Dynamic linkages between Islamic and Conventional Indices: Case Study of Malaysia Islamic banks and Conventional Banks

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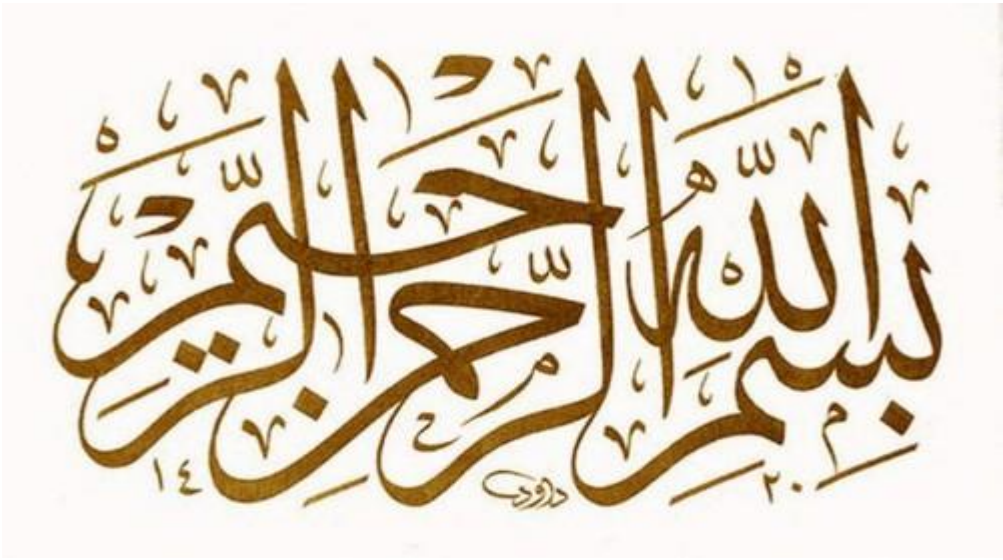
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(Farhan Siddique)

Abstract

The main purpose of the study is find the dynamic linkages of the Islamic (Banks which follow Sharia's Laws) and conventional Banks (which follow the central bank). The study is also made to find the spillover effect of conventional and Islamic banks of Malaysia. First we elicited that there is volatility in the data and to handle this volatility ARCH and GARCH models are used. Time series data of consecutive 7 years was used from January, 2009 to December, 2016. Purely random sampling is used in selection of those conventional and Islamic banks who were listed in security exchange commission of Malaysia. Sampling of the Islamic and Conventional banks was purely random but they were all listed in security exchange commission of Malaysia. Data of five banks were taken from each sector (Islamic and Conventional). Results shows that risk and return of Islamic banks is clearly higher than its counterpart Conventional banks and the performance of the Islamic banks is significantly better than conventional banks. Finally it is found that Islamic banking is better than Conventional banks for investment.

Key words: Dynamic linkages, volatility, random sampling.

Dedication

Dedicated to My father Chaudhary Siddique who put it altogether and many more ...

Mian Farhan

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Chapter 1

1. Introduction

As the world population increasing day by day, and with this massive increase in population financial institutions need of the population also increasing. To fulfill their financial needs banks in different forms also come into existence. In ancient world, banking was started with the prototype banks of merchants and they provide loans to farmer and traders who carried goods between cities. The modern banking was started from medieval and early renaissance Italy and modern banking including the issuance of banknotes was started in 17th and 18th centuries. After the global financial crisis's regulators force banks to issue contingent convertible bonds to save the account holders. But unfortunately bankers and other financial experts are failed to make such a mechanism which can protect customers from the catastrophic financial crises.

The basic purpose of this study to find the dynamic linkages between Conventional and Islamic financial Institutions. For this purpose we can check the spillover effect between the Islamic financial institutions and Conventional financial institutions.

Islamic banking is a recent introduced mechanism or we can say that school of thought which provide such a system in which banks share a business with their customers and accounts are based of profit and loss sharing account. In this way of banking no bank can be defaulter even during any financial crises. Islamic banking or Sharia compliant finance is actually a banking or banking activity that is in accordance with Sharia. As conventional banking is purely based on interest based banking and in Islam Interest (Riba) is strictly prohibited in Islam and that's why there is no germs of interest in Islamic banking and no *Haraam* business (e.g. alcohol and pork) is allowed Islamic banking. In various Islamic countries these restrictions have been applied in varying degrees before 20th century but during 20th century, formally first time Islamic banks was formed to apply the Sharia's principles to private and semi-private commercial institutions.

Currently as of 2014, Islamic financial institutions is of 1% of total world assets and total asset of $2 trillion were Sharia-compliant and it growing faster than conventional banking (The Economist, 2009; Naveed, 2014). From 2009 to 2013, annual growth rate of Islamic banking was 17.6% and it is expected to grow this by an average of 19.7% per year to 2018 (The Economist, 2014).

Prohibition of riba was a well-established working principle integrated into the Islamic economic system during the time of caliph Umar (Choudhury and Malike, 1992).

During the 5th decade of 20th century, some prominent Islamic scholars like Maulana Maududi, Muhammad Hamidullah and Naeem Siddiqi recognized the need of the Islamic bank to get rid of great evil (Interest) and based on the concept of Mudarabha, which is a relationship between two parties in which one party contributes capital and other party provide their expertise to earn profit and which is divided at an agreed ratio (such as 50:50). In history of Islam Muhammad (P.B.U.H) was the first Mudarabh, who traded for Hazrat Khadija (R.A).

The first local Islamic bank was established in a rural area of Pakistan in 1950's which charged no interest on lending (Wilson, 1983). The influx of the "general re-Islamization" and "petro-dollars" following the oil crises of 1973 and Yom Kippur war, provide great help to build such Islamic bank and just in 2 years it was spread globally. The first modern Islamic bank was Dubai Islamic Bank which was established in 1979. By 2015, the market of Islamic bond *Sukuk* has become so strong that many non-Muslim majority countries like UK, Luxemburg and Hong Kong also issued *Sukuk.*

1.1 Types of Islamic Lending

In Conventional Institutions have only one product: That's name is Debt. In Islamic Financial Institution have six product (Hamed, 2011). These sre,

1) Mudardara
2) Musharka
3) Murabaha
4) Ijara
5) Salam
6) Istisna

Each Islamic financial product is backed by a particular real asset. Therefore, it is believed that Islamic financial products are less risky and robust to risky conditions.

1.2 Significance of this study:

Islamic financial institutions are more reliable as compare to the conventional financial institutions. In present time no signal Islamic bank got default or bailout etc. This study help for domestic and foreigner investor for choosing appropriate institution for investment, Islamic financial institutions are more reliable and faster growing than its counterpart (IMF, 2016).

1.3 Research objective:

The main objective of the study is to compare the financial banking system of conventional and Islamic banking system. Sub objectives of the study are

1) To calculate and Compare the risk of Islamic financial institution with conventional financial institutions.
2) To calculate and compare the return of the Islamic financial institution and conventional institutions.
3) Check the Spillover effect between Conventional and Islamic financial Institution.

1.4 Research Question:

1) Which one financial institution better for investment, Islamic or Conventional?
2) They effect each other or not.

Chapter 2

2.1 Literature Review

This part of the study is to bring the review of the quality research which have done before in this part both national as well as international studies have been incorporated. During the last few decades different Islamic countries (OIC) marked revival of Islamic fundamental values in several countries, Malaysia was also in one of these countries. With the revival of these Islamic values, Muslims also start trying to bring a system which is halal and not contradictory with Shari'a. The fundamental principle of Islamic finance and banking is the prohibition of "Riba" (Interest). The Holy Quran (The holy book of Islam) is very explicit in prohibiting interest based transactions, roughly translated the verse 278-279 of Chapter 2 of holy Quran states that " O you who believe! Observe your duty t Allah and give up what remains from Riba, if you are believers, if not, then be warned of war from Allah and his Messenger". Islamic banking system operates under the general principle of profit-loss sharing account which effectively transform banks into equity based firms.

Conventional banking system is purely based on interest based financial and banking system. Many western economic and financial writers also raised questions the viability of western banking system (Pryor, 1985). Some prominent economist like Kindleberger (1985) and Simon (1948) have proposed a banking system which have resemblance to a large extent that of Islamic banking system. The practice of conventional banking of paying the predetermined fixed interest, regardless of whether or not a bank is performing good and interest free system can save banks from instantaneous potential asset shocks and Islamic banking system can provide shelter against bank failure and financial instability (Darrat, 1988). Similar results was elicited by Habibi (1987) based on Keynesian-type macroeconomic model.

Deng *et.al* (2011), find out the Bank Productivity Effect in Malaysia during 2001-2008. Study shows that average total factor productivity (TFP) is 1.4%, which is mainly due to the efficiency change of 3.3%. Total factor productivity does not always keep increasing as the technology improved. To improve the performance in long run, more attention should be given to the effect of internet in banking sector. Finally, some engineering management techniques are proposed to overcome the common problems which is faced during data analysis time.

Different comparative studies have also done to compare the efficiency of Islamic banking industry and traditional banks in many countries. Islamic banking is evolved in recent years and according to International Monetary Fund (IMF) Islamic baking is growing with the pace of 14% per annum. Even though Islamic banking is less efficient as compared to their conventional counterparts (Hassan, 2006). Ariffin, (2012), provide us a deep understanding on issue relating to liquidity risk management by the Islamic banks in his paper "Liquidity risk management and financial performance in Malaysia". Results shows that financial crisis has little impact on the extent of liquidity risk in the Islamic banks.

Some studies also done to check the impact of global financial crises of 2008 on Islamic and Conventional indices. Islamic index did not exhibit lower volatility than its counterparts during global financial crises of 2008 (Miniaoui *et.al*, 2015). In this study data of six Gulf Cooperation Council (GCC) countries as well as Jones Islamic market Indices was taken. The financial crises only effect the mean return of Bahrain and effect the volatility of three GCC countries Kuwait, Bahrain and UAE while impact on other markets was insignificant. But why the global financial crises occur and can Islamic finance help minimize the severity and frequency of such a crises in future? Chapra (2008), investigated that one of the crises was the lack of adequate market discipline in the financial system which leads to excessive lending and high leverage and ultimately the crises occur. This study finally concluded that Islamic finance stands for, can help inject greater discipline into the system and thereby sustainability reduce financial instability.

Various studies tried to investigate the determinants of profitability but no study could determine the profitability of Islamic banks but a study find out that internal factors such as liquidity, total expenditures, percentage of the profit-sharing ratio between the bank and the borrower of funds and funds invested in Islamic securities are highly correlated with the level of total income received by the Islamic banks. Similar effects are found for the external factors like size of banks, market shares and interest rates (Haron, 2004).

In Asia growth of the Islamic finance is led by, Pakistan, Bangladesh, Brunei Darussalam, Indonesia, Malaysia, Hong Kong, China, Singapore and Thailand. Global Islamic financial services have grown substantially over the last few decades and the assets of Islamic industry have grown from $150 billion in 1990 to $1.9 trillion as of the 2014 and its double digit growth shows that it is likely to become the fastest growing financial sector in the world (Grewal, 2015).

Islamic finance can synthesize close equivalents to equity, mortgages, and derivatives known in conventional finance. In some Islamic countries like Iran and Sudan, the banking system is completely based on the principles of Islamic financial principles. As the role of Islamic finance is increasing the literature of the Islamic banking is also growing. A large part of the literature contains comparisons of the instruments used in Islamic and commercial banking (Sole, 2007; Cihak and Hesse, 2008).

In a recent study, Choong and Liu (2006) argue that Islamic banking, at least as practiced in Malaysia, deviates from the PLS paradigm, and in practice is not very different from conventional banking. The authors therefore suggest that for purposes of financial sector analysis, Islamic banks should be treated similarly to their commercial counterparts.

Asutay (2007), find out the social failure of Islamic Banking and Finance and concluded that Islamic banking and finance needs to move into the third stage of development through the institutionalization of social banking as a second best solution in overcoming the social failure of IBF and in creating value-added for capacity building and social justice.

Since its inception the number of Islamic institutions have risen from 1 in 1975 to more than 300, Bahrain and Malaysia are the biggest hubs. This study suggests that the unique issues which Islamic financial institutions are facing can be overcome if multilateral cooperation of concerned central banks enhanced (Qorchi, 2005).

Cihak and Hesse (2008), find out the financial stability of Islamic banks and concluded that small Islamic banks tend to be financially stronger than small commercial banks and small Islamic banks tend to be financially stronger than large Islamic banks but large commercial banks tend to be financially stronger than large Islamic banks. And share of Islamic banks does not have a significant impact on the financial strength of other banks.

Furqani and Mulyany (2009), investigated the dynamic interaction between Islamic banking and economic growth of Malaysia. In this study time series data of total Islamic bank financing and real GDP per capita, fixed investment and trade activities to represent real economic sectors were used. Results shows that when gross domestic product increases then Islamic banking develops and not vice versa.

Rashwan (2012), estimated that how listed Islamic and Traditional Banks Performed: pre and post the 2008 financial crisis? This study is actually made to check if there is any difference in the performance of Islamic and traditional banks in pre and post financial crises of 2008. Results shows that there is significant difference between traditional and conventional banks in 2007 and 2009 but there is no difference in 2008 which shows effect of crises on both sectors. This result indicates the spread of the crisis to the real economy where IBs usually operate.

Tarmizi (2010), find the Profitability of Islamic Banks in Malaysia: An Empirical Analysis. For estimations researcher used OLS method for estimations. Results shows that capital and asset quality have an inverse relationship with bank profitability while liquidity and operational efficiency have a positive influence and finally it is elicited that both inflation and growth domestic product have positively influenced the bank profitability.

Camilleri (2005), Analyze the profitability, risk and growth indicators of banks operating in Malta. Results shows that, smaller institutions generated comparatively more revenue; they were more capitalized in relative terms, were relatively more provisioned against loan losses and held a higher proportion of liquid assets.

Errico and Farahbaksh (1998), analyzes the implications of Islamic precepts on banks' structure and activities, focusing on banking supervision issues. It points out and discusses these issues in the context of a paradigm version of Islamic banking, as well as in frameworks that fall between the paradigm version and conventional banking. The case of Islamic banks operating in a conventional system is also examined.

Sole (2007), find out the impact of introducing the Islamic Banks into Conventional Banking Systems. Results shows that Islamic banking has been making headway into an increasing number of Western countries. As in Islam interest and interest rate are prohibited, so Islamic finance is a 100% reserve banking system and capital is influenced by equity. The rate of return is not fixed and it is determined on profit and loss basis and money is not influenced by interest based credit. Authors of the Chicago plan (1933) considered a 100% reserve based economy the only system capable of securing financial stability and steady full employment. The 2008 financial crisis indicates that an interest-based system is unstable (Askari *et al*., 2010; Minsky, 1986).

A study in Malaysia was done to check the performance of Islamic bank during 1984-1997: An exploratory study. And in this study it is found that Bank Islam Malaysia Berhad (BIMB) is more liquid and less risky as compared to a group of 8 conventional banks (Samad and Hassan, 1998).

Samad (2004), check the performance of interest free Islamic banks and interest based conventional banks of Bahrain in terms of profitability, liquidity risk and credit risk. Nine financial ratios are used in measuring these performances. Results shows that there is no major difference in performance between Islamic and conventional banks with respect to profitability and liquidity but there exists a significant difference in credit performance. There is a question that are Islamic banks performing well even during financial crises. Islamic banks suffer slight inefficiencies during the global crises 1998-9. Efficiency differences across the sample data appear to be mainly determined by country specific factors (Yudistira, 2003).

Mohamed *et. al.* investigated the efficiency of Conventional versus Islamic banks and cost and profit of 80 banks (37 conventional and 43 Islamic banks) in 21 OIC countries is elicited using stochastic Frontier Approach. Findings suggests that there are no significant difference between the efficiency of both conventional and Islamic banks and overall the results are in favor of Islamic financial system. Conventional banking profits are based on the gap based on the purchasing deposits from the depositors at low interest rate and reselling those funds at higher interest rate (Santos, 2000).

