section data

T = time series data

$e_{i\,t-1}$ = error term of model

$\lambda^{\wedge}_{i}$ = a scalar equivalent to correlation matrix.

In addition to that, Pedroni (1995) provides the limiting distributions of two test statistics as well as can be written in equation:

$$\text{PP-statistic} = [T\sqrt{N}\,(g^{\wedge}_{N,T}{}^{-1})] / \sqrt{2} \rightarrow N(0,1) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(15)$$

This research focuses on ADF test statistic based on residual-based test that follows the concept of Kao (1999) to test of cointegration in panel estimation. In addition to that, this research focuses on PP-test statistic that bases on the concept of Pedroni (1995) to test of cointegration in panel estimation. Both ADF–statistics and PP-statistic have same null hypothesis of no cointegration in panel.

4.7.3 Panel Data Regressions and Models

Data sets that combine both time series and cross sections are called longitudinal or panel data sets. Panel data sets are more orientated towards cross section analyses – they are wide but typically short (in terms of observations over time).

In addition, Heterogeneity across units is central to the issue of analyzing panel data. Accordingly, this research is used Panel data models to analyse the research variables.

This part shall provide a brief on the panel data regression. Here, for purpose of explaining the equations and symbols of panel data regression we use Brooks (2014) terms. The basic framework for the panel data is a regression of the form:

$$y_{it} = \alpha + \beta x_{it} + u_{it} \quad \text{…………………………………………………………..….(16)}$$

Where;
y_{it} is the dependent variable.
α is the intercept term.
β : k×1 vector of parameters to be estimated on the explanatory variables,
x_{it} : 1 × k vector of observations on the explanatory variables, t = 1,.., T; i =1,.., N.

k represents the number of slope parameters (equal to the number of explanatory variables)

The simplest way to deal with such data would be to estimate a pooled regression that estimating a single equation on all the data together. However, it has some severe limitations, most importantly, pooling the data in this way implicitly assumes that the average values of the variables and the relationships between them are constant over time and across all of the cross-sectional units in the sample. Therefore, the broadly two panel estimators that deal with heterogeneity and can be employed in financial research are: fixed effects models and random effects models (Brooks, 2014).

a. Fixed Effects Model:

Fixed effect (FE) model assumes that the intercept term may differ across entities (in our case banks) but each entity's intercept does not vary (constant) over time period, which refers to a time-invariant. Also, the model suggests that the slope coefficients of the regressors and error variances are constant across entities or over time.

Furthermore, the cross-sectional (group/individual) specific effect is a time invariant in fixed effect model, and it considered a part of the intercept (Park, 2011); (Brooks, 2014).

The fixed effects model is a useful specification for accommodating individual heterogeneity in panel data. Despite that, it has been problematic for two reasons as in most cases, the estimator is inconsistent owing to the incidental parameters problem. How serious this problem is in practical terms remains to be established – there is only a very small amount of received evidence – but the theoretical result is unambiguous. A second problem is purely practical.

To see how the fixed effects model works, we can take equation (5) above, and decompose the disturbance term, u_{it}, into an individual specific effect, μ_i, and the 'remainder disturbance', v_{it}, that varies over time and entities (capturing what is left unexplained about y_{it}).

Then, the disturbance term can be rewritten as following equation:

$$u_{it} = \mu_i + v_{it} \quad \ldots\ldots\ldots\ldots \quad (17)$$

for the liner regression model with fixed effect, we should rewrite equation (16) by substituting in for u_{it} from (6) to obtain

$$y_{it} = \alpha + \beta x_{it} + \mu_i + v_{it} \quad \ldots\ldots\ldots\ldots \quad (18)$$

In case of μ_i encapsulate all of the variables that affect y_{it} cross sectionally but do not vary over time, the Fixed Effects model could be estimated using dummy variables, which would be termed the least squares dummy variable (**LSDV**) approach.

$$y_{it} = \beta x_{it} + \mu_1 D_{1i} + \mu_2 D_{2i} + \mu_3 D_{3i} + \cdot\cdot\cdot + \mu N D N_i + v_{it} \quad \ldots\ldots\ldots\ldots (19)$$

Where D_{1i} is a dummy variable that takes the value 1 for all observations on the first entity in the sample and zero otherwise, D_{2i} is a dummy variable that takes the value 1 for all observations on the second entity and zero otherwise, and so on.

Notice that the intercept term (α) has been removed from this equation to avoid the 'dummy variable trap' of perfect multicollinearity between the dummy variables and the intercept. For avoiding the necessity to estimate so many dummy variable parameters, a transformation is made to the data to simplify matters by using "**within transformation**". It involves subtracting the time-mean of each entity away from the values of the variable. Then we can subtract the time-means from each variable to obtain a regression containing demeaned variables only.

The model containing the demeaned variables is

$yit – yi = β(xit − xi) + uit − ui$ ………………………………..…..…(20)

Or it could be written as

$\ddot{y}it = β \ddot{x}it + \ddot{u}it$ ……………………………………………………....(21)

Where the double dots above the variables denote the demeaned values.

An alternative to the demeaning would be to simply run a cross-sectional regression on the time-averaged values of the variables, which is known as the "**between estimator**". A further possibility is to use the first difference operator in equation (16) so that the model becomes one for explaining the change in y_{it} rather than its level. It is also possible to have a time-fixed effects model rather than an entity-fixed effects model; which means that the average value of y_{it} changes over time but not cross-sectionally.

Therefore, we could write a time-fixed effects model as

$y_{it} = α + βx_{it} + λ_t + v_{it}$ ……………………………………………………….(22)

Where $λ_t$ is a time-varying intercept that captures all of the variables that affect y_{it} and that vary over time but are constant cross-sectionally.

Time variation in the intercept terms can be allowed for in exactly the same way as with entity-fixed effects.

The LSDV model could be estimated as follows:

$$y_{it} = \beta x_{it} + \lambda_1 D_{1t} + \lambda_2 D_{2t} + \lambda_3 D_{3t} + \cdots + \lambda_T DT_t + v_{it}$$

Finally, it is possible to allow for both entity-fixed effects and time-fixed effects within the same model. Such a model would be called a "two-way error component model" as it combines equations (18) and (22) above, and the LSDV equivalent model would contain both cross-sectional and time dummies

$$yit = \beta x_{it} + \mu_1 D_{1i} + \mu_2 D_{2i} + \mu_3 D_{3i} + \cdots + \mu_N DN_i + \lambda_1 D_{1t} + \lambda_2 D_{2t} + \lambda_3 D_{3t} + \cdots + \lambda_T DT_t + v_{it} \ldots (23)$$

The number of parameters to be estimated would now be k + N + T, and the within transformation in this two-way model would be more complex.

b. Random Effects:

The Random Effect (RE) is an alternative to the fixed effect (FE) model which is also called the Error Component Model (ECM) or Generalized Least Square (GLS) technique. Similar to the fixed effect; Brooks (2008) mentions that the random effects technique proposes different intercept terms for each entity and these intercepts are constant over time. Moreover, in the random effect model, there are two residual components. The first one is the residual as a whole where it is a combination of cross section and time series.

The second residual is an individual residual that is an individual specific random heterogeneity or a component of the composite error term, and it is varies cross-sectionally but constant over time.

The fixed effects (FE) model allows the unobserved individual effects to be correlated with the independent variables. The differences between units are then modeled as shifts in the constant term. If the individual effects are uncorrelated with the regressors, then this is appropriate of the random effects (RE) model.

The gain to this approach is that it substantially reduces the number of parameters to be estimated. The cost is the possibility of inconsistent estimates should the assumption be inappropriate. Econometrically, the difference between fixed effects and random effects is that under the random effects model, the intercepts for each cross-sectional unit are assumed to arise from a common intercept α , plus a random variable εi that varies cross-sectionally but is constant over time. εi measures the random deviation of each entity's intercept term from the 'global' intercept term α. Therefore, for random effects we reformulate the basic model as follows:

$$y_{it} = \alpha + \beta x_{it} + \omega_{it}, \quad \omega_{it} = \varepsilon_i + v_{it} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(24)$$

Where;

- x_{it} is still a $1\times k$ vector of explanatory variables with no dummy variables to capture the heterogeneity in the cross-sectional dimension. Instead, this occurs via the ε_i terms.
- εi , has zero mean, is independent of the individual observation error term (v_{it}), has constant variance σ^2_ε and is independent of the explanatory variables (x_{it})
- α and the β vector are estimated consistently but inefficiently by OLS, and the conventional formula would have to be modified as a result of the cross-correlations between error terms for a given cross-sectional unit at different points in time.

Instead of above, a generalized least squares (GLS) procedure can be applied. The transformation shall involve in the GLS procedure is to subtract a weighted mean of the y_{it} over time. Define the 'quasi-demeaned' data as

$$y^*_{it}= y_{it} - \theta\, y_i \text{ and } x^*_{it}= x_{it} - \theta\, x_i, \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(25)$$

Where;

y_i and x_i are the means over time of the observations on y_{it} and x_{it} , respectively. θ will be a function of the variance of the observation error term, σ^2_v, and of the variance of the entity-specific error term, σ^2_ε

This transformation to ensure that there are no cross-correlations in the error terms, but fortunately it should automatically be implemented by standard software packages. Moreover, random effects it is also conceptually can allow for time variation as of allowing for cross-sectional variation. Hence, in the case of time variation, a time period-specific error term is included the estimate can be as follows:

$y_{it} = \alpha + \beta x_{it} + \omega_{it}, \omega_{it} = \varepsilon_t + v_{it}$ ……………………………………………(26)

Hausman's Test for the Random Effects Model.

The decision to use either the fixed effects model or the random effects model can be made by applying the Hausman test (MacManus, 2011); (Park, 2011); and (Brooks, 2014). It essentially tests whether the parameter estimates of the coefficients of the variables for the two methods are significantly different. The specification test devised by Hausman is used to test for whether the random effects are independent of the right-hand side variables.

This is a general test to compare any two estimators. The test is based on the assumption that under the hypothesis of no correlation between the right-hand side variables and the random effects both fixed effects and random effects are consistent estimators but fixed effects is inefficient (This is the assumption with random effects). Whereas under the alternative assumption (i.e., that with fixed effects) fixed effects is consistent but random effects is not.

The test is based on the following Wald statistic:

$W = [\beta_{FE} - \boldsymbol{\beta}_{\mathbf{RE}}]' \boldsymbol{\Psi}^{-1}[\beta_{FE} - \boldsymbol{\beta}_{\mathbf{RE}}]$ ……………………………………………….. (27)

Where:

$Var[\beta_{FE} - \boldsymbol{\beta}_{\mathbf{RE}}] = Var[\beta_{FE}] - Var[\beta_{RE}] = \boldsymbol{\Psi}$

W is distributed as X^2 with (K-1) degrees of freedom where K is the number of parameters in the model.

If W is greater than the critical value obtained from the table then we reject the null hypothesis of that both estimators are consistent "i.e. no correlation between the right-hand side variables and the 'random effects'" in which case the fixed effects model is better.

The intuition behind the test is relatively simply if both estimates are consistent then $\beta_{FE} - \boldsymbol{\beta}_{\mathbf{RE}}$ should not be too great (i.e., the two should be close together). $[\beta_{FE} - \boldsymbol{\beta}_{\mathbf{RE}}]' [\beta_{FE} - \boldsymbol{\beta}_{\mathbf{RE}}]$ would be equivalent to summing the squares of the differences between the two sets of estimators. Hence the greater this is the more unlikely the null hypothesis is to be valid.

4.7.4 Diagnostic Tests

a. Coefficient Tests

Coefficient tests test restrictions on the estimated coefficients, including the special cases of omitted or redundant variables. They include the following: If a variable that should be included in the model specification is omitted, the regression estimates are biased, in general.

Further, the standard errors of the coefficients and their corresponding *t* tests are generally invalid. The omitted variables likelihood ratio test determines whether the addition of one or more variables to an existing demand specification increases the explanatory power of the model.

The variables to be added must contain the same number of observations as in the original equation, and so cannot contain missing variables (as is often the case with lagged variables).

This test can be applied to least squares, two-stage least squares, and binary and count models, among others. If data are unavailable for a potentially significant variable, use a proxy for that variable rather than leave it out of the demand specification.

b. Residual Tests

Most econometric software packages feature residual tests for autocorrelation, Heteroskedasticity, autoregressive conditional Heteroskedasticity (ARCH), and normality. Not all these tests are applicable to every form of model specification.

Testing and Correcting for Autocorrelation (Serial Correlation)

Autocorrelation (Serial Correlation) refers to that the covariance between the error terms over time (or cross-sectionally) is zero. It is assumed that the errors are uncorrelated with one another. Cov (ui, uj) = 0 for $i \neq j$. Usually, autocorrelation is positive. It therefore stands to reason that the most common cause of positive autocorrelation is the persistence of the influence of excluded variables. Negative autocorrelation is less common, and can be caused by the data manipulations used to change the original specification of a model into a form suitable for regression analysis (e.g., the application of distributed lag models).

Hence, autocorrelation can result from the omission of an important independent variable from the demand specification, or from the use of an inappropriate functional form. Nevertheless, Autocorrelation is more likely to be a problem when the interval between observations is short; the longer the interval, the less possibility there is for the influence of excluded variables to persist from one observation to the next.

The following tests are applicable for the autocorrelation:

1. **The *Durbin-Watson (DW) statistic***: it is the most commonly applied test. It, tests for first-order autocorrelation only which is related to the relationship between the residuals U_t and U_{t-1}. Further, this test's range of possible results includes areas of indecision, and the test is invalidated by specification of lagged dependent variables.
2. **Breusch-Godfrey test**: it is an extendable test to the r_{th} order by testing the relationship between the residuals U_t and all the values down to U_{t-r}. Therefore, this test is a general test for the autocorrelation.

Ignoring autocorrelation in OLS when it is present will not make the coefficient estimates unbiased, but they are inefficient and the OLS standard errors estimates will be biased relatively to the true standard errors (Brooks, 2014, p.199).

In most applications, the Ljung-Box Q-statistic and the Breusch-Godfrey Lagrange Multiplier test are preferable.

Testing and Correcting for Heteroscedasticity

Heteroscedasticity refers to the situation when the observations' errors in the regression do not have a constant variance (different error variance), var $(u_t)=\sigma^2 <\infty$. It implies a systematic change in the spread of the residuals over the range of measured values. Heteroscedasticity is unlikely to be a serious problem with time-series data.

However, various tests for Heteroscedasticity are available in econometric software packages. Following are the most common tests:

1. **White's (1980)** test: it can be applied to least squares regressions. This test is usually presented with two parameter options, namely (a) with cross terms and (b) without cross terms.

The latter option is preferable if there are many independent variables in the regression. (Baltagi, 2005); (Brooks, 2008).

2. **Breusch-Pagan / Cook-Weisberg test**: which is testing whether the error variance depends on anything observable, and it detects any linear form of heteroskedasticity.

The present of heteroskedasticity in the regression model will still result in consistent estimates of the regression coefficients and does not result in biased parameter estimates, however such estimates will no longer be efficient and their standard errors will be biased [see, Baltagi (2005) and Brooks)2008)].

Residual Normality.

Econometric software packages often present tests of whether the regression residuals are normally distributed, such as the Jarque-Bera statistic, together with histograms (bar charts) of the distribution of the residuals. The Jarque-Bera test compares the skewness (asymmetry) and kurtosis (flatness) of the distribution of the residuals with that of the standard normal distribution. Apply the test to least squares, two-stage least squares, non-linear least squares, and binary and count models, among others, but not to cointegration regressions, whose estimates are non-normally distributed.

c. Multicollinearity

Multicollinearity occurs when any single independent variable is highly correlated with a set of other independent variables. The effects of multicollinearity can be categorized in terms of estimation or explanation. In either instance, however, the underlying reason is the same: Multicollinearity creates “shared” variance between variables, thus decreasing the ability to predict the dependent measure as well as ascertain the relative roles of each independent variable (Hair et al., 2014, p.197). Additionally, using aggregate time-series data is a problem because of the high degree of correlation between many of these potentially significant independent variables. There are many methods of detecting Multicollinearity.

A simplest and most obvious means for detecting multicollinearity are to calculate the correlation coefficients between any two of the explanatory variables, and the Variance inflation factor with its corresponding tolerance ($VIF_i = 1/TOL_i$) of the effect that the other independent variables have on the standard error of a regression coefficient.

If correlation coefficients are greater than 0.80 or 0.90 then this is an indication of multicollinearity. Also, the generally accepted levels of multicollinearity within the threshold up to VIF 10 (corresponding tolerance values of .10) almost always indicate problems with multicollinearity. Once multicollinearity is detected, the best and obvious solution to the problem is to obtain and incorporate more information, biased estimation, and various variable selection procedures.

d. Regression Goodness of Fit and Explanation:

The research models use the following terms for examining the regression goodness of fit and to explain the regression outputs.

Coefficient of determination (R^2): it measures of the proportion of the variance of the dependent variable about its mean that is explained by the independent variables. The coefficient can vary between 0 and 1. The greater the explanatory power of the regression equation, and therefore the better the prediction of the dependent variable.

Adjusted coefficient of determination (adjusted R^2): it is a modified measure of the coefficient of determination that takes into account the number of independent variables included in the regression equation and the sample size. Although the addition of independent variables will always cause the coefficient of determination to rise, the adjusted coefficient of determination may fall if the added independent variables have little explanatory power or if the degrees of freedom become too small.

Degrees of freedom (df): it refers to the calculated value from the total number of observations minus the number of estimated parameters. Degrees of freedom provide a measure of how restricted the data are to reach a certain level of prediction. The large degrees-of-freedom value indicates the fairly robust of prediction with regard to being representative of the overall sample of respondents.

Standard Error of the Estimate: the standard error of the estimate is a measure of the accuracy of the predictions, and it represents an estimate of the standard deviation of the actual dependent values around the regression line. It is the square root of the sum of the squared errors divided by the degrees of freedom.

F Ratio: the analysis of variance (ANOVA) analysis provides the statistical test for the overall model fit in terms of the F ratio. F-statistics are based on the ratio of mean squares which is an estimate of population variance that accounts for the degrees of freedom.

Regression Coefficients: (*b* and *Beta*): The regression coefficient (*b*) and the standardized coefficient (β) reflect the change in the dependent measure for each unit change in the independent variable. Comparison between regression coefficients allows for a relative assessment of each variable's importance in the regression model.

Standard Error of the Coefficient: the standard error of the regression coefficient is an estimate of how much the regression coefficient will vary between samples of the same size taken from the same population. It is the standard deviation of the estimates of *b* across multiple samples. The smaller standard error the more reliable prediction and therefore smaller confidence intervals.

***t* Value of Variables in the Equation:** the *t* value of variables in the equation measures the significance of the partial correlation of the variable reflected in the regression coefficient. The software may provide F values rather than t values, and they are directly comparable because the t value is approximately the square root of the F value.

4.8 Variables Characteristics of the Research

The previous studies that presented in the literature review section (see chapter II) have motivated the researcher to select and articulate the variables of this research. This part of the chapter sheds a light and specifies the operational characteristics of the selected variables of risk management and financial performance of Sudanese Islamic banks.

The variables in this research are constructed in basis of financial ratios from the banks' audited financial reports and CBOS annual reports, then after, they are statistically analysed. Hassan and Bashir (2005) are stated that the financial ratios are useful and provide a broader understanding of the bank's financial status since the they are built from accounting data contained on the bank's financial statements and market regulators.

