CORRELATION BETWEEN SUKUK RATE AND CONVENTIONAL BOND RATE IN MALAYSIA

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DECLARATION

We hereby declare that:

(1) This undergraduate FYP is the end result of our own work and that due acknowledgement has been given in the references to ALL sources of information be they printed, electronic, or personal.

(2) No portion of this FYP has been submitted in support of any application for any other degree or qualification of this or any other university, or other institutes of learning.

(3) Equal contribution has been made by each group member in completing the FYP.

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LIST OF ABBREVIATION

AAOIFI	Accounting and Auditing Organization for Islamic Financial Institutions
ADF	Augmented Dickey-Fuller
AECM	Asymmetric Error Correction Model
BNM	Bank Negara Malaysia
BR	Conventional Bond Rate
CAARs	Cumulative Abnormal Average Returns
CASARs	Cumulative Average Standardized Abnormal Returns
CUSUM	Cumulative Sum
CUSUMSQ	Cumulative Sum of Square
ECM	Error Correction Model
FEVD	Forecast Error Variance Decomposition
GDP	Gross Domestic Product
KPSS	Kwiatkowski, Phillips, Schmidt, and Shin
MTAR	Momentum Threshold Autoregressive
SAC	Shariah Advisory Council
SC	Securities Commission Malaysia
SPV	Special Purpose Vehicle
SR	Sukuk Rate
TAR	Threshold Autoregressive
UKN	Unknown
VaR	Value at Risk
VAR	Vector Autoregressive
VD	Variance Decomposition
VECM	Vector Error Correlation Model
YTM	Yield to Maturity

PREFACE

Over the past decade, Islamic finance recorded substantial expansion in its global market development. The integration into the global finance market with systematic industry standards and innovation boom had contributed to a wider range of financial services to customers, ranging from retail banking to insurance and capital market investments. Undoubtedly, the development of Sukuk market has been the most remarkable in Islamic capital market. According to S&P Global Ratings (2018), Sukuk issuance in 2017 increased by 45.3%, reaching $97.9 billion, up from $67.4 billion in 2016.

The competition towards the conventional industry which is much more streamlined and globally interconnected might challenging the Shariah-compliance nature of Sukuk. Generally, the criticisms of Sukuk rate is mimicking against conventional bond rate are seems to be most detrimental to the 'Islamicity' and the reputation of Sukuk market. Therefore, there is a need to examine the relationship lying between these two financial instruments in order to clarify the distinction of Sukuk from conventional bond and even the credibility and integrity of Islamic finance.

Thus, this study designed to examine whether there is mutual correlation between Sukuk rate and conventional bond rate and the existence of asymmetric effect when there is an increase or decrease in the former's rate to the latter's rate and vice versa. Meanwhile, the study focused on Malaysia context as Malaysia is the world's largest Sukuk issuer. It might make the study more meaningful.

ABSTRACT

This study examines the relationship between the conventional bond rate and Islamic bond (Sukuk) rate in Malaysia market. Monthly data of 5 different maturities including 1 year, 2 years, 3 years, 5 years and 10 years spanning from May 2013 to May 2018 had been employed. The existing literature did not emphasize on the studies of asymmetric effect between the pattern of conventional bond rate and Sukuk rate. More than that, the criticism of Sukuk rate is mimicking the conventional bond rate emerged in the Islamic Finance. Hence, the study fills this gap by analysing if there is asymmetric in how the Sukuk rate responds to increase or decrease in conventional bond rate and vice versa. To determine whether there are asymmetric roots, Threshold autoregressive (TAR) and Momentum Threshold autoregressive (M-TAR) models were used. From the Error Correction Model (ECM), there is an existence of long-run equilibrium relationship in 2, 5 years Sukuk rate and 3, 5, 10 years conventional bond rate. Besides, it found that no long-run integration in 3 years Sukuk rate and 2 years conventional bond rate. On the other hand, Asymmetric Error Correction Model (AECM) was able to prove an asymmetric relationship between the variables in 1, 10 years Sukuk rate and 1 year conventional bond rate. Furthermore, the findings showed a bi-directional Granger causality which indicated that Sukuk rate and conventional bond rate are actually affected by each other. However, Variance decomposition test shows that Sukuk rate is more likely to affect by itself rather than the changes in the conventional bond rate while conventional bond rate is more likely to be affected by Sukuk rate changes rather than itself. The findings hence provide evidence for a better understanding on the relationship between Sukuk rate and conventional bond rate.

