A comparison of Market Risk Management Practices of selected Islamic banks in the UAE

مقارنة ممارسات إدارة المخاطر السوقية لبعض المصارف الإسلامية المختارة في الإمارات العربية المتحدة

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Abstract

Purpose – The paper aims to estimate the Value-at-Risk of stock returns for three major Islamic Banks in UAE and compare VaR results among each banks' stock returns.

Design/methodology/approach – The paper calculates VaR models using three approaches which are Variance-Covariance, Historical Simulation and Monte Carlo methods and compares among three Islamic Banks stock returns'. Also, the paper assesses the validity of models using back testing.

Findings – The empirical results demonstrate that three VaR models applied were not shown same results between each banks' stock returns. In case of variance-covariance method, the most risky stock return was for SIB while least risky stock return was for ADIB. However, in the case of Historical Simulation, the most risky return was for DIB while the least was for SIB. Lastly, in case of Monte Carlo simulation, the most risky stock return seemed to be ADIB while the least SIB. Thus, it concluded that in general the least risky stock returns were for ADIB followed by SIB and DIB.

Originality/value – Despite the fact there were substantial studies about the meaning, technique, validity and the application of VaR models in Financial sectors, this article provides real world examples from the prospect of Islamic Banks especially most popular Islamic Banks in the UAE. The article will be of value to those interested in the banking industries especially for Risk managers of Islamic Banks.

Keywords Risk Management, Market Risk, Islamic Banks in Middle East, North Africa

Paper type Research paper

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List of Abbreviations

VaR- Value at Risk

UAE-United Arab Emirates

ADIB-Abudhabi Islamic Bank

DIB-Dubai Islamic Bank

SIB-Sharjah Islamic Bank

OPEC-Organization of Petroleum Exporting Countries

NYMEX-New York Mercantile Exchange

IMF-International Monetary Fund

BIS-Bank for International Settlement

IFSB-Islamic Financial Standard Board

BNM-Bank Negara Malaysia

IFI-Islamic Financial Institution

MENA-Middle East and North Africa

EVT-Extreme Value Theory

ADSE-Abudhabi Stock Exchange

DFM- Dubai Financial Market

Introduction

In order to understand the Risk Management, we have to emphasize on the importance of Risk and how we can interprete it. Risk can be defined as the probability of uncertain event that will happen in the future. It can have negative or positive outcome. We cannot avoid or omit risk.

Therefore, we should try to manage and reduce it in an efficient and effective way. Application of Risk Management is very crucial to the sound functioning of any financial Intermediaries. Laurence H.Mayer (2000) emphasizes on the importance of Risk Management and says " The Industry couldn't have survived without practicing the risk management and it exists since there have been banks". Moreover, Goldman Sachs (2010) reported that "Effective Risk Management is of a primary importance to the success of a firm" . Financial intermediaries can have mainly four major risks which are market, credit, liquidity and operational risks. Beside those, there are some other categories of risks such as interest rate risk, equity risk, legal risk, political risk etc…

The importance of Risk Management has been improving after the different financial turmoil such as the Barings bank in 1995, Asian financial crisis 1997-98, Metallgesellschaft 1993, Orange country 1994 as well as financial crisis in 2007 etc.. Especially 2007-2008 financial crises have affected badly the Financial Intermediaries all over the world. However, according to the external rating agencies' such as PWC (2010) the risk of Islamic Banks was more favourable than the conventional banks. Findings of Hasan and Jemma (2010) said that "the Factors related to IBs'business model helped limit the adverse impact on profitability in 2008". Moreover, Azam et al (2012) has almost similar finding as Hasan and Jemma. Their findings show that "there is a less impact of global financial crises on Islamic banking system which is an integral part of the Islamic finance as compared to conventional banks. Islamic Finance showed its importance one more time after the 2007-2008 crises and the increasing demand of Islamic Financial System was shown in Western countries.

One of the main areas of risk affected during financial crisis was the Market risk. It is defined by Basell 2 Accord (1995) as " The risk of loss in on and off- balance- sheet positions arising from movements in the market prices" .
The primary purpose of this study is to make in depth analysis of Market risk performance in Islamic Banks and compare the techniques that will be applied for those banks.
The most popular market risk measurement used by financial intermediaries is Value at Risk, now on will be mentioned as VaR. Jorian (1997) and Dowd (2005) have defined that VaR measures the potential loss in value of a risky asset or portfolio of assets over a defined period of investment at a given confidence level. Thomas J. Linsmeier and Neil D. Pearson*Value (1996) has defined that "VaR is a single, summary, statistical measure of possible portfolio losses".

Within this context, the study is an attempt to examine the Market Risk performance of Islamic Banks in UAE by applying the most popular three VaR models which are Historical Simulation, Variance-Covariance method and Monte-Carlo Simulation. Since UAE plays one of the major role in terms of Islamic Banking, three main banks were chosen to be compared which are Dubai Islamic Bank, Abudhabi Islamic Bank and Sharjah Islamic Bank now on will be mentioned as DIB, ADIB and SIB.

Rest of the paper is divided into five chapters. In chapter one, an overview of Risk Management in Financial Sectors were discussed. It follows with an evolution of Risk management practices and different type of risks faced by financial sectors. Then, in chapter two, we have summarized the Literature review on Risk Management Practices in Islamic Banks. It ends with the literature review on Market Risk Management Practices in Islamic Banks. After that, in chapter three, research data and methodology were discussed. Chapter four has given information about the data analysis and results. Finally in chapter five, conclusion and recommendation were discussed.

Chapter I

An overview of Risk Management in Financial Sectors

1.1 Background and Evolution

Risk can be defined as the probability of uncertain event that will happen in the future. In any kind of activities such as financial, business, agricultural, scientific, there lies a risk. Thus, it can be said that the history of Risk Management is very old and it can be gone beyond thousands of years.

According to the Business Support Information, risk management is an old concept and it can be found since the age of ancient Roman and Greek markets. Also, they have reported some evidence of Risk management practices that can be found back in 2000 B.C such as commodities trade in India. Moreover, the first future contracts were used in Japan around 1700s. The Dojima Rice Exchange was the first futures market in Japan. (Karen A. Horcher, 2005). From above examples, we can note that history of Risk Management is very old.

In a recent paper of John C. Braddock (2004), he says that "The serious study of risk began during the Renaissance, when people broke with the past and challenged long held beliefs". The below timelines concerned with Risk Management were summarized from his findings:

- Mid 1600s, basic concept of probability theory was developed by French mathematicians Blaise Pascal and Pierre de Fermat.
- In 1703s, Law of Large Numbers was invented by Swiss scientist Jacob Bernoulli.
- In 1730s, concept of normal distribution was developed by Abraham de Moivre.
- Mid 1800s, financiers for the Confederates issued bonds

  In 1875s, statistical concept of regression to the mean was developed by Francis Galton, Charles Darwin's first cousin.

In 1970s, there were major price instability in financial markets due to turbulence in Financial Markets such as Regional war and conflict, persistent high interest rates and inflation, weak equities markets, and agricultural crop Failures etc.

Also, Global Association of Risk Professionals (2004) reported that "Before 1970's, there was a fairly stable exchange rates and inflation rates but all changed with the breaking of Bretton wood's system in 1971 which fixed the major value of relative

exchange rate to US dollar. After 1970s, when Organization of petroleum exporting countries (OPEC) restricted production of oil for increasing prices, then the study of risk management became the focus of attention".

As we can note from above studies that financial risk management was not as old as general risk management. Yuval Millo and Donald Mackenzie1 (2007) also agrees with this point and mentioned in their studies that financial risk was lagged behind. They noted that there are several reason for that such as in the past " Financial risk was strongly politicized, and, perhaps

More significantly, all important business transactions until 1971 were based indirectly on gold (or sometimes silver). This eliminated the type of day-to-day interest rate and foreign exchange risk we have today and instead enabled periodic panics in which short-term interest rates went to astronomical levels, and currencies' changed value sharply. Of course, this created a whole set of problems – because panics are hard to model".

After 1971s, there was fast development in Risk Management in Financial Markets. In 1973, Fischer Black and Myron Scholes developed an option pricing model that is referred to as the “Black & Scholes Model”.

In 1978, a first energy futures contract was introduced by The New York Mercantile Exchange (NYMEX). In 1984, the first automated exchange begun in Bermuda.

In 1990s new derivatives products were developed and VaR models and other advanced techniques for calculating the maximum worst case outcome were used in order to manage and improve Risk Management dialogue and methodologies. (Introduction to Risk Management)

1.2 Different type of Risks Faced by Financial Sectors

There are different types of risks that financial intermediaries face. In general they can be divided into financial and non-financial risks. According to Risk Management Guidelines market risk and credit risk are considered as financial while operational risk, regulatory risk, and legal risk are considered as non financial.

Market Risk is defined by Basel (1995) as "Risk of losses in on and off balance sheet positions arising from movements in the market prices". There are four types of Market risks which are Interest rate risk, Commodity risk, Exchange risk and Equity risk. Since Marker Risk includes commodity risk, it can occur in both banking and trading books of banks.

Market risks can be systematic which can be also said un-diversifiable or unsystematic. Systematic market risk results from overall movement of prices and policies in the economy. George and Anthony (1997) mentioned that "systematic risk can be hedged but it cannot be diversified completely away". The unsystematic market risk can occur from the price change of the specific asset or instrument due to events linked to the instrument or asset portfolio.

Among four above mentioned market risks, interest rate risk is one of the major risk that banks pay major attention among others.

Interest rate risk arises when there is an unfavourable movement in banks' interest rates. According to the Basel (1995), there can be different sources of interest rate risks such that repricing risk, yield curve risk, basis risk and optionality risk. As its name reveals, repricing risk can occur if there lays timing differences in the maturity and repricing of assets, liabilities and off-balance sheet items.

Yield curve risk can arise from the unexpected movements on the yield curve which has undesirable cause on the economic value or income. Basis risk can occur if there would be poor correlation on the modification of the rates paid and earned on different kind of instruments. Finally optionality risk arise from different kind of call and put options.

Credit Risk can be defined by Basel (2000), as “the risk that counterparty will fail to meet its obligations timely and fully in accordance with the agreed terms”. Like Market risk, we can find Credit risk on the banking as well as trading books of banks. In the banking book, there can occur loan credit risk due to the failure of payment of loan obligations on time and completely by the counterparty. Loan risk affects the quality of assets and the probability of default. Basel (2000) discusses that “Because of loan risk occurs, there is uncertainty of net-income and market value of equity arising from non-payment and delayed payment of principal and interest”. In contrary to banking book, the credit risk in trading book might arise because of the

borrower couldn't pay or can reluctant to pay the contractual obligations in trading contracts.

Liquidity Risk is defined by Basel (2000) as the , "Risk that arises due to insufficient liquidity for normal operating requirements reducing the ability of banks to meet its liabilities when it falls due". Moreover, its identified by Basel(2000) that in liquidity risk there can arise financing liquidity risk and asset liquidity risk. Financing liquidity risk may refer to the obstacles for getting cash at favourable cost from borrowings. On the other hand, asset liquidity risk can refer to the difficulty from obtaining sale of asset. One of the main purpose of asset-liability management in the banking business is to minimize the liquidity risk. It said that, "While financing or funding risk can be controlled by proper planning of cash-flow needs and seeking newer sources of funds to finance cash shortfalls, the asset liquidity risk can be mitigated by diversification of assets and setting limits of certain illiquid products". Basel (Feb 2000)

Operational Risk is defined by Basel (2001), as "the risk of direct or indirect loss resulting from inadequate or failed internal processes, people and systems or from external events"

As its name refers people risk may occur from the any action taken by the people. If there would occur lack of required skills and deception, then it might cause the people risk. On the other hand, if there would be problem on the programs used or computers, telecommunications, then it might raise the technology risk.