Also, table (1-1) in chapter one – section two – confirms the feasibility of using the selected variables by the researcher to assess the impact of risk management on the financial performance of Sudanese Islamic banks, in this study.

4.8.1 The Depended Variables

The dependent variables that have been selected for this study are the Return on Assets (ROA) and the Return on Equity (ROE). The reason of such selection is that these two variables are commonly used to measure the banks' financial performance as they provide a comprehensive metrics to show the financial performance of a business.

This justification is supported by Bashir (1999); Hassan and Bashir (2005); Imane (2014); and Elgadi (2016) who stated that ROA is the most comprehensive accounting measure that can be used to assess the banks overall financial performance. Moreover, it represents how effectively banks are used their financial to generate earnings. On the other hands, the return on equity (ROE) is a paramount important measure of banking returns because it indicates whether the bank has ability to use its internal funds sources to maximize the owners' returns (Bashir,1999; Hassan and Bashir,2005; Elgadi,2016).

In addition to that, there are other measures can be used to assess the bank's financial performance. These measures such as: Net Interest Margin (NIM), Net Profit Margin (NPM), Operating Profit Margin (OPM), and Return on Capital Employed (ROCE). The NIM measure is not applicable for Islamic banks since the Islamic financing prohibits dealing in interest rate. While, NPM, OPM and ROCE are seeming insignificant metrics for this research comparing and are not providing a comprehensive measurement to the financial performance, in a comparison with ROA and ROE.

Return on Assets (ROA)

Return on Assets (ROA) explains the bank's profitability, efficiency of managing the resources and financial performance of the bank. It shows the performance result in allocating overall company's resources into net profit during the financial period. It reflects the ability of the bank's management to generate returns on its assets' portfolio during a period, which is annually in this research. ROA is calculated by dividing annual net profit by total bank's assets in order to determine how much profit earned per unit of assets.

ROA =Net Profit (Income) / (Average) Total Assets %

Generally, the higher ROA the better indication of a bank's profitability and financial performance.

Return on Equity (ROE)

ROE is the measure that attract both management and investors in how effectively a bank management is using shareholders' equity fund. Equity fund refers to composition of share capital, retained earnings or accumulated loss, and other bank's reserves and surplus. ROE indicates how effectively the management of bank utilizes the bank's shareholders fund (in book value) in creating value to their current investment. It is calculated by dividing the annual net profit over the shareholders' equity in order to express the profit earned per unit of equity.

ROE =Net Profit (Income) / (Average) Stockholders' Equity %

The higher ROE the better indication of a bank's financial performance.

For both independent variables, it is worth to mention that, the bank return (as numerator in the ROA and ROE formulas) is based on net profit (after tax profits) since all banks under consideration are subject to the same tax law in Sudan. The choice between using pre-tax and post-tax profits in a study is not a significant matter when all the banks are subject to pay tax as per the same country' business tax law, which is equally applicable to all the banks (Guru, Staunton, and Shanmugam, 1999).

4.8.2 Independent Variables

The explanatory variables in this research are based on the main types of risks that affect the Islamic banking industry, which are defined by Islamic Financial Services Board (IFSB,2005) and CBOS (2008). They also used in many previous studies. Some of these similar studies are shown in chapter one, in table (1-1).

The main types of risks that have been selected by the researcher are include: credit risk, liquidity risk, market risk, operational risk, capital risk, and risk index. The characteristics of these independent variables are explained as follows.

Liquidity Risk

Liquidity risk is paramount important for banking industry. It needs to be carefully managed in order to meet the planned and unplanned liquidity withdrawal, and to provide the bank with the required level of funds for financing and investment activities. Accordingly, the research uses one of the most common measure for the liquidity risk which is the ratio of total financing (loan) to total deposits (FIDP). Such measure ratio represents the portion that acquired funds from depositors that utilized to finance (loan) banks' customers. At a high percentage of FIDP ratio, the bank will be in less liquidity as the depositors' funds were largely invested. Accordingly, the bank expected to be in a liquidity risk (shortage) as it has no enough liquidity to meet depositors' withdrawals. However, the bank's profitability is expected to be high due large portion of deposits being moved to investment activities.

Given that, the increase of FIDP ratio indicates the high potential risk to the bank's liquidity, ending to inability of the bank to meet its obligations toward depositors. While the reduction in this ratio provides an indicator of high liquid assets at the bank. The FIDP ratio can be calculated as follows:

$$\text{FIDP} = \text{Total Financing (Loans)} / \text{Total Deposits } \%$$

The FIDP ratio has been applied as independent variable in previous studies of Ishtiaq (2015); OFOSU-HENE, Eric Dei, and AMOH (2016); Bace (2016); Bagh, Ashif-Khan, and Razzaq (2017): Amaliah and Hassan (2019); Ariyibi, Yunusa & Williams (2020); Fadun & Oye (2020).

Credit Risk

The literature shows that provision of loan (financing) loss ratio (LLP) and/or non-performing loan or financing (NPL) ratio are widely used as metrics to measure the performance of credit risk management and quality of loan (financing) in the bank. NPL defines as a percentage of gross loans (financing) that are in doubtful or impaired in investment portfolio of banks.

Accordingly, bank's management build a provision to absorb the potential loss from this nonperforming finance and any doubtful of collection from counterparty. Thus, the bank's credit risk controls appear in the decision of how much provision shall be account for against financing loss. Given that, the ratio of LLP measures the bank's credit quality as well as management control of financing the bank's customers. If the bank is financing a risky customers and management negligence to control their financed operations, the results come as higher loan (financing) loss provision in order to cover the credit risk. Therefore, the lower the LLP ratio and NPL ratio, the better the quality of credit risk management, which in return positively bank's performance.

This research chose the LLP as independent variable to proxy credit risk as: the data to calculate LLP can be directly generated from the bank's audited financial statements, most of Sudanese Islamic Banks do not disclose data pertaining the NPL in their annual financial reports, and in addition to that LLP ratio is evidently used in the previous literature for the same purpose (see chapter II, table.2-1). The LLP can be calculated as follows:

LLP = Total Provision of Loan (Financing) Loss / Gross Loan (Financing) %

This choice follows the literature that is provided by Yuqi (2007); Tafri, Hamid, Meera and Omar (2009); Alshatti (2015); Ishtiaq (2015); Elbahar (2016); Al-Eitan and Bani-Khalid (2019); Al-Rdaydeh, Matar and Alghzwai (2017); Ahmadyan (2018); Abbas, Iqbal and Aziz (2019). Batten and Vo (2019) Mustafa (2019).

Operational Risk

In many literatures, the ratio of operational cost to operating income is used as a proxy for bank's operational efficiency and costs management. Such ratio considers as an explanatory variable as it explains to level of efficiently management of bank's operational costs.

Ultimately, this has a direct undesirable impact on the bank's financial performance as a determinant of the profitability status, and it considers as an inherent cost to the bank from this point of view.

Accordingly, this study follows many literatures in selecting the ratio of operational costs to operating income (OCOI) as a measure of operational risk. OCOI is calculated by dividing the bank's operational costs to operating income (profit). The operating costs represent the controllable costs that incurred by the bank, while the operating income includes the ordinary profit before statutory deductions (Tax and Zakat) and other income.

$$\text{OCOI} = \text{Operational Costs} / \text{Operating Income}$$

A high ratio of this metric, eventually indicates that the management of the bank is operationally inefficient in controlling costs, and vice versa. OCOI as a measure of operational risk is used as independent variable in previous studies. These studies are conducted by Almazari (2013); OFOSU-HENE, Eric Dei, and AMOH (2016); Elgadi (2016) Bagh, Ashif-Khan, and Razzaq (2017); Kusumastuti and Alam (2019); Batten and Vo (2019); Neves, Gouveia and Proença (2020); Fadun and Oye. (2020).

Market Risk

The most recommended measures of market risk that are given by CBOS (2008) include the historical Value at Risk (VAR), and the Present Value (PV) of commodities and assets by using the current prices (Market to Market).

This research used the historical VAR method to measure the market risk, which is align with the CBOS (CBOS, 2008.b), IFSB, and Basel guidance (Heffernan, 2005, p.146) recommendations. Value-at-Risk is one of the most well-known method to quantify and valuate market risk in a systematic manner. VAR describes the quintile of the projected distribution of losses over a particular time period at a given probability.

According to Greuning and Bratanovic (2009); Bogdan, Baresa, and Ivanovic (2015); the VAR measures losses due to a number of market risk and it calculates risk value into a single metric under a given probability. Therefore, the VAR method measures the level of any possible loss from the market in relation to the confidence interval. Moreover, the VAR model estimates expected to be sensitive to changes in the bank's trading risk profile and it's an appropriate method to measure the market risk on the basis of profit or loss level (CBOS, 2008.b. p18).

There are three basic methods used to calculate the VAR method, namely: historical method, variance and covariance and Monte Carlo method. The three most important elements in the VAR method include: the amount of potential loss, timeframe for risk estimation and the probability of loss. The amount of risk may be expressed in either absolute or relative value. Obviously, the use of historical method is considered the easiest methods.

Following the study of Ishtiaq (2015), the researcher estimated the VAR for the Sudanese Islamic banks by adopting the following steps.

a. Gather the profit or loss data for fourteen years of each bank (2005-2018). For each year's observation, the researcher calculates the average out of three years (current year plus previous two years). For observation at the first year (2007), the study has used yearly data from the years 2005 to 2007. For the observation at the second year (2008), the study used yearly data from the years 2006 to 2008, and so on.
b. Calculate the mean (average) of net profit (ANP) of each year from 2007 to 2018 based on above (a) estimates (for year 2007, the mean for the years 2005, 2006 and 2007). Same procedure has been applied for all the twelve years (2007-2018).

c. Calculate the standard deviation of profits or losses (σNP) for each year. For instance, to calculate σNP for the year 2007, we calculate the standard deviation of years 2005, 2006 and 2007. This procedure has been applied for all twelve years (2007-2018).
d. The absolute number of the value at risk ($VAR.abs$) for each bank for every year (2007-2018) by using 95 percent level of confidence ($2\sigma NP$) has been calculated as: $VAR.abs = ANP - 2\sigma NP$
e. In order to eliminate size-effect bias of (*VAR*.abs) number, the *VAR*.abs has been deflated by mean cross-section *VAR*.abs of all banks (based on all samples). This procedure gives us the *VAR* metric which used to proxy the market risk

VAR metric = VaR.abs for individual bank / Mean Cross Section VaR.abs

Accordingly, the higher the VAR indicates that the bank tackles a greater problem in the market risk exposure. Whereas, the lower VAR express a low market exposure. The VAR as a measure of market risk has been used as independent variable in similar previous study of Ishtiaq (2015)

Capitalization Adequacy

Obviously, any bank maintains a shareholders' equity in its financial position. The initial portion of the equity is the paid-up capital by shareholders, which determines the percentage of a bank's assets that are owned by shareholders.

In addition to that, the portion of retained earnings encompasses the generated and carried forward profits by bank and not yet distributed to those shareholders. The paid-up capital, retained earnings, and other reserves are the composition of shareholders' equity.

This research uses the ratio of shareholders' equity to total assets (EQTA) to measure the capitalization adequacy of bank. It refers to the total assets that financed by shareholders equity.

EQTA ratio represents the adequacy of bank's capital and its leverage position. Also, it explains the bank ability to absorb losses and manage the risk exposure with shareholders. The EQTA is calculated using the average balances of:

$$\text{EQTA} = \text{Shareholders Equity} / \text{Total Assets } \%$$

The higher the EQTA ratio, the less leveraged the bank is, and the low insolvency position of the bank. Consequently, it supports the bank's profitability and financial performance.

Basel committee and IFSB are use the Capital Adequacy Ratio (CAR) as a tool to measure the stability of bank's financial system, its ability to meet any risks which may be imposed in the future and to absorb any losses before insolvency position takes place. However, the researcher finds a difficulty in obtaining the CAR for all sampled banks for the period that covers the study, as some of them did not report the CAR in their audited financial statements.

Therefore, the researcher choses the EQTD as proxy for the capitalization adequacy of banks instead of CAR, as this approach follows previously by Yuqi (2007); Tafri, et al. (2009); Almazari (2013); OFOSU-HENE, Eric Dei and AMOH (2016); Bace (2016); Elbahar (2016); Elgadi (2016); Al-Rdaydeh, Matar and Alghzwai (2017).

4.9 Summary

In this chapter, the researcher provides a review for the methodological approaches that are applied and used to analyse the impact of risk management practice on the financial performance of Sudanese banks from the period 2007 – 2018. The applied methodology outlines the main techniques and testes with their alternatives that employed by the researcher to reach the findings of the study. Moreover, this chapter describes the panel data models, their relevant tests and diagnostics, and study's variables that used for the empirical analysis.

Chapter Five

Empirical Analysis and Research Findings

5.1 Introduction

This chapter provides empirical findings that are obtained from the data analysis for the impact of risk management practice on the financial performance of Sudanese Islamic Banks. It intends to provide results of the descriptive statistics, application of panel unit root tests for testing the presence of unit root to the series of the studied period, cointegration tests of the study's variables, estimation of panel models that applied in the study, and end up with the main findings and discussion. The empirical findings are based on the relationship between risk management practice (that measured by liquid risk, credit risk, operational risk, market risk and bank capitalization) and financial performance of Sudanese Islamic banks (that measured by ROA and ROE). The researcher attempts to report the empirical findings in accordance of the

5.2 Descriptive Statistics

Descriptive statistics are useful and they provide general highlights into the characteristics of a studied sample. The study employed descriptive statistics in its initial stage of data analysis to describe the basic features of the data of the studied period. The mean, median, standard deviation, maximum, minimum, skewness and kurtosis, and normality status provide simple summaries about the data distribution and the measures.

The below table (5-1) presents a summary of the descriptive statistics of the studied sample. The data used in this analysis spans ten (10) banks for the period of twelve (12) years, from 2007 to 2018. The included variables in this research are ROA, ROE, FIDP, LLP, OCOI, VAR and EQTA.

Table (5-1)

Descriptive Statistics of the variables in Studied Sample

Measure	ROA	ROE	FIDP	LLP	OCOI	VAR	EQTA
Mean	2.503	16.149	76.398	4.449	69.099	0.852	17.324
Median	2.145	14.895	79.050	4.345	68.875	0.530	12.985
Maximum	8.450	54.780	121.200	8.350	290.040	5.240	61.100
Minimum	-7.02	-58.370	38.190	1.650	29.820	0.010	-1.010
Std. Dev.	2.145	14.336	17.541	1.528	30.209	0.962	12.040
Skewness	-0.008	-1.277	0.107	0.381	3.366	2.212	1.665
Kurtosis	6.369	10.985	2.739	2.282	25.285	8.518	5.100
Jarque-Bera	56.77	351.50	0.571	5.484	2709.9	250.18	77.55
Probability	0.000	0.000	0.751	0.064	0.000	0.000	0.000
Observations	120	120	120	120	120	120	120

Source: Researcher calculation from the results of E-views outputs.2020

The mean value describes the mathematical average of the variable's dataset, whereas the median is the middle observation. Maximum and minimum measures represent the highest and smallest values of the variable's observations, respectively. In addition, the standard deviation shows the variability in a dataset from its mean. A smaller standard deviation indicates that the variable's observation in a dataset is so closer to its mean, and vise vera for the higher value of standard deviation, which indicates that the variable's observation in the dataset is more dispersed from its mean.

Skewness refers to the distribution pattern that is not symmetrical, and it may be negatively skewed (left) or positively skewed (right) according to which tail is longer. Whereas kurtosis measures the height and sharpness of the peak to the data. A distribution with kurtosis ≈3 is called mesokurtic, while a distribution with kurtosis <3 is called platykurtic, and finally for the kurtosis >3 is called leptokurtic. From anther hand, Jarque-Bera test also measures the normality.

The above table shows that the mean and median values of ROA, ROE, FIDP and OCOI are very closed for each variable, while there is a variation between these measures with respect to variables VAR and EQTA. Moreover, the standard deviation of each variable does not exceed its respected mean except for the variable VAR; while FIDP and LLP have relatively smaller standard deviations.

Additionally, the independent variables ROA and ROE are negatively skewed and the rest of variables are positively skewed. The skewness and the Jarque-Bera statistics are clearly indicate that the variables ROA, ROE, OCOI, VAR and EQTA are not normally distributed, However, the Jarque-Bera statistic provides p-values > .05 that suggest do not reject the null hypothesis of normality for each of the variables FIDP and LLP. The implication of this is that there is heterogeneity among the Sudanese Islamic banks in terms of financial performance and risk measures.

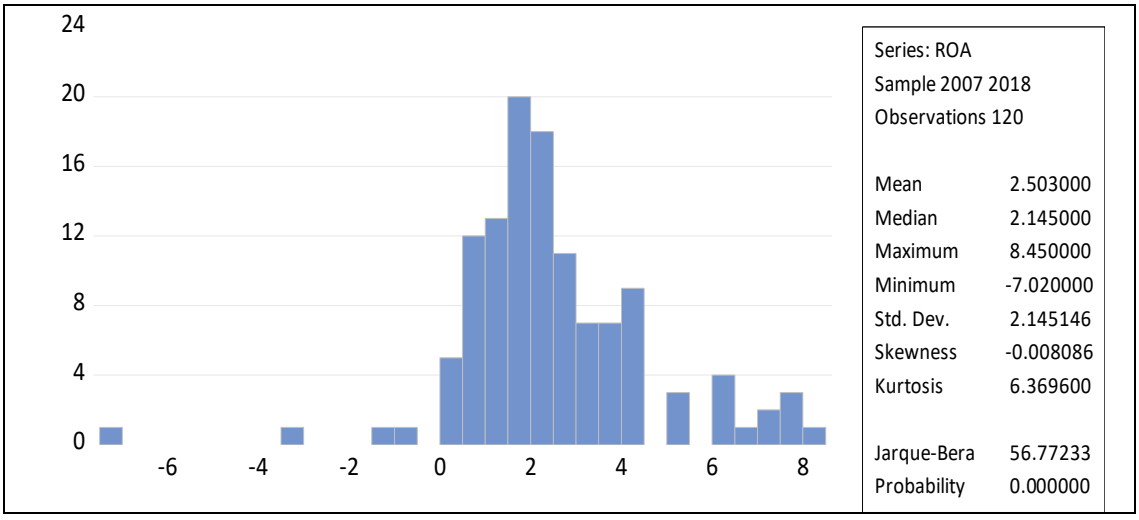
The individual variable descriptive statistics, graphical representation is provided as follows:

ROA:

The following figure (5-1) shows the descriptive statistics for the variable ROA.

Figure (5-1)

Descriptive Statistics of Study Variable (ROA)



Source: Researcher calculation from the results of E-views outputs.2020

The figure (5-1) shows that the mean value of the return on asset ratio (ROA) during the study period (2007-2018) is (2.5) with a standard deviation of (2.14). This indicates that 95% of banks' ROA between (-1.79) and (6.79). The maximum and minimum values are (8.45) and (-7.02) respectively. The normality tests show that the (ROA) series data is not normally distributed, with leptokurtic distribution and negatively skewed (value of -0.007).

Apparently, the sampled banks are not similar in terms of the profits generation and how efficiently are using their resources. Despite that, the ROA mean of (2.5) implies that Sudanese Islamic banks – on average – presented a sound profitability ratio.