Islamic baking is very much practiced like modern conventional banking with some restrictions imposed by Shari'a. Major difference between conventional and Islamic banking exists in operations but investment and financing options available to Islamic banks are limited in comparison with conventional banks. Though Riba (Interest) is strictly prohibited in Islam and this is the reason that Muslims are trying to build a setup accordance with the Shari'a but non-Muslims are also looking toward such financial systems after the recent financial crises of 1998 and 2008. But due to ignorance people both Muslims and Non-Muslims prefer to deal with conventional rather than Islamic systems (Sultan, 1999).

Islamic Banks allocate a greater share of their assets to financing activities compared to conventional banks. Islamic banks are better capitalized, its asset quality is higher and it is less likely to disintermediate during crises. The performance of Islamic banks during the last financial

crises of 2008 was also higher than its counterparts of conventional system in term of higher capitalization and better asset quality. Impact of current crisis on Islamic banking and finance is less marked as compared to conventional finance and it yields higher return on Islamic Investment. Islamic system reduce systemic risk and generate significant diversification benefits.
In risk and stability small Islamic banks in Muslim dominant countries have lower credit risk than conventional banks. Loan quality of Islamic banks is less responsive to domestic interest rates as compared to its counterparts and Islamic banks also charge rents to their customers for offering Shari'a compliant financial products (Abedifar *et. al*. 2013).

If we make a sight at the determinants of profitability of Islamic banking then it will come to know that loan-to-asset and high capital are the main determinants which influence the profitability of Islamic banks while controlling the macroeconomic environmental and market structure. Implicit and explicit taxes affect the bank performance negatively and macroeconomic conditions impact performance measures positively and it shows a strong positive correlation between profitability and overhead (Hassan, M. K. and Bashir, A. H. M.).

Chapter 3

3 Conceptual frame work of Islamic finance

3.1 Introduction

In this chapter I shall briefly discuss the Islamic finance, and how can we differentiate Islamic banking from conventional banking?

Islamic financing is completely different from conventional financing. Islamic finance is financing back of real asset. According to risk theory more risk or more return (F. B. Hawley offered his "***risk theory*** of profit" in 1893). All Islamic financial institutions financing on risk sharing principle.

The first part of this section discuss the brief history of Islamic finance and growth of Islamic finance. Second part discuss the prohabitation of Islamic finance, third part discuss the basic principles of Islamic finance. Forth part discuss the choosing criteria and fifth part discuss the Islamic financial institutions are more reliable for investment.

3.2 History of Islamic finance

We saw the Islamic fiancé may be modern phenomenon, but Islamic finance is as old as the religion itself with its principles primarily derived from the Quran, which was revealed some 1400 years ago. But In modern time we have been introduced modern tools and products on the basics of old Islamic financial principle.

Today all Islamic financial institutions full fill the desired of modern financial market. It consists of banking, capital forming, capital market and all types of financial intermediation working under sharia complaints. Islamic banking is completely Riba free banking. In Islam Riba is prohibited. Allah said in Quran, (AL –BAQRA) -2:278

"O you who have attained to faith! Remain conscious of God. And give up all outstanding gains from usury, if you are [truly] believers".

All kinds of Riba is prohibited in Islam. Islam clearly told about Riba, maysar and gabling is prohibited. In 1963, the Mit Ghamr Saving Bank in Egypt was opened, becoming the first modern Islamic Bank, Also in 1963, the Pilgrims Saving Corporation of Malaysia although not a bank began to incorporate basic Islamic banking concepts, In 1975, the Islamic Development Bank opened in Saudi Arabia and gave the Islamic finance industry an international presence. It recruited member countries and then offered them financial products to promote economic and community development. In 1979, the first Islamic insurance (or *takaful*) company the Islamic Insurance Company of Sudan — was established. (Muslims cannot purchase conventional insurance products because those products involve interest-based transactions, uncertainty, and gambling, which are all prohibited by Islamic law), Also in 1990, the Islamic bond market emerged when the first tradable *sukuk* — the Islamic alternative to conventional bonds were issued by Shell MDS in Malaysia, In 2002, the Malaysia-based Islamic Financial Services Board (IFSB) was established as an international standard-setting body for Islamic financial institutions, In 2004, the Islamic Bank of Britain became the first Islamic commercial bank established outside the Muslim world.

In this time almost 75 countries opened Islamic bank in world. In total more than 500 Islamic financial institution have been established worldwide since the 1970, including about 300 Islamic banks, in past two decades the Islamic finance industry has averaged growth of 14 percent per year.

Islamic financial institutions growth rate more from conventional Banks. All Islamic banks operating according to sharia complains. Sharia complaints used three main sources.

These three basic sources of sharia complain.

1: Quran

2: Hadith

3: Ijma

3.3 Fundamental principles of Islamic finance:

Islamic finance is totally different from conventional finance. Islamic finance stand on Doctrine's principles of Islam. Principle of Islamic finance prohibited of conventional system. These basic prohibited in Islam.

3.4 Prohibition of Riba:

This is the basic difference between Islamic finance and conventional finance. Islam against Riba (Interest). Conventional finance basically stand on Riba, but Islamic finance stand on without Riba. We can asked prohibition of Riba is the basic of Islamic finance. In many time God told in Quran Riba is Haram. Many of scholars gave different definitions of Riba, Some asked excess of amount is called Riba. Some scholar asked Riba term was not in introduced in Islamic era, so we rethink the concept of Riba. But mostly Islamic scholar was cleared on "Any amount of money received excess of original money without any enterprenual skilled". This is the simple definition of Riba.

There are twelve time dealing Riba in Quran, the word Riba occurred in eight time in Quran. Allah said in Quran Al-baqrah

> *"Those who swallow usury cannot rise up save as he arises whom the devil has prostrated by his touch. That is because he say: trade is just like usury; where Allah permits trading and forbids usury. He unto whom an admonition from his lord comes and (he) refrain (obedience thereto), he will keep (the profit of) that whish is past, and his affair (henceforth) is with Allah. As for who return to (usury)…. Such are rightful owners of the fire. They will abide the therein".*

Mostly Muslims scholars divided Riba in three kinds, these are.

1) Riba an-jahiliya
2) Riba an-nasiya
3) Riba al-fadl

3.4.1 Riba an-jahiliya:

This kind of Riba mean In Islamic era was old that time people have no knowledge people made money “doubled or redoubled”. That time people don’t know the term of Riba, May be people used Riba for trade of money. Some scholars told that time people have no knowledge about consequences of Riba. Due to this people make money easily double without any effort.

3.4.2 Riba an-nasiya:

This kind of Riba mean excess of charge of actual amount. Some scholars told if we charge genuine amount or some amount on actual amount is halal, and it ok. But Quran or all Hadith told Riba is haram may be one percent or may be two hundred percent. So this kind of Riba also haram. Sharia cleared about this kind of Riba.

3.4.3 Riba al-fadl:

This is deal with sale or barter etc. This deal unequal qualities or quantities, some people used this kind of Riba for high charges. For example one person storage all wheat. Market show shortage of wheat that person want to charge more on wheat. This is also haram.

3.4.4 Consequences of Riba:

There are many consequences of Riba but I discuss here some main.

1) Money goes to some hand.
2) People treat as slave.
3) Rich people forgot God.

1) Islam is completely cleared about Riba and Riba consequences. Due to this Islam resist on Sharing of profit and loss. Due to sharing of profit and loss people trust on financial Institutions. Due to sharing of profit and loss financial Institutions earn more.

2) Capital diversification its mean Financial Institutions invest in more places and Risk of financial institutions went to minimize. Another aspect sharing of Risk default ration of Islamic bank is minimum. All conventional banks gave guarantee to fix depositor to give back money.

3) Due to investment of many portfolio's Islamic banks asset increases and banks total efficiency Increases. Islamic banks deals only in real assets.

4) Proper utilizations of funds and proper check and balance created equal justice between fund provider and fund user. In conventional banks have no justice, Conventional banks don't share risk to others.

3.5 Maysir (Gambling):

Maysir is prohibited in Islam. Maysir or (Gambling) simple mean game of chance. Because mostly people loss all wealth in chance. Allah said in Quran Al-baqara 2:219

They ask you about wine and gambling. Say: 'In them both lies grave sin, though some benefit, to mankind. But their sin is more grave than their benefit.'

Islam clearly told Maysir is haram. Maysir concept create greediness in human behavior, due to this human loss all wealth in gambling. Modern era is called technology era in this era people used technology for gambling. For example computer etc. This also haram according to Quran. In conventional Banking all derivate working on the basis game chance Sharia complained banned all this kind of derivate.

One more term used "Qimar" this also prohibited in Islam. Its mean some people collect money any one got benefits with chance. Cost bear others and someone got benefit. We can aske Qimar is the subset of maisir. Lottery or all these kinds of products to give financial benefits they all prohibited in Islam.

3.6 Gharar (Uncertainty):

Gharar deals the uncertainty, due to gharar lack of control in financial contracts. Literally "deception danger, risk and excessive, uncertainty

Uncertainty (ambiguity) it's mean one face more risk with the lack of information or knowledge he faced loss is called gharar.

Islam is clearly told gharar is prohibited. All kinds of gharar is prohibited. If we saw the all conventional contract almost all don't discussed all information, for earning opportunity. They all involved in minor gharar. Islam is not gave this kind of permission to hide some information to

other. In Islamic finance basic Doctrine of this principle don't hide anything in financial contract. Some main disadvantages of gharar are,

1) Lack of trust in contractual parties.
2) Due to gharar mostly business people shut down.
3) All capital went to drown due to gharar.

Due to gharar some main financial essential things hide in both parties financial contract has broken. Gharar in involved in all kinds of contracts for example organization made one product. That product sale in market but don't tell the some bad feature people used one time but don't use again and again. In sharia'h, contract is considered as void in the existence of gharar may be minor or may be major. Sharia complaints is clearly told all aspects of financial contracts to show both of parties. Nothing hide every single or little aspects in financial contract. This act eliminate the uncertainty in both of parties. Every single elements of ghrar make the cause of broken financial contracts. If we control the ghrar in financial contract we will able to mature the financial contract.

How can we eliminate ghrar in financial contract? Gharar can be eliminated through the additions of the other elements. First thing is nothing hide any information in financial contract. Second thing if we controlled the gharar almost we controlled the risk of contract broken, we can do if we are sharing of all kinds information's with both of parties. We can asked ghrar term associated with term Risk. Risk of financial contract with all parties. Its mean we controlled the gharar we controlled the risk or financial contract.

3.7 Conclusion:

Islamic finance is prohibited these all things we discuss in above. If we eliminate these things it's more beneficial for financial institutions and market.

3.8 Distinct feature of Islamic finance:

Islamic finance is using tools for financing is completely different from conventional finance. Conventional finance is operating with only one tool. That is called debt (Hamed, 2009). Islamic finance have six basic tools. These are,

1) Mudarabaha
2) Musharkaha

3) Murabaha
4) Ijara
5) Salam
6) Istisna

3.8.1 Mudarabaha:

Mudarabaha is the one of financing tool of Islamic fiancé. Mostly used this tool and made different products of Islamic finance. In which mudarabaha two parts, one of mudarab and other one is entrepreneur. Mudarab is the financial provider and other one is provide entrepreneur skills. They decided in first which ratio of profit divided in both two parties.

But in mudarabaha one main character sticks is If business bear loss all loss goes to mudarab (Finance provider) and other is loss is only entrepreneur skills and time.

Entrepreneur is only bear loss of time and reward. No financial liability on entrepreneur. Mudarab bear all financial loss.

Islamic bank is not provided fund in direct but Islamic bank invest in term of real asst. So the Islamic bank used mudarabaha to invest in real asset. Mudarabaha is the best tool of Islamic financing to earn more profit. In conventional banking, Conventional bank gave direst funds. Mostly time people misused these funds. In return in profit is nothing but conventional banks bear huge loss. Due to different feature of mudarabaha conventional banks does not used this products.

The main feature of mudarabaha is: mudarab have full right to check all time business activities and all financial matters.

3.8.2 Musharka:

Musharka is another tool of Islamic finance. Musharka is another tool used in Islamic finance. There are many numerous hadith's available in different books of hadith about Musharka. Used of musharka many products made by Islamic finance. For example all pools of money used by musharka. Musharka have two main parts, Numb one they decided all partner in first how much invest in this pool or business. Musarka have two main things.

1) In first they decided how much invest in business.

2) In first they decided ratio of profit and loss.

In musharaka have main feature is all decided in first how much invest in first and also decided profit and loss ratio's. In musharaka all parties liable for preplanned profit and loss rations. All mutual funds working on base of musharka. Musharka basically used concept of sharika. They all decided in first in musharka.

3.8.3 Murabaha:

Murabaha is another tool of Islamic finance. Some more concept working same like murabaha.

1) Mushwama
2) Tawarruq
3) Mudarbaha
4) Bay Ul Tawan Aaijl

These all concept working on principle of Pre-payment. They decided the product in first all feature and delivery date or gave payment in first. Both of parties agreed about all kinds of feature and qualities or characteristics of product etc.

In murabaha all characteristics decided in first al prices or gave payment in first. But main feature is product on delivery date is necessary full fill the characteristics day first decided. If product is not full fill the decided characteristics day first on delivery date all loss went manufacturer. Manufacturer is liable for pay back all and bear all loss if they failed to full fill requirement, all kinds of requirement decided in first. In murabaha gave payment in advance but capital provided have all rights.

Mani characteristics is everything decided in first and gave payment in advance. If anything want to change in contract this will be possible only with cooperation with both of parties. If both of parties agree then changed.

3.8.4 Ijara:

Ijara deals with all products of rent base. Ijara replace with term of leasing. In conventional finance used term leasing. But In Islamic finance used term Ijara. Ijara is completely different from leasing. Ijara working base on ownership concept. Islam gave permission to Ijara. Ijara is working if any

one need product for example car, Any Islamic financial institution provided that product but owner ship consist name of financial institution name. Two main things saw in ijara contract,

1) Rent matter.
2) Ownership.

In Ijara rent matter decided in first and ownership still name of provided. They have no rent payment change in whole contract, they vailed in completion of time. If anyone delay payment or rent no extra charge on as delay fees. After completion of time or rent payment ownership transferred to rental as gift. During whole process ownership of asset does not change. After completed rent payment ownership of asset change as gift.

3.8.5 Salam:

Salam is another Islamic financing tool, its deal all sale contract. Salam have some main features,

1) Payment in advance
2) Delivery in differed.

Islam gave permission this kind of contract, Payment gave in advance and product delivered in differed. All payment matters or product qualities decided in first, if anything want to change only possible with mutual cooperation. If anyone does not want change in contract anything it's not change in real sense. Its only change with mutual collaboration.

3.8.6 Istisna:

Istisna is also used in Islamic finance for financing. Istisna contract is related mateer of manufacturer. Islam gave a permission of Istisna. Istinsa have main feature is gave payment in differed and in installment.

1) Manufecture related contract
2) Payment in Installment in differed or completion of stages.

3.8.7 Conclusion:

Islamic finance used this six basic principle for financing. We can asked Islamic finance have six tool for financing. These all tools more reliable as compere to conventional finance.

3.9 Unique Risk nature of Islamic finance:

Risk sharing is the unique feature of Islamic finance mode. Islamic finance and conventional finance sharing risk is completely different. Practically, asset side of Islamic bank's balance sheet profit and loss sharing modes (mudaraba. Musharaka), fix income modes (Murabaha,salam, istisna) and leasing mode is Ijara. All financial funds uses these modes of Islamic finance. On the other side is balance sheet is liability side. Islamic finance also used in this time two type of accounts (current and saving). Liability side in Islamic banks is deposit of customer and deposit foe investment. Bank reliable all time to give on demand of customers. If we saw present risk sharing mode investment we don't see risk sharing. But we see the profit may be different from different every month.

In Islamic finance have no concept of debt, yes but In Islam gave concept of Qurd- Hassan. Qurde-hassan is mean you gave loan to needy person but in future you will back only original amount. Islam didn't give permission to charge any extra amount on actual loans. Islam told if you charge extra amount on loan its burden of that person and it's against humankind. Doue to extra charge poorer goes to poorer. And Rich goes to richer. Conventional loan create gapes between poor and rich. Islam prohibited all kinds of loans.