Basel (2001), has reported that "Process risk is may occur due to various reasons including errors in model specifications, inaccurate transaction execution, and violating operational control limits". Also, it was mentioned that "due to problems arising from inaccurate processing, record keeping, system failures, compliance with regulations, etc., there is a possibility that operating costs might be different from what is expected affecting the net income adversely". Basel (1998)

Basel (2001) has defined that "Legal Risks relate to risks of unenforceability of financial contracts. This relates to statutes, legislation, and regulations that affect the fulfillment of contracts and transactions. This risk can be external in nature (like regulations affecting certain kind of business activities) or internal related to bank's management or employees (like fraud, violations of laws and regulations, etc.) ".

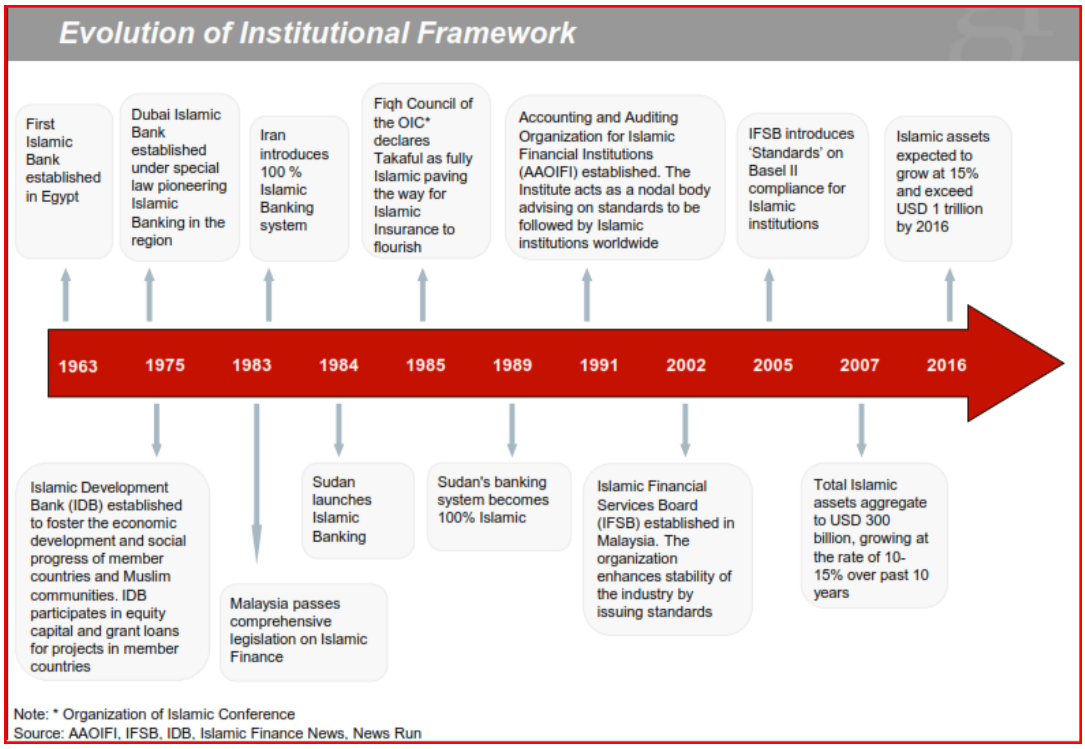
Chapter II
Literature review on
Risk Management Practices in Islamic Banks

2.1. An overview of Risk Management in Islamic Banks

Properly handling of risk is very important for the sound functioning of economic activities and efficiency and stability of any financial systems.

Evolution of Islamic Finance is not as old as conventional finance, thus the Risk Management in Islamic finance can be said as recent and new concept as well. We can track from the table below about the evaluation of Islamic Finance.

Table 1: Evolution of Islamic Finance Timeline



Source: Grail Research, 2007

As can be seen from the table above, in 1963, first Islamic bank was established in Egypt by Ahmad El Najjar. He was the leading scholar whose key principle was based on profit sharing (non-interest based philosophy of Shariah). According to Shariah Fortune reported, there established nine banks those were operating using the profit sharing principal at the end of 1976. The first bank that was fully based on Shariah principles was established by the Organization of Islamic countries (OIC) in 1974, which was Islamic Development Bank (IDB). The main purpose of Islamic Development Bank was providing funds to its member countries where they have

different kind of projects for development. Moreover, the main business functions of IDB were doing financial assistance for projects by using profit sharing principals as well as doing payments for financial services.

According to Fakihah.A (2009), Malaysia was the leading country for setting up of the IDB in the world. She reported that, “despite the first Islamic Bank in Malaysia which is Bank Islam Malaysia was established in 1983, the roots of Islamic Bank in Malaysia can go back to 1963s”. In that year, there were Established the Lembaga Tbung Haji, which was the Pilgirm Fund. The aim of fund was to provide pilgrim fund in order to cover the cost for those who are performing hajj in Makkah. Those funds were later on channelled toward investments in productive sectors and that gave good opportunity for Lembaga Tbung Haji to gain good returns to its depositors in accordance with Shariah Principals. After that, in the meeting held in 1972 in Cairo to set up the IDB, Malaysian team were given the opportunity to set up the legal framework for the Islamic Development Bank.

In 1975, Dubai Islamic Bank was established as a first private commercial bank under special law for serving the Islamic Finance. After that, in 1977, there was established the Faisal Islamic Bank in Sudan followed by Bahrain Islamic Bank in 1979.

In 1985, Takaful (Islamic Insurance) was announced as an Shariah compliant instrument by High Council of Organization of Islamic Conference. Later on, Islamic Finance has broadened and included different services such as banking activities, capital market activities as well as different financial intermediaries. According to Shariah fortune, “Auditing Organization for Islamic Financial Institutions (AAOIFI) was established to advice on Islamic finance standards all over the world which was the biggest change came in terms of adaptability in 1991”.

Habib Ahmed and Tariqullah Khan (2007) mentioned in their findings that "As Islamic banking is relatively new, the risks inherent in the instruments used are not well comprehended". In general , both conventional and Islamic banks face four major risks which are market risk, credit risk, liquidity and operational risks. However, beside those risks, Islamic banks face another type of unique risks owing to their compliance with the Shariah. In this regard, Ahmed and Khan (2007) mentioned that " Islamic banks are constrained in using some of the risk mitigation instruments that their conventional counterparts use as these are not allowed under

Islamic commercial law" . On top of that, the report of PWC about the the Managing risk in Islamic banks (2008) agrees that Shariah compliance law excludes Islamic Institution in participating in the different complex credit trading activities as a result that paralyses their conventional competitiors.

Regarding the rules and regulations of Risk Management, IMF has written different Risk Management Guidelines which is the Basel Accord.
Beside the Basel Accord development, there are some other guiding principles of Risk Management in Islamic Finance which are guided by Islamic Financial Services Board (IFSB), Bank Negara Malaysia (BNM), Institute of International Finance (IIF), Islamic Development Bank (IDB) etc…

There are 10 different guiding principle standards by IFSB. The main concern of IFSB Capital adaquacy standard is in two folds. Firstly, to make sure that Islamic banks are solvent and they can take action toward the expected level of losses. Secondly, to provide protection to depositors. Moreover, to help to strenghten the the effectivity and efficiency of the financial system by minimizing the possibility of Islamic banks becoming insolvent.

Bank Negara Malaysia has developed as well different guiding principles such as "Islamic Banking Act 1983, guidelines on Capital Adequacy (CAFIB, Financial Reporting, Anti Money Laundering and Prudential Limits and Standards" seperately.

Institute of International Finance has writtien, "Final Report of the IIF Committee on Market Best Practices: Principles of Conduct and Best Practice Recommendations Financial Services Industry Response to the Market Turmoil of 2007-2008".

Also, over the past decade, Standard & Poor's Ratings Services has become well known with their strong analatycal expertise in the field of Islamic finance. In their Risk Management Report (2008) , they said that "We have adapted and refined our rating methodology to address the specifics of operations carried out by IFIs. They also have emphasised that "those ratings were concerned with the creditworthiness of an IFI or a specific debt instrument and it doesn't relate to the degree of compliance with Sharia".

Shariah compliance laws apply to the all aspect of Islamic Finance Instruments. Some of the most well known Shariah compliance laws are mentioned below:

1. Freedom from Al Riba

All types of contracts and transactions in Islamic Finance must be free from riba. Since one of the main source of Shariah is derived from the Quran, the Muslim holy book strictly forbids riba while allowing trade. The Quran states, "O You who believe! Fear Allah and give up what remains of your demand for usury, if you are indeed believers."

The question of riba has been studied by many different islamic experts and there are large number of literature review regarding the concept and understanding of riba.

2. Freedom from Al Gharar (Excessive Uncertainty)

Muhammed Ayub (2007) defined Gharar as "entering into a contract in absolute risk or uncertainty about the ultimate result of the contract and the nature and/or quality and specifications of the subject matter or the rights and obligations of the parties" He also added that if there is going to be any lack of vital information or inadequacy or inaccuracy there can be exist Gharar as well.

Speculative trade in shares, short-selling, discounting of bills and securities or trading in unidentified items are all prohibited under Islamic Finance due to the excess level of uncertainty it include.

3. Freedom from Al-Qimar (gambling) and Al-Maysir (Unearned Income)

Maisir refers to "easily available wealth or acquisition of wealth by chance, whether or not it deprives the other's right. Qimar means the game of chance – one gains at the cost of other(s); a person puts his money or a part of his wealth at stake wherein the amount of money at risk might bring huge sums of money or might be lost or damaged. " (Mohammed Ayub,2007) Above 2 practices are strictly forbidden by Quran since it disagrees with the morals of Quran. The below versus from Quran has mentioned the messages for Maysir and Qimar:

"O you who believe! intoxicants and gambling, sacrificing to stones, and divination by arrows, are abominable actions of Satan; so abstain from them, that you may prosper." (5: 90)

“Satan intends to excite enmity and hatred among you with intoxicants and gambling, and hinder you from the remembrance of Allah, and from prayer; will ye not then abstain?” (5: 91)

“They ask thee concerning wine and gambling. Say: ‘In them is great sin and some benefits for people; but the sin is greater than the benefits’.” (4: 219)

The essentianl example of Gharar can be said as Gambling.

4. Freedom from Price Control and Manipulation

One of the important rules under Shariah compliance is that the instruments traded must be free from price control. Generally, in Islam there should be free market in which forces of demand and supply will be applied for determination of prices. Thus, there should not be any obstacles formation process of price in Islamic Finance. Islam does not approve to have ihtikar which is process of trying to change prices by creating non natural or fake shortage of supply. Such that,the former mentioned can be applied to demand as well in which Islam forbids any endeavour to bid up the prices by creating fake demand.

5. Entitlement to Transact at Fair Prices

Fair price can be refered to market prices those are traded freely whithout any involvement or management. Any transaction in the market should be available and accessible to all the investors.