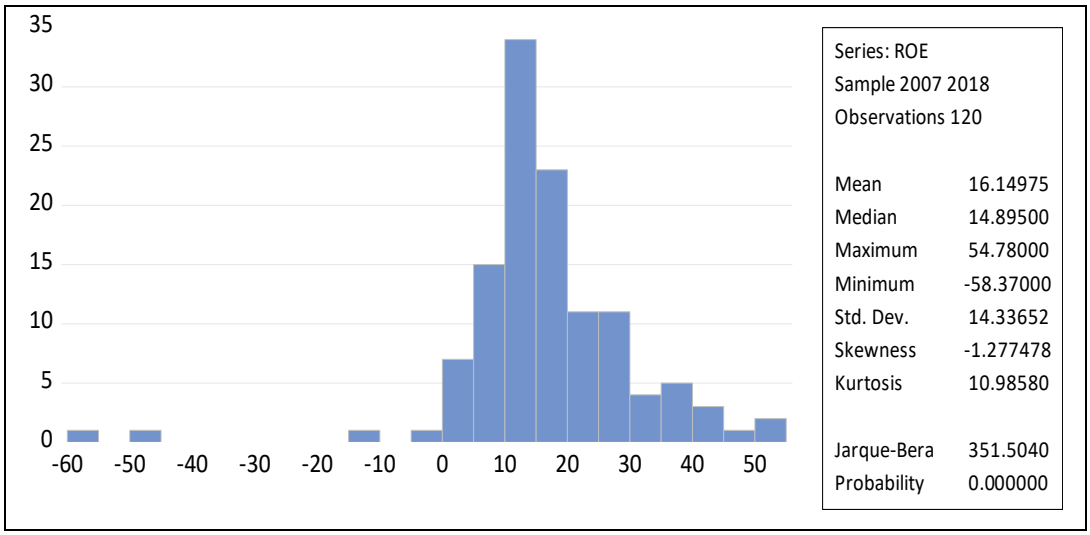
The normality tests show that the (ROA) series data is not normally distributed, with leptokurtic distribution and negatively skewed (value of 0.007-).

ROE:

The following figure (5-2) shows the descriptive statistics for the variable ROE

Figure (5-2)

Descriptive Statistics of Study Variable (ROE)



Source: Researcher calculation from the results of E-views outputs.2020

The figure (5-2) shows that the mean value of the return on shareholders' equity ratio (ROE) during the study period (2007-2018) is (16.14) with a standard deviation of (14.33). This indicates that 95% of banks' ROE lies between (-12.5) and (44.8), which is a relatively large variation and it supported by the given values of the maximum and minimum, which are (54.78) and (-58.37) respectively. Moreover, the normality tests show that the (ROE) series data is not normally distributed, with leptokurtic distribution and negatively skewed (value of -1.27).

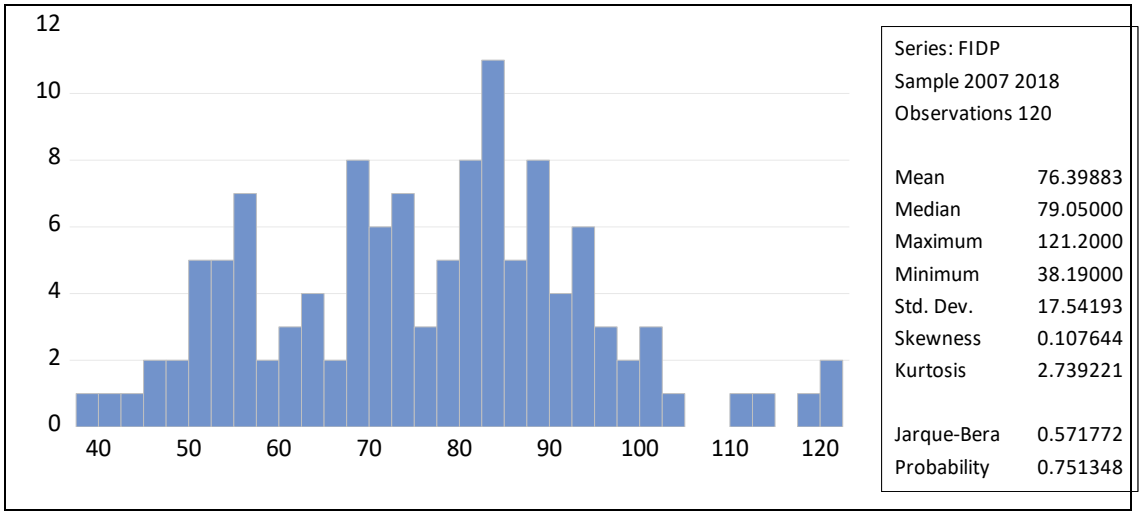
The higher average of ROE of Sudanese Islamic banks comparing with the ROA implies that banks have higher capacity to generate returns on shareholders' funds than on the bank's financial resources. Also, Table (5-2) indicates that the Sudanese Islamic banks are highly geared their capital structure which attribute the residual profits to the banks' shareholders. Despite that, the mean of ROE ratio seen to be a moderate ratio comparing with the Islamic banks in the region and overall Sudanese Islamic banks. This is due to some banks in the sample have significant losses in some years during the study's period.

FIDP:

The following figure (5-3) shows the descriptive statistics for the variable FIDP.

Figure (5-3)

Descriptive Statistics of Study Variable (FIDP)



Source: Researcher calculation from the results of E-views outputs.2020

The figure (5-3) shows that the mean value of the liquidity risk (FIDP) of Sudanese Islamic banks during the period 2007-2018 is (76.39) with a relatively lower standard deviation of (15.54) and the associated values with maximum and minimum rates are (121.2) and (38.19) respectively. The Jarque Bera probability and skewness tests show that the (FIDP) series data is normally distributed, with platykurtic distribution and skewedness value of (0.107). The Descriptive statistics indicate that 95% of the Sudanese Islamic banks' liquidity lies between the ratios (45.3) and (107.48).

This variation gives a sign that some banks have a good management of their liquidity risk pertaining the circulating of invested depositors' funds, while other banks have a potential liquidity problem, especially in the short run period.

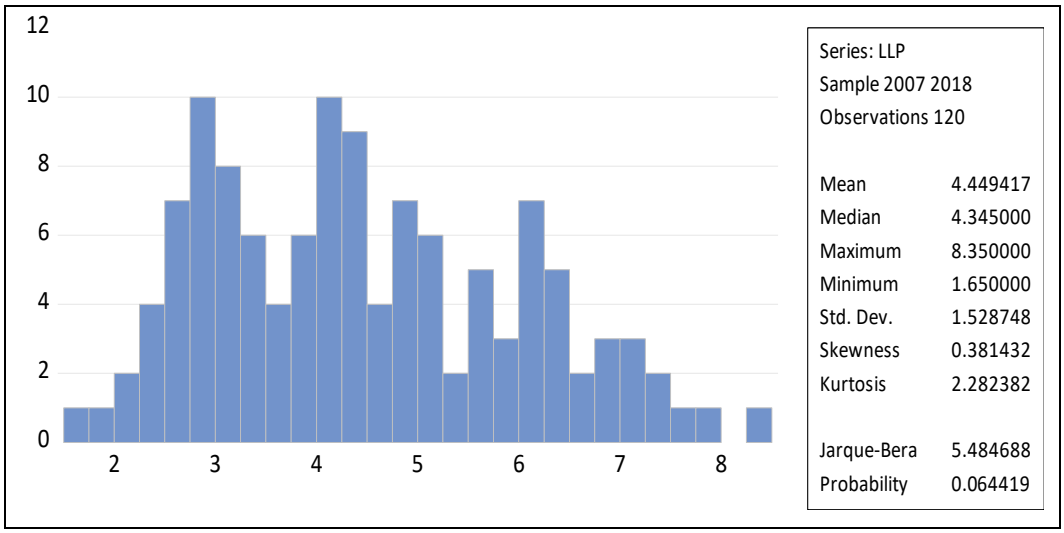
The mean for the sampled banks (76.39) is not far away from the mean of overall Sudanese Islamic banks (81.2) during the period of the study. The higher the ratio of FIDP gives an indication of high utilization of funds in the invested activities and the lower level of liquidity.

LLP:

The following figure (5-4) shows the descriptive statistics for the variable LLP.

Figure (5-4)

Descriptive Statistics of Study Variable (LLP)



Source: Researcher calculation from the results of E-views outputs.2020

The figure (5-4) shows that the mean value of the credit risk (LLP) of Sudanese Islamic banks during the period 2007-2018 is (4.44) with a relatively lower standard deviation of (1.52) and the associated values with maximum and minimum rates are (8.35) and (1.65) respectively. The Jarque Bera probability and skewness tests show that the (LLP) series data is normally distributed, with platykurtic distribution and skewedness value of (0.38). The Descriptive statistics indicate that 95% of the Sudanese Islamic banks' liquidity lies between the ratios (1.40) and (7.48).

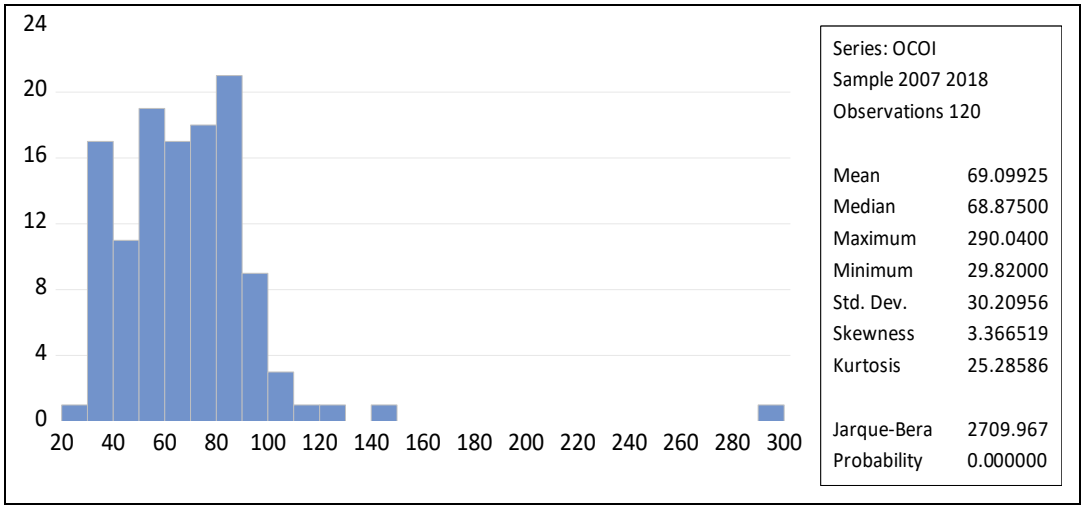
The closed values of the LLP's mean and median around the ratio of (4.4) indicate that the most of the Sudanese Islamic banks maintain a relatively similar approach and policy on how to allocate their reserve that shall cover the nonperforming (loan) financing.

OCOI:

The following figure (5-5) shows the descriptive statistics for the variable OCOI.

Figure (5-5)

Descriptive Statistics of Study Variable (OCOI)



Source: Researcher calculation from the results of E-views outputs.2020

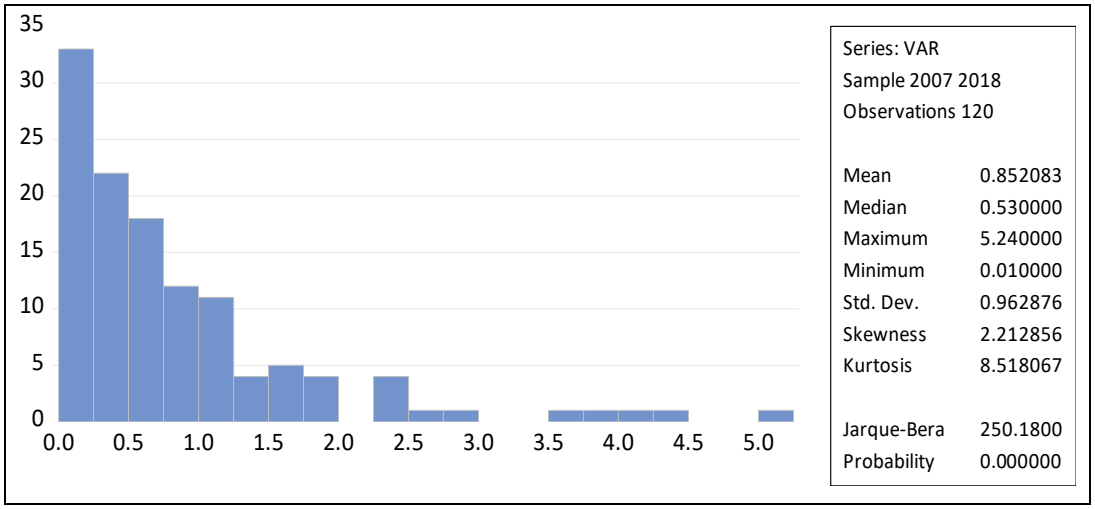
The figure (5-5) shows that the mean value of the operational risk (OCOI) during the study period (2007-2018) is (69.09) with a standard deviation of (30.20). Although the median value (68.87) is closed to the mean, the statistics show that there is a large interval between the maximum (290.04) and minimum (29.82) values. The variation in the OCOI ratio indicates that Sudanese Islamic banks have varying policies in managing their operational costs and the quality of invested assets in a way that to reduce operational risk. The normality tests show that the (OCOI) series data is not normally distributed, with leptokurtic distribution and positively skewed (value of 3.36).

VAR:

The following figure (5-6) shows the descriptive statistics for the variable VAR

Figure (5-6)

Descriptive Statistics of Study Variable (VAR)



Source: Researcher calculation from the results of E-views outputs.2020

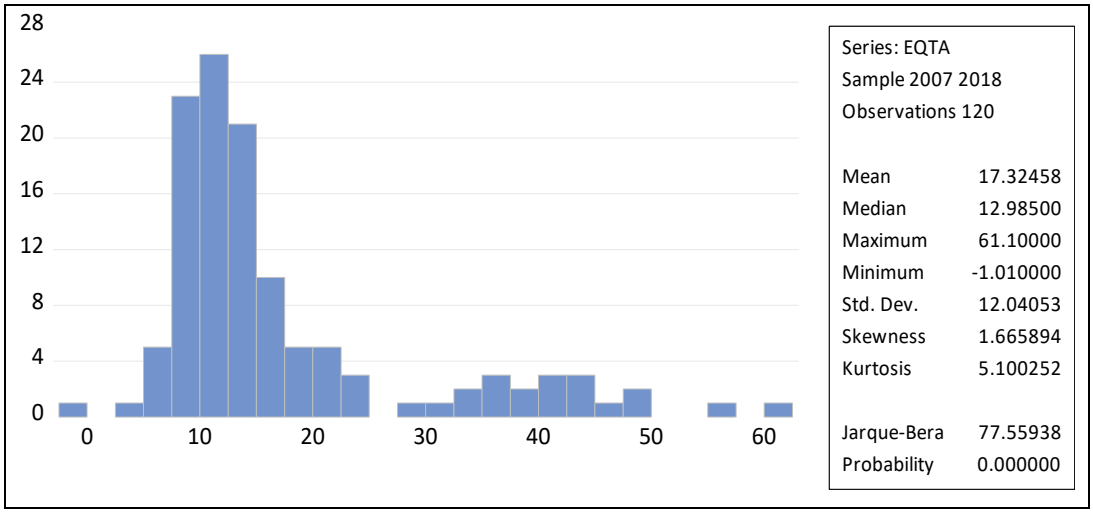
The descriptive statistics of market risk that measures by (VAR) are depicted in the above figure (5-6). It shows that the mean value of the (VAR) during the study period (2007-2018) is (0.85) with a high standard deviation of (0.96). The figure also shows that there is a significant variation between the Sudanese Islamic banks since 95% of the sampled banks have a VAR between (-1.07) and (2.77), maximum and minimum values of (5.24) and (0.010), respectively. Additionally, the normality tests show that the (VAR) series data is not normally distributed, with leptokurtic distribution and positively skewed (value of 2.21). The observed variation in the VAR of Sudanese Islamic banks can be justified by the different profits' distribution of these banks over the periods which they can be afforded to match market risk.

EQTA:

The following figure (5-7) shows the descriptive statistics for the variable EQTA.

Figure (5-7)

Descriptive Statistics of Study Variable (EQTA)



Source: Researcher calculation from the results of E-views outputs.2020

The figure (5-7) shows that the mean value of the bank capitalization ratio (EQTA) during the study period (2007-2018) is (17.32) with a standard deviation of (12.04), and a large interval between the maximum (61.10) and minimum (-1.01) ratios. The EQTA series data is not normally distributed, with leptokurtic distribution and positively skewed (value of 1.66). The statistics indicate that 95% of the Sudanese Islamic banks financed their investments from the equity-capital up to 41.4% and with at least 59.6% from depositors' funds.

We observed that there are a few cases with a negative bank's capitalization ratio during the study period. This was due to the excessive accumulated losses affected the bank(s) and absorbed the corresponding small paid-up capital.

5.3 Data and Variables Examinations

This part includes an examination of the sampled data and research's variables using the necessary tests. This is to avoids spurious regression for the panel models to assure that their results will be reliable.

5.3.1 Panel Unit Root Tests

This research applied the panel unit root tests of the study's variables to examine whether the data is stationary or has a unit root in order to avoids spurious regression for the panel models. The study used two standard unit root tests out of the common tests that are used for panel data. These tests namely; Levin, Lin and Chu [LLC, (2002)] and Im, Pesaran and Shin [IPS, (2003)]. We have testes the series data for the unit root at level [I(0)] including intercept and trend model, while we testes the unit root for the first difference [I(1)] with only the intercept. Following table (5-2) presents the summary results of the panel unit root tests.

Table (5-2)

Panel Unit Root Tests Using LLC and IPS Methods

Test	Levin, Lin and Chu			Im, Pesaran and Shin		
Variables	Test Statistic	Significance Level	Result	Test Statistic	Significance Level	Result
ROA	-2.58165	0.0049	I(1)	-2.61009	0.0045	I(1)
ROE	-1.93437	0.0265	I(0)	-3.24064	0.0006	I(1)
FIDP	-6.23661	0.0000	I(0)	-3.26924	0.0005	I(0)
LLP	-4.42436	0.0000	I(1)	-3.619	0.0001	I(0)
OCOI	-1.85152	0.0320	I(0)	-3.53284	0.0002	I(1)
VAR	-2.93599	0.0017	I(0)	-3.58905	0.0002	I(1)
EQTA	-2.29712	0.0108	I(0)	-5.62691	0.0000	I(0)

Source: Researcher calculation from the results of E-views.2020

From above table 5-2, the first test of LLC indicates that the variables ROE, FIDP, OCOI, VAR and EQTA are stationary at I(0), since the null hypothesis that series has a unit root is rejected at .05 (significance) level. Additionally, the test results revealed that the variables ROA and LLP are non-stationary at level. However, after we run the first differencing both variables became stationary at I(1).

The LPS statistics of the second test indicate that the FIDP, LLP and EQTA variables are significance at .05 level and therefore the null hypothesis that series has a unit root is rejected. The test results indicated that the variables ROA, ROE, OCOI and VAR have unit root at level but they became stationary after first differencing, I(1).

We conclude that each variable is tested through the level and first differencing to confirm the stationarity of the data and to assure this step prevents spurious regression. Subsequently, the researcher conducted the co-integration test in the next step.