Risk sharing concept of Islam is unique. Conventional finance does not share risk. All conventional financial institutions want to earn more but without risk sharing. All Islamic products change the risk sharing dimension at each phase of their working process. Islam against the one sided risk. Due to risk sharing all parties behave as responsible and putt all effort to want success.

3.10 Credit Risk:

Islamic financial services board (IFSB) define credit risk for Islamic financial institutions "How can deal with situation if certain party failed to meet obligations in accordance with agreed terms and conditions". In Islamic finance services board (IFSB) told the way how can deal after failed to written agreed agreement does not full fill. Credit risk Islamic banks faced in all products of Islamic. For example if Islamic bank deal in Mudarbaha contract. Islamic bank only provided finance in term of real asset but other is putt entrepreneur skills. But all finance in term of real asset provider by Islamic banks. IFSB told the way how to treat after faced this kind of risk.

In Musharka contract of Islamic banks also faced credit risk. This contract both of parties faced same kind of risk. Murabaha contract is also involved risk. Ijara is leasing type contract but in which contract owner ship have banks of real assets due to this banks faced more risk. Due to Ijara cash flows of banks increasing or decreasing all time. But IFSB described the way how can treat with this risk?

In Salam or Istisna two deal with sale kinds of products, this is also faced credit risk. In Islamic banks provided only finance in real asset but lender is failed to delivery of products, quantity, and quality etc. This is also faced credit risk by Islamic banks.

3.11 Market Risk:

Market Risk faced by Islamic financial institutions two type.

1) Islamic or conventional
2) Islamic with other Islamic institutions.

First type of market risk is Islamic financial institutions faced by conventional financial institutions. Sometime conventional institutions offer very low rates of interest. This is big challenge for Islamic financial institutions. But same time Islamic financial institutions offered our products. It's very crucial for Islamic banks to survive in this situations.

Second one is Islamic banks with compete with Islamic banks for market capturing. This situations will be easy for handling this but first one is very tough to handling. Islamic banks offered almost same kinds of products. This is the best example of Islamic bonds (sukuk) or conventional bonds. If we compare the performance of two bonds Islamic bonds performance is better or original. But they offered different rate of returns.

3.12 Mark up and return Risk:

In latest report issued by (IMF2016 Growth of Islamic banks) in this report we saw 14 percent of growth in 2016. Its mean people more trust on Islamic financial institutions. But the same time Islamic banks faced serious issue of market mark up or fix return. Islam told clearly first decided which rate offered or not. But due competitions Islamic banks some time offered high rate or sometime low same like as conventional banks.

3.13 Price Risk:

Price Risk also two types. These are

1) Price Risk on products or commodities
2) Stock prices risk.

These two type of risk faced by Islamic banks. In first risk may be controlled able with management skills. But second risk is related to stock market. It's not easy to control. Stock market some time goes down and faced serious crisis. This effect also came in Islamic securities, and mostly prices went to down. First type of risk mostly saw in Ijara, Salam, and Istisna products. It may be solved able after negotiate with both of parties.

3.14 Currency Risk:

Currency risk mean Convert in one currency to another currency during this process bear loss is called currency risk. Mostly of time all currency depreciate or appreciate. Islamic financing facing this risk. It can be handle if we firstly decided the price of commodity within the currency.

3.15 Business failure risk:

In Islamic banks people perceive as same conventional banks. Mostly people deposit money for investment and expected same return want to get. Islamic banks invest in different portfolios as investment purpose but some gave profit or some gave loss. Those people deposited money they want to profit in all conditions. Due to diversification of investment in different business it's very difficult for Islamic banks to watch every business activates. Due to lack of grip in all business some may be give loss but people want all time profits.

3.16 Liquidity Risk:

Liquidity risk is challenge for Islamic financial advisors. Because if we compare the liquidity concept in conventional finance. Its main concept in (liquidity theory of finance) is those product convert is more easy to cash is called more liquid asset. But if saw in Islamic finance all financing in real asset. Asset has time taken to convert in cash.

IFSB still working on this issue. Islam actually consider money as an only used for medium of exchange. Money have itself no worth. Mostly scholars or Islamic financial analyst working on this issue. Sharia complaints also helping to resolve this issue.
Rifki Ismal, (2010 "Assessment of liquidity management in Islamic banking industry", International Journal of Islamic and Middle Eastern Finance and Management, Vol. 3 Iss: 2, pp.147 – 167)

In this paper finding we can eliminate liquidity risk with improve the management skills. We eliminate liquidity risk with improve management skills.

3.17 Operational Risk:

Everyone start business for seeking profit. Operational risk is very highly problem and mostly business failed due to this risk. In this book (Written by M Ainley, A Mashayekhi,R Hicks, Arahman, 2007, Islamic finance in the UK: Regulation challenges) Regulation is the big challenge for Sharia complaints. Islamic financing tools is totally different from conventional finance. It's very difficult to watch every transaction in banks. FSA need to check and all kinds of transactions in business.

Still working all sharia complaints to introduce with latest technology to check all kinds of transactions in Islamic banks. Mostly Islamic banks business failed due to lack of management skills. All financing in Islamic bank in real asset or term with of risk sharing, risk of banks increases.

3.18 Lack of familiarity Risk:

Mostly people don't know how to worked Islamic banks? People don't have much knowledge and awareness. Mostly people think may be Islamic banks operate same like conventional banks. Islamic banks give low rate of profit or different profit ratio's. In conventional banks fix rate of profit. IFSB working or Pakistan state banks also conducts seminar for awareness. Mostly people show fear to investment in Islamic banks.

3.19 Legal Risk:

Due to different tools of financing in Islamic banks people show fear to investment. Legal binding in Islamic finance is more from conventional finance. (Written by M Ainley, A Mashayekhi,R Hicks, Arahman, 2007, Islamic finance in the UK: Regulation challenges, chapter 2) Discuss the Islamic finance stand on Islamic laws. Mostly people don't understand the Islamic laws. Yes mostly Muslims understand the Islamic laws but mostly non-Muslims don't understand the Islamic laws.

Second argument about Islamic finance is all contracts in Islamic finance used by sharia laws. Non-Muslims have no knowledge about Islam.

Chapter 4

4 Methodology

4.1 ARCH (q) Model

First time introduced Autoregressive conditional Hetroscedastic (ARCH) model by Robert F. Engle in (1982). This model overcomes all previous model existed. In this model Engle, introduced conditional mean and conditional variance equations, empirically the conditional mean equation follows ARMA (p, q) process and the conditional variance depends upon the square of past values of error process ε_t.

The general description of ARCH model is

Conditional mean equation

$$R_t = \gamma_0 + \beta X_t + \varepsilon_t \quad \text{..... (3.3)}$$

Where $\varepsilon_t \sim N(0, \sigma_t^2)$

Conditional variance equation

$$\sigma_t^2 = \theta_0 + \sum_{i=1}^{q} \theta_i \, \varepsilon_{t-1}^2 \quad \text{..... (3.4)}$$

Where $\theta_0 > 0, \theta_i \geq 0$ i= 1,2,……., q

Explanation:

In conditional mean equation R_t represents the return which is linear function of X_t. $where\ \beta$ shows the vector of parameters. Empirically βX_t illustrates ARMA (m, n) process with different specifications. In some cases it may be ARMA (0, 0). According to the "Efficient Market Hypothesis (EMH)" R_t represents mean reversion behavior and it is unpredictable. In conditional variance equation the restriction on coefficients is that they must be non-negative.

σ_t^2 Represents conditional variance which depends upon lags of squared past value of ε_t process.

4.2 GARCH (p, q) Model

Linear ARCH Model faced some problems.Linear ARCH (q) model has some problems first, sometime takes long lag length 'q' due to this number of parameters are going to increase as result loss of degree of freedom. Second, non- negativity condition of parameters, due to resolve these problems. Generalized extension of ARCH (q) model Generalized autoregressive conditional hetroscedastic (GARCH) model, Proposed by Bollersley (1986).

The general description of GARCH model is

Conditional mean equation

$$R_t = \alpha_0 + \beta X_t + \varepsilon_t \qquad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{(3.5)}$$

Where $\varepsilon_t \sim N(0, \sigma_t^2)$

Conditional variance equation

$$\sigma_t^2 = \theta_0 + \sum_{i=1}^{q} \theta_i \, \varepsilon_{t-1}^2 + \sum_{i=1}^{p} \varphi_j \, \sigma_{t-1}^2 \qquad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{(3.6)}$$

Where$\theta_0 > 0, \theta_i \geq 0, \varphi_j \geq 0$

In GARCH (p, q) model the conditional variance depends upon square of past values of processε_t and lag of conditional varianceσ_{t-1}^2. The condition of non-negativity of parameter also applied in this model.

4.3 Data and sampling:

We took data of five Islamic banks and five conventional banks to full fill the objective of this study. For data collection we used random technique. We picked randomly five banks Islamic and five banks conventional. These banks are,

Islamic banks:	Conventional Banks:
1. Al Rajhi Banking	1. AM Bank
2. Public Islamic Banking	2. CIMB Bank
3. Affin Islmaic Banking	3. Hong leogn Bank
4. Bimb Holding	4. Malayan Bank
5. BNB Paribas	5. RHB Capital Bank

4.4 Screening criteria:

For screening data we used only those Islamic banks they are operating under sharia complaints. They are fulfilled the criteria of sharia complaints. And conventional banks almost operating same way. We took only those banks they listed in Security exchange commission.

Chapter 5

5.1 Result and Graph

Bidirectional spillover between AIB and conventional banks

Table 5.1.1Bidirectional spillover between AIB and AMB banks

Return series / Parameters	AIB to AMB ARMA(1,0) GARCH (1,1)	AMB to AIB ARMA(1,1) GARCH (1,1)
Conditional Mean Equation		
Constant α_0	0.0122 (0.0006)	-0.0002 (0.4469)
R_t π_1	1.0341 (0.0000)	0.6622 (0.0000)
AR(1) ϑ_1	0.0157 (0.0000)	-0.6743 (0.0000)
MA(1) $\emptyset_1$	0.4563 (0.0000)	0.6572 (0.0000)
Conditional Variance Equation		
Constant θ_0	0.0067 (0.0206)	0.0075 (0.0463)
R_t^2 π_2	0.0056 (0.0033)	0.0524 (0.0007)
ARCH(1) θ_1	0.0819 (0.0000)	0.0757 (0.0000)
GARCH(1) φ_1	0.7768 (0.0000)	0.0506 (0.0000)
Persistence of shock	0.9588	0.7864
Null Hypotheses(All Null Hypotheses are for nth order) AR (p) H0: ϑ_i= 0 No AR Process, MA (q) H0: $\emptyset_i$= 0 No MA Process, ARCH H0: θ_i= 0 No ARCH effect, GARCH H0: φ_i= 0 No GARCH effect, Mean spillover H0:π_1= 0 No mean spillover, volatility spillover H0: π_2= 0 No volatility spillover. Leverage effect H0: δ_i= 0 No Leverage effect. P-values are in the parenthesis.		
Residual Analysis		

Parameter / Series	Jarque Bera	Q-Stat (5)	Q-Stat (10)	Q^2-Stat (5)	Q^2-Stat (10)	LM -ARCH (1-2)	LM-ARCH (1-5)
S&P 500 to NASDAQ 100	265.04 (0.0000)	0.8830 (0.9631)	1.1501 (0.9993)	2.3059 (0.5000)	12.080 (0.2433)	1.3436 (0.4454)	0.3819 (0.8900)
NASDAQ 100 to S&P 500	30.067 (0.0000)	1.4821 (0.6634)	5.20171 (0.7432)	4.0905 (0.2914)	8.1283 (0.4310)	0.1667 (0.8464)	0.1510 (0.4104)

Null Hypotheses(All Null Hypotheses are for nth order)

Q-stat (return series) there is no serial autocorrelation. Q^2-stat (square return series) H0: there is no serial autocorrelation. Jarque-Bera H0: distribution of series is normal. LM-ARCH H_0: there is no ARCH effect. P-values are in the parenthesis.

Table 5.1.2Bidirectional spillover between AIB and CIMB bank

Return series / Parameters	AIB to CIMB ARMA(1,1) GARCH (1,1)	CIMB to AIB ARMA(1,1) GARCH (1,1)
Conditional Mean Equation		
Constant α_0	0.0034 (0.0028)	-0.0001 (0.4469)
R_t π_1	1.0551 (0.0000)	0.5457 (0.0000)
AR(1) ϑ_1	0.0017 (0.0050)	-0.7868 (0.0000)
MA(1) $\emptyset_1$	0.0450 (0.0120)	0.764348 (0.0000)
Conditional Variance Equation		
Constant θ_0	0.0065 (0.0206)	0.0065 (0.0163)
R_t^2 π_2	0.0044 (0.0633)	0.0322 (0.0007)
ARCH(1) θ_1	0.0619 (0.0000)	0.0857 (0.0000)
GARCH(1) φ_1	0.7768 (0.0000)	0.5506 (0.0000)
Persistence of shock	0.9588	0.7864

Null Hypotheses(All Null Hypotheses are for nth order)

AR (p) H0: ϑ_i= 0 No AR Process, MA (q) H0: $\emptyset_i$= 0 No MA Process, ARCH H0: θ_i= 0 No ARCH effect, GARCH H0: φ_i= 0 No GARCH effect, Mean spillover H0:π_1= 0 No mean spillover, volatility spillover H0: π_2= 0 No volatility spillover. Leverage effect H0: δ_i= 0 No Leverage effect. P-values are in the parenthesis.

Residual Analysis

Parameter / Series	Jarque Bera	Q-Stat (5)	Q-Stat (10)	Q^2-Stat (5)	Q^2-Stat (10)	LM -ARCH (1-2)	LM-ARCH (1-5)
S&P 500 to NASDAQ 100	330.44 (0.0000)	0.7831 (0.564)	2.3521 (0.6509)	3.3653 (0.5012)	10.181 (0.4331)	1.0703 (0.3235)	0.3818 (0.6760)
NASDAQ 100 to S&P 500	41.607 (0.0000)	1.45321 (0.5534)	7.3071 (0.5632)	4.0425 (0.3214)	8.1343 (0.4510)	0.2563 (0.8082)	0.9015 (0.5093)

Null Hypotheses(All Null Hypotheses are for n^{th} order)

Q-stat (return series) there is no serial autocorrelation. Q^2-stat (square return series) H0: there is no serial autocorrelation. Jarque-Bera H0: distribution of series is normal. LM-ARCH H_0: there is no ARCH effect. P-values are in the parenthesis.

Table 5.1.3Bidirectional spillover between AIB and HLB bank

Return series / Parameters	AIB to HLB ARMA(0,1) GARCH (1,1)	HLB to AIB ARMA(0,1) GARCH (1,1)
Conditional Mean Equation		
Constant α_0	0.0013 (0.0026)	-0.0003 (0.4269)
R_t π_1	1.0451 (0.0000)	0.6557 (0.0000)
AR(1) ϑ_1	0.04331 (0.0000)	.05432
MA(1) $\emptyset_1$	0.0757 (0.0000)	0.764348 (0.0000)
Conditional Variance Equation		
Constant θ_0	0.0045 (0.0406)	0.0078 (0.0343)
R_t^2 π_2	0.0036 (0.0643)	0.0224 (0.0007)
ARCH(1) θ_1	0.0619 (0.0000)	0.0877 (0.0000)
GARCH(1) φ_1	0.7768 (0.0000)	0.5606 (0.0000)
Persistence of shock	0.9588	0.7864

Null Hypotheses(All Null Hypotheses are for n^{th} order)

AR (p) H0: ϑ_i= 0 No AR Process, MA (q) H0: $\emptyset_i$= 0 No MA Process, ARCH H0: θ_i= 0 No ARCH effect, GARCH H0: φ_i= 0 No GARCH effect, Mean spillover H0:π_1= 0 No mean spillover, volatility spillover H0: π_2= 0 No volatility spillover. Leverage effect H0: δ_i= 0 No Leverage effect. P-values are in the parenthesis.