6. Freedom from Darar (Detriment)

Islam encourages to have freedom from Darar. In case of darar, supposedly there is contract between two parties and the third party who is not participated in the contract is affected with failure of that contract's costs.

2.2. Nature of risks faced by Islamic Banks

Both financial institutions face similar risk types like market risk, credit risk, liquidity risk and operational risk. However, above mentioned risks have some differences based on the nature of the activity in Islamic Banks. Moreover, there are some other unique risks in Islamic banks which do not exist in conventional banks such as displaced commercial risk and Shariah compliance risk. Some of the main risks faced in Islamic Banks are mentioned below:

Table 2: Main risks faced in Islamic Banks

Credit Risk	Islamic banks have similar methods as Conventional banks in order for mitigating the credit risks. Though, Islamic banks result in the special credit risks due to its unique characteristics of financial instruments such as in murabahah transaction, bay' al-salaam or istisnah contracts and in mudarabah investments.
Liquidity Risk	In the case of Islamic Banks, Liquidity risk occurs from their failure or inconsistency either to have insufficiency of cash in which funding is necessary or increase of cash in which investment is needed.
Operational Risk	In Islamic banking, Operational risk is similar to the conventional banks, that is as Basel (2000) stated, "it could arise from failures in their internal controls involving processes, people and systems In Islamic banking, Operational risk is broader and could arise from failures in their internal controls involving processes, people and systems".
Market Risk	There are different type of market risk in Islamic banks such as mark up risk related to murabahah contracts, price risk related to bay' al-salaam (forward sale), leased asset value risk related to ijarah contracts and currency risk.

Rate of Return risk	Helmy (2012) has described Rate of return risk as "Risk resulted from unknown return of an investment invested by IAH (investment account holder) , as the increasing in benchmark rates caused by other investment financial institutions".
Shariah noncompliance risk	It occurs if there would be any failure in the Shariah principals as a result of not obeying Shariah rules.
Displaced commercial risk	Displaced Commercial Risk arises in case of bank face difficulty to pay returns. In this case, there should be balance between the banks returns and the returns of asset that are managed by Investors of bank.
Equity investment risk	Equity investment risk is the risk that may occur from joining the partnership contracts with the aim of undertaking in different kind of activities as stated on the contract.

2.3. Market Risk Management Practices in Islamic Banks

Market risk measurements have become popular by financial intermediaries and Risk Managers to manage risks in their firms. Especially, 2007-2008 financial crises has been affected banking sector badly and people have lost confidence in banks. Most of the banks had negative cash flows, showing huge losses and high leverage in their trading book activities. KPMG, (2009). Basel accord emphasized that "The main contributing factor was the current capital framework for market risk, based on the 1996 Amendment to the Capital Accord to incorporate market risks, and does not capture some key risks". (BCBS, 2009)..

Market risk is defined by Basell 2 Accord (1995) as "The risk of loss in on and off-balance- sheet positions arising from movements in the market prices". The most

popular market risk measurement used by financial intermediaries is Value at Risk, now on will be mentioned as VaR. Jorian (1997) has defined that "VaR measures the potential loss in value of a risky asset or portfolio of assets over a defined period of investment at a given confidence level". Thomas.J. & Neil.D. (1996) has defined that "VaR is a single, summary statistical measure of possible portfolio losses".

VaR model has become popular and showed its importance throughout the years. Market risk can be done using different kind of VaR models such that Historical simulation, Variance-covariance approach, Monte-Carlo Simulation. On top of these, more advanced models can be used such as GARCH and FIGARCH. Vast numbers of literature reviews have been done for the different VaR models.

Thomas J. Linsmeier and Neil D. Pearson (1996) have examined three VaR models which are Parametric VaR, Historical Simulation and Monte Carlo Simulation. The researchers have discussed each of their advantages and disadvantages for computing VaR. Also they have answered the question of "Which method is the best?". They said there is no easy answer for this question because "The methods differ in their ability to capture the risks of options and option-like instruments, ease of implementation, ease of explanation to senior management, flexibility in analyzing the effect of changes in the assumptions, and reliability of the results". The finder has mentioned that best choice of VaR models differ according to risk managers and the importance of project. Also, they have suggested alternative technique to VaR which are Sensitivity analysis and Cash Flow at Risk.

Aymen, Ousama and Jaleleddin (2012) have done VaR analysis for Tunisian Currency Market. They have compared four Value-at-Risk simulation methods in order to find out which method was most suitable technique for predicting the exchange rate risk. The four methods compared were the Variance-Covariance, the Historical Simulation, the Bootstrapping and the Monte Carlo. Analysis was done using three currencies and four currency portfolios in the Tunisian exchange market in the period between 01-01-1999 and 31-12-2007.

Among all the currencies analyzed, result revealed that the Japanese Yen seemed to be the most risky currency while Euro seemed to be the least risky. Further, they have applied evaluation tests to find out which VaR techniques were most precise. The result suggested that the traditional Variance-Covariance was the most appropriate method.

Aktham and Haitham (2006) have studied the relative performance of the most popular VaR estimates stressing on the extreme value theory (EVT) methodology. Their research included Middle East and North Africa (MENA) countries. They have used three VaR methods which were Variance-Covariance method, Historical simulation, and ARCH-type process. The ARCH model was analysed using 3 methods which were normal distribution, Student-t distribution and skewed student-t distribution.

The results suggested that in MENA countries, if the VAR measures depend on only normal distribution, then it will undervalue the VaR calculated because MENA stocks were considered by fat tails in their distribution. Also, their results revealed that Extreme Value Theory (EVT) are more appropriate measures for modelling VaR in MENA stock markets because they are used for modelling the tail of the distribution.

Moreover, they have found that compared to other VaR models, the APARCH models with skewed Student distribution had shown positive results only in 2 of the MENA countries those were Morocco and Turkey. On the other hand, Extreme Value Theory was dominated the most, compared to other VaR models in rest of the MENA countries.

Finally, they have emphasized that in order to assess risk in financial markets in MENA, it might lead to incorrect estimation to use Conventional methods of VaR with normal distribution because the MENA markets are volatile like other markets in the world. Therefore, they suggested that, when doing any risk modelling for MENA stock markets, one should consider the environmental changes and the fundamental difference of MENA markets from developed markets.

Zatul Karamah Ahmad Baharul-Ulum,Ismail bin Ahmad and Norhana binti Salamudin (2011) has applied VaR models to Malaysian Non-Financial Markets in order to estimate the Market Risk using Monte-Carlo Simulation. They have chosen sample between 1993- 2010 for three non-financial sectors which were Industrial Product (INP), Property (PRP) and Trade and Services (TAS). The expected maximum losses were quantified at 95% confidence level and in order to harmonize results, they have conducted several accuracy tests namely the Kupiec, Christoffersen and Lopez tests. Their result provided evidence that consideration of fat-tails and

asymmetries are crucial issues when deciding to estimate VaR in managing financial risk. Moreover, the results of their study agrees with the study of Aktham and Haitham (2006) in which they have also found out the consideration of fat tails were important in considering the VaR models in MENA stock markets.

Also, David and Alan (2007) have done research on the use of VaR models in Emerging Equity Markets using GARCH models. They have analysed the evaluation of Symmetric, Asymmetric and Long Memory GARCH models. The analyses were done on eight Asia-Pacific emerging stock markets.
Their results revealed in order to get more improved VaR estimation, it is important to take into consideration asymmetric and long memory features of VaR models. When those features are considered, it will help to decrease the case of minimum capital requirements when there occurs actual loss.
Generally, their results have showed important considerations regarding how to minimize the possibility occurrence of inappropriately estimated VaR models.

Moreover on the estimation of advanced VaR models, Thupayagale (2010) has done evaluation of VaR using GARCH based models and their long memory extensions.
His results suggested that in order to have more improved VaR estimates, it's crucial to consider long memory and asymmetric effects of VaR models.
His findings are similar with those of David and Alan (2007) in which long memory and asymmetric effects will help to decrease the occasions of minimum capital requirements when there occurs actual loss.
Finally, the results suggested that in order to get more accurate VaR estimates, using out-of-sample forecast evaluation methods are more favourable.

Mike K. & Philip L. (2005) has also studied different type of GARCH models in order to estimate VaR. They have compared the performance of seven GARCH-type models in estimating VaR of market indices. Two of them were long memory GARCH models. Those models were applied to 12 market indices and four foreign exchange rates in order to measure the VaR at several confidence intervals.
Their results indicated that while estimating VaR at 99% confidence interval, stationary and fractionally integrated GARCH models performed better than Risk Metrics. Moreover, they have emphasized on the importance of considering the fat-

tailed error in estimating VaR. Also, from their data analysis, at 99% confidence interval, t-error gave better results than the normal error in terms of long position of the stock rather than the short position. Moreover, the fat tail and asymmetric behaviour were considered in the stock returns.

Another GARCH model was studied by Ping.T & Shwu.J. (2006), for analyzing long term interest rate futures. For this purpose, they have assessed the GARCH(1,1) and FIGARCH(1,d,1) models with the normal, Student-t, and skewed Student-t error distributions. The analysis was done on the daily returns of long-term T-Bond interest rate futures. There were total of 7296 observations used for assessment from October 4, 1977 through December 31, 2004. The researchers used in-sample data and out-of-sample data from total observations. Only minor amount of observation which is 1000 daily returns were used for out-of sample forecasting while the major data were used for in-sample forecasting.

The empirical results showed that based among the models, FIGARCH(1,d,1) model with skewed Student-t innovations showed more precise results in both in sample and out of sample data. This result was tested by Kupiec LR failure rate tests in order to assess the validity of model. Another important finding was that VaR values that was obtained by in-sample data showed considerable positive bias.

Eric.G. & , Mohamed.O.(2005) have studied the Arab capital markets in order to indentify the risk involved. They have chosen five Arab emerging capital markets which were Egypt, Jordan, Morocco, Saudi Arabia and Tunisia. The data were chosen over the period 1997–2001.

In order to identify the risks involved, they have used fundamental risk measures and country risk scores. The main aim of their study was to assess if there lies any the correlation between risk and stock in sparingly traded emerging markets .

They have used the Capital Asset Pricing Model (CAPM) to examine the risk associated in those capital markets. The results of their study revealed that continuous result of beta doesn't appear as a good estimate for estimating VaR in thinly traded markets. Also, the results showed that compared to CAPM model, fundamental risk measures and country risk rating measures were favourable in order to explain the risk measures.

Mazin (2006) used VaR models in order to calculate “foreign-exchange trading risk-management in Moroccan foreign-exchange market”. His analyses were carried out for several foreign-exchange rates of the Moroccan Dirham versus major currencies. The analyses that were performed included volatility, skewness, and kurtosis tests.

Moreover, he did some case studies by assessing VaR models under different scenario analysis. The various scenarios were assessed to check if there were any occurrence of short selling as well as slow down for any illiquidity of trading assets. Also, different percentages were provided for assets. The results of the tests applied were suggested that returns of the sample data showed clear asymmetric performance among the different tests performed.

Another research by Mazin.A.(2007) has studied “the risk parameters for larger foreign-exchange portfolios both developed and emerging economies". In order to test the VaR model, the researcher has used matrix-algebra and optimization techniques. After that, the risk management and control models were applied to different foreign-exchange rates. Moreover, he has done several case studies in order to calculate VaR under various scenarios such as during the times of crisis as well as normal cases. The analyses that are performed included volatility, skewness and kurtosis tests.
The results showed similarity with his previous done research Mazin.A.(2006) that the results of the tests applied were suggested that returns of the sample data showed clear asymmetric performance among the different tests performed.