5.3.2 Cointegration Tests

Numerous time series literature suggests empirical work based on time series data assumes underlying time series is stationary. If a time series is no stationary the spurious results are likely to arise, as discussed in previous section. Accordingly, we can use stationary or first differenced variable to overcome this problem. However, the use of differenced variable eliminates the long run information from data set. Therefore, it merely provides short run information. To solve such kind of problem, we followed the econometrician those who proposes that testing to determine whether or not a long-run relationship exists among variables in the model is required. Many techniques are available to test for the existence of long-run relationships in the levels among variables. This study uses Pedroni (1999, 2004), Kao (1999) methods for computing panel cointegration tests using Eviews. They provide the Augmented Dickey-Fuller (ADF) statistic and Phillips-Perron (PP) statistic.

The two models for this research have been tested for the residual cointegration and the results of these tests are shown in the following tables (5-3) and (5-4)

Model No.1 (ROA)

ROA = β0 + β2 FIDP + β3 LLP + β4 OCOI + B5 VAR + β1 EQTA + Ui

Table (5-3)

The Result of Cointegration Tests for the Model No.1 (ROA)

Method of Test	Statistic	Prob.	Statistic	Prob.
Pedroni Test – Panel v-Statistic	-1.084248	0.8609	-1.659669	0.9515
Pedroni Test – Panel rho-Statistic	2.099113	0.9821	2.873880	0.9980
Pedroni Test – Panel PP-Statistic	-11.25659	0.0000	-6.015294	0.0000
Pedroni Test – Panel ADF Statistic	-0.271496	0.3930	-1.888615	0.0295
Kao Cointegration Test – ADF			-6.829702	0.0000

Source: Researcher calculation from the results of E-views.2020

Table (5-3) presents the results of the panel cointegration tests of the model No.1 (ROA). Based on Pedroni test with ADF statistic and PP statistic, both statistics indicate that all variables that are used in this model are significant at .05 (significance) level. This let to reject the null hypothesis that no cointegration in the panel. Moreover, Kao test with ADF statistic indicates the rejection of the null hypothesis (i.e. no cointegration) at the .05 level of significance. Therefore, the empirical results implied that all variables that are used in model No.1 have cointegration with each other.

Model No.2 (ROE)

ROE =β0 + β2 FIDP + β3 LLP + β4 OCOI + B5 VAR + β1 EQTA + Ui

Table (5-4)

The Result of Cointegration Tests for the Model No.2 (ROE)

Method of Test	Statistic	Prob.	Statistic	Prob.
Pedroni Test – Panel v-Statistic	-1.405774	0.9201	-1.539795	0.9382
Pedroni Test – Panel rho-Statistic	3.168873	0.9992	2.703085	0.9966
Pedroni Test – Panel PP-Statistic	-2.492926	0.0063	-5.935728	0.0000
Pedroni Test – Panel ADF Statistic	0.920106	0.8212	-1.288404	0.0988
Kao Cointegration Test – ADF			-2.029527	0.0212

Source: Researcher calculation from the results of E-views.2020

Table (5-4) summaries the results of the panel cointegration tests of the model No.2 (ROE). Based on Pedroni test with ADF statistic and PP statistic. Both statistics indicate that all variables that are used in this model are significant at .05 and .10 levels which conclude to reject of the null hypothesis (no cointegration). In addition to that, Kao test with ADF statistic indicates the rejection of the null hypothesis of no cointegration at the .05 level of significance. Accordingly, the empirical results implied that all variables that are used in the model No.2 have cointegration with each other.

To sum up, the researcher applied both Pedroni and Kao panel cointegration tests for the two models in this research. The ADF and PP statistics indicated that all variables that are used in the two models are cointegrated and have long run association. Therefore, we can confirm that there will be a long run impact of the independent variables on the dependent variable, for both models.

5.3.3 Multicollinearity Tests

The research tested the multicollinearity problem by running the correlation analysis to calculate the correlation coefficients of all independent variables that are given in the two models of this research. This method is the simplest mean for detecting multicollinearity.

Accordingly, table (5-5) shows the correlation matrix of all independent variables that used in the two models' estimates.

Table (5-5)

Correlation Matrix for All Independent Variables

Variable	FIDP	LLP	OCOI	VAR	EQTA
FIDP	1.000000				
LLP	-0.130612	1.000000			
OCOI	-0.339016	0.387455	1.000000		
VAR	0.017937	0.107555	-0.133565	1.000000	
EQTA	0.590869	0.004546	-0.486401	0.002369	1.000000

Source: Researcher calculation from the results of E-views.2020

The table shows that the largest pairwise correlation coefficient is 0.59 between FIDP and EQTA variables, and the smallest correlation coefficient of 0.0023 between the VAR and EQTA variables. The results reveal that there is no multicollinearity between the independent variables that they tend to be orthogonal to one another; as there is no correlation coefficient reaches the threshold of 0.8 (as stated in methodology, chapter IV).

Additionally, the variance inflation factors (VIF) and its corresponding tolerances have been calculated for all independent variables as shown in the below table (5-6).

Table (5-6)

VIF and Tolerance Values for All Independent Variables

Variable	VIF	Tolerance (1/VIF)
FIDP	1.582069	0.632083
LLP	1.330550	0.751568
OCOI	1.721836	0.580775
VAR	1.066978	0.937226
EQTA	1.972236	0.507038

Source: Researcher calculation from the results of E-views.2020

Accordingly, the diagnostics test reveals that there is no inflation in the variances of the parameters' estimates. The test results indicate that the VIF values lie between 1.066 and 1.972 (.580 < tolerance < .9373) which is lower than the suggested thresholds by Hair et al. (2014) (VIF value ≤ 5 with a tolerance value ≥ .20).

The two tests concluded that there is no multicollinearity between the explanatory variables that used in the models of this research.

5.4 Heteroskedasticity and Serial Correlation (Autocorrelation) Tests

The purpose of this section is to test the heteroskedasticity and serial correlation of the residuals of the research estimated equations (pure models) to check if there is serious problem with time-series data or not.

5.4.1 Heteroskedasticity Test

White test and Breusch-Pagan-Godfrey test were applied to test the null hypothesis that there is no heteroskedasticity (i.e., homoskedasticity) in the residuals of both models of ROA and ROE. The results of these tests are shown in Table (5-7).

For model No.1(ROA); Table (5-7) shows that the p-values are small than 0.05 which suggest a rejection of the null hypothesis at the level. Therefore, the test concluded that there is heteroskedasticity problem in model No.1 at the 0.05 level of significance.

From other hand, the tests' results reveal that there is no heteroskedasticity in the residual of model No.2 (ROE). Here, the p-values are greater enough to not reject the null hypothesis at 0.05 (significance) level. Thus, the errors in Model.2 (ROE) do have a constant variance.

Table (5-7)

The Results of Heteroskedasticity Test on the Pure Models

Model	**Model 1 (ROA)**	**Model 2 (ROE)**
	Prob. Chi-Square (5)	Prob. Chi-Square (5)
White Test	0.0000	0.4518
Breusch-Pagan-Godfrey	0.0000	0.6359

Source: Researcher calculation from the results of E-views.2020

5.4.2 Serial Correlation (Autocorrelation) Test

The research applied Breusch-Godfrey LM Test to the panel data to test the null hypothesis over a range of lag orders. The results of this test are shown in Table (5-8) for the two models of ROA and ROE. As the p-values are smaller than 0.05 (significance) level, the null hypothesis of no serial correlation is rejected. Hence the test concluded that there is a serial correlation in the two models.

Table (5-8)

The Results of Serial Correlation Test on the Pure Models

	Model 1 (ROA)	**Model 2 (ROE)**
Test	Prob. Chi-Square (2)	Prob. Chi-Square (2)
Breusch-Godfrey LM	0.0000	0.0001

Source: Researcher calculation from the results of E-views.2020

5.4.3 Corrections to Heteroskedasticity and Serial Autocorrelation

In panel data analysis, the researcher applied the available techniques that recommended by Eviews-10 software for correcting the Heteroskedasticity and/or Autocorrelations in the research models. The correction done by using cluster-robust estimates for the both models. The purpose of this step is to make the research models as efficient estimators.

These techniques are widely used by researchers as an alternative approach by applying cluster/robust standard errors in panel data estimation (Brooks. 2008); (Baltagi. 2005); (Cameron and Miller. 2015) (Greene. 2018).

For the model No.1 (ROA): the researcher applied the option of "Period SUR(PCSE)" from the coefficient covariances matrix in Eviews panel estimation. The Period - Seemingly Unrelated Regressions (panels corrected standard errors) function allows for accommodate and clustering heteroskedasticity and autocorrelation. (Beck and Katz, 1995. p.646); (Greene, 2003, p. 361). (Eviews 10, User Manual, 2017.p.919); (Moundigbaye, Rea and Reed. 2018, p.28).

For the model No.2 (ROE): the researcher applied the option of "Cross Section SUR (PCSE)" that allows for correcting general correlation of residuals across periods for cross sections (clustering the individuals); which provide a feasible GLS (Eviews10, User Manual, 2017, p.919); (Cameron & Miller.2015, p.325). The seemingly unrelated regressions (SUR) approach is popular since it captures the efficiency due to the correlation of the disturbances error, and it is a common method in time-series or cross-section data (Baltagi, 2005. p.107).

5.5 Models Determination and Regression Analysis:

The researcher assessed the panel data in order to determine the appropriate panel data model between the fixed effects model (FEM) and the random effects model (REM) in order to estimate each independent variable.

Additionally, this research assumes that there is a heterogeneity between the Sudanese Islamic banks and the FEM and REM are tackling this heterogeneity.

From the output in appendixes No. (09) and No. (15), the Wald test for the cross sections dummy variables (Sudanese Islamic banks) in both models (ROA & ROE), the test result found that the p-values are smaller enough.

This leads to reject the null hypothesis at 0.05 (significance) level. Thus, the Sudanese Islamic banks varies in both the models.

5.6 Estimated Results Using the Fixed Effects Model for Model No.1 (ROA)

The study estimated the model No.1 (ROA) using the Fixed Effects Model (FEM) considering the fact of the heterogeneity among the variables and the formal statistical tests of Hausman and redundant fixed effects that are applied using the Eviews program. This implies that the error term in the ROA model is correlated with the explanatory variables

5.6.1 Hausman Test and Fixed Effects Test

The study conducted the Hausman test to determine if the fixed effects model is preferred to the random effects model. It is essentially testing whether the parameter estimates of the variables' coefficients are significantly different between the FEM and RFM. If the p-value for the test is small than 0.05 at the significant level, it shall indicate that the random effects model is not appropriate and then the fixed effects model is to be preferred. From table (5-9), the results of Hausman test and Chow test using Eviews.10 application show that the FEM is an appropriate for the Model No.1 (ROA). We reject the null hypothesis of that random effect is the choice.

Following table (5-9) provides the parameters of the aforementioned tests.

Table (5-9)

Hausman Test and Chow Test for Fixed Effects Model

Test	Chi-square	Probability
Hausman (Cross Section Random) Test	9.703771	0.0481
Redundant Fixed Effect (Cross-section) Chi-square	83.528379	0.0000

Source: Researcher calculation from the results of E-views.2020

5.6.2 The Empirical Results of Fixed Effects Model for Model. 1(ROA)

Table (5-10) shows the regression results for the first model with the dependent variable of ROA. This regression model estimated using the robust/clustered Fixed Effects Model. As mentioned in the methodology and the model determination (section 5.5); the robust/clustered standard errors options in the Eviews allow for controlling of heteroskedasticity and autocorrelation for the respected model.

Table (5-10)

Panel Regression Model on Fixed Effect Model (FEM)

Dependent Variable: (ROA)				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
FIDP	-0.029588	0.008680	-3.408740	0.0010
LLP	-0.067915	0.060471	-1.123103	0.2643
OCOI	-0.038730	0.003107	-12.46470	0.0000
VAR	0.465983	0.122311	3.809823	0.0002
EQTA	0.044535	0.020764	2.144840	0.0345
C	6.573219	0.821084	8.005537	0.0000
Cross-section fixed (dummy variables)				
R-squared	0.901		F-statistic	34.274
Adjusted R-squared	0.875		Prob-F	0.0000
S.E. of regression	0.76		Durbin-Watson	D.W=1.56

Source: Researcher calculation from the results of E-views.2020

The model prediction in algebraic Eviews form is shown as follows:

*ROA = 6.573 - 0.0295*FIDP - 0.0679*LLP - 0.0387*OCOI + 0.4659*VAR + 0.0445*EQTA*

5.6.3 Model (ROA) Goodness of Fit

According to the table (5-10), the value of adjusted R^2 (adjusted coefficient of determination) for the model (ROA) is 0.875. It measures the explanatory power of the model. It suggests that (87.5%) of the variation in financial performance that measured by ROA is explained by joint variations in the explanatory variables of risk management practice. The remaining variation of (12.5%) is the caused by other variables that not included in this model. This value gives a significant indication of goodness of fit and quality of the model.

F-statistic is used in combination with its p-value when deciding if the overall results of the regression are significant. The objective of this statistic is to compare the joint effect of all the variables together.

For this FEM, the p-value of F-statistic is (0.0000) is less than (0.05). This is an indicator of existence of significant relationship between the joint explanatory variables (EQTA, FIDP, OCOI, LLP, VAR) and the dependent variable (ROA).

The standard error (SE) of regression indicates how large the prediction errors (residuals) are for the model's data set. The small value for standard error the possibly accurate of predictions. The table shows that the SE of regression is 0.76 in the same units of independent variable.

We conclude that the model fits the data well for the Fixed Effects Model pertaining the first model (ROA).

5.6.4 Regression Coefficients and Their Explanation

The panel regression of fixed effects model (FEM) in table (5-10) presents the following coefficients' results:

The results reveal that all variable -with an exception of Credit Risk (LLP)- that are used in this research to explain the risk management practice have a significant impact of the financial performance – that measured by (ROA) – on Sudanese Islamic banks.

The results suggest that liquidity risk (FIDP) and operational risk (OCOI) have a negative and highly significant impact (at 1% significance level) on Sudanese Islamic banks' ROA. Whereas, market risk (VAR) and bank capitalization (EQTA) show a positive and significant impact (1% and 5% level of significance, respectively) on these banks' ROA. Additionally, the credit risk (LLP) apparently does not have a significant impact on banks' financial performance when it measured by ROA.

The coefficient of (**FIDP**) is negative (-0.0295) which indicates that an increase of 1% in the financing to deposits ratio will result into 2.95% decrease in ROA of Sudanese Islamic banks. This adverse relationship means that if the Sudanese Islamic banks highly utilized the depositors' funds into financing (loan) projects, and the ratio of financing (loan) to deposits increase; this will reduce the banks' ROA. Probably banks avoid investing the highly demanding depositors' funds in long-term projects to meet the expecting withdrawals by depositors. By this, banks keep considerable cash in form of short-term securities that classified as liquid assets, and getting some profit from them.

In addition to that, the coefficient of (**OCOI**) is negative (-0.0387) which implies that an increase of the operating costs to Operational profit ratio by 1% will reduce the ROA ratio by 3.87%. Such adverse relationship justifies the practical rationale of that the low efficiency of Islamic banks in Sudan has a significant negative impact of the financial performance of these banks. The lack of costs management (high operational risk) in banks reduces the net profits which subsequently decrease the ROA.

For the market risk, the coefficient of **VAR** has a positive sign (0.4659). It indicates that 1% an increase of VAR leads to an increase of 46.59% profitability on bank's assets. Since the VAR is measured. This result holds a theoretical ground that implies the maximum amount a Sudanese Islamic bank can afford to loss during a certain period (i.e., a year in this study) at a specific confidence level (in this study is a 5% level of confidence).

Given that, the results show that when the sampled Sudanese Islamic banks consider high levels of VAR this indicate that such banks can deal with a greater market risk exposure, which is reflected in more profitability generation.

Regarding the bank capitalization (capital adequacy) ratio; the associated **EQTA** coefficient is (0.0445) with positively relationship with banks financial performance. This result implies that the higher shareholders' equity to be invested by banks, the more generation of profitability to assets. The increase of 1% of EQTA shall provide an increase of 4.45% in ROA.

This can be justified by two reasons. One is that the EQTA includes the proportion of retained earnings that can be reinvested by the Sudanese Islamic banks as internal source of finance to push for more profitability. On other hand, the banks that maintain high level of shareholders' equity is giving protection to depositors' funds and absorption of any expected loss of their deposits. Consequently, this attracts for more external funds to be utilized the operational activities to generate more earnings. However, a careful strategy for funds' utilization shall be in place to a liquidity risk (which has a negative impact of ROA).

As shown in table (5-10), the results reveal that the **LLP** (credit risk) has no impact of the ROA of Sudanese Islamic banks during the studied period although it has a negative coefficient sign (-0.0679). The (LLP) represents a provision/reserve for the amounts of financing (loan) loss that created by banks to offset the default cases from credit risk that are exposed to banks' financing portfolios. Creation of more reserves by banks the less profitability generation by those banks as such reserve is a deductible from the periods' earnings. From the sampled Sudanese Islamic banks in this study, it seems that such LLP is not significant enough to affect the profitability to overall banks' assets.

5.6.5 The Estimation Diagnostics for Model No.1 (ROA)

Testing for Time –Fixed Effects

To see if time fixed effects are needed when running a FEM, we used the command for Wald test. It is a joint test to see if the dummies for all years are equal to (0). If they are equal to (0) then no time fixed effects are needed in the model. The test result [as shown in appendix No. (10)] reveals that the prob. of *F*-statistic is greater than 0.05 at the significance level. So, we failed to reject the null that the coefficients for all years are jointly equal to (0). Therefore, no time-fixed effects are needed in this case.

Testing for Multicollinearity

Multicollinearity generally occurs when there are high correlations between two or more independent (explanatory) variables. Such problem has been detected by this research in correlation matrix of the independent variable and VIF test. Both, the correlation matrix and VIF test show that there is no multicollinearity problem. See tables (5-5) and table (5-6) presented above.

Testing for Serial Correlation (Autocorrelation)

The final model shows that there is no problem of serial correlation under the consideration that the model is based on clustering of heteroskedasticity and autocorrelation (Period SURR (PCSE)) option.

Testing for Heteroskedasticity

Although Heteroskedasticity tests mainly apply to macro panels with long time series (over 20-30 years) and it is not a problem in micro panels (with very few years); The (ROA) model shows that there is no problem of heteroskedasticity as far as the model is built on clustering heteroskedasticity and autocorrelation using the Eviews appropriate options for panel correction of the residuals.

5.7 Estimated Results Using the Random Effects Model for Model No.2 (ROE)

The study estimated the model No.2 (ROE) using the Random Effects Model (REM) considering the fact of the heterogeneity among the variables and the formal statistical result from Hausman Test. This implies that the error terms in the ROE model are uncorrelated with the explanatory variables.

5.7.1 Hausman Test for Random Effects

The study conducted the Hausman test to determine whether the fixed effects (FEM) model or the random effects model (REM) is econometrically preferable. If the p-value for the test is smaller than 0.05 at the significant level, it shall indicate that the FEM is an appropriate over the REM. The result from Hausman test is shown in table (5-11). It indicates that p-value of chi-square statistics is failed to reject the null hypothesis of that there is uncorrelation between the errors term and the regressors in the ROE model. Therefore, we conclude that REM is an appropriate for Model No.2 (ROE).

Table (5-11)

Hausman Test for Radom Effects Model

Test	Chi-square	Probability
Hausman (Cross Section Random) Test	7.932973	0.1600

Source: Researcher calculation from the results of E-views.2020

5.7.2 The Empirical Results of Random Effects Model for Model No.2 (ROE)

Table (5-12) shows the regression results for the second model of the dependent variable (ROE). The regression model estimated using the Random Effects Model with robust/clustered of standard errors. As aforementioned in the methodology and the model determination (section 5.5); the robust/clustered standard errors options in the Eviews allow for controlling of the heteroskedasticity and/or autocorrelation issues in the panel models.