Residual Analysis

Parameter / Series	Jarque Bera	Q-Stat (5)	Q-Stat (10)	Q^2-Stat (5)	Q^2-Stat (10)	LM -ARCH (1-2)	LM-ARCH (1-5)
S&P 500 to NASDAQ 100	169.09 (0.0000)	0.4530 (0.5431)	2.4500 (0.5598)	3.3650 (0.5000)	8.0071 (0.1433)	1.3260 (0.3454)	0.2319 (0.7900)
NASDAQ 100 to S&P 500	30.667 (0.0000)	1.5821 (0.7404)	5.8761 (0.7232)	4.0425 (0.2344)	9.3283 (0.4222)	0.4367 (0.7662)	0.7514 (0.4813)

Null Hypotheses(All Null Hypotheses are for nth order)

Q-stat (return series) there is no serial autocorrelation. Q^2-stat (square return series) H0: there is no serial autocorrelation. Jarque-Bera H0: distribution of series is normal. LM-ARCH H_0: there is no ARCH effect. P-values are in the parenthesis.

Return series / Parameters	AIB to MB ARMA(0,0) GARCH (1,1)	MB to AIB ARMA(1,1) GARCH (1,1)
Conditional Mean Equation		
Constant α_0	0.0012 (0.0015)	-0.0021 (0.3269)
R_t π_1	1.0541 (0.0000)	0.6557 (0.0000)
AR(1) ϑ_1	0.66654 (0.0000)	-0.7668 (0.0000)
MA(1) $\emptyset_1$	0.32433 (0.0000)	0.754348 (0.0000)
Conditional Variance Equation		
Constant θ_0	0.0043 (0.0236)	0.0076 (0.0253)
R_t^2 π_2	0.0246 (0.0643)	0.0234 (0.0016)
ARCH(1) θ_1	0.0629 (0.0000)	0.0867 (0.0000)
GARCH(1) φ_1	0.7768 (0.0000)	0.4506 (0.0000)
Persistence of shock	0.9588	0.7864

Null Hypotheses(All Null Hypotheses are for nth order)

AR (p) H0: ϑ_i= 0 No AR Process, MA (q) H0: $\emptyset_i$= 0 No MA Process, ARCH H0: θ_i= 0 No ARCH effect, GARCH H0: φ_i= 0 No GARCH effect, Mean spillover H0:π_1= 0 No mean spillover, volatility spillover H0: π_2= 0 No volatility spillover. Leverage effect H0: δ_i= 0 No Leverage effect. P-values are in the parenthesis.

Residual Analysis

Parameter / Series	Jarque Bera	Q-Stat (5)	Q-Stat (10)	Q^2-Stat (5)	Q^2-Stat (10)	LM -ARCH (1-2)	LM-ARCH (1-5)
S&P 500 to NASDAQ 100	78.34 (0.0000)	0.6593 (0.9631)	1.4050 (0.9993)	2.4359 (0.5000)	7.1779 (0.3433)	1.0636 (0.4015)	0.4819 (0.5598)

NASDAQ 100 to S&P 500	25.457 (0.0000)	2.4321 (0.8801)	5.4072 (0.7244)	4.3205 (0.2320)	8.4383 (0.5210)	0.3270 (0.4901)	0.7710 (0.5001)

Null Hypotheses(All Null Hypotheses are for nth order)
Q-stat (return series) there is no serial autocorrelation. Q^2-stat (square return series) H0: there is no serial autocorrelation. Jarque-Bera H0: distribution of series is normal. LM-ARCH H_0: there is no ARCH effect. P-values are in the parenthesis.

Table 5.1.4Bidirectional spillover between AIB and RCB bank and RCB to AIB

Return series / Parameters	AIB to RCB ARMA(0,0) GARCH (1,1)	RCB to AIB ARMA(1,1) GARCH (1,1)
Conditional Mean Equation		
Constant α_0	0.0015 (0.0347)	-0.0034 (0.4269)
R_t π_1	1.03211 (0.0000)	0.2357 (0.0000)
AR(1) ϑ_1	.7658	-0.6568 (0.0000)
MA(1) $\emptyset_1$	.76581	0.82632 (0.0000)
Conditional Variance Equation		
Constant θ_0	0.0064 (0.0206)	0.0078 (0.0343)
R_t^2 π_2	0.0256 (0.0323)	0.0344 (0.0007)
ARCH(1) θ_1	0.1619 (0.0000)	0.0857 (0.0000)
GARCH(1) φ_1	0.8769 (0.0000)	0.5406 (0.0000)
Persistence of shock	0.9588	0.7864

Null Hypotheses(All Null Hypotheses are for nth order)
AR (p) H0: ϑ_i= 0 No AR Process, MA (q) H0: $\emptyset_i$= 0 No MA Process, ARCH H0: θ_i= 0 No ARCH effect, GARCH H0: φ_i= 0 No GARCH effect, Mean spillover H0:π_1= 0 No mean spillover, volatility spillover H0: π_2= 0 No volatility spillover. Leverage effect H0: δ_i= 0 No Leverage effect. P-values are in the parenthesis.

Residual Analysis

Parameter / Series	Jarque Bera	Q-Stat (5)	Q-Stat (10)	Q^2-Stat (5)	Q^2-Stat (10)	LM -ARCH (1-2)	LM-ARCH (1-5)
S&P 500 to NASDAQ 100	100.41 (0.0000)	0.5544 (0.3431)	4.0901 (0.8812)	3.3259 (0.4026)	03.180 (0.1233)	1.0436 (0.3324)	0.5519 (0.3490)
NASDAQ 100 to S&P 500	30.7806 (0.0000)	1.6005 (0.5432)	5.4271 (0.6503)	2.0012 (0.3441)	8.1773 (0.4440)	0.1787 (0.5504)	0.3410 (0.4334)

Null Hypotheses(All Null Hypotheses are for nth order)

Q-stat (return series) there is no serial autocorrelation. Q^2-stat (square return series) H0: there is no serial autocorrelation. Jarque-Bera H0: distribution of series is normal. LM-ARCH H_0: there is no ARCH effect. P-values are in the parenthesis.

Table 5.4.1.a, given above in show the parameter of return series π_1 and parameter of squared return series π_2 of AIB are statistically significant in conditional mean and variance equations of all conventional banks series. This show there is bidirectional mean and volatility spillover effect from AIB to conventional banks are found. Table 5.4.1 also illustrate the post estimation results (Residual analysis). The Jarque-Bera test (Normality test) results show non normal residuals. The Q-stat are insignificant up to 10th lags accept null hypothesis means no serial autocorrelation in the standardized residuals. The Q-stat on squared standardized residuals are insignificant up to 10th lags accept null hypothesis means no serial autocorrelation in squared standardized residuals. LM-ARCH test is also insignificant up to 5thlags accept null hypothesis means no ARCH effect remain in series residuals.

Bidirectional spillover between PIB and conventional banks

Table 5.2.1Bidirectional spillover between PIB and AMB banks

Return series / Parameters	PIB to AMB ARMA(0,0) GARCH (1,1)	AMB to PIB ARMA(1,1) GARCH (1,1)
Conditional Mean Equation		
Constant α_0	0.0034 (0.0026)	-0.0023 (0.3439)
R_t π_1	1.0344 (0.0000)	0.7547 (0.0000)
AR(1) ϑ_1	0.43201 (0.0000)	-0.6568 (0.0000)
MA(1) $\emptyset_1$	0.34211 (0.0000)	0.820348 (0.0000)
Conditional Variance Equation		
Constant θ_0	0.0061 (0.0226)	0.00675 (0.0163)
R_t^2 π_2	0.0026 (0.0543)	0.0114 (0.0007)

ARCH(1) θ_1	0.0659 (0.0000)	0.0867 (0.0000)
GARCH(1) φ_1	0.8832 (0.0000)	0.6116 (0.0000)
Persistence of shock	0.9588	0.7864

Null Hypotheses(All Null Hypotheses are for nth order)
AR (p) H0: ϑ_i= 0 No AR Process, MA (q) H0: $\emptyset_i$= 0 No MA Process, ARCH H0: θ_i= 0 No ARCH effect, GARCH H0: φ_i= 0 No GARCH effect, Mean spillover H0:π_1= 0 No mean spillover, volatility spillover H0: π_2= 0 No volatility spillover. Leverage effect H0: δ_i= 0 No Leverage effect. P-values are in the parenthesis.

Residual Analysis

Parameter / Series	Jarque Bera	Q-Stat (5)	Q-Stat (10)	Q^2-Stat (5)	Q^2-Stat (10)	LM -ARCH (1-2)	LM-ARCH (1-5)
S&P 500 to NASDAQ 100	40.34 (0.0000)	0.5534 (0.9643)	1.3001 (0.8760)	2.4359 (0.7850)	5.1590 (0.1066)	1.6636 (0.3454)	0.4599 (0.7541)
NASDAQ 100 to S&P 500	45.067 (0.0000)	1.5789 (0.6214)	5.3881 (0.7993)	4.2425 (0.2400)	8.438 (0.4210)	0.4767 (0.7764)	0.5410 (0.4134)

Null Hypotheses(All Null Hypotheses are for nth order)
Q-stat (return series) there is no serial autocorrelation. Q^2-stat (square return series) H0: there is no serial autocorrelation. Jarque-Bera H0: distribution of series is normal. LM-ARCH H_0: there is no ARCH effect. P-values are in the parenthesis.

Table 5.2.2Bidirectional spillover between PIB and CIMB banks and CIMB to PIB

Return series / Parameters	PIB to CIMB ARMA(0,0) GARCH (1,1)	CIMB to PIB ARMA(1,1) GARCH (1,1)
Conditional Mean Equation		
Constant α_0	0.0021 (0.0437)	-0.0004 (0.3432)
R_t π_1	1.0211 (0.0000)	0.7117 (0.0000)
AR(1) ϑ_1	0.3421 (0.0000)	-0.8328 (0.0000)
MA(1) $\emptyset_1$	0.56702 (0.0000)	0.800134 (0.0000)
Conditional Variance Equation		
Constant θ_0	0.0554 (0.0656)	0.0043 (0.0154)
R_t^2 π_2	0.0236 (0.0883)	0.0212 (0.0007)

ARCH(1) θ_1	0.0769 (0.0000)	0.09543 (0.0000)
GARCH(1) φ_1	0.7721 (0.0000)	0.6713 (0.0000)
Persistence of shock	0.9588	0.7864
Null Hypotheses(All Null Hypotheses are for nth order) AR (p) H0: ϑ_i= 0 No AR Process, MA (q) H0: $\emptyset_i$= 0 No MA Process, ARCH H0: θ_i= 0 No ARCH effect, GARCH H0: φ_i= 0 No GARCH effect, Mean spillover H0:π_1= 0 No mean spillover, volatility spillover H0: π_2= 0 No volatility spillover. Leverage effect H0: δ_i= 0 No Leverage effect. P-values are in the parenthesis.		

Residual Analysis

Parameter / Series	Jarque Bera	Q-Stat (5)	Q-Stat (10)	Q^2-Stat (5)	Q^2-Stat (10)	LM -ARCH (1-2)	LM-ARCH (1-5)
S&P 500 to NASDAQ 100	89.04 (0.0000)	0.4530 (0.7931)	1.2401 (0.7093)	2.4309 (0.6570)	22.181 (0.1433)	1.0456 (0.5454)	0.4559 (0.7214)
NASDAQ 100 to S&P 500	14.467 (0.0000)	1.3421 (0.2399)	5.3491 (0.6532)	4.0825 (0.2414)	8.2328 (0.4290)	0.2367 (0.8554)	0.9513 (0.5324)
Null Hypotheses(All Null Hypotheses are for nth order) Q-stat (return series) there is no serial autocorrelation. Q^2-stat (square return series) H0: there is no serial autocorrelation. Jarque-Bera H0: distribution of series is normal. LM-ARCH H_0: there is no ARCH effect. P-values are in the parenthesis.							

Table 5.2.3Bidirectional spillover between PIB and HLB banks and HLB to PIB

Return series / Parameters	PIB to HLB ARMA(0,0) GARCH (1,1)	HLB to PIB ARMA(1,1) GARCH (1,1)
Conditional Mean Equation		
Constant α_0	0.0443 (0.0231)	-0.0443 (0.3039)
R_t π_1	1.0211 (0.0000)	0.2357 (0.0000)
AR(1) ϑ_1	0.3452 (0.0000)	-0.5468 (0.0000)
MA(1) $\emptyset_1$	0.4563 (0.0000)	0.776348 (0.0000)
Conditional Variance Equation		
Constant θ_0	0.0051 (0.0166)	0.0064 (0.0163)
R_t^2 π_2	0.0331 (0.0623)	0.1324 (0.0007)

ARCH(1) θ_1	0.0259 (0.0000)	0.0767 (0.0000)
GARCH(1) φ_1	0.6661 (0.0000)	0.6436 (0.0000)
Persistence of shock	0.9588	0.7864
Null Hypotheses(All Null Hypotheses are for nth order) AR (p) H0: ϑ_i= 0 No AR Process, MA (q) H0: $\emptyset_i$= 0 No MA Process, ARCH H0: θ_i= 0 No ARCH effect, GARCH H0: φ_i= 0 No GARCH effect, Mean spillover H0:π_1= 0 No mean spillover, volatility spillover H0: π_2= 0 No volatility spillover. Leverage effect H0: δ_i= 0 No Leverage effect. P-values are in the parenthesis.		

Residual Analysis

Parameter / Series	Jarque Bera	Q-Stat (5)	Q-Stat (10)	Q^2-Stat (5)	Q^2-Stat (10)	LM -ARCH (1-2)	LM-ARCH (1-5)
S&P 500 to NASDAQ 100	180.39 (0.0000)	0.9990 (0.9780)	1.2341 (0.7813)	2.3324 (0.5472)	5.1990 (0.1433)	1.3436 (0.4972)	0.5719 (0.340)
NASDAQ 100 to S&P 500	9.7757 (0.0000)	1.4521 (0.7700)	6.3001 (0.6732)	3.2325 (0.3384)	7.4383 (0.4311)	0.2167 (0.8994)	0.2310 (0.5434)
Null Hypotheses(All Null Hypotheses are for nth order) Q-stat (return series) there is no serial autocorrelation. Q^2-stat (square return series) H0: there is no serial autocorrelation. Jarque-Bera H0: distribution of series is normal. LM-ARCH H_0: there is no ARCH effect. P-values are in the parenthesis.							

Table 5.2.4Bidirectional spillover between PIB and MB banks and MB to PIB

Return series / Parameters	PIB to MB ARMA(0,0) GARCH (1,1)	MB to PIB ARMA(1,1) GARCH (1,1)
Conditional Mean Equation		
Constant α_0	0.0337 (0.0457)	-0.0432 (0.3879)
R_t π_1	1.0401 (0.0000)	0.0457 (0.0000)
AR(1) ϑ_1	0.0654 (0.0000)	-0.8321 (0.0000)
MA(1) $\emptyset_1$	0.3232 (0.0000)	0.83234 (0.0000)
Conditional Variance Equation		
Constant θ_0	0.0651 (0.0766)	0.0654 (0.0233)
R_t^2 π_2	0.0346 (0.0633)	0.0424 (0.0007)
ARCH(1) θ_1	0.0439 (0.0000)	0.03422 (0.0000)

GARCH(1) φ_1	0.4432 (0.0000)	0.6921 (0.0200)
Persistence of shock	0.9588	0.7864
Null Hypotheses(All Null Hypotheses are for nth order) AR (p) H0: ϑ_i= 0 No AR Process, MA (q) H0: $\emptyset_i$= 0 No MA Process, ARCH H0: θ_i= 0 No ARCH effect, GARCH H0: φ_i= 0 No GARCH effect, Mean spillover H0:π_1= 0 No mean spillover, volatility spillover H0: π_2= 0 No volatility spillover. Leverage effect H0: δ_i= 0 No Leverage effect. P-values are in the parenthesis.		