Regarding the UAE risk management, Hussein and Faris, (2007) has done research about the how well the Risk Management is practiced in banks in UAE and what are the methods used for different risk types. Moreover, comparison of risk management practices was done on both national and foreign banks in UAE. Their research was qualitative research, which comprised of questionnaire.
Their results showed that foreign exchange risk, credit risk and operating risk were the most important types of risk facing the UAE commercial banks. They have also analysed and reached the result that “risk identification, risk assessment and risk analysis” were the most effective variable assessing the risk management practices. Finally, their results indicated that in terms of risk management practices, there seemed to be difference to some level between the UAE national and foreign banks.

In their recent research studies' Aktham and Basil (2011) have applied VaR models to UAE stock markets. Their concern was on the "role of long memory, fat tails and asymmetries in return innovations". Thus, researchers have investigated the adequacy of the FIAPARCH class of GARCH models for measuring VaR. The model was evaluated with three alternative distributions and in terms of its ability to produce accurate VaR measures. The results of the tests showed that FIPARCH model with skewed Student-t distribution provided the best fit for the UAE stock exchanges. Moreover, researchers have found that the same model with Skewed-t distribution was also more accurate in out of sample forecasting of VaR. They have concluded that, the modelling of asymmetry, fat tails and long memory have potentially important implications for risk assessment, and hedging strategies in the UAE stock exchanges.

To sum up with, we can note that there were done vast number of research studies on the use of different VaR models. The studies can be found from US Markets, Emerging markets, Developing markets, MENA as well as GCC countries. Also, different VaR models were applied to different market risks such as interest rate risk, commodity risk, exchange risk as well as equity risk

Some of the studies have concluded in similar views while some others had different results and views. For instance, Thomas J. Linsmeier and Neil D. Pearson (1996) has mentioned in order to choose the best method for calculating VaR, the one has to think about the condition of project, dimension and ease of importance. Aktham and Haitham (2006) had similar view such that they said practitioners should take into account changes in the environment while considering the VaR estimates on certain markets.

Some of the researchers have reached the result of variance-covariance was the most appropriate model in terms of calculating VaR, while some others have concluded that more advanced techniques like GARCH models are more accurate estimates of VaR in terms of calculating Market Risk.

Finally, despite being one of the major hubs for Islamic finance, there were very limited researches done on the GCC and UAE markets. Thus, the aim of this study is to estimate the Value-at-Risk of stock returns for three major Islamic Banks in UAE and compare results among each banks' stock returns.

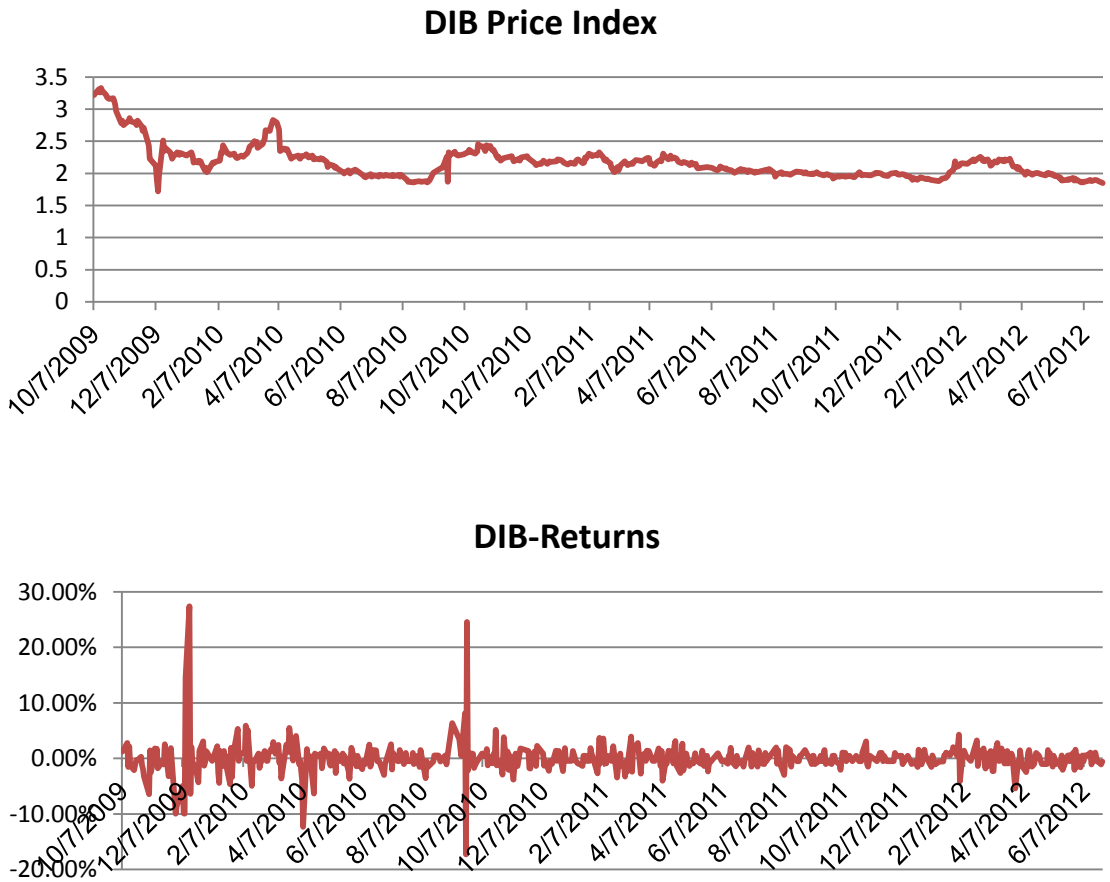
Chapter III
Research Data and Methodology

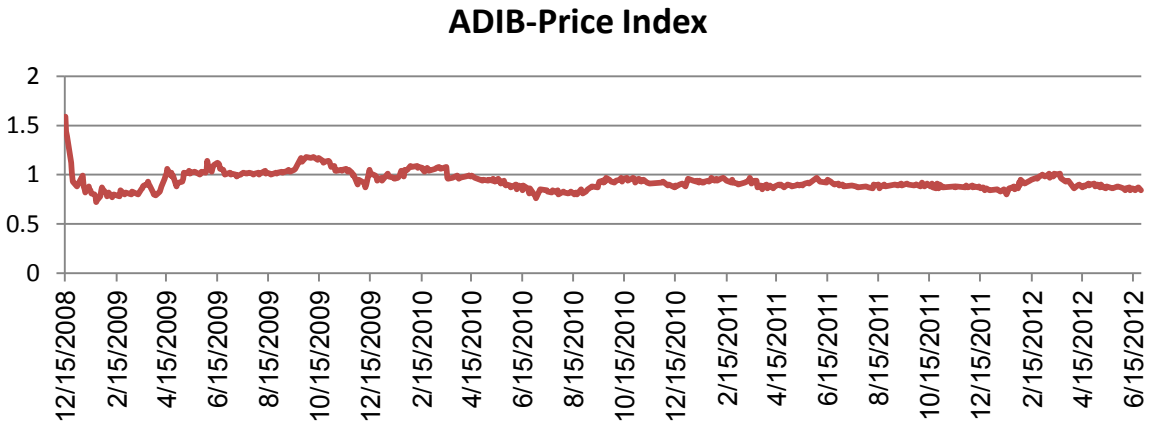
3.1. Data description

The data used for this study have been obtained from the ADSE, DFM, ZAWYA as well as financial content. The data included daily closing price of indices for DIB, ADIB and SIB . The sample for DIB extends from 10/12/2009-6/25/2012. Sample data for ADIB extends from 11/17/2009-6/24/2012. Sample data for SIB is from 12/15/2008-6/24/2012. Period was determined primarily by the availability of data in the markets. Data was adjusted with the normality of the sample by excluding the unchanged price of certain date. Analysis was computed for the total of 1503 observations. The Islamic banks were chosen in terms of its size and profitability.

Figure 1 shows the daily closing prices and returns for three banks separately.
As can be seen in the figure, volatility clustering is clearly visible.

Figure 1: Plots of DIB, ADIB and SIB daily closing prices and returns.




ADIB-Price Index
2
1.5
1
0.5
0
12/15/2008
2/15/2009
4/15/2009
6/15/2009
8/15/2009
10/15/2009
12/15/2009
2/15/2010
4/15/2010
6/15/2010
8/15/2010
10/15/2010
12/15/2010
2/15/2011
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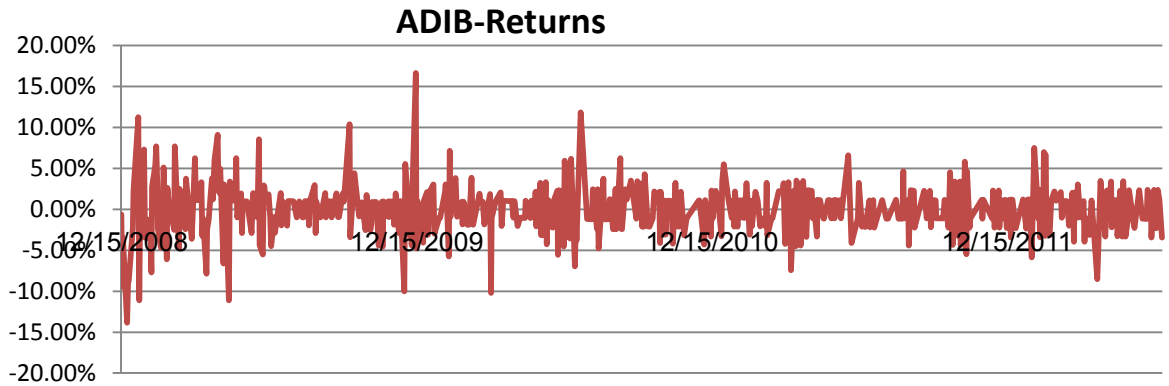
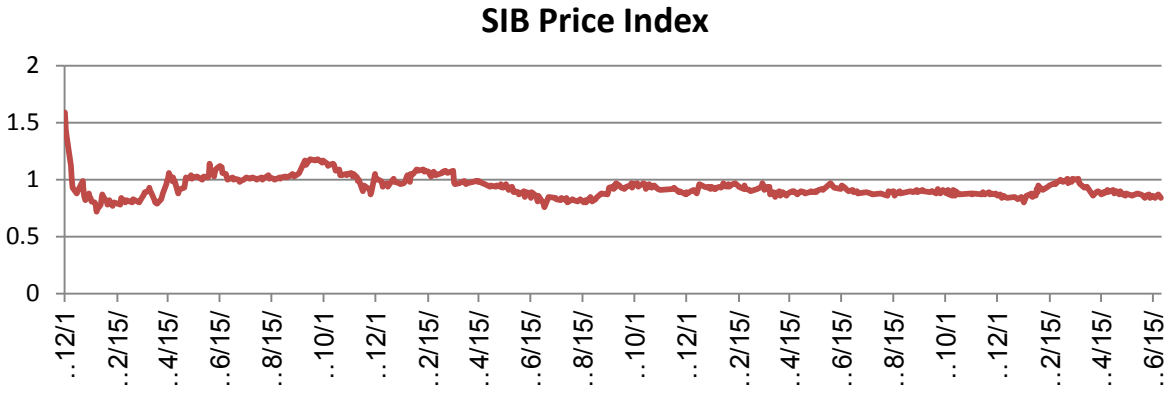
2/15/2012
4/15/2012
6/15/2012