Table (5-12)

Panel Regression Model.2 (ROE) on Random Effect Model (REM).

Dependent Variable: (ROE)				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
FIDP	-0.119424	0.060082	-1.987666	0.0492
LLP	-1.045651	0.498691	-2.096791	0.0382
OCOI	-0.376189	0.037840	-9.941493	0.0000
VAR	2.211689	0.746298	2.963545	0.0037
EQTA	-0.339519	0.101689	-3.338783	0.0011
C	59.91799	4.473067	13.39528	0.0000
Cross-section fixed (dummy variables)				
R-squared	0.674		F-statistic	47.123
Adjusted R-squared	0.660		Prob-F	0.0000
S.E. of regression	6.45		Durbin-Watson	D.W=1.22

Source: Researcher calculation from the results of E-views.2020

The model prediction in algebraic Eviews form is shown as follows:

*ROE= 59.9179 –0.1194*FIDP –1.0456*LLP –0.3761*OCOI +2.2116*VAR –0.3395*EQTA*

5.7.3 Model (ROE) Goodness of Fit

With reference to the table (5-12), the value of adjusted coefficient of determination (R^2) for the model (ROE) is 0.66.

The explanatory power of the model suggests that (66%) of the variation in financial performance that measured by ROE is explained by joint variations in the variables that represent the risk management practices for Sudanese Islamic banks. Accordingly, the remaining variation of (34%) is caused by other variables that not included in this model. This value gives an appropriate sign of goodness of fit and the quality of the model.

F-statistic and its p-value indicate if the overall results of the regression are significant. The objective of this statistic is to compare the joint effect of all the variables together in the regression model, not for an individual variable.

In this model of (ROE), the p-value of F-statistic is (0.0000) is less than (0.05). This gives a clear indication of the significant relationship between the joint explanatory variables (EQTA, FIDP, OCOI, LLP, and VAR) and the dependent variable (ROE).

The standard error (SE) of regression indicates the variation of the prediction errors (residuals) from the model's data set. The small value for standard error the possibly accurate of predictions. The table shows that the SE of regression is (6.45) in the same units of independent variable.

The regression analysis concludes that the model fits the data well for the Random Effects Model toward the second model (ROE) in this research.

5.7.4 Regression Coefficients and Their Explanation

The panel regression of REM in table (5-11) presents the following results:

The results reveal that all variable that explain risk management practices of Sudanese Islamic banks have significantly impact to the financial performance (when it measures by ROE) of these banks, during the studied period. The results suggest that liquidity risk (FIDP), credit risk (LLP), operational risk (OCOI) and bank's capitalization (EQTA) have a negative and highly significant impact (at 5% significance level) on Sudanese Islamic banks' ROE. Also, market risk (VAR) coefficient's metrics show a positive and significant impact (at 5% level of significance) on the ROE of these banks.

The coefficient of **(FIDP)** shows a negative measure of (-0.1194) that indicates an adverse relation. An increase of the financing to deposits by 1% shall lead to a decrease of the Sudanese Islamic banks' ROE by 11.94%, Keeping other factors constant.

This means that if the Sudanese Islamic banks invested the depositors' funds aggressively into the banks' financing portfolios, the return on shareholders' equity takes an opposite direction.

Regarding the credit risk, the (**LLP**) coefficient is (-1.0456). It means that any increase in the credit risk by 1% shall impact the ROE of the sampled banks by 104.56%. Apparently, the more default cases in the Sudanese Islamic banks drive these banks to make a significant provision and reserves to offset any potential the losses. As a result, this increase the credit risk (loss due to customers' default) which shall be reflected in a reduction of the profit and lowering the ROE of the banks.

The coefficient of **(OCOI)** has a negative sign (-0.376189) which implies that a 1% increase of the operating costs to operational profit ratio will reduce the ROE ratio by 37.61%, when other factors are constant. This result justifies that the high ratio of OCOI means that a low efficiency (i.e., high operational risk) of Islamic banks in Sudan, which has a negative significant impact on the ROE. As mentioned earlier, the lack of costs management (high operational risk) in banks ultimately reduces the bank's financial performance in term of ROE.

Pertaining proxy of the market risk, its associated coefficient has a positive sign (2.2116). It indicates that an increase of 1% of the VAR leads to an increase of 221.16% of the profitability on shareholders' equity. The result (at 5% significance level) implies that when the banks' yearly amount that affordable to mitigate the period's losses is increasing (i.e., the market risk exposure being at low level); the ROE will improve.

From other hands, the bank capitalization (capital adequacy) ratio as **EQTA** has a coefficient of (-0.339519). The increase of 1% of EQTA shall provide a decrease of 33.95% in ROE, keeping other factors constant. This result implies that the more utilization of shareholders' equity in investment activities, the low percentage of the return to shareholders' equity (i.e., ROE).

In other words, the banks' shareholders preference is to use the depositor's funds for generating more returns.

5.7.5 The Estimation Diagnostics for Model No.2(ROE)

Testing for Multicollinearity

Multicollinearity problem has been detected in this research using correlation matrix of the independent variable and VIF test. Given that, results from the two methods of the correlation matrix and VIF test reveal that there is no Multicollinearity problem. See the above table (5-5) and table (5-6).

Testing for Serial Correlation (Autocorrelation)

The model shows that there is no problem of serial correlation under the consideration that the REM model is built on panel corrected standard error to deal with autocorrelation (i.e., Cross Section SUR (PCSE)) option as presented in above section (5.4.3).

Testing for Heteroskedasticity

Although Heteroskedasticity tests mainly apply to macro panels with long time series (over 20-30 years) and it is not a problem in micro panels (with very few years); The (ROE) model shows that there is no problem of heteroskedasticity. This considers the results of white test and Breusch-Pagan-Godfrey test in the above table (5-7).

5.8 Discussion of the Research Findings

The below table (5-13) summaries the coefficients of the explanatory variables in two model of this research. It followed by the findings' discussion to explain the impact of risk management practices on the financial performance of Sudanese Islamic banks.

Table (5-13)

Summaries of the Two Models' Coefficients

	Model No.1 (ROA)		Model No.2 (ROE)	
Variable	**Coefficient**	**Prob.**	**Coefficient**	**Prob.**
FIDP	-0.029588	0.0010	-0.119424	0.0492
LLP	-0.067915	0.2643	-1.045651	0.0382
OCOI	-0.038730	0.0000	-0.376189	0.0000
VAR	0.465983	0.0002	2.211689	0.0037
EQTA	0.044535	0.0345	-0.339519	0.0011

Source: Researcher calculation from the results of E-views.2020

Liquidity Risk

The study results prove that liquidity risk is significant with negative impact on financial performance of Sudanese Islamic banks. It implies that when Sudanese Islamic banks utilize more depositors' funds on bank's investment activities, the profitability of these banks adversely being affected. In other words, the negative relationship between liquidity risk and profitability in Sudanese banks can be explained as keeping high liquid assets (i.e. theoretically a low liquidity risk) by banks, leads to improve the; specifically, when banks are investing in short-term profitable projects and securities. This situation drives the Sudanese banks to keep more liquid assets in term of securities (Sukuk) that provides these banks by profit as well as a mitigation line against the shortage the liquidity.

Sudanese Islamic banks tends to take a liquidity conservative approach to avoid any shortage due to depositors' withdrawals and lack of depositor's confidence. This result is supported by Elgadi (2016, p139) Mustaf (2020, p.274) findings on similar studies on Sudanese banks, and by Bace (2016) study. They confirmed the negative impact of liquidity risk on the financial performance of Sudanese Islamic banks.

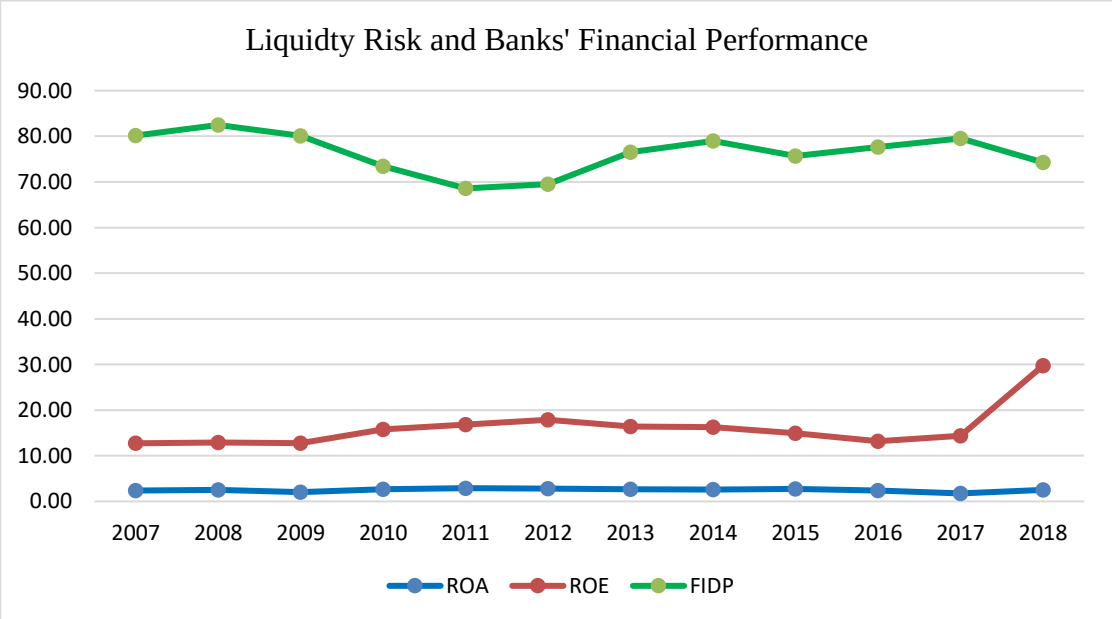
The result can be justified by the increase and significant portion of current accounts in banks deposit's structure which seems to improve liquidity position in such banks. However, this situation challenges the trade-off between liquidity and profitability of Sudanese Islamic banks in absence of diversification in liquidity sources.

On opposite direction to this finding; the previous studies of Ishtiaq (2015); OFOSU-HENE, et al (2016); Bagh, et al (2017): Amaliah and Hassan (2019); Ariyibi, et al (2020); Fadun and Oye (2020) that found that liquidity risk has a positive and significant impact to banks' financial performance.

Following figure (5-8) depicts a trend analysis for the relationship between liquidity risk and banks' performance of Sudanese Islamic banks during the period of study. It clearly shows that at the higher liquidity risk, the banks' profitability reduces, and vice-versa, along the period of the study.

Figure (5-8)

The Relationship between Liquidity Risk and Sudanese Banks' Financial Performance



Source: The Researcher Outputs Using Data from the Banks' Financial Statements

Credit Risk:

The impact of credit risk on Sudanese Islamic banks' financial performance is negative. This means that poor financing (loan) management in banks increases the nonperforming finance and consequently reduces the efficiency of banks' costs and then profitability.

However, the negative impact of credit risk on bank's profitability in this research is only significant to the profitability when it measured by ROE, while it is insignificant to ROA. The insignificant result of credit risk to banks' profitability can be justified by Ahmed (2016) argument which states that credit risk management framework in the Islamic Sudanese banks is not weak and is sufficiently manage the nonperforming financing (loan). This provides a controllable level of allocating financing (loan) loss provision by banks' management to cater any potential credit risk. In return, the provision of financing (loan) loss and/or nonperforming finance are directly affecting the level of bank's profitability (as deduction from generated revenue). Consequently, the return on equity's shareholders will be negatively affected.

Given the Sudanese Islamic banks are heavily investing in short-term and non-participatory financing modes (such as Murabaha, Ijara, Salam, etc.), they are taking collaterals from their customers to cover the amount of financing that given to them. So, the market values of these collaterals probably are getting higher than the amount of credit facility, especially during the inflationary time in Sudan. Therefore, any customer's default amount can be recovered – in nominal value – out of the respective collateral or guarantee, unless there is management negligence practice.

In addition to that, the prudential regulator policies toward the nonperforming financing and default of banks' customers provide a sound credit risk management that improves the banks' profitability and liquidity.

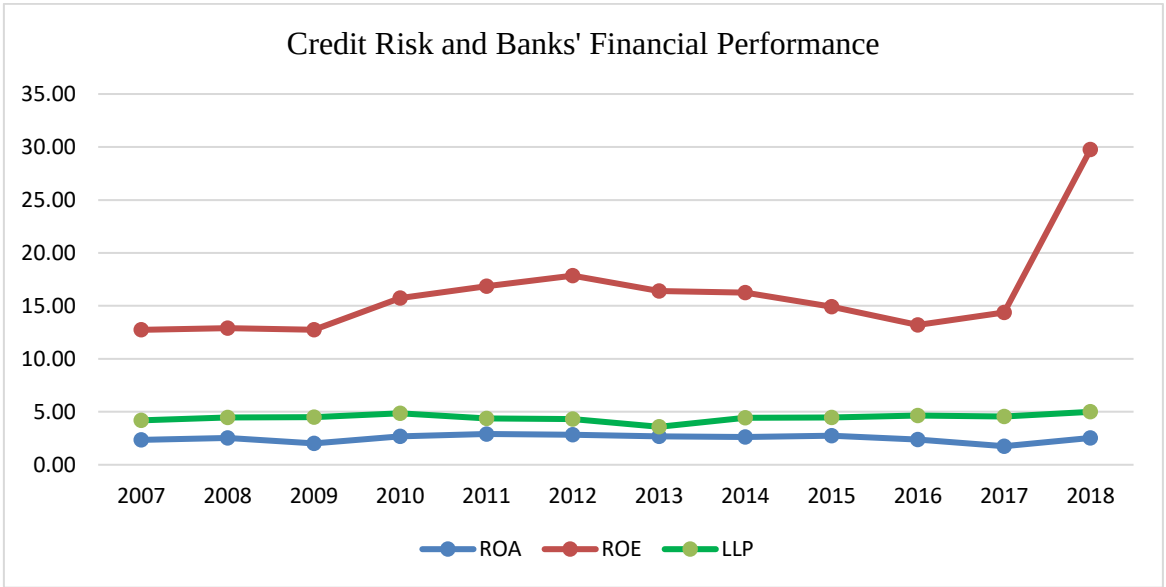
Therefore, the Islamic banks in Sudan can be characterized by having a suitable quality of credit assessment, control and collection policy that improve the return on banks' assets. The insignificant impact of credit risks on banks' financial performance (when it measured by ROA) is supported the previous studies of Li and Zou (2014); Elbahar (2016); Kusumastuti and Alam (2019); Echwa and Atheru (2020).

The significant and negative impact of credit risk on banks' financial performance (when it measured by ROE) matches the results of Yuqi (2007); Tafri, et al., (2009); Alshatti (2015); Al-Rdaydeh, Matar and Alghzwai (2017); Ahmadyan (2018); Al-Eitan and Bani-Khalid (2019); Abbas, Iqbal and Aziz (2019); Batten and Vo (2019) Mustafa (2019) that prove a poor financing management is always increases the bad quality of bank's financing and reduces the cost efficiency; which affects the financial performance negatively

Following figure (5-9) depicts a trend analysis for the relationship between credit risk and banks' performance of Sudanese Islamic banks during the period of study. It presents the adverse relation between credit risk and the banks' profitability during the period that covers the study.

Figure (5-9)

The Relationship between Liquidity Risk and Sudanese Banks' Financial Performance



Source: The Researcher Outputs Using Data from the Banks' Financial Statements

Operational Risk

The empirical results report a negative relationship between banks' operational risk exposure and financial performance. This implies that the failure in banks' internal controls to efficiently manage their costs is diminishing the profitability of those banks.

Accordingly, the Sudanese Islamic banks shall manage their costs efficiently through the business activities. This will enable the banks to achieve best return on their assets, as well as to enhance the shareholders' value. The use of different cost management techniques, improving the employees' skills and caring of IT infrastructure to automate the operations are expected to increase the operational efficiency and in return maximization of banks' profitability which is a core part of financial performance.

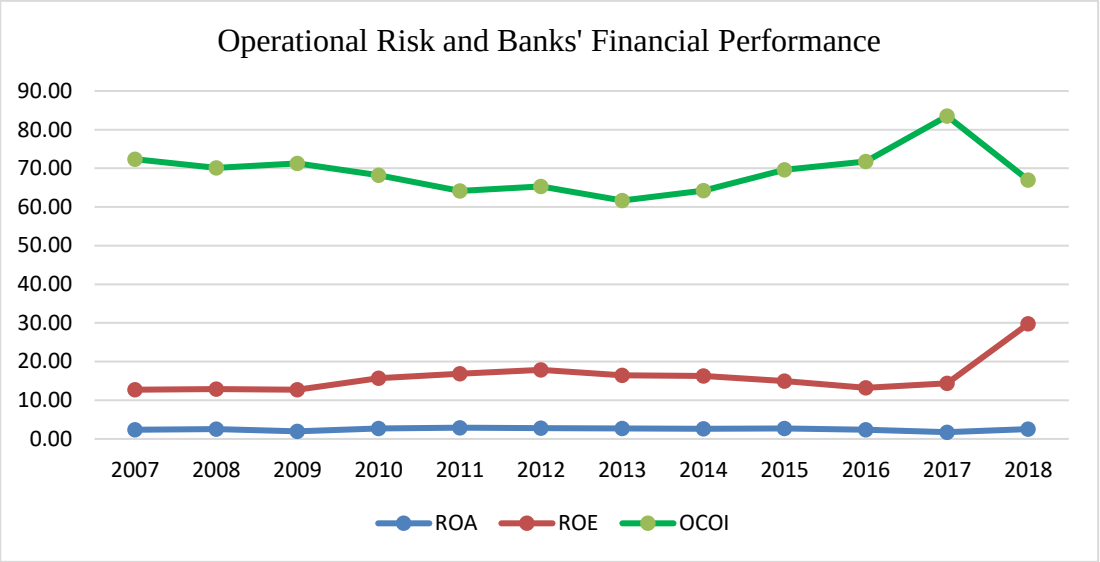
This finding agrees with the result of previous studies that conducted by Almazari (2013); OFOSU-HENE, et al (2016); Elgadi (2016) Bagh, et al., (2017):; Batten and Vo (2019); Fadun and Oye (2020) and they reveal the significant and negative sign of operational risk against the banks' financial performance.

However, a contradiction result is shown in Kusumastuti and Alam (2019); Fadun and Oye (2020) studies that claim a positive impact of operational risk on banks' financial performance. Following figure (5-10) presents a trend analysis for the relationship between operational risk and banks' performance of Sudanese Islamic banks during the period of study.

It obviously shows the adverse relation between operational risk and the banks' profitability during the period that covers the study. The more operating costs management, the better financial performance of Sudanese Banks in term of profitability.

Figure (5-10)

The Relationship between Operational Risk and Sudanese Banks' Financial Performance



Source: The Researcher Outputs Using data from the Banks' Financial Statements

Market Risk

The market risk in this study provides a positive and significant impact on the profitability of Sudanese Islamic banks, which leads to improve their financial performance. The market risk consists of several elements that generally include changes in the prices, foreign exchange rates, inflation, etc. that have been proxied by the measure of Value at Risk for the banks' profitability.