Residual Analysis

Parameter / Series	Jarque Bera	Q-Stat (5)	Q-Stat (10)	Q^2-Stat (5)	Q^2-Stat (10)	LM -ARCH (1-2)	LM-ARCH (1-5)
S&P 500 to NASDAQ 100	34.786 (0.0000)	0.9550 (0.6901)	1.4401 (0.3210)	4.3643 (0.5056)	20.199 (0.4433)	1.4336 (0.3454)	0.7819 (0.7805)
NASDAQ 100 to S&P 500	25.007 (0.0000)	1.3421 (0.4434)	5.5071 (0.5902)	4.4325 (0.5414)	8.4583 (0.5009)	0.1577 (0.4364)	0.4310 (0.2334)
Null Hypotheses(All Null Hypotheses are for nth order) Q-stat (return series) there is no serial autocorrelation. Q^2-stat (square return series) H0: there is no serial autocorrelation. Jarque-Bera H0: distribution of series is normal. LM-ARCH H_0: there is no ARCH effect. P-values are in the parenthesis.							

Table 5.2.4Bidirectional spillover between PIB and RCB banks And RCB to PIB

Return series / Parameters	PIB to RCB ARMA(0,0) GARCH (1,1)	RCB to PIB ARMA(1,1) GARCH (1,1)
Conditional Mean Equation		
Constant α_0	0.0032 (0.0237)	-0.0881 (0.3239)
R_t π_1	1.0321 (0.0000)	0.7435 (0.0000)
AR(1) ϑ_1	0.0432 (0.0000)	-0.5368 (0.0000)
MA(1) $\emptyset_1$	0.32101 (0.0000)	0.82045 (0.0000)
Conditional Variance Equation		
Constant θ_0	0.05014 (0.0206)	0.0567 (0.02013)
R_t^2 π_2	0.0423 (0.0331)	0.0344 (0.0107)

ARCH(1) θ_1	0.0519 (0.0000)	0.03407 (0.0000)
GARCH(1) φ_1	0.5480 (0.0000)	0.5706 (0.0000)
Persistence of shock	0.9588	0.7864

Null Hypotheses(All Null Hypotheses are for nth order)
AR (p) H0: ϑ_i= 0 No AR Process, MA (q) H0: $\emptyset_i$= 0 No MA Process, ARCH H0: θ_i= 0 No ARCH effect, GARCH H0: φ_i= 0 No GARCH effect, Mean spillover H0:π_1= 0 No mean spillover, volatility spillover H0: π_2= 0 No volatility spillover. Leverage effect H0: δ_i= 0 No Leverage effect. P-values are in the parenthesis.

Residual Analysis

Parameter / Series	Jarque Bera	Q-Stat (5)	Q-Stat (10)	Q^2-Stat (5)	Q^2-Stat (10)	LM -ARCH (1-2)	LM-ARCH (1-5)
S&P 500 to NASDAQ 100	140.22 (0.0000)	0.9340 (0.8701)	1.3101 (0.5597)	2.3349 (0.5000)	12.45 (0.2733)	1.0236 (0.3404)	0.5419 (0.8700)
NASDAQ 100 to S&P 500	45.397 (0.0000)	1.5451 (0.7751)	5.3471 (0.5099)	4.3525 (0.5414)	8.3283 (0.5610)	0.1227 (0.8904)	0.6710 (0.4334)

Null Hypotheses(All Null Hypotheses are for nth order)
Q-stat (return series) there is no serial autocorrelation. Q^2-stat (square return series) H0: there is no serial autocorrelation. Jarque-Bera H0: distribution of series is normal. LM-ARCH H_0: there is no ARCH effect. P-values are in the parenthesis.

Table 5.4.1.a, given above in show the parameter of return series π_1 and parameter of squared return series π_2 of PIB are statistically significant in conditional mean and variance equations of all conventional banks series. This show there is bidirectional mean and volatility spillover effect from PIB to conventional banks are found. Table 5.4.1 also illustrate the post estimation results (Residual analysis). The Jarque-Bera test (Normality test) results show non normal residuals. The Q-stat are insignificant up to 10th lags accept null hypothesis means no serial autocorrelation in the standardized residuals. The Q-stat on squared standardized residuals are insignificant up to 10th lags accept null hypothesis means no serial autocorrelation in squared standardized residuals. LM-ARCH test is also insignificant up to 5thlags accept null hypothesis means no ARCH effect remain in series residuals.

Bidirectional spillover between BNP and conventional banks

Table 5.3.1Bidirectional spillover between BNP and AMB banks

Return series / Parameters	BNP to AMB ARMA(0,0) GARCH (1,1)	AMB to BNP ARMA(1,1) GARCH (1,1)
Conditional Mean Equation		
Constant α_0	0.0032 (0.0203)	-0.0023 (0.4469)
R_t π_1	1.3441 (0.0000)	0.8057 (0.0000)
AR(1) ϑ_1	0.3267 (0.0000)	-0.0068 (0.0000)
MA(1) $\emptyset_1$	0.4325 (0.0000)	0.87034 (0.0000)
Conditional Variance Equation		
Constant θ_0	0.0032 (0.0176)	0.0405 (0.0463)
R_t^2 π_2	0.0106 (0.0073)	0.0027 (0.0007)
ARCH(1) θ_1	0.0817 (0.0000)	0.1157 (0.0000)
GARCH(1) φ_1	0.7638 (0.0000)	0.4306 (0.0000)
Persistence of shock	0.9588	0.7864

Null Hypotheses(All Null Hypotheses are for nth order)

AR (p) H0: ϑ_i= 0 No AR Process, MA (q) H0: $\emptyset_i$= 0 No MA Process, ARCH H0: θ_i= 0 No ARCH effect, GARCH H0: φ_i= 0 No GARCH effect, Mean spillover H0:π_1= 0 No mean spillover, volatility spillover H0: π_2= 0 No volatility spillover. Leverage effect H0: δ_i= 0 No Leverage effect. P-values are in the parenthesis.

Residual Analysis

Parameter / Series	Jarque Bera	Q-Stat (5)	Q-Stat (10)	Q^2-Stat (5)	Q^2-Stat (10)	LM -ARCH (1-2)	LM-ARCH (1-5)
S&P 500 to NASDAQ 100	149.44 (0.0000)	0.9430 (0.9631)	9.4501 (0.9093)	2.3549 (0.5996)	10.430 (0.1343)	1.0456 (0.5554)	0.4349 (0.6390)
NASDAQ 100 to S&P 500	51.559 (0.0000)	1.6024 (0.7804)	5.4327 (0.8732)	4.4325 (0.3401)	8.1283 (0.5410)	0.1667 (0.8114)	0.6510 (0.7034)

Null Hypotheses(All Null Hypotheses are for nth order)

Q-stat (return series) there is no serial autocorrelation. Q^2-stat (square return series) H0: there is no serial autocorrelation. Jarque-Bera H0: distribution of series is normal. LM-ARCH H_0: there is no ARCH effect. P-values are in the parenthesis.

Table 5.3.2Bidirectional spillover between BNP and CIMB banks And CIMB to BNP

Return series / Parameters	BNP to CIMB ARMA(0,0) GARCH (1,1)	CIMB to BNP ARMA(1,1) GARCH (1,1)
Conditional Mean Equation		
Constant α_0	0.0004 (0.0327)	-0.0034 (0.3449)
R_t π_1	1.4341 (0.0000)	0.6657 (0.0000)
AR(1) ϑ_1	0.67432 (0.0000)	-0.8786 (0.0000)
MA(1) $\emptyset_1$	0.45627 (0.0000)	0.52634 (0.0000)
Conditional Variance Equation		
Constant θ_0	0.0071 (0.0436)	0.0435 (0.0063)
R_t^2 π_2	0.0036 (0.0553)	0.0424 (0.0003)
ARCH(1) θ_1	0.0651 (0.0000)	0.0657 (0.0000)
GARCH(1) φ_1	0.8541 (0.0000)	0.5006 (0.0000)
Persistence of shock	0.9588	0.7864

Null Hypotheses(All Null Hypotheses are for nth order)

AR (p) H0: ϑ_i= 0 No AR Process, MA (q) H0: $\emptyset_i$= 0 No MA Process, ARCH H0: θ_i= 0 No ARCH effect, GARCH H0: φ_i= 0 No GARCH effect, Mean spillover H0:π_1= 0 No mean spillover, volatility spillover H0: π_2= 0 No volatility spillover. Leverage effect H0: δ_i= 0 No Leverage effect. P-values are in the parenthesis.

Residual Analysis

Parameter / Series	Jarque Bera	Q-Stat (5)	Q-Stat (10)	Q^2-Stat (5)	Q^2-Stat (10)	LM -ARCH (1-2)	LM-ARCH (1-5)
S&P 500 to NASDAQ 100	234.36 (0.0000)	0.7030 (0.6701)	1.3201 (0.5547)	4.3659 (0.5000)	08.180 (0.1883)	3.0699 (0.5454)	0.3809 (0.4724)
NASDAQ 100 to S&P 500	33.887 (0.0000)	1.4821 (0.6834)	5.4371 (0.6123)	4.7625 (0.3414)	10.4083 (0.3210)	0.59267 (0.3216)	0.5720 (0.4094)

Null Hypotheses(All Null Hypotheses are for nth order)

Q-stat (return series) there is no serial autocorrelation. Q^2-stat (square return series) H0: there is no serial autocorrelation. Jarque-Bera H0: distribution of series is normal. LM-ARCH H_0: there is no ARCH effect. P-values are in the parenthesis.

Table 5.3.3Bidirectional spillover between BNP and AMB banks And BNP to HLB

Return series / Parameters	BNP to HLB ARMA(0,0) GARCH (1,1)	HLB to BNP ARMA(1,1) GARCH (1,1)
Conditional Mean Equation		
Constant α_0	0.0312 (0.2317)	-0.0403 (0.3229)
R_t π_1	1.2141 (0.0000)	0.4357 (0.0000)
AR(1) ϑ_1	0.5432 (0.0000)	-0.5468 (0.0000)
MA(1) $\emptyset_1$	0.0765 (0.0000)	0.80036 (0.0000)
Conditional Variance Equation		
Constant θ_0	0.0524 (0.0436)	0.0345 (0.0065)
R_t^2 π_2	0.0203 (0.0733)	0.0324 (0.0007)
ARCH(1) θ_1	0.7519 (0.0000)	0.7657 (0.0000)
GARCH(1) φ_1	0.4368 (0.0000)	0.4706 (0.0000)
Persistence of shock	0.9588	0.7864

Null Hypotheses(All Null Hypotheses are for nth order)

AR (p) H0: ϑ_i= 0 No AR Process, MA (q) H0: $\emptyset_i$= 0 No MA Process, ARCH H0: θ_i= 0 No ARCH effect, GARCH H0: φ_i= 0 No GARCH effect, Mean spillover H0:π_1= 0 No mean spillover, volatility spillover H0: π_2= 0 No volatility spillover. Leverage effect H0: δ_i= 0 No Leverage effect. P-values are in the parenthesis.

Residual Analysis

Parameter / Series	Jarque Bera	Q-Stat (5)	Q-Stat (10)	Q^2-Stat (5)	Q^2-Stat (10)	LM -ARCH (1-2)	LM-ARCH (1-5)
S&P 500 to NASDAQ 100	90.675 (0.0000)	0.3297 (0.4501)	1.4301 (0.6753)	5.4754 (0.5117)	15.380 (0.4723)	1.3436 (0.3774)	0.2519 (0.3259)
NASDAQ 100 to S&P 500	47.007 (0.0000)	1.56992 (0.5884)	5.4361 (0.0000)	4.3725 (0.9031)	8.3683 (0.9810)	0.4367 (0.0064)	0.8099 (0.6734)

Null Hypotheses(All Null Hypotheses are for nth order)

Q-stat (return series) there is no serial autocorrelation. Q^2-stat (square return series) H0: there is no serial autocorrelation. Jarque-Bera H0: distribution of series is normal. LM-ARCH H_0: there is no ARCH effect. P-values are in the parenthesis.

Table 5.3.4Bidirectional spillover between BNP and MB banks and MB to BNP

Return series / Parameters	BNP to MB ARMA(0,0) GARCH (1,1)	MB to BNP ARMA(1,1) GARCH (1,1)
Conditional Mean Equation		
Constant α_0	0.0301 (0.0207)	-0.5001 (0.3889)
R_t π_1	1.5401 (0.0000)	0.7997 (0.0000)
AR(1) ϑ_1	0.0321 (0.0000)	-0.5668 (0.0000)
MA(1) $\emptyset_1$	1.2107 (0.0000)	0.93034 (0.0000)
Conditional Variance Equation		
Constant θ_0	0.0032 (0.0107)	0.1185 (0.0363)
R_t^2 π_2	0.0046 (0.0933)	0.3324 (0.0000)
ARCH(1) θ_1	0.0519 (0.0000)	0.0327 (0.0000)
GARCH(1) φ_1	0.9908 (0.0000)	0.7606 (0.0000)
Persistence of shock	0.9588	0.7864

Null Hypotheses(All Null Hypotheses are for nth order)

AR (p) H0: ϑ_i= 0 No AR Process, MA (q) H0: $\emptyset_i$= 0 No MA Process, ARCH H0: θ_i= 0 No ARCH effect, GARCH H0: φ_i= 0 No GARCH effect, Mean spillover H0:π_1= 0 No mean spillover, volatility spillover H0: π_2= 0 No volatility spillover. Leverage effect H0: δ_i= 0 No Leverage effect. P-values are in the parenthesis.

Residual Analysis

Parameter / Series	Jarque Bera	Q-Stat (5)	Q-Stat (10)	Q^2-Stat (5)	Q^2-Stat (10)	LM -ARCH (1-2)	LM-ARCH (1-5)
S&P 500 to NASDAQ 100	98.00 (0.0000)	0.7034 (0.9451)	1.0001 (0.5883)	2.4359 (0.5029)	5.1490 (0.1433)	1.5536 (0.3254)	0.4819 (0.7399)
NASDAQ 100 to S&P 500	41.711 (0.0000)	1.4621 (0.8734)	5.8071 (0.7322)	1.7025 (0.7604)	8.3283 (0.3210)	0.2967 (0.3464)	0.6920 (0.5573)

Null Hypotheses(All Null Hypotheses are for nth order)

Q-stat (return series) there is no serial autocorrelation. Q^2-stat (square return series) H0: there is no serial autocorrelation. Jarque-Bera H0: distribution of series is normal. LM-ARCH H_0: there is no ARCH effect. P-values are in the parenthesis.

Table 5.3.4Bidirectional spillover between BNP and RCB banks

Return series / Parameters	BNP to RCB ARMA(0,0) GARCH (1,1)	RCB to BNP ARMA(1,1) GARCH (1,1)
Conditional Mean Equation		
Constant α_0	0.0032 (0.0327)	-0.0031 (0.3439)
R_t π_1	1.0541 (0.0000)	0.6457 (0.0000)
AR(1) ϑ_1	0.0453 (0.0000)	-0.0368 (0.0000)
MA(1) $\emptyset_1$	0.5643 (0.0000)	0.62643 (0.0000)
Conditional Variance Equation		
Constant θ_0	0.0452 (0.0106)	0.0435 (0.0183)
R_t^2 π_2	0.0036 (0.0733)	0.0243 (0.0004)
ARCH(1) θ_1	0.0719 (0.0000)	0.0965 (0.0000)
GARCH(1) φ_1	0.8868 (0.0000)	0.7306 (0.0000)
Persistence of shock	0.9588	0.7864

Null Hypotheses(All Null Hypotheses are for nth order)
AR (p) H0: ϑ_i= 0 No AR Process, MA (q) H0: $\emptyset_i$= 0 No MA Process, ARCH H0: θ_i= 0 No ARCH effect, GARCH H0: φ_i= 0 No GARCH effect, Mean spillover H0:π_1= 0 No mean spillover, volatility spillover H0: π_2= 0 No volatility spillover. Leverage effect H0: δ_i= 0 No Leverage effect. P-values are in the parenthesis.

Residual Analysis

Parameter / Series	Jarque Bera	Q-Stat (5)	Q-Stat (10)	Q^2-Stat (5)	Q^2-Stat (10)	LM -ARCH (1-2)	LM-ARCH (1-5)
S&P 500 to NASDAQ 100	143.94 (0.0000)	0.5830 (0.4301)	3.4001 (0.5439)	2.4359 (0.4310)	17.430 (0.1523)	1.4536 (0.3009)	0.5419 (0.7642)

NASDAQ 100 to S&P 500	44.507 (0.0000)	1.5651 (0.8036)	5.4510 (0.6932)	3.2405 (0.2434)	6.4983 (0.4000)	0.3267 (0.0009)	0.5410 (0.6934)
Null Hypotheses(All Null Hypotheses are for nth order) Q-stat (return series) there is no serial autocorrelation. Q^2-stat (square return series) H0: there is no serial autocorrelation. Jarque-Bera H0: distribution of series is normal. LM-ARCH H_0: there is no ARCH effect. P-values are in the parenthesis.							