ADIB-Returns
20.00%
15.00%
10.00%
5.00%
0.00%
-5.00%
-10.00%
-15.00%
-20.00%
12/15/2008
12/15/2009
12/15/2010
12/15/2011


SIB Price Index
2
1.5
1
0.5
0
..12/1
..2/15/
..4/15/
..6/15/
..8/15/
..10/1
..12/1
..2/15/
..4/15/
..6/15/
..8/15/
..10/1
..12/1
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..4/15/
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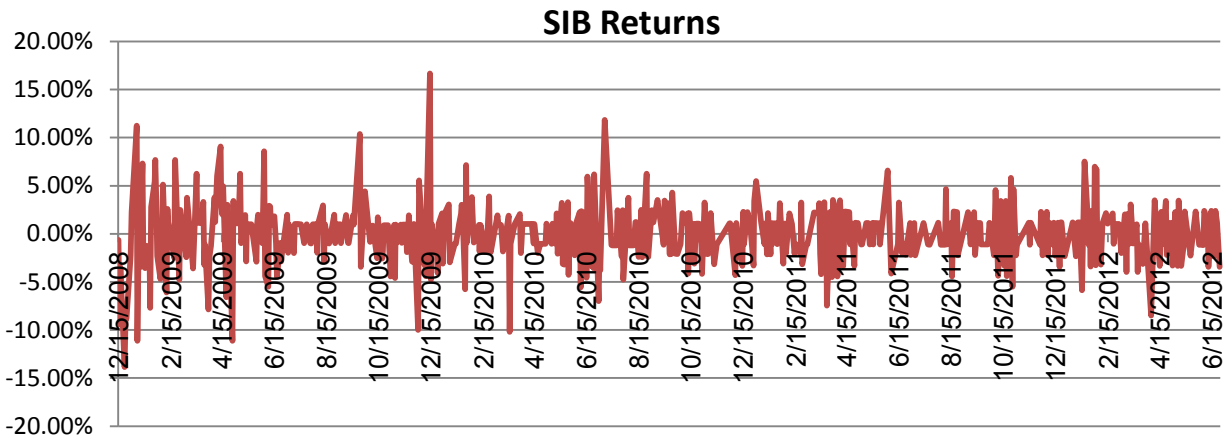

SIB Returns
20.00%
15.00%
10.00%
5.00%
0.00%
-5.00%
-10.00%
-15.00%
-20.00%
12/15/2008
2/15/2009
4/15/2009
6/15/2009
8/15/2009
10/15/2009
12/15/2009
2/15/2010
4/15/2010
6/15/2010
8/15/2010
10/15/2010
12/15/2010
2/15/2011
4/15/2011
6/15/2011
8/15/2011
10/15/2011
12/15/2011
2/15/2012
4/15/2012
6/15/2012

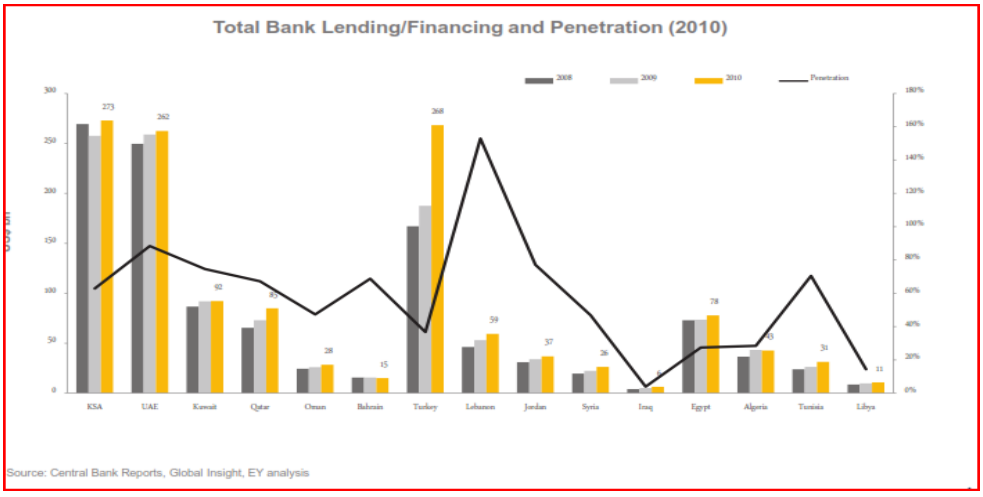
3.1.1. Islamic Banks in UAE

According to the Ministry of Foreign Trade (2012),it was reported that "The UAE banking industry has emerged as the Islamic banking sub-industry is starting to assume a larger share in industry activities, thus gaining regional prominence" .

The Banking sector of the United Arab Emirates has become one of the fast growing in the region, which is playing a leading role in terms of financial centre for the Middle East.

Also, UAE banks are considered to be the largest by assets among all the GCC countries. Within the banking sector, the Islamic Banks play a vital role in UAE. There are eight Islamic Banks in UAE those offer banking services compliant with the Sharia'a- (Islamic law). According to the World Islamic Banking competitiveness report by Earnest & Young (2011-2012), the "GCC markets were more developed in terms of greater lending/financing assets to GDP penetration". Among that, as can be seen from table below, the UAE Islamic Sector falls to second highest after the Saudi Arabia Islamic Markets.

Figure 2: World Islamic Bank Total Bank lending/financing& Penetration



Source: Ernst & Young. The World Islamic Banking Competitiveness report, 2011-2012.

Moreover, according to the Abu Dhabi 2011 Report, which has been published by Oxford Business Group in collaboration with ADIB, "Islamic banking and financial services sector in the UAE represented 30 per cent of the global Islamic banking industry in 2011".

3.1.2. Abudhabi Islamic Bank

Abu Dhabi Islamic Bank (ADIB) is considered as one of the largest Islamic bank in UAE. According to information from adib.ae (2012), "It was established on 20th May 1997 as a Public Joint Stock Company through the Amiri Decree No. 9 of 1997. The Bank commenced commercial operations on 11th November 1998, and was formally inaugurated by His Highness Sheikh Abdullah Bin Zayed Al Nahyan, UAE Minister of Information and Culture on 18th April 1999". ADIB provides different kind of activities such as Islamic financing, investments, commercial and other banking services in accordance with Islamic Shari'a. Also, it provides different kind of banking services including personal banking, corporate banking, investment banking and institutional banking.

The share price of ADIB is 10 dirams each and it started its business activities with one hundred billion dirhams. According to the financial report 2001, ADIB has gained net profit of AED 1,155.1 million compared to AED 769.1 million in 2007.

3.1.3. Dubai Islamic Bank

Dubai Islamic Bank (DIB) one of the oldest Islamic Bank in the world and it was established in 1975 with compliance to Shariah laws. DIB offers its retail, corporate and institutional customers a range of retail, wholesale banking, treasury and real estate services. As of 28 May 2012, the bank operated a network of 75 domestic branches and ATMs, and is also represented internationally in the Bahamas, Egypt, Ireland, Jordan, Pakistan, Sudan and Turkey.

At the same time, DIB is the largest and oldest Islamic bank in the United Arab Emirates (UAE) and the third-largest Islamic bank in the world, as of 31 December

2011. As of 31 March 2012, DIB was the fifth-largest commercial bank in the UAE, with a market share of 5.3% based on its total consolidated assets of AED92.5 billion (USD25.2 billion).

3.1.4. Sharjah Islamic Bank

Sharjah Islamic Bank was commenced as a commercial bank in 1975 with the name of National Bank of Sharjah. It was found by H. Dr. Sultan Bin Mohammed Al Qassimi, Member of the UAE Supreme Council and Ruler of Sharjah under the Amiri decree. Later on in 2002, it was converted its banking services to Islamic Banking and became fully Shariah Compliant bank as Sharjah Islamic Bank.

Sharjah Islamic Bank PJSC provides retail, commercial, corporate, investment, and international banking products and services in UAE. It offers Islamic financial products and services to companies, institutions and government, and government departments. The company, through its subsidiaries, also operates hotels and resorts; provides catering and related services; and offers brokerage services for trading.

In addition, Sharjah Islamic Bank provides financial products and services for the acquisition and construction of commercial, residential, and industrial real estate properties; and advisory, financial and technical assessment, and project funding services in the area of real estate properties development.

Its retail banking products and services comprise current, saving, Hassalati, Watani, and fixed account products; and Islamic cards, car and home finance, personal finance, online banking, ATM, and motor Takaful. The company's investment banking products and services include asset management products, such as portfolio and fund management, and wealth management; investments products and services, including structured finance, equity investments, and financial advisory services; and international banking and treasury products and services.

Its corporate banking products and services comprise assets rental, contracting, partnership, and pre-agreed profit products and services; and business solutions consist of cash management, as well as trade services, including letter of credit and letter of guarantee.

3.2. Methodology discussion

3.2.1. Introduction to VaR

VaR measures "the potential loss in value of a risky asset or portfolio of assets over a defined period of investment at a given confidence level". Basell 2 Accord (1995) . For instance, if VaR of an asset at a 95 % confidence level, in a week is 100$, it means that there is only a 5% chance that the value of the asset will drop by more than 100$ in a week There are three key elements of VaR which are specified level of loss, a defined horizon and a given confidence level. In this research paper, I tried to calculate the VaR of each bank using Parametric Approach, historical simulation, Delta-Normal approach as well as Monte Carlo simulation. After that, the results of each approach were compared and commented. Moreover, I have compared among three banks and identified the most and least risky banks according to my results. To make it more simplified, I chose Dubai Islamic Bank calculations as a sample explanation. The same methods were applied to both ADIB and SIB. The return distributions for all banks were normally distributed by excluding the unchanged or untraded days in the stock market.

3.2.2. Variance-Covariance approach

The Variance-Covariance approach can be also said as Analytical VaR or Parametric VaR, because its return distribution is considered as normal or lognormal. s. Analytical VaR can simply be expressed as

$$\text{VaR} = N^{-1}(c) * \sigma * W \quad \text{or} \quad \alpha * \sigma * W$$

where $N^{-1}(.)$ is the inverse cumulative normal distribution (NORMSINV in excel), c is the confidence level, σ is the standard deviation of the return distribution expressed on an annual basis and W is the initial value of the asset/option

If σ is expressed on an annual basis and risk horizon in Δt years then

$$\text{VaR} = \alpha * \sigma * W * \sqrt{\Delta t}$$

We have used 501 trading days for each bank in order to calculate different VaR approaches. There were used few steps for calculation of Parametric VaR. Firstly, the stock price for DIB were obtained between 10/12/2009-6/25/2012. After that, the return was calculated for each bank using the below formula:

Rt= (Pt-P t-1)/Pt-1

After that the data were sorted in a descending order and mean and standard deviation were calculated using below formula on excel:

$$\sigma = \sqrt{\frac{1}{N}\sum_{i=1}^{N}(x_i - \mu)^2}, \quad \text{where} \quad \mu = \frac{1}{N}\sum_{i=1}^{N} x_i.$$

Table 3: The excel functions used for calculating Variance-Covariance matrix

Mean	AVERAGE(RANGE)
Standard deviation	STDEV(RANGE)
Correlation	CORREL(Array1,Array2)
Variance -Covariance matrix	COVAR(Array1,Array2)

Once the mean and standard deviation are identified VaR at 95% and 99% confidence level were calculated separately for the sample data using formula below:

VaR 95%= 1.65* (standard deviation of change in portfolio value)

VaR 99%= 2.33* (standard deviation of change in portfolio value)

The excel function is as below:

VaR 95%	=PERCENTILE(E5:E505,0.05)
VaR 99%	=PERCENTILE(E5:E505,0.01)

3.2.3. Historical Simulation approach

As its name refers, Historical Simulations methodology is based on the historical data in which the previous performance of asset is considered and results are derived according to those data using VaR model. Based on the results we can draw an assumption that the past occurrence of data are good to forecast for the future or the past data might repeat in the near future.