The positive relationship between market risk and financial performance of Sudanese Islamic banks can be explained by the banks' strategy to pass the market's changes to their customers, and revalue their investment portfolio on a regular basis. In the same line, banks' deal efficiently with their costs. This will improve the banks' profitability as results to relatively higher margin of operational earnings.

Moreover, the results reveal that when the Sudanese Islamic banks increase its value at risk on the basis of profitability, this will make such banks ready to mitigate more market risk exposure.

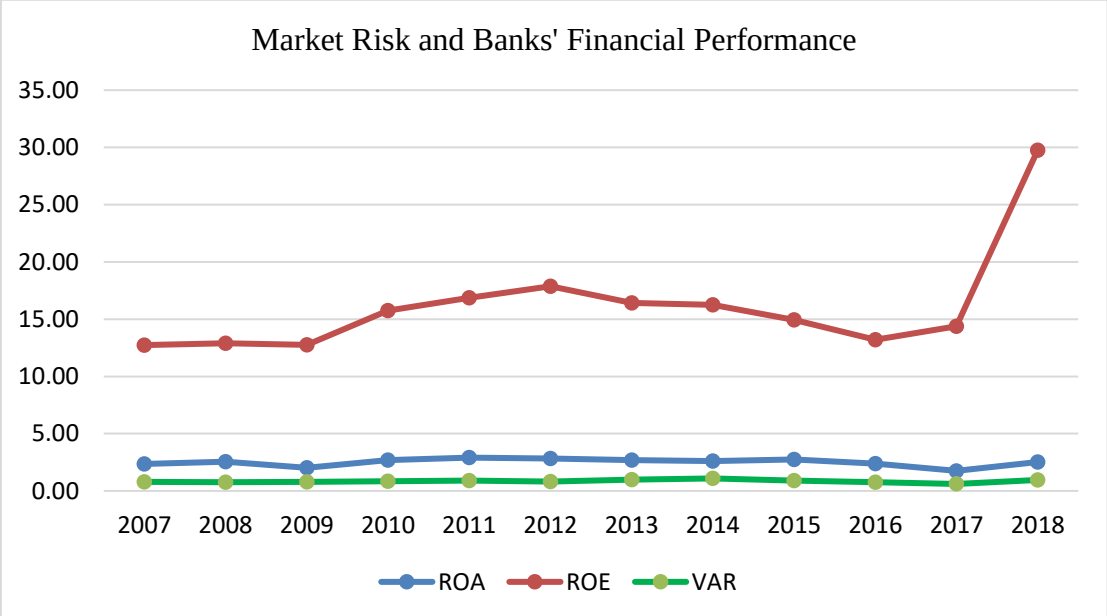
In addition to that the banks probably apply a set exposure limit to different classes of assets and investments that should be exposed to market risk, such as Murabaha, Musharaka, Mudarabah and Salam.

This result of positive relationship between market risk and financial performance of banks is in consistent with Fadun and Oye (2020); and Echwa and Artheru (2020); those who used the interest rate to measure the market risk. However, this result is in contradiction with Ishtiaq (2015) finding that shows an insignificant impact of market risk on the financial performance of Pakistani banks. This may be due to the differences in the market determinants of Islamic banks between different countries, and to which extend banks deals with the changes in the market.

Following figure (5-11) presents a trend analysis for the relationship between market risk and banks' performance of Sudanese Islamic banks during the period of study. The VaR metric that measured the market risk represent a positive direction with the banks' profitability measures that are used to indicate the financial performance of Sudanese Islamic banks.

Figure (5-11)

The Relationship between Operational Risk and Sudanese Banks' Financial Performance



Source: The Researcher Outputs Using data from the Banks' Financial Statements

Bank's capitalization:

The findings conclude that the impact of equity capital is significant on the financial performance of Sudanese Islamic banks, despite the two opposite directions of such impact on banks' ROA and ROE.

The empirical results reveal that when the Sudanese Islamic banks maintain a high level of equity capital, they get an advantage to increase their return on assets. This explanation is supported by Bandt, et al. (2017)[22] argument that evidences the increase of bank's capital has a positive impact on the ROA, according to their study of optimal capital and regulatory requirements with bank performance of French banks. In addition to that, the more equity capital in banks provides a high capacity to absorb any potential loss, and to protect the banks' investment and assets. Furthermore, we cannot deny that the banks' profits become part of their equity' capital in the form of retained earnings, which can be reinvested for better rate on investment.

The result of positive impact of bank's capitalization on ROA is supported by previous studies' results such as Yuqi (2007); Tafri, et al., (2009); Bace (2016); Elbahar (2016); Elgadi (2016).

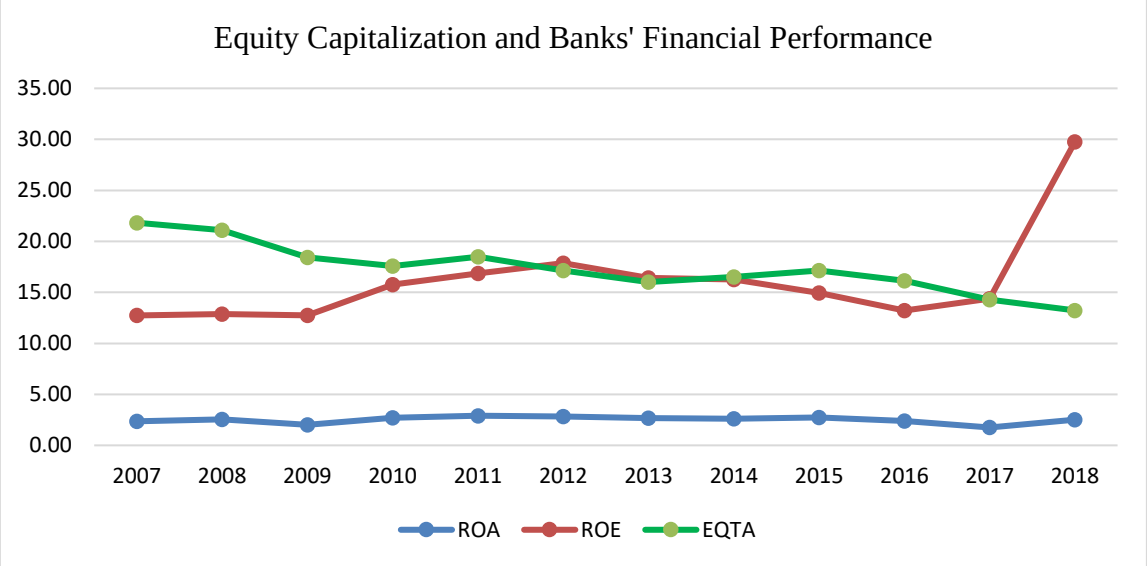
On other hands, the negative relationship between equity capitalization and ROE of Sudanese Islamic banks can be justified by the rational that banks' shareholders are keen to generate more profits from depositors' funds rather than increasing their equity capital. This finding matches the results of Almazari (2013); OFOSU-HENE, et al., (2016) studies. Additionally, the finding can be also explained by Osborne, Fuertes, and Milne (2012) argument (based on their study of US banks during 1970 to 2010) that banks with a surplus of capital have a strongly negative relationship between capital and profitability, therefore reducing capital seems to be the optimal strategy for these banks.

This result, can motivate further studies to investigate the impact of bank's capitalization on overall financial performance in Sudanese banks.

Following figure (5-12) shows the relationship between equity funds and banks' profitability, as it appears positively with ROA, a negatively with ROE of the Sudanese Islamic banks.

Figure (5-12)

The Relationship between Operational Risk and Sudanese Banks' Financial Performance



Source: The Researcher Outputs Using data from the Banks' Financial Statements

5.9 Summary

The study results conclude to the paramount importance of risk management practices as determinant of the financial performance of Sudanese Islamic banks. The significant impact of liquidity, market, operational risks and bank's capitalization toward banks' performance is empirically found in this research. Accordingly, the management of Sudanese Islamic banks and regulators have to advanced their policies and guidance to assess, monitor and control such risks to enable efficient control of operating costs, better utilization of funds' sources, diversify investments portfolios, and close monitoring of market and macroeconomic factors. All these for the purpose of enhancing the banks' profitability, maximizing the return on banks' assets and shareholders' values; which in return improving overall economic growth and achieve social welfare.

Conclusions

Introduction

This part contains the practical and theoretical results of the research, the recommendations, contributions, and limitations of the Research in addition to the suggested further studies.

It is worth mentioning that, this study aims to investigate the impact of risk management practice on the financial performance of Sudanese Islamic banks during the period from 2007 to 2018. The study applied panel data analysis for 120 observations from ten (10) Islamic banks in Sudan. The study results have been extracted from two models that used independent variables of return on assets ratio and return of equity ratio.

Summary of Practical Research's Results

1. The most significant types of risks that affect the financial performance of Islamic banks in Sudan include; liquidity, operational and market risks and the equity capitalization. The banks in Sudan need to manage and mitigate all these risks together in order to create add values to their business.
2. The study results indicate that the liquidity of Sudanese Islamic banks is mostly from current and short-term deposits. That is why Islamic banks in Sudan keep a significant portion of liquid assets to match the short-term deposits. Obviously, this conservative situation provides a low liquidity risk and some profit from investing in Sukuk securities.
3. The study results provide an evidence of the adverse relationship between credit risk and the financial performance of Sudanese Islamic banks when it measured by the ROA and ROE, however, credit risk has no impact on ROA. This implies that Islamic banks in Sudan are adequately manage the credit risk with prudential policies and procedures and sufficient collaterals.

4. There is a clear indicator from the research results that efficiency in managing the operating costs has an immediate effect to enhance the banks' profitability that measured by ROA and ROE. In such case, the banks' management in Sudan can enhance their financial performance by improving the use of information technology and cost optimization tools.
5. The market risk is shown to be positively significant to financial performance of Sudanese Islamic banks. The Islamic banks in Sudan are adjusting the prices changes in the market in their structure of the cost of services; in a way that the banks can increase their profitability. In anther word, the banks are transferring the market exposure into their customers.
6. The capital strength that measured by the ratio of equity to assets ratio, has a positive impact on profitability when it measured by ROA. This provides an evidence that the well-capitalised banks tend to reduce their financing costs and to enhance its financial performance.
7. The findings also reveal that the increase in bank's capitalization has a negative relationship with banks' profitability when it measures by ROE. This indicates that the sampled banks are heavily financing their activities from external and depositors' funds with probably low costs.
8. The Islamic banks' management in Sudan concentrate on investing in non-participatory modes of finance, and mainly on Murabaha; while investing in profit-loss-sharing (PLS) does not have significant size in these banks' investments' portfolios. This can create a concentration exposure on both credit and liquidity management.
9. The empirical cointegration tests confirm that there is a long run relationship between risk management variables and the financial performance measures of the sampled Sudanese Islamic banks. So, the policy makers and management of Islamic banks need to review these variables regularly and apply necessary actions.

Summary of Theoretical Research's Results

1. The types of risks that addressed by Basel (BCOS) accords have an impact on both Islamic and conventional banks. However, the differences between the two systems come from the application of Shariah and the characteristics of financing structure.
2. There is a rapid grow of the Islamic finance in the last decades, and after the latest financial crisis, the interest on the Islamic finance is shown not only in Islamic regions, but also in the western countries. This as a potential solution to remedy some problems in the conventual financial systems.
3. A remarkable improvement has been shown in the area of organizing the Islamic finance aspects by issuing different standards to unify the practice and establishing many international Islamic organizations (such as IFSB, AAOIFI, CIBAFI, etc.) to support, guide and strengthen the best Islamic financial practices. Also, the role of academic scholars in different Islamic finance areas support the spread and development of Islamic finance
4. Further steps have been taken for internationalization of Islamic finance system. This can be seen in the adoption of Basel accords by IFSB after adjusting Basel standards in order to match the Islamic rules that applicable in the Islamic financial institutions. This provides a useful guidance to Islamic banks in managing both the common types and unique types of risk.
5. The liquidity management centre plays a significant role to arrange and to issue *shariah* compliant financial instruments (Sukuk), which substitute the conventional bonds and other financial securities. The Islamic banks can benefit from this to manage their liquidity positions.

The Recommendations

The following recommendations can be suggested to the management of Sudanese banks, regulatory body, and decision makers in order to promote the soundness of banks' financial performance and managing the related risks.

1. The application of risk management in Sudanese Islamic banks has to be developed to enable catering the dynamic changes especially after the latest financial crunch, therefore, applications of Basel III and its subsequent liquidity standards for liquidity coverage ratio (LCR) and the net stable funding ratio (NSFR) are recommended to be in place at early as possible.
2. Sudanese Islamic banks are recommended to diversify their liquidity sources and the types of investments in a rationale way. This step can enhance the mitigation of the associated risks in order to positively reflected its impact into banks' profitability.
3. Sudanese Islamic banks need to establish programs in order to promote the depositors' awareness and trust to attract mid and long terms funds (such as IAHs). This can assist the banks to utilize the funds and match their duration with Mudarabah and Musharaka financing modes rather than concentration of Murabaha and other short-term financing. By this, the risks can be diversified and the financial performance can be improved.
4. The regulatory body (CBOS) is recommended to strictly activate a policy that directing Sudanese banks to increase their equity capital to an optimal level. This will support the banks during the stress times, and improve the stability of business in these banks. Additionally, the depositors' trust is probably be enhanced and the banks can promote their investment portfolios with long run projects.

5. The CBOS has to push the Sudanese banks to use the most advanced techniques in assessing and controlling the risks. Such techniques may include internal model approaches that proposed by Basel, stress testing, value at risk, scenario analysis, etc.
6. The banks policies and culture should consider the significant role of staff training and development, skills' capacity building, and hiring/positioning the right staff in the right role. Based on that, management of Sudanese banks are recommended to practically consider this aspect in order to assure that staff is delivering proper banking services, minimize the operational and inherent risks, and creating good image and performance to banks.
7. Now a days, the use of information technology becomes not only to advance the banks' operations, but also for supporting the decision-making process. The recommendation is that, Sudanese Islamic banks need to benefit from the advanced technology in risk management process, scenarios analysis, and reporting areas. This can expedite the monitoring and decision making toward the operations and risk management practice.
8. The culture of risk management has to be imbedded in all banking activities and staff. Both the CBOS and operating banks in Sudan need to establish and maintain such culture. Because the policies and rules are not enough to make the risk management practice effective unless the management and staff are committed to this role.

Contributions of the Research

Theoretical Contributions:

1. The study expects to contribute to advance the knowledge by providing broader views on risk management in the context of local banking industry, and to highlight the strategic value of risks as determinant of banks' financial performance.
2. The study expects to provide a significant contribution to Sudanese banking and Islamic banks literature by empirically assessing the impact of risk management on the banks' financial performance.

Practical contributions:

1. The study provides an empirical investigation of the impact of various types of risks – instead of a single type – on the financial performance of Sudanese Islamic Banks. This, will create a useful base for banks' management and policy makers to identify and manage the risks, and to take appropriate actions toward mitigating the components of these risks.
2. The study is expected to be the first in investigating the impact of market risk using value at risk method comparing with other peer studies in the context of Sudan. This can provide instrumental guide in helping the Sudanese Islamic banks to improve their risk measurement tools.
3. The study is expected to provide insights and suitable ground to future researches/ researchers in applying econometrics' models and empirical methods in assessing the relationship between risk management and financial performance in Sudan context. This is because the results of the existing literature of risk management toward Sudanese banks seems to be inconclusive due to the limitations of qualitative research's methods.

Limitations of the Research

Following are the main limitations of the study:

1. The availability of, and access to secondary data of operating banks in Sudan during the period of study. These create a real challenge and limitation of this research. Most of the Sudanese Islamic banks neither published – or keep for long period – their financial statements in accessible websites, nor provide an access to such.
2. This research measures its variables using on the basis of historical data rather than market values. This is because Khartoum stock exchange market (KSE) does not provide the market values of Sudanese Islamic banks on a systematic basis and on publicity. Also, not all banks are listed in KSE.
3. The research is limited to the sampled Sudanese Islamic banks that have an access to their published audited financial statement in websites, from the year 2007 to 2018. Furthermore, the missing banks' data across the dataset limited the sample to 120 observation.
4. The study measured the risks using five variables as these mentioned in the capital adequacy requirements' structure. Other types of risks (such as *Shariah* non-compliance risk, rate of return risk, equity investment risk) are not included as explanatory variables.

Potential Future Researches

The rapidly growing and dynamic changes within the financial industries provide a motivation for further researches in various areas. As this study concentrates on risk management and financial performance in Islamic banking, the suggestions for further researches to tackle these aspects is an ongoing matter. Therefore, further researches in the risk management and banks' financial performance can cover a longer times series, larger sample

size, and multiple external and bank's internal factors to enrich the academic and professional practice.

In addition to that, this study can be extended to include other cross countries Islamic banks, more measures of risk management practice such as Basel pillars two and three, regulatory controls and microeconomic factors.

Also, for banks' performance measures, further research may focus on banks' efficiency and quality of management as determinant variables.

Furthermore, the dataset that can be applied for the future researches may cover monthly or quarterly dataset during long-span period of time, and it can be gathered from primary as well as secondary sources (mixed research approach).

Finally, based on this research findings and recommendations; the researcher suggests the following future studies:

1. The role of equity capital and capital adequacy requirement to improve risk management and performance of Islamic banks.
2. Risk management and corporate governance in Islamic financial institutions, and their impact to maximize the value of these institutions.
3. The impact of macroeconomic factors on the financial performance of Islamic banks.
4. The strategies of risk mitigations in Islamic financial institutions and how they can improve the return on investment.
5. Risk management practices in banks: A comparative study between Islamic and conventional banks.
6. The structure of Islamic financing, risk management, and banks' performance of the Sudanese banks: A consideration on private, Gov, and foreign branch's banks.