Table 5.4.1.a, given above in show the parameter of return series π_1 and parameter of squared return series π_2 of BNP are statistically significant in conditional mean and variance equations of all conventional banks series. This show there is bidirectional mean and volatility spillover effect from BNP to conventional banks are found. Table 5.4.1 also illustrate the post estimation results (Residual analysis). The Jarque-Bera test (Normality test) results show non normal residuals. The Q-stat are insignificant up to 10th lags accept null hypothesis means no serial autocorrelation in the standardized residuals. The Q-stat on squared standardized residuals are insignificant up to 10th lags accept null hypothesis means no serial autocorrelation in squared standardized residuals. LM-ARCH test is also insignificant up to 5thlags accept null hypothesis means no ARCH effect remain in series residuals.

Bidirectional spillover between BIMB and conventional banks

Table 5.4.1Bidirectional spillover between BIMB and AMB banks

Return series / Parameters	BIMB to AMB ARMA(0,0) GARCH (1,1)	AMB to BIMB ARMA(1,1) GARCH (1,1)
Conditional Mean Equation		
Constant α_0	0.0032 (0.0437)	-0.0005 (0.4369)
R_t π_1	1.0041 (0.0000)	0.7406 (0.0000)

AR(1) ϑ_1	.05640 (0.0000)	-0.4665 (0.0000)
MA(1) $\emptyset_1$	0.3421 (0.0000)	0.930634 (0.0000)
Conditional Variance Equation		
Constant θ_0	0.0054 (0.0106)	0.0085 (0.0183)
R_t^2 π_2	0.0036 (0.0733)	0.02232 (0.0006)
ARCH(1) θ_1	0.0719 (0.0000)	0.0907 (0.0000)
GARCH(1) φ_1	0.7881 (0.0000)	0.9006 (0.0000)
Persistence of shock	0.9588	0.7864

Null Hypotheses(All Null Hypotheses are for nth order)

AR (p) H0: ϑ_i= 0 No AR Process, MA (q) H0: $\emptyset_i$= 0 No MA Process, ARCH H0: θ_i= 0 No ARCH effect, GARCH H0: φ_i= 0 No GARCH effect, Mean spillover H0:π_1= 0 No mean spillover, volatility spillover H0: π_2= 0 No volatility spillover. Leverage effect H0: δ_i= 0 No Leverage effect. P-values are in the parenthesis.

Residual Analysis

Parameter / Series	Jarque Bera	Q-Stat (5)	Q-Stat (10)	Q^2-Stat (5)	Q^2-Stat (10)	LM -ARCH (1-2)	LM-ARCH (1-5)
S&P 500 to NASDAQ 100	110.79 (0.0000)	0.9330 (0.6430)	7.431 (0.3444)	2.3659 (0.5599)	19.080 (0.3483)	1.4300 (0.5014)	0.5619 (0.5812)
NASDAQ 100 to S&P 500	63.47 (0.0000)	1.4521 (0.7509)	5.1271 (0.8137)	4.3225 (0.3424)	5.4383 (0.3400)	0.2317 (0.4704)	0.3470 (0.4504)

Null Hypotheses(All Null Hypotheses are for nth order)

Q-stat (return series) there is no serial autocorrelation. Q^2-stat (square return series) H0: there is no serial autocorrelation. Jarque-Bera H0: distribution of series is normal. LM-ARCH H_0: there is no ARCH effect. P-values are in the parenthesis.

Table 5.4.2Bidirectional spillover between BIMB and CIMBB banks

Return series / Parameters	BIMB to CIMBB ARMA(0,0) GARCH (1,1)	CIMBB to BIMB ARMA(1,1) GARCH (1,1)
Conditional Mean Equation		
Constant α_0	0.0003 (0.0016)	-0.0004 (0.3068)
R_t π_1	1.0322 (0.0000)	0.4557 (0.0000)
AR(1) ϑ_1	0.0453 (0.0000)	-0.8048 (0.0000)
MA(1) $\emptyset_1$	0.4111 (0.0000)	0.92634 (0.0000)
Conditional Variance Equation		
Constant θ_0	0.00324 (0.0106)	0.0075 (0.0263)
R_t^2 π_2	0.0046 (0.0833)	0.0424 (0.0000)
ARCH(1) θ_1	0.0519 (0.0000)	0.0867 (0.0000)
GARCH(1) φ_1	0.6669 (0.0000)	0.7501 (0.0000)
Persistence of shock	0.9588	0.7864

Null Hypotheses(All Null Hypotheses are for nth order)

AR (p) H0: ϑ_i= 0 No AR Process, MA (q) H0: $\emptyset_i$= 0 No MA Process, ARCH H0: θ_i= 0 No ARCH effect, GARCH H0: φ_i= 0 No GARCH effect, Mean spillover H0:π_1= 0 No mean spillover, volatility spillover H0: π_2= 0 No volatility spillover. Leverage effect H0: δ_i= 0 No Leverage effect. P-values are in the parenthesis.

Residual Analysis

Parameter / Series	Jarque Bera	Q-Stat (5)	Q-Stat (10)	Q^2-Stat (5)	Q^2-Stat (10)	LM -ARCH (1-2)	LM-ARCH (1-5)
S&P 500 to NASDAQ 100	145.04 (0.0000)	0.4599 (0.9771)	2.34501 (0.8993)	2.3549 (0.4450)	07.450 (0.1543)	1.4336 (0.2404)	0.4319 (0.7120)
NASDAQ 100 to S&P 500	34.907 (0.0000)	1.6521 (0.4732)	5.4371 (0.5430)	1.3225 (0.2344)	9.3283 (0.4910)	0.2867 (0.3404)	0.8660 (0.4510)

Null Hypotheses(All Null Hypotheses are for nth order)

Q-stat (return series) there is no serial autocorrelation. Q^2-stat (square return series) H0: there is no serial autocorrelation. Jarque-Bera H0: distribution of series is normal. LM-ARCH H_0: there is no ARCH effect. P-values are in the parenthesis.

Table 5.4.2Bidirectional spillover between BIMB and HLB banks

Return series / Parameters	BIMB to HLB ARMA(0,0) GARCH (1,1)	HLB to BIMB ARMA(1,1) GARCH (1,1)
Conditional Mean Equation		
Constant α_0	0.0052 (0.0037)	-0.0008 (0.3499)
R_t π_1	1.0242 (0.0000)	0.6559 (0.0000)
AR(1) ϑ_1	0.7640	-0.5608 (0.0000)
MA(1) $\emptyset_1$	0.3889	0.80038 (0.0000)
Conditional Variance Equation		
Constant θ_0	0.0063 (0.0203)	0.0075 (0.0063)
R_t^2 π_2	0.0046 (0.0833)	0.0334 (0.0007)
ARCH(1) θ_1	0.0909 (0.0000)	0.0757 (0.0000)
GARCH(1) φ_1	0.5669 (0.0000)	0.6406 (0.0000)
Persistence of shock	0.9588	0.7864

Null Hypotheses(All Null Hypotheses are for nth order)
AR (p) H0: ϑ_i= 0 No AR Process, MA (q) H0: $\emptyset_i$= 0 No MA Process, ARCH H0: θ_i= 0 No ARCH effect, GARCH H0: φ_i= 0 No GARCH effect, Mean spillover H0:π_1= 0 No mean spillover, volatility spillover H0: π_2= 0 No volatility spillover. Leverage effect H0: δ_i= 0 No Leverage effect. P-values are in the parenthesis.

Residual Analysis

Parameter / Series	Jarque Bera	Q-Stat (5)	Q-Stat (10)	Q^2-Stat (5)	Q^2-Stat (10)	LM -ARCH (1-2)	LM-ARCH (1-5)
S&P 500 to NASDAQ 100	199.40 (0.0000)	0.9340 (0.4331)	1.3201 (0.9009)	1.5759 (0.6002)	08.480 (0.1293)	1.5906 (0.3204)	0.5419 (0.7650)
NASDAQ 100 to S&P 500	23.327 (0.0000)	1.5541 (0.5934)	5.4371 (0.5487)	4.2325 (0.3104)	7.1483 (0.3810)	0.4367 (0.9947)	0.6014 (0.5335)

Null Hypotheses(All Null Hypotheses are for nth order)
Q-stat (return series) there is no serial autocorrelation. Q^2-stat (square return series) H0: there is no serial autocorrelation. Jarque-Bera H0: distribution of series is normal. LM-ARCH H_0: there is no ARCH effect. P-values are in the parenthesis.

Residual Analysis

Parameter / Series	Jarque Bera	Q-Stat (5)	Q-Stat (10)	Q^2-Stat (5)	Q^2-Stat (10)	LM -ARCH (1-2)	LM-ARCH (1-5)
S&P 500 to NASDAQ 100	165.34 (0.0000)	0.9930 (0.9631)	1.3501 (0.9993)	2.3659 (0.5000)	12.180 (0.1433)	1.0636 (0.3454)	0.4819 (0.7900)

NASDAQ 100 to S&P 500	30.667 (0.0000)	1.5821 (0.6634)	5.3171 (0.7232)	4.1925 (0.2414)	8.1283 (0.4210)	0.1667 (0.8464)	0.8510 (0.5134)

Null Hypotheses(All Null Hypotheses are for nth order)

Q-stat (return series) there is no serial autocorrelation. Q^2-stat (square return series) H0: there is no serial autocorrelation. Jarque-Bera H0: distribution of series is normal. LM-ARCH H_0: there is no ARCH effect. P-values are in the parenthesis.

Table 5.4.3Bidirectional spillover between BIMB and MB banks

Return series / Parameters	BIMB to MB ARMA(0,0) GARCH (1,1)	MB to BIMB ARMA(1,1) GARCH (1,1)
Conditional Mean Equation		
Constant α_0	0.0034 (0.00347)	-0.0002 (0.4369)
R_t π_1	1.0335 (0.0000)	0.4557 (0.0000)
AR(1) ϑ_1	0.8765 (0.0000)	-0.6568 (0.0000)
MA(1) $\emptyset_1$	0.4786 (0.0000)	0.850348 (0.0000)
Conditional Variance Equation		
Constant θ_0	0.0354 (0.0346)	0.0485 (0.0363)
R_t^2 π_2	0.0236 (0.0733)	0.03424 (0.0007)
ARCH(1) θ_1	0.0019 (0.0000)	0.03457 (0.0000)
GARCH(1) φ_1	0.5468 (0.0000)	0.2306 (0.0000)
Persistence of shock	0.9588	0.7864

Null Hypotheses(All Null Hypotheses are for nth order)

AR (p) H0: ϑ_i= 0 No AR Process, MA (q) H0: $\emptyset_i$= 0 No MA Process, ARCH H0: θ_i= 0 No ARCH effect, GARCH H0: φ_i= 0 No GARCH effect, Mean spillover H0:π_1= 0 No mean spillover, volatility spillover H0: π_2= 0 No volatility spillover. Leverage effect H0: δ_i= 0 No Leverage effect. P-values are in the parenthesis.

Residual Analysis

Parameter / Series	Jarque Bera	Q-Stat (5)	Q-Stat (10)	Q^2-Stat (5)	Q^2-Stat (10)	LM -ARCH (1-2)	LM-ARCH (1-5)
S&P 500 to NASDAQ 100	201.01 (0.0000)	0.8727 (0.7821)	2.3241 (0.6893)	2.4259 (0.5721)	8.1909 (0.6133)	1.7606 (0.3164)	0.3419 (0.8910)
NASDAQ 100 to S&P 500	41.97 (0.0000)	1.7621 (0.4934)	5.4311 (0.2832)	4.8735 (0.3719)	9.2283 (0.4710)	0.2807 (0.7614)	0.9820 (0.5304)

Null Hypotheses(All Null Hypotheses are for nth order)

Q-stat (return series) there is no serial autocorrelation. Q^2-stat (square return series) H0: there is no serial autocorrelation. Jarque-Bera H0: distribution of series is normal. LM-ARCH H_0: there is no ARCH effect. P-values are in the parenthesis.

Table 5.4.4Bidirectional spillover between BIMB and RCB banks

Return series / Parameters	BIMB to RCB ARMA(0,0) GARCH (1,1)	RCB to BIMB ARMA(1,1) GARCH (1,1)
Conditional Mean Equation		
Constant α_0	0.0034 (0.0027)	-0.00034 (0.4369)
R_t π_1	1.0041 (0.0000)	0.3457 (0.0000)
AR(1) ϑ_1	0.32004 (0.0000)	-0.6568 (0.0000)
MA(1) $\emptyset_1$	0.8889 (0.0000)	0.82343 (0.0000)
Conditional Variance Equation		
Constant θ_0	0.0604 (0.02306)	0.0345 (0.0563)
R_t^2 π_2	0.0036 (0.0733)	0.0222 (0.0000)
ARCH(1) θ_1	0.0619 (0.0000)	0.0457 (0.0000)

GARCH(1) φ_1	0.5563 (0.0000)	0.6096 (0.0000)
Persistence of shock	0.9588	0.7864

Null Hypotheses(All Null Hypotheses are for nth order)
AR (p) H0: ϑ_i= 0 No AR Process, MA (q) H0: $\emptyset_i$= 0 No MA Process, ARCH H0: θ_i= 0 No ARCH effect, GARCH H0: φ_i= 0 No GARCH effect, Mean spillover H0:π_1= 0 No mean spillover, volatility spillover H0: π_2= 0 No volatility spillover. Leverage effect H0: δ_i= 0 No Leverage effect. P-values are in the parenthesis.

Residual Analysis

Parameter / Series	Jarque Bera	Q-Stat (5)	Q-Stat (10)	Q^2-Stat (5)	Q^2-Stat (10)	LM -ARCH (1-2)	LM-ARCH (1-5)
S&P 500 to NASDAQ 100	101.21 (0.0000)	0.8719 (0.7631)	1.231 (0.873)	2.2319 (0.5438)	14.43 (0.1433)	1.3736 (0.3274)	0.3713 (0.5910)
NASDAQ 100 to S&P 500	29.327 (0.0000)	1.6521 (0.6541)	5.7671 (0.4372)	4.6525 (0.5414)	2.4883 (0.0000)	0.1547 (0.0004)	0.9732 (0.5900)

Null Hypotheses(All Null Hypotheses are for nth order)
Q-stat (return series) there is no serial autocorrelation. Q^2-stat (square return series) H0: there is no serial autocorrelation. Jarque-Bera H0: distribution of series is normal. LM-ARCH H_0: there is no ARCH effect. P-values are in the parenthesis.

Table 5.4.1.a, given above in show the parameter of return series π_1 and parameter of squared return series π_2 of BNP are statistically significant in conditional mean and variance equations of all conventional banks series. This show there is bidirectional mean and volatility spillover effect from BNP to conventional banks are found. Table 5.4.1 also illustrate the post estimation results (Residual analysis). The Jarque-Bera test (Normality test) results show non normal residuals. The Q-stat are insignificant up to 10th lags accept null hypothesis means no serial autocorrelation in the standardized residuals. The Q-stat on squared standardized residuals are insignificant up to 10th lags accept null hypothesis means no serial autocorrelation in squared standardized residuals. LM-ARCH test is also insignificant up to 5thlags accept null hypothesis means no ARCH effect remain in series residuals.