In order to calculate the historical simulation, we will re-price the asset or the portfolio after every run.

Firstly, we have calculated the returns using the same formula as in Parametric approach. After that, the data were sorted in ascending order.

Next step was computing simulated stock prices for the sample portfolio. In order to calculate the simulated stock price, we have applied the price changes calculated to the current mark-to-market value of the assets and re-valued our portfolio.

In case of DIB, return rate on 6/25/2012 is applied to the last days' price on the series, which is 10/12/2009. Same return rate is applied for all 501 days.
After identifying the simulated stock price of portfolio, we have calculated the change in the Value of the Asset.
It was calculated as: Actual stock price- last day's return rate in the series
Final step was to calculate the VaR at 99% confidence level using the change in the Value of Asset. The excel formula used was:
=ABS(PERCENTILE(Q5:Q505,0.01))

3.2.4. Monte Carlo Simulation approach

The Monte Carlo simulation methodology is an improved type of Historical simulation method. There are similarities between both methods such as both of them are simulated data based on the historical data to forecast for the future.

The main difference is that in Historical simulation, we will calculate produce the simulation by taking into consideration the last N period's observed changes in the market. However, in Monte Carlo simulation, the random numbers will be created in order to forecast the return at the end of analysis horizon. After that, the VaR of the stock price is calculated from this distribution.

In order to compute VaR using Monte Carlo simulation, we have taken few steps as below.

Step 1 – We will assign equally divided weight for each return .In order to do that, we will decide for our analysis horizon length T,in our case its 1 day, and divide it with the total number of returns. Δt (i.e. $\Delta t = T/N$).

The purpose of defining change in t, Δt is to make sure that Δt is large enough to estimated the continuous pricing we find in the financial markets. Romain Berry (2012) has defined this process as "discretization, whereby we approximate a continuous phenomenon by a large number of discrete intervals".

In our analysis, the analysis horizon is 10 days and we have generated 100 simulations.

Step 2.1 – Assume a geometric Brownian motion for the price path of S. The change in S for the period Δt can be described by:

$$\Delta S_t = S_{t-1}(\mu \Delta t + \sigma \sqrt{\Delta t}\varepsilon)$$

Where ε is a standard normal random variable, μ the drift rate, σ the volatility and Δt the time interval.

Therefore , $S_t = S_{t-1} + \Delta S_t$

We can estimate the drift by:

$$\mu = \frac{1}{T\delta t}\sum_{i=1}^{T} R_i$$

The volatility of the share can be estimated by:

$$\sigma = \sqrt{\frac{1}{(T-1)\delta t}\sum_{i=1}^{T}(R_i - \bar{R})^2}$$

$$\varepsilon_1, \varepsilon_2, \varepsilon_3, \ldots\ldots \varepsilon_n$$

Step 2.2- Generate a random sequence of

Then, construct a price path for S and calculate the value of the asset F_{t+n}= F_T with these prices $S_{t+1}, S_{t+2}, S_{t+3}, \ldots\ldots S_{t+n}$

At the next day (δt = 2), we draw another random number and apply same formula as in day one to determine S_{i+2} from S_{i+1}. We repeat this procedure until we reach T and can determine S_{i+T}. In our example, S_{i+9} represents the estimated (terminal) stock price .

Table 4: The excel functions used for calculating Monte Carlo Simulation

Drift	=mu*time
Shock	=(NORMSINV(RAND())*volatility*SQRT(time)
Drift + Shock	=mu*time+normsinv(rand())*volatility*sqrt(time)
Into time series	=B12+B12*(mu*time+normsinv(rand())*volatility*sqrt(time))

Final step is to calculate the VaR of the simulated stock price at 95% confidence interval.

In order to do that, firstly we calculated the change in value of the asset by subtracting the actual price in day 1 from the future price in day 10.

Then , VaR= $N^{-1}(c)*\sigma*W$ or $\alpha*\sigma*W$

3.2.5. Back testing

After calculating the VaR with different models, we have done back testing to make sure weather the actual losses are within the projected losses or not. In order to accept our models using back testing, we should make sure that the number of observations violating the projected loss levels should be in line with the confidence level.

In case of DIB, we have taken the actual returns of 2009-2010 as considered to be 250 days and tested for year 2011-2012.

Firstly, we have calculated VaR at 99% confidence lever for 2009-2010 using delta-normal approach and tested it for the actual returns in 2011-2012 for the number of violations.

Also, we have done same step as above for calculating VaR with historical simulation method.

VaR 99% for Delta Normal= -2.33*SDEV of returns (2009-2010)

VaR 99% historical simulation= percentile(array, 0.01)

Once we indentified the VaR, the violations were identified from 2011-2012 actual returns using excel function:

Violations =COUNTIF(E3:E252,"<"&G4)= it means count if the actual returns of 2011-2012 has value less than the VaR identified.

The number of violations follow a binomial distribution. Let the total no of days of observations be **n** and the VaR is exceeded on **m** days.

Thus, 99% VaR for n=250 days, we expect only 250*0.01= 2.5 exceptions

In case of DIB, we observed 0 violations <2.5

Probability of 0 or more violations can be calculated in excel as

1-BINOMDIST(0,252,0.05,true)

Rule: If the result is >.05 we accept the model, else reject

The result is 0.9189415 > 0.05, thus we accept the model.

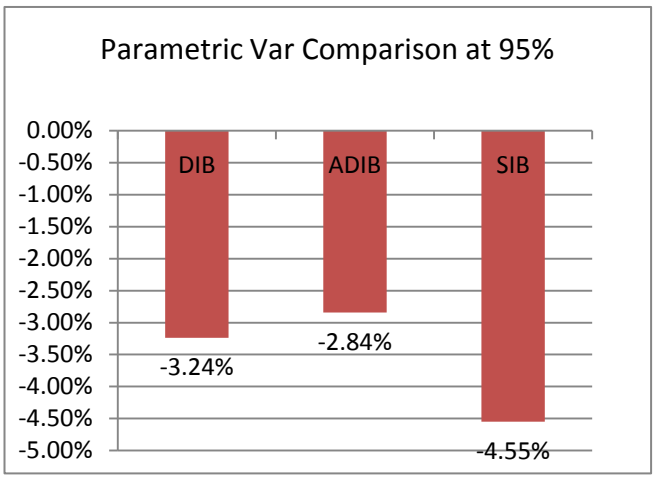
Chapter IV
Empirical Results and Analysis

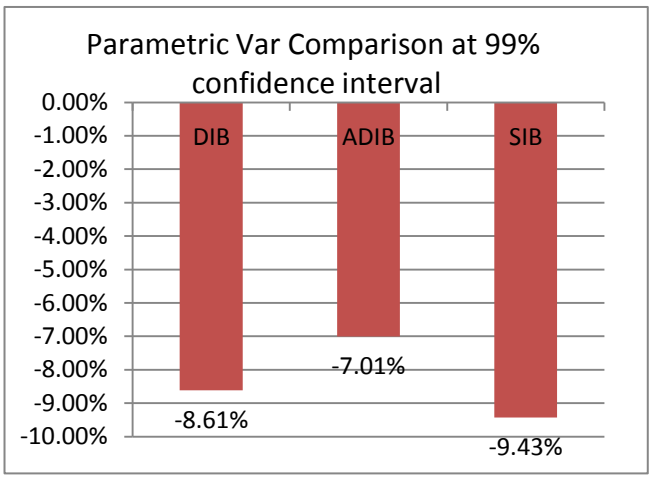
4.1. Results of Variance-Covariance approach

The analysis begins by estimating the parametric VaR for the stock returns of three banks. We can note that the various VaR simulations have negative signs, since they represent losses on stock returns. In our research, the analysis of the VaR in case of Historical Simulation and Monte Carlo methods will be calculated in absolute values. At the same time, under the normality assumption, the VaR estimation depends significantly on the confidence level 95% and 99%, because they allow us to control for the probability that the investor will obtain a return higher or equal to the Value-at-Risk. We can notice that the VaR rises with the increase in the confidence level. This is perfectly consistent, because as the confidence level increases, it will bring closer to the 100% level, which represents the total loss. In general, if the confidence level is high, the VaR rank will be less and thus the VaR becomes higher.

Figure 1 compares the Parametric VaR for three banks' stock returns at 95% and 99% confidence levels. Among the three banks, we can observe that SIB returns are the most risky followed by DIB returns. The least risky stock return is for ADIB with the lowest VaR value of -2.84% at 95% confidence level and -7.01% at 99% confidence level.