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Appendixes

Appendix No (1)

Specified Risk Weights for Islamic Bank's Assets as per CBOS

الاوزان الترجيحية للتمويل بصيغتي المرابحة والاجارة باستخدام الاوزان التفضيلية

اسم المصرف :

التاريخ :

(المبالغ بالاف الجنيهات)

الرقم	صيغة التمويل	أوزان المخاطر (1)	حجم المرابحة و الإجارة (2)	الأصول الخطرة المرجحة (1*2)
1	مرابحة و اجارة مضمونة بعقار سكني	35٪		
2	مرابحة و اجارة مضمونة بعقار تجاري	100٪		
3	مرابحة و اجارة مستحقة على الافراد او الاعمال الصغيرة *	75٪		
	الاجمالي			

الاوزان الترجيحية للتمويل بصيغتي المشاركة والمضاربة (تزيد اجالها عن ثلاثة اشهر)

اسم المصرف :

التاريخ :

(المبالغ بالاف الجنيهات)

الصيغة	التصنيف (1)	أوزان المخاطر (2)	حجم التمويل* (3)	حجم الضمانات (4)	حجم الخصم من قيمة الضمانات (5)	قيمة الضمانات بعد التخفيض بنسب الخصم (6)	صافى حجم التعرض للمخاطر (7) (6-3)	الاصول الخطرة المرجحة (8) (2*7)
مضاربة	الطريقة البسيطة	400٪						
مشاركات	طريقة التصنيف	90٪						
متوسطة	الرقابى	100٪						
وطويلة الاجل		135٪						
		270٪						
الاجمالي								

*حجم التمويل لا يتضمن الديون المتعثرة

* يمكن استخدام وزن مخاطر 300٪ للمضاربات بعد موافقة بنك السودان المركزي

* لا يتم إستخدام طريقة التصنيف الرقابي إلا بعد موافقة بنك السودان المركزي

الاوزان الترجيحية للتمويل طويل الاجل (ماعدا المشاركات والمضاربات) + المرابحات والاجارة وتمويل الافراد طويل الاجل

الذين لا تنطبق عليهم الشروط التفضيلية

اسم المصرف :

التاريخ :

(المبالغ بآلاف الجنيهات)

العميل	تصنيف العميل (1)	أوزان المخاطر (2)	حجم التمويل* (3)	حجم الضمانات (4)	حجم الخصم من قيمة الضمانات (5)	قيمة الضمانات بعد التخفيض بنسب الخصم (6)	صافى حجم التعرض للمخاطر (7) (6-3)	الاصول الخطرة المرجحة (8) (2*7)
الهيئات الحكومية والبنوك المركزية	AAA to AA	٪0						
	A+ to A-	٪20						
	BBB to BBB-	٪50						
	BB to B-	٪100						
	Below B-	٪150						
	Unrated	٪100						
	Unrated	٪100						
الشركات	AAA to AA	٪0						
	A+ to A-	٪20						
	BBB to BBB-	٪50						
	BB to B-	٪100						
	Below B-	٪150						
	Unrated	٪100						
الافراد	Unrated	٪100						
الاجمالي								
مؤسسات القطاع العام الحكومية غير المركزية	AAA to AA	٪0						
	A+ to A-	٪20						
	BBB to BBB-	٪50						
	BB to B-	٪100						
	Below B-	٪150						
	Unrated	٪100						
بنوك تنمية متعددة الاطراف	AAA to AA	٪20						
	A+ to A-	٪50						
	BBB to BBB-	٪50						
	BB to B-	٪100						
	Below B-	٪150						
	Unrated	٪100						
مؤسسات الخدمات المالية الاسلامية والمصارف وشركات الاوراق المالية	AAA to AA	٪20						
	A+ to A-	٪50						
	BBB to BBB-	٪50						
	BB to B-	٪100						
	Below B-	٪150						

الاوزان الترجيحية للتمويل طويل الاجل (ماعدا المشاركات والمضاربات) + المرابحات والاجارة وتمويل الافراد طويل الاجل

الذين لا تنطبق عليهم الشروط التفضيلية

اسم المصرف :

التاريخ :

(المبالغ بآلاف الجنيهات)

العميل	تصنيف العميل (1)	أوزان المخاطر (2)	حجم التمويل* (3)	حجم الضمانات (4)	حجم الخصم من قيمة الضمانات (5)	قيمة الضمانات بعد التخفيض بنسب الخصم (6)	صافى حجم التعرض للمخاطر (7) (6-3)	الاصول الخطرة المرجحة (8) (2*7)
الهيئات الحكومية والبنوك المركزية	AAA to AA	٪0						
	A+ to A-	٪20						
	BBB to BBB-	٪50						
	BB to B-	٪100						
	Below B-	٪150						
	Unrated	٪100						

الاوزان الترجيحية للذمم المدينة المتأخر سدادها (الديون المتعثرة)

اسم المصرف :

التاريخ :

(المبالغ بالاف الجنيهات)

البند	حجم الديون المتعثرة (1)	حجم المخصص (2)	نسبة المخصص (3)	اوزان المخاطر (4)	صافى التعثر (5) (2-1)	الاصول الخطرة المرجحة (6) (4*5)
تمويل متعثر وغير مضمون			المخصص اكبر من 50٪ من حجم التعثر	٪50		
			المخصص اكبر من 20٪ من حجم التعثر	٪100		
			المخصص اقل من 20٪ من حجم التعثر	٪150		
تمويل متعثر بضمانات عقارية سكنية			المخصص اكبر من 20٪	٪50		
			المخصص اقل من 20٪	٪100		
تمويل متعثر مضمون بضمانات اخري			المخصص اكبر من او يساوي 15٪	٪100		
			المخصص أقل من 15٪	٪150		

الاوزان الترجيحية للاصول الاخري (غير تمويلية)

اسم المصرف :

التاريخ :

(المبالغ بالاف الجنيهات)

البند	التصنيف	اوزان المخاطر (1)	الرصيد كما تعكسه الميزانية (2)	الاصول الخطرة المرجحة (3) (2*1)
حساب المراسلين	AAA to AA	٪20		
	A+ to A-	٪50		
	BBB to BBB-	٪100		
	BB to B-	٪150		
	Unrated	٪100		
نقدية وحسابات لدي بنوك محلية	--	٪0		
سلفيات العاملين		٪0		
اصول اخري	--	٪200		
الاصول الثابتة	--	٪100		

مع إلزام البنوك بالحصول على تصنيف المراسلين

الاوزان الترجيحية للبنود خارج الميزانية

اسم المصرف :

التاريخ : (المبالغ بالاف الجنيهات)

البند	أوزان المخاطر (1)	الرصيد كما تعكسه الميزانية (2)	الهامش (3)	صافى قيمة الهامش* (4)	صافى حجم التعرض (5) (4-2)	الأصول الخطرة المرجحة (6) (1)*(5)
التزامات قابلة للإلغاء	٪0					
خطابات ضمان مضمونة	٪20					
التزامات فترة استحقاقها الاصلية اقل من سنة	٪20					
التزامات فترة استحقاقها الاصلية سنة	٪50					
أخري	٪100					
الإجمالي						

* صافى قيمة الهامش تساوي 100٪ للهامش بالنقد المحلي و 92٪ من الهامش بالنقد الاجنبي

Appendix No (2)

Variance Inflation Factors
Date: 08/06/20 Time: 16:21
Sample: 1 120
Included observations: 120

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
FIDP	4.37E-05	31.84274	1.582069
LLP	0.004836	12.69634	1.330550
OCOI	1.60E-05	10.80598	1.721836
VAR	0.009776	1.909563	1.066978
EQTA	0.000116	6.089677	1.972236
C	0.356113	42.27237	NA

Appendix No (3)

Heteroskedasticity Tests: Model 1. (ROA)

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	21.13339	Prob. F(5,114)	0.0000
Obs*R-squared	57.72391	Prob. Chi-Square(5)	0.0000
Scaled explained SS	101.1343	Prob. Chi-Square(5)	0.0000

Heteroskedasticity Test: White

F-statistic	9.556687	Prob. F(20,99)	0.0000
Obs*R-squared	79.05337	Prob. Chi-Square(20)	0.0000
Scaled explained SS	138.5042	Prob. Chi-Square(20)	0.0000

Appendix No (4)

Heteroskedasticity Tests: Model 2. (ROE)

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.932168	Prob. F(5,114)	0.4630
Obs*R-squared	4.713443	Prob. Chi-Square(5)	0.4518
Scaled explained SS	22.08467	Prob. Chi-Square(5)	0.0005

Heteroskedasticity Test: White

F-statistic	0.831673	Prob. F(20,99)	0.6704
Obs*R-squared	17.26158	Prob. Chi-Square(20)	0.6359
Scaled explained SS	80.87852	Prob. Chi-Square(20)	0.0000

Appendix No (5)

Serial Correlation: Model 1. (ROA)

Model 1. (ROA)

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	25.22512	Prob. F(2,112)	0.0000
Obs*R-squared	37.26697	Prob. Chi-Square(2)	0.0000

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 08/06/20 Time: 16:20
Sample: 1 120

Included observations: 120
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FIDP	-0.000836	0.005550	-0.150687	0.8805
LLP	0.072111	0.059141	1.219301	0.2253
OCOI	0.001842	0.003366	0.547307	0.5853
VAR	0.045997	0.083086	0.553606	0.5810
EQTA	-0.000300	0.009006	-0.033287	0.9735
C	-0.409218	0.504430	-0.811249	0.4189
RESID(-1)	0.427032	0.092258	4.628672	0.0000
RESID(-2)	0.239115	0.092678	2.580066	0.0112

R-squared	0.310558	Mean dependent var	3.74E-16
Adjusted R-squared	0.267468	S.D. dependent var	0.984090
S.E. of regression	0.842264	Akaike info criterion	2.558894
Sum squared resid	79.45380	Schwarz criterion	2.744727
Log likelihood	-145.5337	Hannan-Quinn criter.	2.634362
F-statistic	7.207177	Durbin-Watson stat	1.956664
Prob(F-statistic)	0.000000		

Appendix No (6)

Serial Correlation: Model 2. (ROE)

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	9.814633	Prob. F(2,112)	0.0001
Obs*R-squared	17.89505	Prob. Chi-Square(2)	0.0001

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 08/06/20 Time: 16:24
Sample: 1 120
Included observations: 120
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FIDP	0.024753	0.048749	0.507759	0.6126
LLP	0.325934	0.516271	0.631325	0.5291
OCOI	0.014293	0.029833	0.479109	0.6328
VAR	-0.041358	0.726043	-0.056964	0.9547
EQTA	-0.058881	0.080661	-0.729973	0.4669
C	-3.068167	4.462891	-0.687484	0.4932
RESID(-1)	0.428713	0.110224	3.889475	0.0002
RESID(-2)	0.112033	0.111737	1.002643	0.3182

R-squared	0.149125	Mean dependent var	-7.52E-15
Adjusted R-squared	0.095946	S.D. dependent var	7.736372
S.E. of regression	7.355879	Akaike info criterion	6.893217
Sum squared resid	6060.203	Schwarz criterion	7.079050
Log likelihood	-405.5930	Hannan-Quinn criter.	6.968685
F-statistic	2.804181	Durbin-Watson stat	1.766053
Prob(F-statistic)	0.009972		

Appendix No (7)

Pure Models: Model 1 (ROA)

Pooled OLS

Dependent Variable: ROA
Method: Panel Least Squares
Date: 08/05/20 Time: 21:43
Sample: 2007 2018
Periods included: 12
Cross-sections included: 10
Total panel (balanced) observations: 120

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FIDP	-0.003428	0.006609	-0.518738	0.6049
LLP	-0.141175	0.069544	-2.030002	0.0447
OCOI	-0.041847	0.004003	-10.45277	0.0000
VAR	0.206934	0.098876	2.092869	0.0386
EQTA	0.071305	0.010750	6.632915	0.0000
C	4.873006	0.596752	8.165883	0.0000

R-squared	0.789546	Mean dependent var	2.503000
Adjusted R-squared	0.780316	S.D. dependent var	2.145146
S.E. of regression	1.005440	Akaike info criterion	2.897434
Sum squared resid	115.2437	Schwarz criterion	3.036809
Log likelihood	-167.8460	Hannan-Quinn criter.	2.954035
F-statistic	85.53746	Durbin-Watson stat	0.862022
Prob(F-statistic)	0.000000		

Fixed Effects
Dependent Variable: ROA
Method: Panel Least Squares
Date: 08/05/20 Time: 21:45
Sample: 2007 2018
Periods included: 12
Cross-sections included: 10
Total panel (balanced) observations: 120

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FIDP	-0.029645	0.007487	-3.959532	0.0001
LLP	-0.055397	0.060144	-0.921066	0.3591
OCOI	-0.038366	0.003556	-10.78955	0.0000
VAR	0.451838	0.108009	4.183355	0.0001
EQTA	0.041604	0.014007	2.970136	0.0037
C	6.559582	0.648291	10.11827	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.896259	Mean dependent var	2.503000

Adjusted R-squared	0.882427	S.D. dependent var	2.145146
S.E. of regression	0.735547	Akaike info criterion	2.340065
Sum squared resid	56.80816	Schwarz criterion	2.688502
Log likelihood	-125.4039	Hannan-Quinn criter.	2.481567
F-statistic	64.79552	Durbin-Watson stat	1.605151
Prob(F-statistic)	0.000000		

Random Effects

Dependent Variable: ROA

Method: Panel EGLS (Cross-section random effects)

Date: 08/05/20 Time: 21:46

Sample: 2007 2018

Periods included: 12

Cross-sections included: 10

Total panel (balanced) observations: 120

Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FIDP	-0.022989	0.007011	-3.279048	0.0014
LLP	-0.056652	0.058957	-0.960906	0.3386
OCOI	-0.039736	0.003444	-11.53764	0.0000
VAR	0.425522	0.103320	4.118476	0.0001
EQTA	0.053946	0.012633	4.270131	0.0000
C	5.959941	0.651013	9.154878	0.0000

Effects Specification

	S.D.	Rho
Cross-section random	0.819234	0.5537
Idiosyncratic random	0.735547	0.4463

Weighted Statistics

R-squared	0.679883	Mean dependent var	0.627992
Adjusted R-squared	0.665843	S.D. dependent var	1.298420
S.E. of regression	0.750569	Sum squared resid	64.22231
F-statistic	48.42399	Durbin-Watson stat	1.385412
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.712135	Mean dependent var	2.503000
Sum squared resid	157.6339	Durbin-Watson stat	0.564436

Appendix No (8)

Chow Test: Model 1. (ROA)

Redundant Fixed Effects Tests

Equation: EQ01

Test cross-section and period fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	10.505585	(9,94)	0.0000
Cross-section Chi-square	83.528379	9	0.0000
Period F	0.421941	(11,94)	0.9429
Period Chi-square	5.783490	11	0.8874
Cross-Section/Period F	5.305420	(20,94)	0.0000
Cross-Section/Period Chi-square	90.667736	20	0.0000

Appendix No (9)

Wald Test – Dummy Cross Sections Variables: Model 1. (ROA)

Wald Test: Cross sections

Equation: Untitled

Test Statistic	Value	df	Probability
F-statistic	12.00087	(9, 105)	0.0000
Chi-square	108.0079	9	0.0000

Null Hypothesis: C(7)=C(8)=C(9)=C(10)=C(11)=C(12)=C(13)=C(14)=C(15)=0

Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(7)	-0.220321	0.435970
C(8)	0.249928	0.501119
C(9)	-0.157609	0.378593
C(10)	3.345714	0.606644
C(11)	0.213680	0.317643
C(12)	-0.430193	0.322946
C(13)	0.525573	0.370239
C(14)	1.367067	0.352036
C(15)	1.517699	0.396490

Restrictions are linear in coefficients.

Null hypothesis: the dummy variables is equal to zero.

Appendix No (10)

Wald Test – Dummy Time Variable: Model 1. (ROA)

Dependent Variable: ROA
Method: Panel Least Squares
Date: 08/14/20 Time: 13:21
Sample: 2007 2018
Periods included: 12
Cross-sections included: 10
Total panel (balanced) observations: 120

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.389255	0.724150	6.061253	0.0000
FIDP	-0.002481	0.007080	-0.350441	0.7267
LLP	-0.170806	0.073648	-2.319217	0.0224
OCOI	-0.040386	0.004226	-9.556815	0.0000
VAR	0.215901	0.101613	2.124733	0.0360
EQTA	0.074784	0.011439	6.537578	0.0000
DT2	0.206062	0.460906	0.447080	0.6558
DT3	-0.085674	0.462347	-0.185303	0.8534
DT4	0.577737	0.467156	1.236711	0.2190
DT5	0.449844	0.467622	0.961983	0.3383
DT6	0.521064	0.466870	1.116079	0.2670
DT7	0.168602	0.466409	0.361489	0.7185
DT8	0.303047	0.467615	0.648069	0.5184
DT9	0.641413	0.463308	1.384422	0.1692
DT10	0.511381	0.465841	1.097760	0.2749
DT11	0.513537	0.466918	1.099843	0.2740
DT12	0.685418	0.477234	1.436230	0.1540

R-squared	0.801702	Mean dependent var	2.503000
Adjusted R-squared	0.770899	S.D. dependent var	2.145146
S.E. of regression	1.026764	Akaike info criterion	3.021273
Sum squared resid	108.5873	Schwarz criterion	3.416167
Log likelihood	-164.2764	Hannan-Quinn criter.	3.181641
F-statistic	26.02629	Durbin-Watson stat	0.831782
Prob(F-statistic)	0.000000		

Dummy time variable = 0

Wald Test:
Equation: EQ01

Test Statistic	Value	df	Probability
F-statistic	0.573992	(11, 103)	0.8460
Chi-square	6.313907	11	0.8516

Null Hypothesis: C(7)=C(8)=C(9)=C(10)=C(11)=C(12)=C(13)=C(14)=C(15)=C(16)=C(17)=0
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(7)	0.206062	0.460906
C(8)	-0.085674	0.462347
C(9)	0.577737	0.467156
C(10)	0.449844	0.467622
C(11)	0.521064	0.466870
C(12)	0.168602	0.466409
C(13)	0.303047	0.467615
C(14)	0.641413	0.463308
C(15)	0.511381	0.465841
C(16)	0.513537	0.466918

C(17)	0.685418	0.477234

Restrictions are linear in coefficients.