Bidirectional spillover between ALRAJ and conventional banks

Table 5.5Bidirectional spillover between ALRAJ and AMB banks

Return series / Parameters	ALRAJ to AMB ARMA(0,0) GARCH (1,1)	AMB to ALRAJ ARMA(1,1) GARCH (1,1)
Conditional Mean Equation		
Constant α_0	0.0001 (0.00341)	-0.0340 (0.3459)
R_t π_1	1.0431 (0.0000)	0.5657 (0.0000)
AR(1) ϑ_1	0.04321 (0.0000)	-0.6368 (0.0000)
MA(1) $\emptyset_1$	0.8753 (0.0000)	0.80343 (0.0000)
Conditional Variance Equation		
Constant θ_0	0.0034 (0.0456)	0.0485 (0.0363)
R_t^2 π_2	0.0406 (0.0563)	0.06524 (0.0007)
ARCH(1) θ_1	0.0349 (0.0000)	0.0907 (0.0000)
GARCH(1) φ_1	0.9008 (0.0000)	0.7606 (0.0000)
Persistence of shock	0.9588	0.7864

Null Hypotheses(All Null Hypotheses are for nth order)

AR (p) H0: ϑ_i= 0 No AR Process, MA (q) H0: $\emptyset_i$= 0 No MA Process, ARCH H0: θ_i= 0 No ARCH effect, GARCH H0: φ_i= 0 No GARCH effect, Mean spillover H0:π_1= 0 No mean spillover, volatility spillover H0: π_2= 0 No volatility spillover. Leverage effect H0: δ_i= 0 No Leverage effect. P-values are in the parenthesis.

Residual Analysis

Parameter / Series	Jarque Bera	Q-Stat (5)	Q-Stat (10)	Q^2-Stat (5)	Q^2-Stat (10)	LM -ARCH (1-2)	LM-ARCH (1-5)
S&P 500 to NASDAQ 100	163.00 (0.0000)	0.9040 (0.7832)	1.3271 (0.8093)	2.35459 (0.5000)	6.1770 (0.1433)	1.0296 (0.4454)	0.3819 (0.7621)
NASDAQ 100 to S&P 500	27.780 (0.0000)	1.6121 (0.5534)	2.3171 (0.8932)	4.2525 (0.2324)	8.1393 (0.4711)	0.2867 (0.4364)	0.7610 (0.5834)

Null Hypotheses(All Null Hypotheses are for nth order)

Q-stat (return series) there is no serial autocorrelation. Q^2-stat (square return series) H0: there is no serial autocorrelation. Jarque-Bera H0: distribution of series is normal. LM-ARCH H_0: there is no ARCH effect. P-values are in the parenthesis.

Table 5.5.2Bidirectional spillover between ALRAJ and CIMBB banks

Return series / Parameters	ALRAJ to CIMBB ARMA(0,0) GARCH (1,1)	CIMBB to ALRAJ ARMA(1,1) GARCH (1,1)
Conditional Mean Equation		
Constant α_0	0.0004 (0.0007)	-0.0043 (0.3346)
R_t π_1	1.0431 (0.0000)	0.7657 (0.0000)
AR(1) ϑ_1	0.6783	-0.9868 (0.0000)
MA(1) $\emptyset_1$	0.4562	0.09634 (0.0000)
Conditional Variance Equation		
Constant θ_0	0.0404 (0.0436)	0.0685 (0.0363)
R_t^2 π_2	0.0326 (0.0933)	0.0024 (0.0000)
ARCH(1) θ_1	0.0714 (0.0000)	0.0657 (0.0000)
GARCH(1) φ_1	0.8784 (0.0000)	0.6546 (0.0000)
Persistence of shock	0.9588	0.7864

Null Hypotheses(All Null Hypotheses are for nth order)

AR (p) H0: ϑ_i= 0 No AR Process, MA (q) H0: $\emptyset_i$= 0 No MA Process, ARCH H0: θ_i= 0 No ARCH effect, GARCH H0: φ_i= 0 No GARCH effect, Mean spillover H0:π_1= 0 No mean spillover, volatility spillover H0: π_2= 0 No volatility spillover. Leverage effect H0: δ_i= 0 No Leverage effect. P-values are in the parenthesis.

Residual Analysis

Parameter / Series	Jarque Bera	Q-Stat (5)	Q-Stat (10)	Q^2-Stat (5)	Q^2-Stat (10)	LM -ARCH (1-2)	LM-ARCH (1-5)
S&P 500 to NASDAQ 100	187.61 (0.0000)	0.6939 (0.7781)	3.3991 (0.5597)	4.3489 (0.5999)	17.133 (0.3721)	1.0616 (0.4954)	0.3909 (0.7810)
NASDAQ 100 to S&P 500	49.097 (0.0000)	1.4672 (0.5643)	5.3111 (0.6933)	5.1605 (0.3814)	9.1082 (0.4470)	0.4768 (0.9312)	0.7155 (0.6034)

Null Hypotheses(All Null Hypotheses are for nth order)

Q-stat (return series) there is no serial autocorrelation. Q^2-stat (square return series) H0: there is no serial autocorrelation. Jarque-Bera H0: distribution of series is normal. LM-ARCH H_0: there is no ARCH effect. P-values are in the parenthesis.

Table 5.5.3Bidirectional spillover between ALRAJ and HLB banks

Return series / Parameters	ALRAJ to HLB ARMA(0,0) GARCH (1,1)	HLB to ALRAJ ARMA(1,1) GARCH (1,1)
Conditional Mean Equation		
Constant α_0	0.0046 (0.0041)	-0.0003 (0.3565)
R_t π_1	1.0431 (0.0000)	0.5457 (0.0000)
AR(1) ϑ_1	0.8765 (0.0000)	-0.7068 (0.0000)
MA(1) $\emptyset_1$	0.5621 (0.0000)	0.7034 (0.0000)
Conditional Variance Equation		
Constant θ_0	0.0004 (0.0346)	0.0385 (0.2163)
R_t^2 π_2	0.0046 (0.0433)	0.0324 (0.0005)
ARCH(1) θ_1	0.0519 (0.0000)	0.0757 (0.0000)
GARCH(1) φ_1	0.7668 (0.0000)	0.5406 (0.0000)
Persistence of shock	0.9588	0.7864

Null Hypotheses(All Null Hypotheses are for nth order)
AR (p) H0: ϑ_i= 0 No AR Process, MA (q) H0: $\emptyset_i$= 0 No MA Process, ARCH H0: θ_i= 0 No ARCH effect, GARCH H0: φ_i= 0 No GARCH effect, Mean spillover H0:π_1= 0 No mean spillover, volatility spillover H0: π_2= 0 No volatility spillover. Leverage effect H0: δ_i= 0 No Leverage effect. P-values are in the parenthesis.

Residual Analysis

Parameter / Series	Jarque Bera	Q-Stat (5)	Q-Stat (10)	Q^2-Stat (5)	Q^2-Stat (10)	LM -ARCH (1-2)	LM-ARCH (1-5)
S&P 500 to NASDAQ 100	199.30 (0.0000)	0.6785 (0.7831)	2.3901 (0.8793)	3.3637 (0.4670)	16.260 (0.4132)	1.4736 (0.3894)	0.4211 (0.8193)
NASDAQ 100 to S&P 500	28.897 (0.0000)	1.5587 (0.7134)	5.5171 (0.7052)	1.17625 (0.3421)	10.158 (0.4019)	0.3476 (0.3250)	0.7554 (0.4574)

Null Hypotheses(All Null Hypotheses are for nth order)
Q-stat (return series) there is no serial autocorrelation. Q^2-stat (square return series) H0: there is no serial autocorrelation. Jarque-Bera H0: distribution of series is normal. LM-ARCH H_0: there is no ARCH effect. P-values are in the parenthesis.

Table 5.5.4Bidirectional spillover between ALRAJ and MB banks

Return series / Parameters	ALRAJ to MB ARMA(0,0) GARCH (1,1)	MB to ALRAJ ARMA(1,1) GARCH (1,1)
Conditional Mean Equation		
Constant α_0	0.0001 (0.0037)	-0.0016 (0.3349)
R_t π_1	1.0351 (0.0000)	0.6057 (0.0000)
AR(1) ϑ_1	0.4982 (0.0000)	-0.9964 (0.0000)
MA(1) $\emptyset_1$	3.34201 (0.0000)	0.8234 (0.0000)
Conditional Variance Equation		
Constant θ_0	0.00654 (0.0436)	0.0308 (0.0433)
R_t^2 π_2	0.0036 (0.0631)	0.3490 (0.0000)
ARCH(1) θ_1	0.0439 (0.0000)	0.0877 (0.0000)
GARCH(1) φ_1	0.9998 (0.0000)	0.6948 (0.0000)
Persistence of shock	0.9588	0.7864

Null Hypotheses(All Null Hypotheses are for nth order)

AR (p) H0: ϑ_i= 0 No AR Process, MA (q) H0: $\emptyset_i$= 0 No MA Process, ARCH H0: θ_i= 0 No ARCH effect, GARCH H0: φ_i= 0 No GARCH effect, Mean spillover H0:π_1= 0 No mean spillover, volatility spillover H0: π_2= 0 No volatility spillover. Leverage effect H0: δ_i= 0 No Leverage effect. P-values are in the parenthesis.

Residual Analysis

Parameter / Series	Jarque Bera	Q-Stat (5)	Q-Stat (10)	Q^2-Stat (5)	Q^2-Stat (10)	LM -ARCH (1-2)	LM-ARCH (1-5)
S&P 500 to NASDAQ 100	161.35 (0.0000)	0.8130 (0.7631)	1.4399 (0.9157)	2.3455 (0.5470)	20.193 (0.2743)	1.3836 (0.3004)	0.3619 (0.7872)
NASDAQ 100 to S&P 500	41.449 (0.0000)	5.5541 (0.7891)	5.0071 (0.5932)	4.3025 (0.2374)	8.3283 (0.4480)	0.2567 (0.6564)	0.6510 (0.4434)

Null Hypotheses(All Null Hypotheses are for nth order)

Q-stat (return series) there is no serial autocorrelation. Q^2-stat (square return series) H0: there is no serial autocorrelation. Jarque-Bera H0: distribution of series is normal. LM-ARCH H_0: there is no ARCH effect. P-values are in the parenthesis.

Table 5.5.5Bidirectional spillover between ALRAJ and RHBCB banks

Return series / Parameters	ALRAJ to RHBCB ARMA(0,0) GARCH (1,1)	RHBCB to ALRAJ ARMA(1,1) GARCH (1,1)
Conditional Mean Equation		
Constant α_0	0.0042 (0.0016)	-0.0044 (0.3789)
R_t π_1	1.0451 (0.0000)	0.7657 (0.0000)
AR(1) ϑ_1	0.3542 (0.0000)	-0.9868 (0.0000)
MA(1) $\emptyset_1$	0.99876 (0.0000)	0.926309 (0.0000)
Conditional Variance Equation		
Constant θ_0	0.0344 (0.345)	0.0675 (0.0263)
R_t^2 π_2	0.0456 (0.0733)	0.0234 (0.0000)
ARCH(1) θ_1	0.0389 (0.0000)	0.0757 (0.0000)
GARCH(1) φ_1	0.7668 (0.0000)	0.7606 (0.0000)
Persistence of shock	0.9588	0.7864

Null Hypotheses(All Null Hypotheses are for nth order)

AR (p) H0: ϑ_i= 0 No AR Process, MA (q) H0: $\emptyset_i$= 0 No MA Process, ARCH H0: θ_i= 0 No ARCH effect, GARCH H0: φ_i= 0 No GARCH effect, Mean spillover H0:π_1= 0 No mean spillover, volatility spillover H0: π_2= 0 No volatility spillover. Leverage effect H0: δ_i= 0 No Leverage effect. P-values are in the parenthesis.

Residual Analysis

Parameter / Series	Jarque Bera	Q-Stat (5)	Q-Stat (10)	Q^2-Stat (5)	Q^2-Stat (10)	LM -ARCH (1-2)	LM-ARCH (1-5)
S&P 500 to NASDAQ 100	127.45 (0.0000)	0.9760 (0.9009)	2.3951 (0.8319)	2.4325 (0.5321)	13.169 (0.3230)	1.0441 (0.3541)	0.3419 (0.8296)
NASDAQ 100 to S&P 500	30.987 (0.0000)	2.5651 (0.7994)	6.8671 (0.7762)	4.3602 (0.2654)	8.1658 (0.4954)	0.2826 (0.7604)	0.9713 (0.3834)

Null Hypotheses(All Null Hypotheses are for nth order)

Q-stat (return series) there is no serial autocorrelation. Q^2-stat (square return series) H0: there is no serial autocorrelation. Jarque-Bera H0: distribution of series is normal. LM-ARCH H_0: there is no ARCH effect. P-values are in the parenthesis.

Table 5.4.1.a, given above in show the parameter of return series π_1 and parameter of squared return series π_2 of ALRAJ are statistically significant in conditional mean and variance equations of all conventional banks series. This show there is bidirectional mean and volatility spillover effect from ALRAJ to conventional banks are found. Table 5.4.1 also illustrate the post estimation results (Residual analysis). The Jarque-Bera test (Normality test) results show non normal residuals. The Q-stat are insignificant up to 10^{th} lags accept null hypothesis means no serial autocorrelation in the standardized residuals. The Q-stat on squared standardized residuals are insignificant up to 10^{th} lags accept null hypothesis means no serial autocorrelation in squared standardized residuals. LM-ARCH test is also insignificant up to 5^{th}lags accept null hypothesis means no ARCH effect remain in series residuals.

Variables	Summary statistics								
	Mean	**Standard deviation**	**Skewness**	**Jarque Bera**	**Excess Kurtosis**	**Q-stat (5)**	**Q^2-stat (5)**	**ARCH 1-2**	**KPSS**
LAM.C	-8.977	0.01125	-0.3854 (0.000)	1098.1 (0.00 0)	3.1075 (0.000)	5.89961 [0.3161103]	260.310 [0.0000000]**	39.982 [0.0000]**	0.404178
CIMB.C	-.00020	0.012976	-0.3409 (0.000)	14088 (0.00 0)	11.448 (0.000)	7.38046 [0.1938473]	27.0280 [0.0000563]**	4.8359 [0.0002]**	0.219155
HL.C	0.00028	0.0094772	-0.1587 (0.000)	7985.9 (0.00 0)	8.6282 (0.000)	2.56701 [0.7663705]	160.082 [0.0000000]**	22.334 [0.0000]**	0.288369
MAL.C	9.0002	0.0090562	-0.0851	14168	11.499	24.2285 [0.0001962]**	186.013 [0.0000000]**	32.775 [0.0000]**	0.275392

			(0.077)	(0.000)	(0.000)				
RHB.C	-5.8	0.017043	-0.5737 (0.000)	8597.9 (0.000)	8.8850 (0.000)	66.2358 [0.0000000]**	183.512 [0.0000000]**	42.173 [0.0000]**	0.349865
ALRAJ.I	-2.69	0.03647	0.0459 (0.000)	10971 (0.000)	10.120 (0.000)	296.064 [0.0000000]**	428.703 [0.0000000]**	240.58 [0.0000]**	0.0107547
PIB.I	0.00032	0.0063048	-0.1879 (0.000)	7288.8 (0.000)	8.2401 (0.000)	29.9336 [0.0000152]**	85.4229 [0.0000000]**	15.129 [0.0000]**	0.112197
AIB.I	-6.658	0.012909	0.0297 (0.537)	5510.5 (0.000)	7.1719 (0.000)	7.54772 [0.1829865]	150.796 [0.0000000]**	24.305 [0.0000]**	0.360297
BIMB.I	.00024	0.017525	-0.8778 (0.000)	13612 (0.000)	11.135 (0.000)	19.4366 [0.0015934]**	1.04893 [0.9585235]	0.20509 [0.9604]	0.0326706
BNP.I	-9.3416	0.024656	-0.9718 (0.000)	23610 (0.000)	13.135 (0.000)	31.7362 [0.0000067]**	356.582 [0.0000000]**	46.857 [0.0000]**	0.0485814

Null Hypotheses (All Null Hypotheses are for nth order)

KPSS H_0: Return series is level stationary, Asymptotic significant values 1% (0.739), 5% (0.463), 10% (0.347). Q-stat (return series) there is no serial autocorrelation. Q^2-stat (square return series)