Figure 3: Comparison of Parametric VaR at 95% and 99% confidence interval



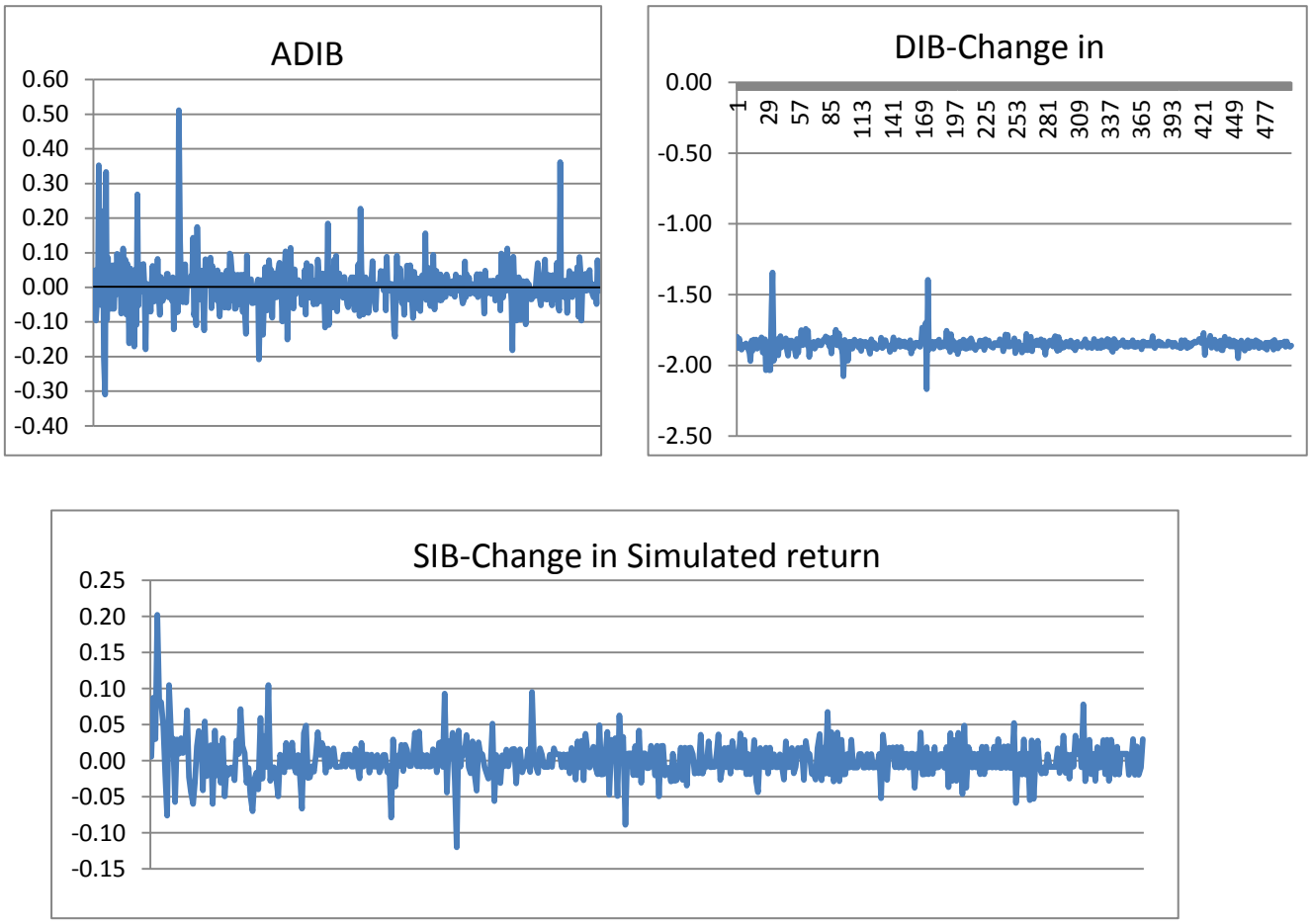


In general, dispersion between VaR results are not far from each other in case of variance-covariance approach.

4.2. Results of Historical Simulation approach

In case of Historical Simulation, our data were computed in absolute values. In the figure 4 below, we can see the change in the value of the stock for three banks.

Figure 4: Change in the value of the asset using Historical Simulation

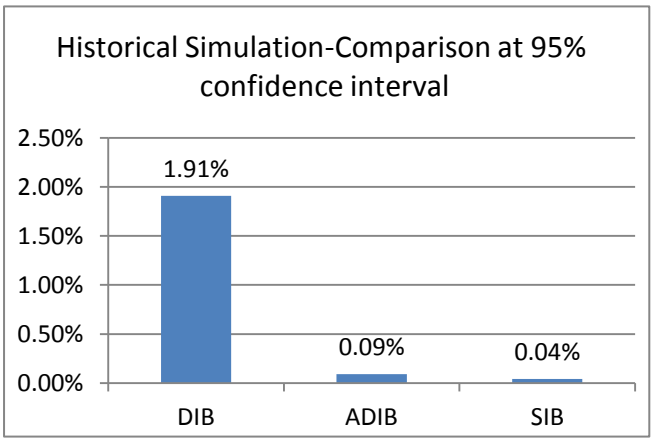


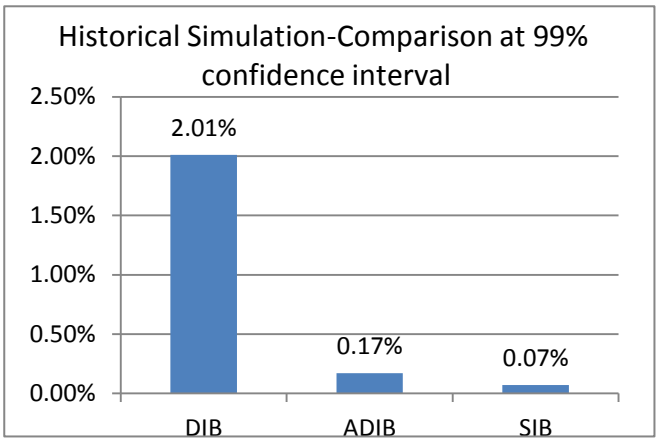
According to the above graphs, we can observe that value of stock for DIB was steeper at the beginning of the observation period and flattened starting from the second half. Change in the value of the asset shows all loss for the stock returns. On the other hand the value of stock for ADIB and SIB are fluctuated throughout the years between -0.5 and plus 0.5 .

Figure 3 below summarizes the VaR comparison for three banks' stock returns using Historical Simulation. As can be noted from the bar chart, DIB stock returns are the

most risky while SIB returns are the least. ADIB returns seem to have moderate risk compared to the former two. This result is true in case of both 95% and 99% confidence interval.

Figure 5: Comparison of VaR using Historical Simulation at 95% and 99% confidence interval.



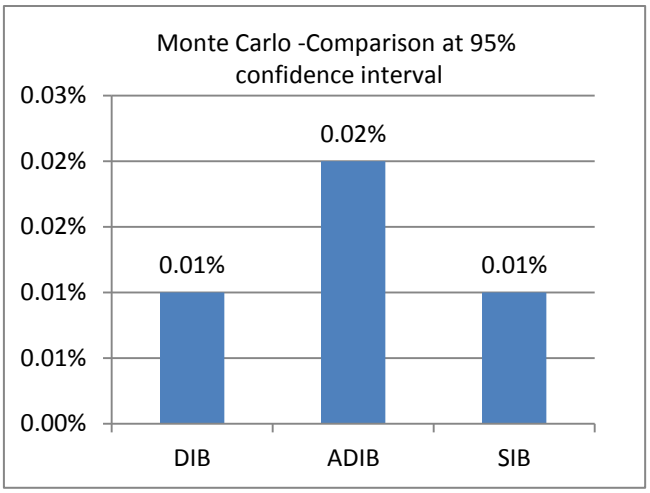


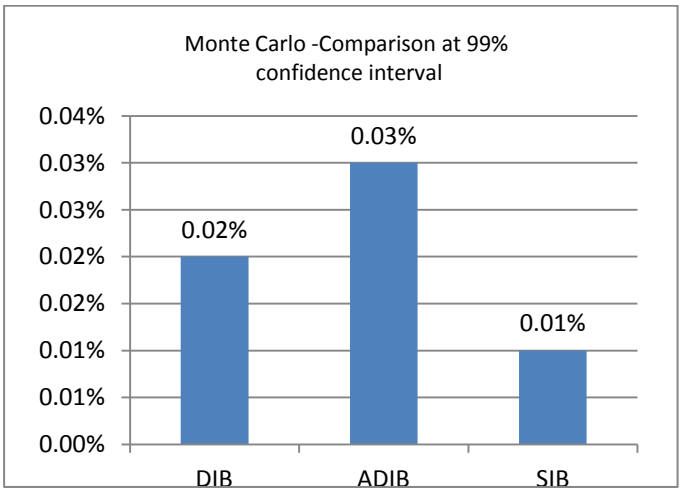
4.3. Results of Monte Carlo Simulation approach

Monte Carlo simulation is more improved version of Historical Simulation method. From the Figure 6 below, we can note that in case of Monte Carlo Simulation, the VaR results are not very different among three banks stock returns. There is only 0.01% difference between each banks' returns.

The results reveal that ADIB stock returns are the most risky followed by DIB returns. The least risky stock return seems to be for the SIB.

Figure 6. Comparison of VaR using Monte Carlo Simulation at 95% and 99% confidence interval.





In summary, we can note from the above three models that the results of VaR are different in each model. In case of variance-covariance method, the most risky stock return was for SIB while least risky stock return was for ADIB. However, in the case of Historical Simulation, the most risky return was for DIB while the least was for SIB. Lastly, in case of Monte Carlo simulation, the most risky stock return seemed to be ADIB while the least SIB. We can conclude from these results that least risky stock returns were for ADIB followed by SIB and DIB.

The reason that all three VaR models showed different results are because of the way models are calculated and used for VaR estimations. Every model has some advantages and drawbacks. Thus its usually big challenge for risk manager to decide which model is the best to choose.

The variance-covariance method is the simplest way of finding VaR among other two methods because it is estimated through mean and standard deviation of the returns.

However it has some drawbacks such that in this model there might arise a problem of adequately capturing the risks of non-linear payoff distribution like options and option-like. The variance-covariance method is more suitable for the assets with holding period shorter.

As for Historical Simulation, it's also easy to apply. In order to compute historical simulation the distribution of asset returns don't need any assumption. Also, volatilities and correlations among assets don't need to be calculated. Unlike in parametric approach, in historical simulation, according to previous researchers results " the fat tails of the distribution and other extreme events are captured as long as they are contained in the dataset". In contrast, it has some drawbacks such that it relies completely on a particular historical dataset and its idiosyncrasies. For instance, if we run a Historical Simulations VaR in a bull market, VaR may be underestimated. Similarly, if we run a Historical Simulations VaR just after a crash, the falling returns which the portfolio has experienced recently may distort VaR. Also, this methodology may not always be computationally efficient when the portfolio contains complex securities or a very large number of instruments.

Unlike historical simulation, Monte-Carlo simulation can estimate extreme events those might arise beyond VaR estimated during the simulation process. Also, complex instruments like options and derivatives can be modelled by Monte Carlo Simulation.

4.4. Results of Back testing

The results of the back testing show that the models are significant at 5% confidence level . The table 5 below summarizes the results of back testing for three banks stock returns.

Table 5: Back Testing for the stock returns of ADIB, DIB, and SIB

ADIB	
Var 99 -Delta normal	1 % UL-Historical Approach
-0.061371946	-0.089822775
Violations	
2	1
Expected violations	Observed (delta normal)
2.5	< 2
Probability of 2 or more violations	Confidence level
0.7142483	> 0.05
DIB	
Var 99 -Delta normal	1 % UL-Historical Approach
-8.62%	-0.099548
Violations	
0	0
Expected violations	Observed (delta normal)
2.5	< 0
Probability of 0 or more violations	Confidence level
0.9189415	> 0.05
SIB	
Var 99 -Delta normal	1 % UL-Historical Approach
-8.92%	-0.1065
Violations	
0	0
Expected violations	Observed (delta normal)
2.5	< 0
Probability of 0 or more violations	Confidence level
0.9189415	> 0.05

As can be seen from the table above, ADIB stock returns had 2 violations which was less than the expected violation of 2.5. On the other hand, DIB and SIB had no violations.

After that, we have applied Binomial distribution function to test for the validity at 5% confidence level.

The hypothesis was to accept the model if the result of Binomial distribution is more than 5% or else reject. Finally, the result for ADIB was 0.7142483 and for DIB,SIB was 0.9189415. Therefore, at 5% confidence level, we accept the model.

Chapter V
Conclusion and Recommendation

5.1. Conclusion

The aim of this paper was to estimate the Value-at-Risk of stock returns for three major Islamic Banks in UAE and compare VaR results among each banks' stock returns. There were used three VaR models to estimate stock returns, the variance-covariance, historical simulation and Monte Carlo simulation approaches. After that, in order to test the validity of the models, back testing was performed for the models used. Results of the all three models were different from each other in terms of all three banks' stock returns. In case of variance-covariance method, the most risky stock return was for SIB while least risky stock return was for ADIB. However, in the case of Historical Simulation, the most risky return was for DIB while the least was for SIB. Lastly, in case of Monte Carlo simulation, the most risky stock return seemed to be ADIB while the least SIB. Thus, it concluded that in general the least risky stock returns were for ADIB followed by SIB and DIB. Also, the results of the back testing were significant at 5 % confidence level.