Appendix No (11)

Hausman Test: Model 1. (ROA)

Correlated Random Effects - Hausman Test
Equation: EQ01
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	9.703771	5	0.0481

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
FIDP	-0.029645	-0.022989	0.000007	0.0113
LLP	-0.055397	-0.056652	0.000141	0.9159
OCOI	-0.038366	-0.039736	0.000001	0.1212
VAR	0.451838	0.425522	0.000991	0.4031
EQTA	0.041604	0.053946	0.000037	0.0413

Appendix No (12)

Appropriate Model: Fixed Effects Model. (ROA)

Dependent Variable: ROA
Method: Panel Least Squares
Date: 08/10/20 Time: 00:25
Sample: 2007 2018
Periods included: 12
Cross-sections included: 10
Total panel (balanced) observations: 120
Period SUR (PCSE) standard errors & covariance (no d.f. correction)
WARNING: estimated coefficient covariance matrix is of reduced rank

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FIDP	-0.029588	0.008680	-3.408740	0.0010
LLP	-0.067915	0.060471	-1.123103	0.2643
OCOI	-0.038730	0.003107	-12.46470	0.0000
VAR	0.465983	0.122311	3.809823	0.0002
EQTA	0.044535	0.020764	2.144840	0.0345
C	6.573219	0.821084	8.005537	0.0000

Effects Specification

Cross-section fixed (dummy variables)
Period fixed (dummy variables)

R-squared	0.901140	Mean dependent var	2.503000
Adjusted R-squared	0.874848	S.D. dependent var	2.145146
S.E. of regression	0.758885	Akaike info criterion	2.475203

Sum squared resid	54.13518	Schwarz criterion	3.079159
Log likelihood	-122.5122	Hannan-Quinn criter.	2.720472
F-statistic	34.27375	Durbin-Watson stat	1.563234
Prob(F-statistic)	0.000000		

Appendix No (13)

Pure Panel Models: Model 2. (ROE)

OLS:

Dependent Variable: ROE
Method: Panel Least Squares
Date: 08/05/20 Time: 22:28
Sample: 2007 2018
Periods included: 12
Cross-sections included: 10
Total panel (balanced) observations: 120

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FIDP	-0.023679	0.051954	-0.455774	0.6494
LLP	-1.177819	0.546719	-2.154340	0.0333
OCOI	-0.399175	0.031473	-12.68315	0.0000
VAR	2.804305	0.777307	3.607720	0.0005
EQTA	-0.510556	0.084512	-6.041225	0.0000
C	57.23782	4.691331	12.20076	0.0000

R-squared	0.708803	Mean dependent var	16.14975
Adjusted R-squared	0.696031	S.D. dependent var	14.33652
S.E. of regression	7.904208	Akaike info criterion	7.021374
Sum squared resid	7122.322	Schwarz criterion	7.160749
Log likelihood	-415.2825	Hannan-Quinn criter.	7.077975
F-statistic	55.49750	Durbin-Watson stat	1.016580
Prob(F-statistic)	0.000000		

Fixed Effects:

Dependent Variable: ROE
Method: Panel Least Squares
Date: 08/05/20 Time: 22:29
Sample: 2007 2018
Periods included: 12
Cross-sections included: 10
Total panel (balanced) observations: 120

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FIDP	-0.174860	0.073600	-2.375801	0.0193
LLP	-0.440930	0.591243	-0.745767	0.4575
OCOI	-0.365456	0.034955	-10.45500	0.0000
VAR	1.593468	1.061773	1.500762	0.1364
EQTA	-0.385469	0.137698	-2.799379	0.0061
C	62.04378	6.372984	9.735435	0.0000

Effects Specification			
Cross-section fixed (dummy variables)			
R-squared	0.775549	Mean dependent var	16.14975
Adjusted R-squared	0.745622	S.D. dependent var	14.33652
S.E. of regression	7.230756	Akaike info criterion	6.911033
Sum squared resid	5489.803	Schwarz criterion	7.259469
Log likelihood	-399.6620	Hannan-Quinn criter.	7.052535
F-statistic	25.91482	Durbin-Watson stat	1.150302
Prob(F-statistic)	0.000000		

Random Effects:

Dependent Variable: ROE

Method: Panel EGLS (Cross-section random effects)

Date: 08/05/20 Time: 22:29

Sample: 2007 2018

Periods included: 12

Cross-sections included: 10

Total panel (balanced) observations: 120

Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FIDP	-0.091086	0.059999	-1.518125	0.1318
LLP	-0.711463	0.551594	-1.289831	0.1997
OCOI	-0.387248	0.031774	-12.18747	0.0000
VAR	2.228140	0.898807	2.478996	0.0146
EQTA	-0.433976	0.101819	-4.262231	0.0000
C	58.65261	5.218431	11.23951	0.0000

Effects Specification		
	S.D.	Rho
Cross-section random	3.314848	0.1737
Idiosyncratic random	7.230756	0.8263

Weighted Statistics			
R-squared	0.640072	Mean dependent var	8.605430
Adjusted R-squared	0.624286	S.D. dependent var	11.94734
S.E. of regression	7.323182	Sum squared resid	6113.705
F-statistic	40.54608	Durbin-Watson stat	1.093764
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.697680	Mean dependent var	16.14975
Sum squared resid	7394.378	Durbin-Watson stat	0.904329

Appendix No (14)

Chow Test: Model 2. (ROE)

Redundant Fixed Effects Tests
Equation: EQ02
Test cross-section and period fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	4.503772	(9,94)	0.0001
Cross-section Chi-square	43.022617	9	0.0000
Period F	4.042231	(11,94)	0.0001
Period Chi-square	46.478342	11	0.0000
Cross-Section/Period F	4.282008	(20,94)	0.0000
Cross-Section/Period Chi-square	77.719313	20	0.0000

Appendix No (15)

Wald Test – Dummy Cross Sections Variables: Model 2. (ROE)

Wald Test: Cross Section

Equation: Untitled

Test Statistic	Value	df	Probability
F-statistic	3.469351	(9, 105)	0.0009
Chi-square	31.22416	9	0.0003

Null Hypothesis: C(7)=C(8)=C(9)=C(10)=C(11)=C(12)=C(
13)=C(14)=C(15)=0
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(7)	10.59845	4.285777
C(8)	0.318534	4.926225
C(9)	-0.391655	3.721740
C(10)	7.423868	5.963576
C(11)	-1.000869	3.122567
C(12)	-3.874375	3.174704
C(13)	2.456712	3.639616
C(14)	3.097775	3.460666
C(15)	11.40805	3.897673

Restrictions are linear in coefficients.

Appendix No (16)

Wald Test – Dummy Time Variable: Model 2. (ROE)

Dependent Variable: ROE
Method: Panel Least Squares
Date: 08/28/20 Time: 19:24
Sample: 2007 2018
Periods included: 12
Cross-sections included: 10
Total panel (balanced) observations: 120

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	58.51963	5.075326	11.53022	0.0000
FIDP	-0.041801	0.049619	-0.842440	0.4015
LLP	-1.711235	0.516176	-3.315216	0.0013
OCOI	-0.385959	0.029618	-13.03124	0.0000
VAR	3.021040	0.712173	4.242002	0.0000
EQTA	-0.447588	0.080173	-5.582808	0.0000
DT2	-0.365154	3.230336	-0.113039	0.9102
DT3	-1.311890	3.240437	-0.404850	0.6864
DT4	0.276146	3.274145	0.084341	0.9329
DT5	-0.996099	3.277406	-0.303929	0.7618
DT6	0.067955	3.272137	0.020768	0.9835
DT7	-4.775405	3.268909	-1.460856	0.1471
DT8	-2.477774	3.277359	-0.756028	0.4514
DT9	-1.006507	3.247171	-0.309964	0.7572
DT10	-1.499636	3.264923	-0.459318	0.6470
DT11	3.771709	3.272474	1.152556	0.2518
DT12	11.76323	3.344779	3.516893	0.0007

R-squared	0.781920	Mean dependent var	16.14975
Adjusted R-squared	0.748044	S.D. dependent var	14.33652
S.E. of regression	7.196253	Akaike info criterion	6.915569
Sum squared resid	5333.964	Schwarz criterion	7.310463
Log likelihood	-397.9341	Hannan-Quinn criter.	7.075937
F-statistic	23.08151	Durbin-Watson stat	1.125844
Prob(F-statistic)	0.000000		

Dummy Time Variable = 0

Wald Test:
Equation: EQ02

Test Statistic	Value	df	Probability
F-statistic	3.139417	(11, 103)	0.0011
Chi-square	34.53358	11	0.0003

Null Hypothesis: C(7)=C(8)=C(9)=C(10)=C(11)=C(12)=C(13)=C(14)=C(15)=C(16)=C(17)=0

Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(7)	-0.365154	3.230336
C(8)	-1.311890	3.240437
C(9)	0.276146	3.274145
C(10)	-0.996099	3.277406
C(11)	0.067955	3.272137
C(12)	-4.775405	3.268909
C(13)	-2.477774	3.277359
C(14)	-1.006507	3.247171
C(15)	-1.499636	3.264923
C(16)	3.771709	3.272474
C(17)	11.76323	3.344779

Restrictions are linear in coefficients.

Appendix No (17)

Hausman Test: Model 2. (ROE)

Correlated Random Effects - Hausman Test
Equation: EQ02
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	7.932973	5	0.1600

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
FIDP	-0.174860	-0.091086	0.001817	0.0494
LLP	-0.440930	-0.711463	0.045312	0.2038
OCOI	-0.365456	-0.387248	0.000212	0.1347
VAR	1.593468	2.228140	0.319506	0.2615
EQTA	-0.385469	-0.433976	0.008594	0.6008

Appendix No (18)

Appropriate Model: Random Effects Model. (ROE)

Dependent Variable: ROE
Method: Panel EGLS (Two-way random effects)
Date: 08/10/20 Time: 00:19
Sample: 2007 2018
Periods included: 12
Cross-sections included: 10
Total panel (balanced) observations: 120
Swamy and Arora estimator of component variances
Cross-section SUR (PCSE) standard errors & covariance (no d.f. correction)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FIDP	-0.119424	0.060082	-1.987666	0.0492
LLP	-1.045651	0.498691	-2.096791	0.0382

OCOI	-0.376189	0.037840	-9.941493	0.0000
VAR	2.211689	0.746298	2.963545	0.0037
EQTA	-0.339519	0.101689	-3.338783	0.0011
C	59.91799	4.473067	13.39528	0.0000

Effects Specification

	S.D.	Rho
Cross-section random	3.470047	0.1952
Period random	3.161545	0.1620
Idiosyncratic random	6.296643	0.6428

Weighted Statistics

R-squared	0.673928	Mean dependent var	6.033124
Adjusted R-squared	0.659627	S.D. dependent var	11.06972
S.E. of regression	6.458243	Sum squared resid	4754.815
F-statistic	47.12326	Durbin-Watson stat	1.216500
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.691610	Mean dependent var	16.14975
Sum squared resid	7542.839	Durbin-Watson stat	0.883368

Appendix No (19)

Calculated Data for the Research Variables

ID	BANK	YEAR	ROA	ROE	FIDP	LLP	OCOI	VAR	EQTA
1	SHB	2007	0.38	3.33	68.95	3.57	97.21	0.19	11.26
1	SHB	2008	0.51	4.76	73.24	4.54	93.32	0.21	12.34
1	SHB	2009	0.62	3.72	72.30	5.99	95.48	0.17	14.60
1	SHB	2010	1.10	11.63	50.24	6.78	79.30	0.22	14.84
1	SHB	2011	1.19	5.14	38.19	7.04	91.77	0.03	14.40
1	SHB	2012	0.42	0.67	44.36	4.55	100.37	0.14	12.70
1	SHB	2013	0.89	15.44	64.92	3.45	81.52	0.26	10.74
1	SHB	2014	2.27	24.00	72.86	3.32	67.27	0.33	11.41
1	SHB	2015	2.17	16.45	56.71	4.89	86.67	0.27	10.46
1	SHB	2016	1.67	13.97	54.92	5.23	75.81	0.33	11.12
1	SHB	2017	1.60	15.48	57.02	3.28	80.43	0.26	10.97
1	SHB	2018	1.64	15.48	55.98	6.28	81.47	0.32	10.54
2	FIB	2007	3.33	32.35	61.26	3.49	58.98	1.63	10.30
2	FIB	2008	3.12	32.86	59.85	4.43	62.64	1.77	9.58
2	FIB	2009	2.79	37.02	58.76	4.56	56.35	1.95	8.36
2	FIB	2010	3.06	42.82	66.37	2.09	51.44	2.33	7.96
2	FIB	2011	3.95	45.37	71.04	2.82	43.32	2.59	8.93
2	FIB	2012	3.90	38.98	72.25	3.21	49.33	3.88	9.19
2	FIB	2013	2.93	30.04	72.81	4.67	59.97	5.24	8.47
2	FIB	2014	2.34	26.94	68.35	6.01	64.73	4.23	8.21
2	FIB	2015	1.98	26.76	68.82	5.67	71.45	3.53	7.37

2	FIB	2016	1.63	23.84	73.79	4.90	69.01	2.47	6.42
2	FIB	2017	1.76	39.70	78.99	3.76	54.65	0.23	5.65
2	FIB	2018	2.42	54.78	68.41	4.38	50.46	2.28	5.12
3	UCB	2007	3.6	5.40	87.67	2.59	38.85	1.09	61.10
3	UCB	2008	3.94	8.10	104.69	4.20	32.88	1.11	57.07
3	UCB	2009	3.49	7.29	90.87	5.70	51.92	1.17	44.79
3	UCB	2010	3.16	10.63	79.11	7.28	46.73	1.48	36.95
3	UCB	2011	3.73	11.81	82.12	6.21	37.82	1.27	37.75
3	UCB	2012	4.46	20.18	79.31	4.05	35.27	0.42	35.75
3	UCB	2013	4.35	14.42	80.74	2.38	34.95	0.84	29.13
3	UCB	2014	3.52	15.05	84.85	4.45	34.45	1.35	23.93
3	UCB	2015	3.05	11.31	82.05	3.07	50.26	1.08	23.14
3	UCB	2016	1.50	1.73	89.12	5.61	81.41	0.13	21.89
3	UCB	2017	0.80	5.65	96.60	7.00	75.21	0.11	21.42
3	UCB	2018	6.33	41.72	81.49	6.12	58.75	4.41	30.36
4	BOK	2007	1.5	6.88	94.22	4.17	99.60	1.93	21.21
4	BOK	2008	0.91	1.90	88.86	6.40	108.42	1.48	19.82
4	BOK	2009	0.60	5.75	83.97	6.39	67.45	0.29	16.53
4	BOK	2010	1.18	10.34	79.55	7.03	75.80	0.87	14.62
4	BOK	2011	1.35	8.32	77.44	5.15	78.86	1.74	14.46
4	BOK	2012	1.99	18.58	82.77	5.50	55.98	0.91	14.64
4	BOK	2013	2.32	13.61	88.04	4.47	36.72	0.75	14.34
4	BOK	2014	2.12	15.96	84.88	5.10	58.51	2.97	14.28
4	BOK	2015	2.70	21.31	71.25	5.01	54.19	1.67	14.54
4	BOK	2016	2.82	22.22	69.83	4.90	40.47	2.28	12.99
4	BOK	2017	2.48	25.28	69.83	5.54	54.45	1.76	10.51
4	BOK	2018	2.04	27.86	52.23	4.84	68.80	0.52	7.77
5	INVB	2007	6.06	21.15	118.32	3.26	30.58	0.58	49.04
5	INVB	2008	8.45	15.82	121.20	2.60	33.25	1.13	45.18
5	INVB	2009	4.10	16.26	110.64	3.56	34.42	1.56	33.25
5	INVB	2010	7.72	19.04	92.47	5.09	32.58	1.23	32.70
5	INVB	2011	7.58	19.44	87.87	4.35	31.39	1.15	40.11
5	INVB	2012	7.43	18.75	95.62	2.91	34.59	1.01	39.66
5	INVB	2013	6.49	17.33	102.20	3.57	38.85	0.88	41.24
5	INVB	2014	6.25	11.81	91.39	4.21	44.93	0.64	44.86
5	INVB	2015	7.99	14.33	97.53	5.90	45.38	0.59	47.67
5	INVB	2016	7.29	22.51	114.32	6.40	47.26	0.32	44.38
5	INVB	2017	5.18	12.93	120.86	4.98	52.97	0.42	41.61
5	INVB	2018	3.34	16.18	100.68	6.75	48.88	0.26	36.38
6	SSB	2007	1.91	9.50	61.79	5.98	83.27	0.04	7.78
6	SSB	2008	0.49	2.31	74.08	2.67	83.10	0.06	7.89
6	SSB	2009	0.99	11.40	82.26	2.41	82.40	0.14	7.40
6	SSB	2010	1.27	10.05	69.89	3.07	84.50	0.11	9.31
6	SSB	2011	1.12	12.86	57.32	3.79	89.30	0.17	11.18
6	SSB	2012	0.93	11.63	52.84	5.27	90.02	0.25	9.05

6	SSB	2013	1.02	12.24	53.02	1.65	83.67	0.22	7.79
6	SSB	2014	1.37	10.51	54.35	3.02	83.29	0.21	9.00
6	SSB	2015	2.18	12.20	50.73	2.27	82.38	0.24	11.84
6	SSB	2016	2.62	28.43	40.70	2.19	69.73	0.03	11.55
6	SSB	2017	2.24	21.05	46.95	2.88	65.96	0.06	10.80
6	SSB	2018	2.21	15.63	79.27	4.03	69.56	0.09	10.62
7	EDB	2007	2.51	19.11	55.38	6.20	82.57	0.79	13.13
7	EDB	2008	1.98	17.20	48.57	6.01	79.99	0.92	12.73
7	EDB	2009	1.51	15.63	47.17	3.88	77.51	0.96	12.04
7	EDB	2010	0.98	10.90	51.57	4.05	91.45	0.69	11.23
7	EDB	2011	0.65	7.21	48.45	4.89	86.75	0.33	10.73
7	EDB	2012	0.53	6.15	56.23	6.59	90.63	0.21	9.51
7	EDB	2013	0.11	6.56	60.54	6.82	92.01	0.16	8.26
7	EDB	2014	-0.90	-3.52	62.82	7.40	115.58	0.16	8.85
7	EDB	2015	-1.47	-11.47	64.96	8.35	127.79	0.54	11.12
7	EDB	2016	-3.13	-46.03	70.65	7.58	149.86	0.74	9.80
7	EDB	2017	-7.02	-58.37	67.18	7.98	290.04	1.64	2.58
7	EDB	2018	0.48	7.69	51.24	6.05	108.88	1.23	-1.01
8	FCB	2007	1.78	13.66	83.67	4.77	75.60	0.92	13.67
8	FCB	2008	1.47	13.90	83.34	5.02	74.61	0.99	13.40
8	FCB	2009	1.10	11.75	84.17	2.81	76.51	0.97	11.26
8	FCB	2010	1.23	11.86	85.99	4.06	77.92	1.04	9.35
8	FCB	2011	1.25	13.76	80.29	5.30	74.65	0.64	9.58
8	FCB	2012	1.28	13.47	72.81	4.35	81.53	0.51	9.17
8	FCB	2013	1.96	10.66	84.36	2.94	74.88	0.37	10.87
8	FCB	2014	2.18	16.08	94.38	4.01	67.08	0.01	14.44
8	FCB	2015	1.96	11.98	92.87	3.66	68.70	0.46	15.47
8	FCB	2016	1.83	13.64	93.86	2.53	69.23	0.61	15.30
8	FCB	2017	1.98	14.79	86.03	4.38	68.95	0.55	12.98
8	FCB	2018	2.07	28.62	81.38	4.40	63.59	0.09	9.51
9	SEB	2007	1.76	10.75	72.22	3.89	68.37	0.55	16.35
9	SEB	2008	2.49	17.00	74.63	6.28	59.65	0.04	17.83
9	SEB	2009	2.91	8.06	77.06	6.18	83.10	0.32	20.22
9	SEB	2010	5.14	16.67	68.74	6.74	65.87	0.39	22.88
9	SEB	2011	6.56	30.41	55.37	2.30	29.82	1.02	22.44
9	SEB	2012	5.24	36.76	53.23	2.67	32.80	0.20	19.59
9	SEB	2013	4.12	18.07	64.76	3.12	56.33	0.79	19.19
9	SEB	2014	4.47	25.56	75.51	2.90	46.33	0.61	18.97
9	SEB	2015	4.18	25.81	84.39	3.01	42.20	0.63	17.39
9	SEB	2016	4.12	28.87	87.21	2.88	40.18	0.61	15.32
9	SEB	2017	4.23	26.86	83.57	3.01	36.58	0.52	14.80
9	SEB	2018	2.56	35.12	82.50	4.06	30.00	0.08	13.84

10	BRK	2007	0.76	5.25	97.94	3.88	88.62	0.29	14.41
10	BRK	2008	2.05	15.00	96.37	2.57	73.24	0.03	15.24
10	BRK	2009	1.94	10.69	93.48	3.46	87.91	0.28	15.92
10	BRK	2010	2.11	13.55	90.79	2.54	76.54	0.11	15.95
10	BRK	2011	1.69	14.26	87.79	1.89	78.09	0.09	15.23
10	BRK	2012	2.02	13.49	85.44	4.01	82.36	0.51	12.11
10	BRK	2013	2.57	25.77	93.57	2.76	57.75	0.32	10.18
10	BRK	2014	2.54	20.20	100.48	3.95	59.94	0.38	11.28
10	BRK	2015	2.75	20.65	87.25	2.78	66.83	0.08	12.43
10	BRK	2016	3.52	22.85	81.82	4.34	74.69	0.15	12.62
10	BRK	2017	4.28	40.49	88.30	2.75	55.84	0.52	11.39
10	BRK	2018	2.19	54.41	89.35	3.05	89.60	0.32	9.18

Appendix No (20)

List of Sampled Sudanese Islamic Banks

No	Banks Name	No	Bank Name
1	Al Shamal Bank (Al Balad Bank)	6	Sudanese Saudi Bank
2	Faisal Islamic Bank	7	Export Development Bank
3	United Capital Bank	8	Farmers' Commercial Bank
4	Bank of Khartoum	9	Sudanese Egyptian Bank
5	Financial Investment Bank	10	Al Baraka Bank