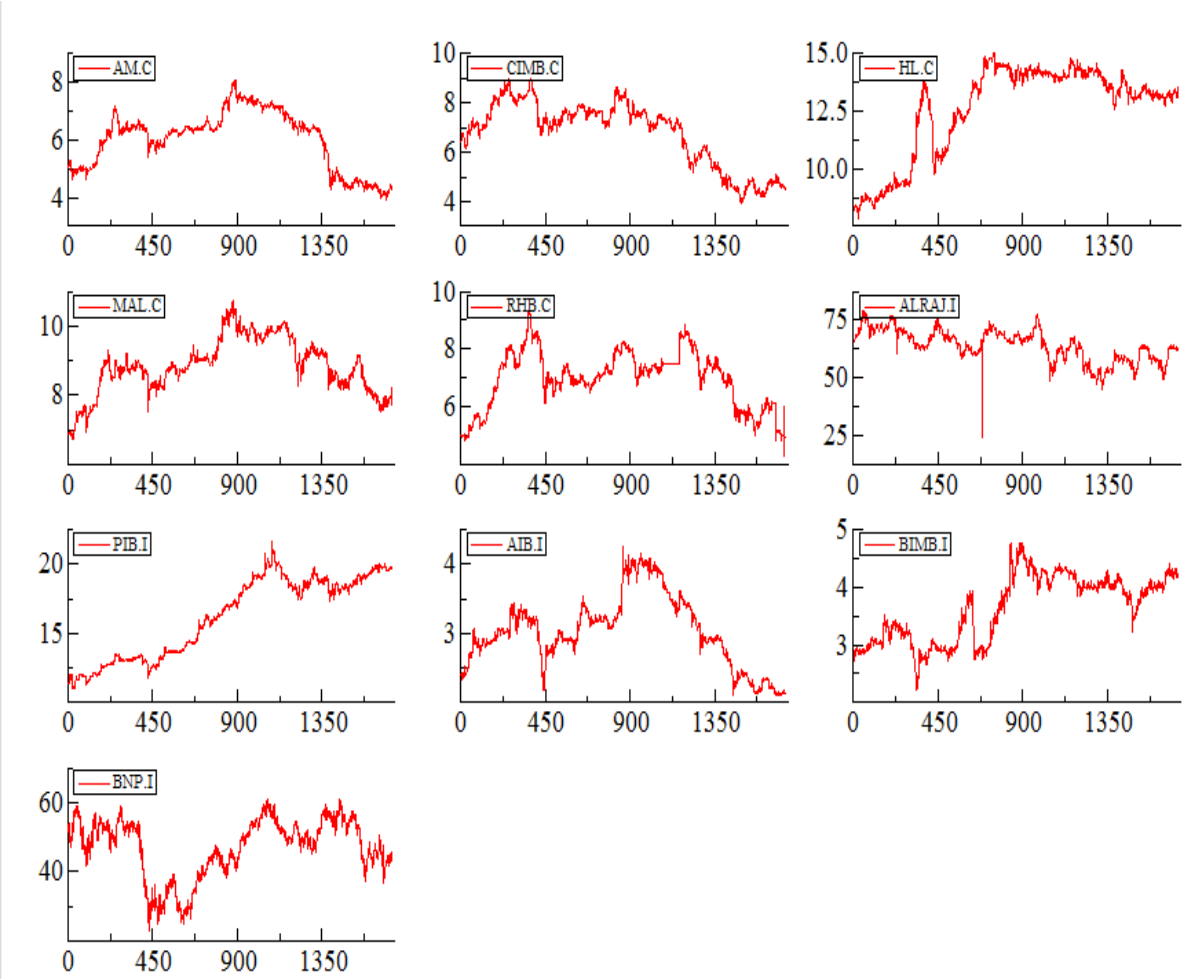
H0: there is no serial autocorrelation.

Jarque-Bera H0: distribution of series is normal.

LM-ARCH

H_0: there is no ARCH effect. Use these Asymptotic Significance values of t-stat 1% (0.01), 5% (0.05), 10% (0.1) and compare these critical values with P-values (Probability values). P-values are in the parenthesis.

5.2 Graph:

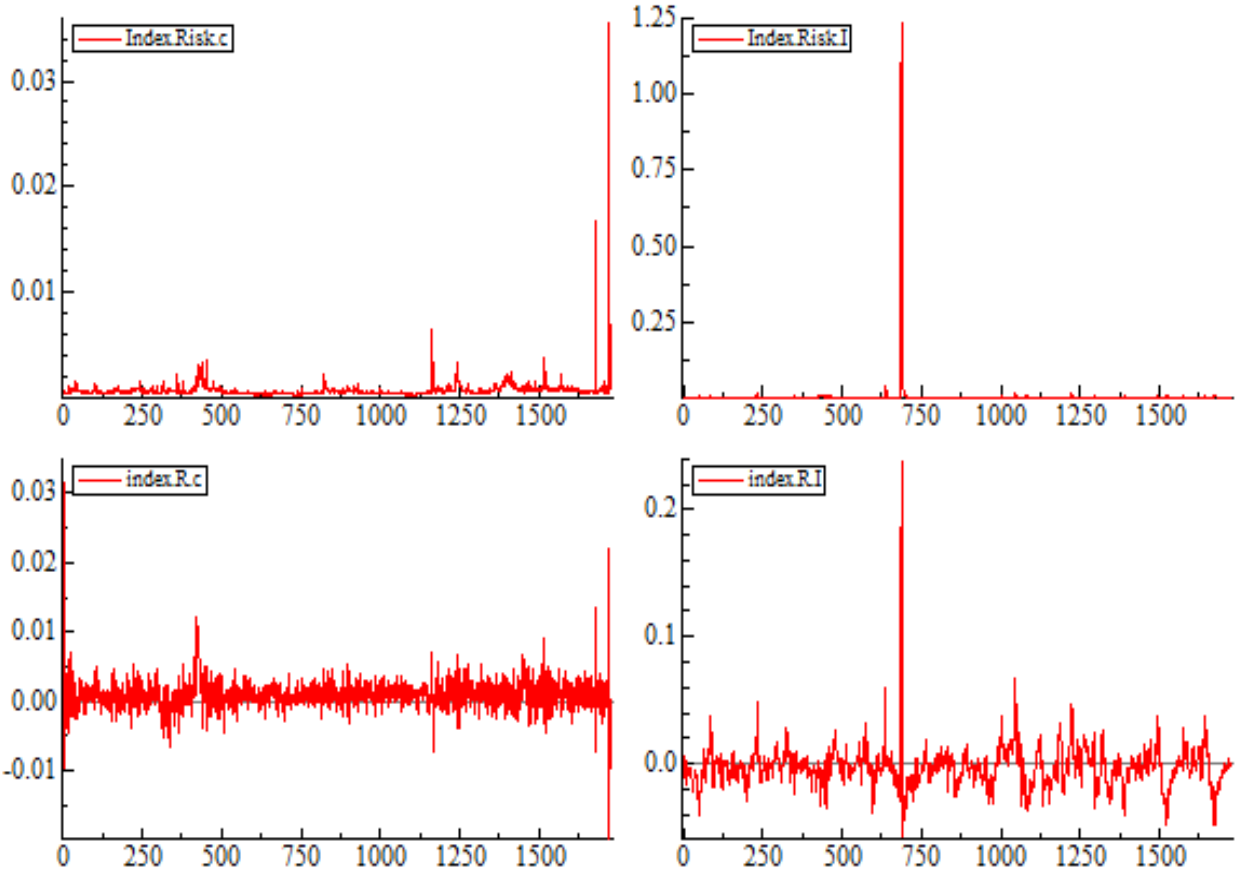


Explanation:

This graphs shows that overall performance of Islamic banks and conventional banks.

If we see conventional banks overall performance of last seven years, we found fluctuation. But in Islamic banks less fluctuation observed.

Risk and return Islamic and Conventional banks:

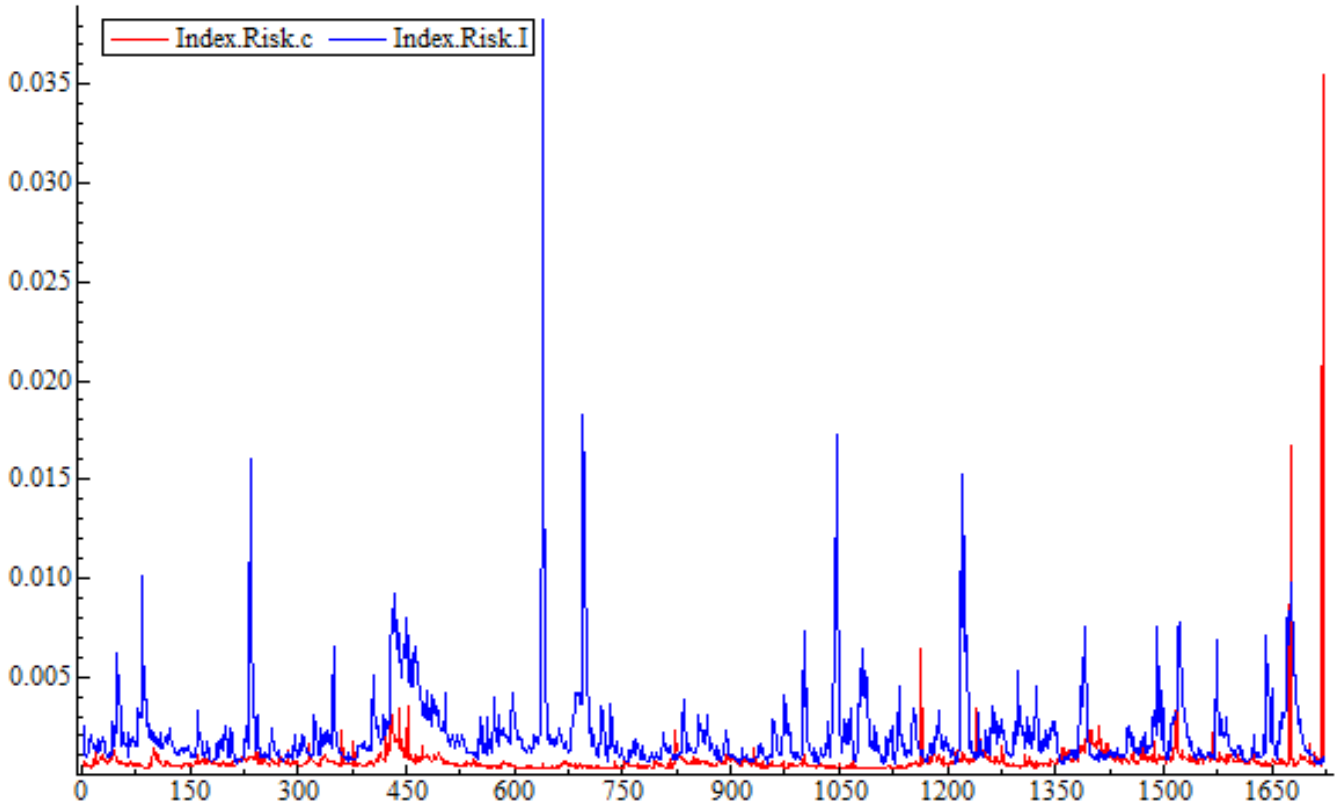


:

EXPLANATION:

This graph shows the risk of Islamic banks and conventional banks. In conventional banks Graphs shows less fluctuation. In Islamic banks graphs greater fluctuation are observed.

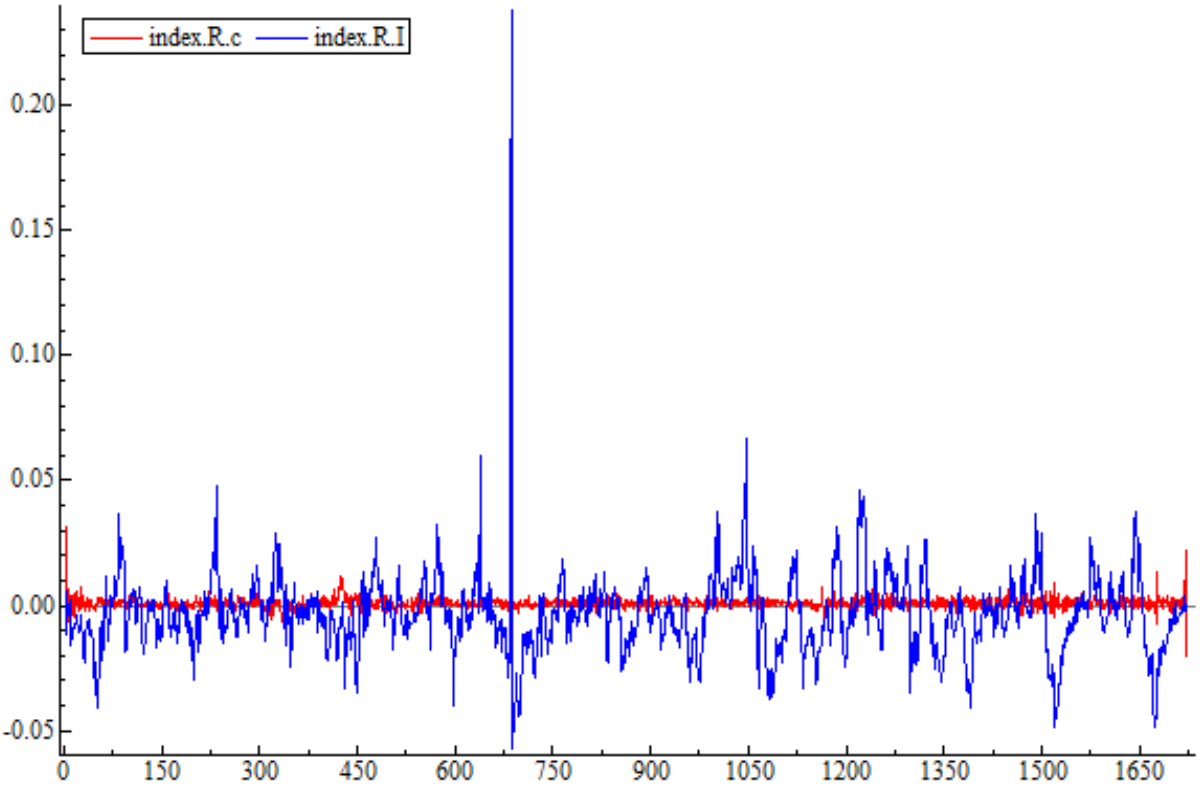
Comparison of Risk Islamic bank with Conventional banks:



Explanation:

As shown in above graphs of risk. It is evident that Islamic banking provides a greater risk as compare to conventional banking.

Comparison of return Islamic and conventional banks:



Explanation:

As shown in above graphs of return. It is evident that Islamic banking provides a greater return as compare to conventional banking.

Chapter 6

6 Conclusion and recommendation

6.1 Conclusion:

This study result shows that, In Islamic banks performance is very well as compare to Conventional banks. Islamic banks have more risk shared as compare to conventional banks. So Islamic banks got. If we saw the performance of Islamic banks in seven years it's also good. "Islamic banking is working in the guidance of Islamic principles. Islam basic principle told is sharing risk with others. In overall performance of Islamic banks increasing in *last seven years*"

If we saw the conventional banks performance in seven years they shared low risk and got low return, we saw overall performance of last 7 years of conventional banks it's not well as compare to Islamic banks. Because they earned low. In same time Conventional banks performance shows up and down and we called it's not well mostly went to down. Graph shows they continually fallen they earned low as compare to Islamic banks.

According to theory risk and return: More risk and more return. If they took more risk ultimately they got more return according to theory.

In conventional banks data result shows risk is low as compare to Islamic banks and returns also shows low. Conventional banks does not share risk.

6.2 Policy recommending:

Islamic banking is more reliable for everyone but in modern time people want quick response. Islamic banking system is very complicated in modern time. We need to make easy and beneficial for everyone. After the finding of this study I gave some policy recommendations,

1. In present Islamic banking system is very complicated, Mostly people don't know the benefits of Islamic banking.
2. Further enhance this study and students can checked spillover effect in regional level.
3. Mostly people don't know about Islamic banks or Investment tools of Islamic banks. Awareness is necessary to people know about Islamic banking.
4. Islamic banks have already six tools of investment but they used only two or three. They need to use all tools.
5. Mostly people gave argument Islamic banking is same like conventional baking they don't know difference between Islamic banking and conventional banking. Awareness is necessary.

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