Indeed, different methods did not give the same results which agrees by several authors, such as Aktham and Haitham (2006), Thomas J. Linsmeier and Neil D. Pearson (1996).

In conclusion, the reason that all three VaR models showed different results were because of the way models were calculated and used for VaR estimations. Every model has some advantages and drawbacks. Thus its usually big challenge for risk manager to decide which model is the best to choose.

5.2. Recommendation

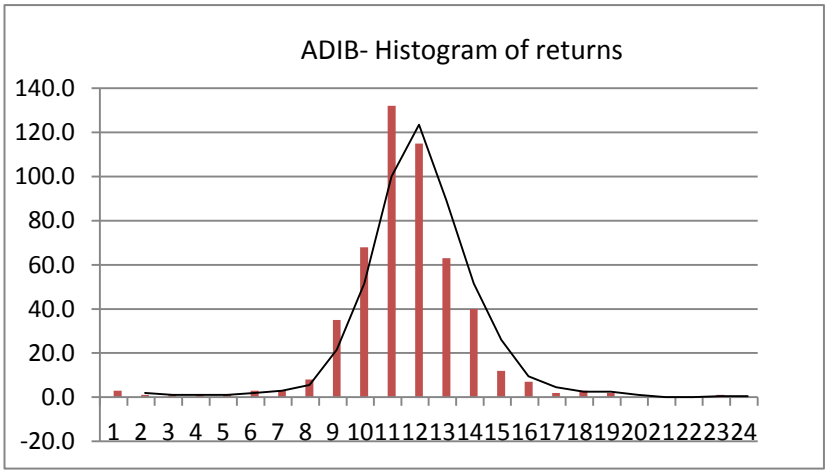
The paper tried to compare the Market Risk performance in Islamic Banks in UAE. In order to do that, three VaR models were applied for each bank's stock returns. The results revealed interesting conclusion such that three VaR models estimated were not same. This might be due to the complicacy of different models used. Also, there were some limitations while doing this research study. One of the limitations was the availability of the data. Data were chosen according to its availability. Second one was the time constraint for the research and the advanced knowledge of the author in financial engineering.

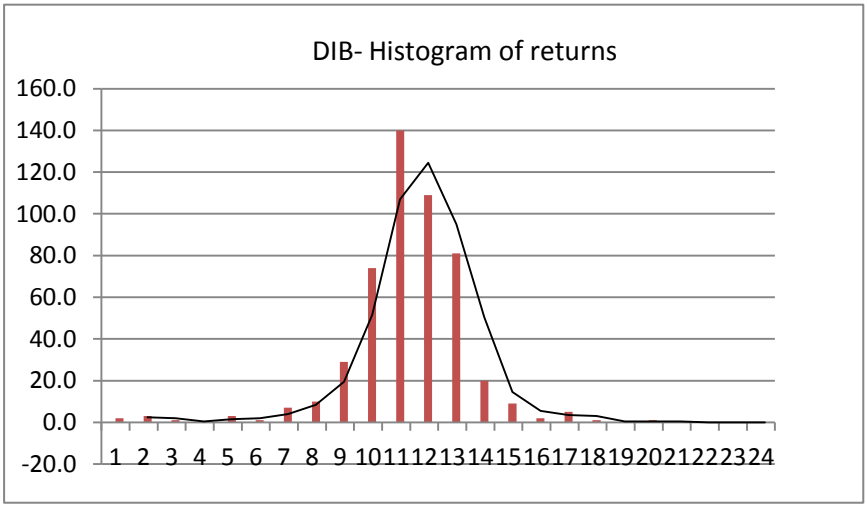
Further research could be followed to improve this study. First, since this study is focused on only some Islamic Banks in UAE, the future study might be more broad and include the all Islamic Banks in UAE and compare with the other regions' Islamic Banks. Second, it would

be interesting to use more advanced models of VaR such as GARCH and APARCH. Finally, some other validation test could be used to test the model as well such that The Failure Likelihood Ratio Test (Kupiec Test),Conditional Testing (Christoffesen Test) and Quadratic Loss Function (Lopez Test).

Appendix

Figure 7: Histogram of Returns for ADIB, DIB, SIB





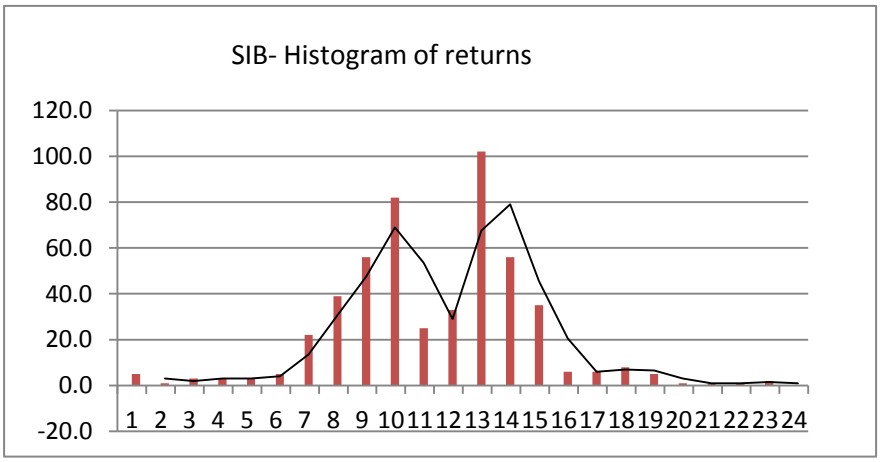
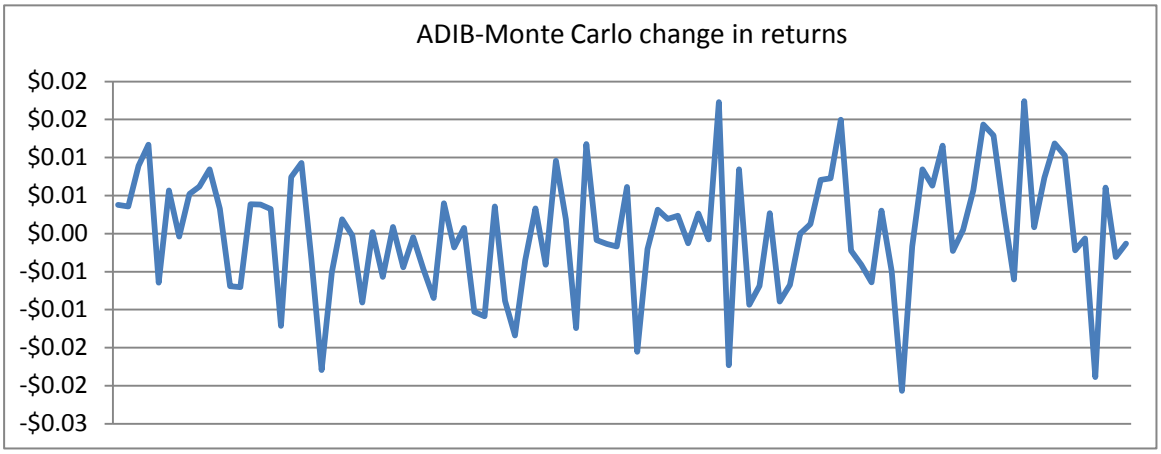
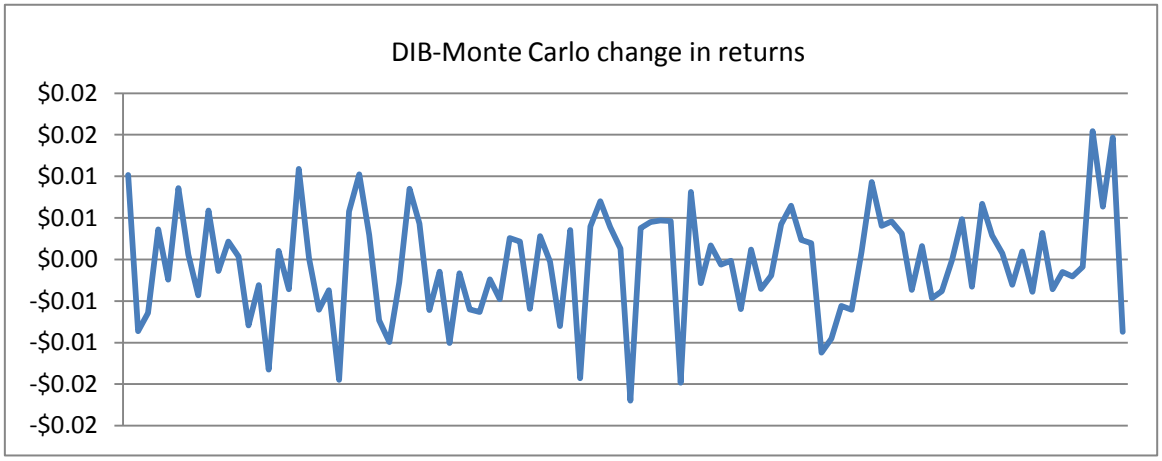
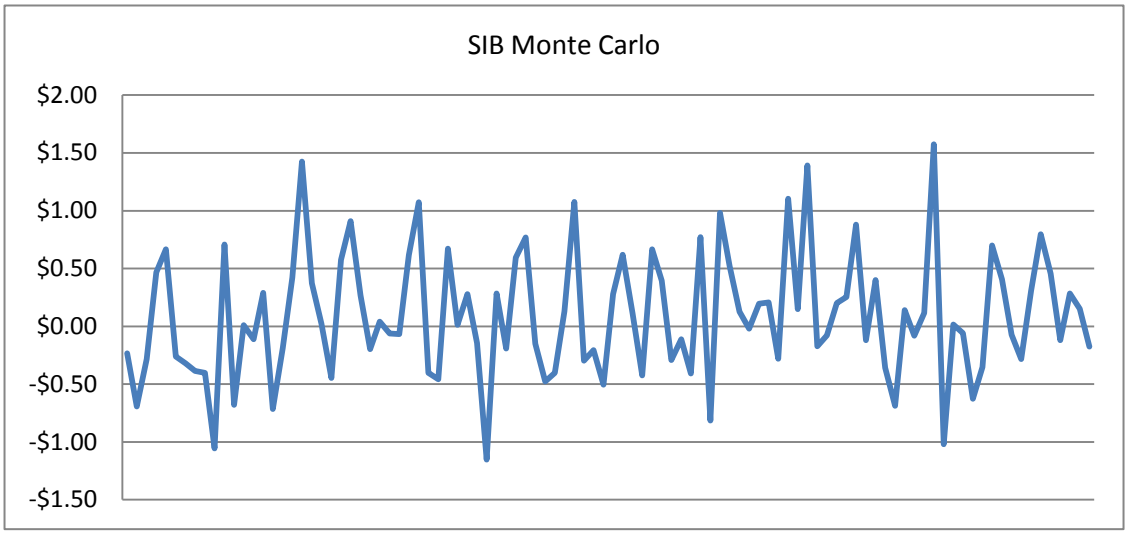


Figure 8: Monte Carlo Simulation returns for ADIB, DIB and SIB







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