Keyword: Sukuk rate, conventional bond rate, long run relationship, co-integration, asymmetric relationship, bi-directional, Malaysia

CHAPTER 1: RESEARCH OVERVIEW

1.0 Introduction

Islamic finance industry has attracted the attention of people all over the world with its substantial growth rate achieved nearly US$1.9 trillion in assets and spreading across 50 countries around the world in 2016 (World Bank and Islamic Development Bank Group, 2016). This trend is growing non-stop in recent years by the increasing demand from investors from Muslim and non-Muslim countries around the world. According to McKinsey (2007), the value of the Islamic assets has almost reached US$1 trillion compared to other non-Islamic assets. The rapid expansion of Islamic finance industry has also arisen across a wide range of financial activities, ranging from retail banking to insurance and capital market investments.

As the decade nowadays is an explosion of activity in Islamic finance, many conventional banks have recognized the opportunity and opened Islamic windows to cater to the developing needs of Islamic customers. An Islamic window is a window within a conventional bank which customers can conduct business utilizing only Shari'ah compatible instruments. This has triggered the implementation of a dual banking system which means the co-existence of Islamic and the conventional banking and they are operate simultaneously and get along with each other in the financial system.

Among the countries issuing Sukuk, Malaysia is the leading Islamic financial centres although it does not have larger Islamic bank or Muslim population (Rahim, 2013). Malaysia has developed as the first country in the world in which a dual banking system was created and the success of it became evident. The creation of dual banking system was vital for Malaysia as it is a multi-religious and a multi-ethnic society with a plural legal structure. The creation of dual banking system was the objective and that it would not be an easy task under the given circumstance

where the conventional legal infrastructure is applicable to Islamic investment practice. This led to controversy that the Islamic foundations (Shari'ah) are virtually not distinct from the conventional practices yet some denied it. Some also raise doubts whether Islamic banking products are the simulation of the conventional banking products (Ariff, 2015).

Among these judgements, the conventional bond rates serve as benchmark against the Islamicity of Islamic banks seems most damaging (Sukmana and Ibrahim, 2017) since the most striking and most famous form of securitized finance credit was the Islamic bonds or Sukuk within Islamic finance (Hesse, Jobst and Sole, 2008). Therefore, to clarify the misunderstanding of investors, it is important to analyze the relationship between Islamic and conventional by examining the pattern of their rates. This is because if asymmetric effect exists, would reveal whether Islamic banks are engaged to seek for benefits or to serve the best for consumers or investors. Further investigation is needed whether there is co-movement or correlation between Sukuk bond rates and conventional bond rates by putting aside all the theoretical and structural differences.

1.1 Background of Conventional Bond and Sukuk in Malaysia

1.1.1 Background of Conventional Bond in Malaysia

Bond commonly referred to fixed income security which is a long-term debt instrument which specifies that an entity such as corporate or governmental, which has borrowed funds from the investor at certain interest rate and will repay it on a certain future date. It is an obligatory agreement between the issuer and the bond holder. Basically, there are two cash flows during its life: coupon interest and principal. If the issuer is default on either one of the cash payments, the bond holders are entitled to bring the lawsuit against the issuer to protect their rights to receive the payment. Instead of applying

loan from banks or other financial institutions, it provides an important alternative means of financing to the fund seeking entity.

In fact, Malaysia's bond market started to develop when the government started issuing bonds domestically in order to collect funds primarily to promote the growth and development of country. Due to lack of a well-developed bond market, banking system is the main credit intermediation channel and when financial crisis happened in 1997 and 1998, the credit risk has been extensively magnified (Ibrahim and Wong, n.d.). Thus, it led the government to emphasize on the bond market's development in order to provide less risk alternative sources of finance to the corporate sector which played important role in boosting the economy. Furthermore, Asian crisis has brought a lesson reminding the importance of diversification within the financial system; therefore, Malaysia was started to develop the corporate debt market in order to diversify and thereby minimize the credit risk. Significantly, this innovative finance source gained popularity in the private sector and fuel the development of Malaysia's corporate bond market. Consequently, Malaysia's bond market experienced extraordinary growth resulted from the well-established government bond market complements with the sizeable corporate bond market.

According to Cagamas Berhad (2016), Malaysia recorded a sizeable bond market of US$260 billion supporting it to become the fifth largest bond market within the Asian region. Moreover, Malaysian corporate bond market achieved a size of RM534 billion which represents 43% of GDP making it the greatest within the region. The establishment of the national mortgage corporation in 1986, Cagamas Berhad, is to diversify the issuer base as well as a platform to promote the corporate bond market. Several economic activities also had been implemented as the government realized that existing financial mechanism were inadequate to meet those long-term projects. Malaysia's government sought to develop corporate bond market to provide support required by the private sectors to tap alternatives source of financing. Besides, individual and unit trusts from corporate bonds were allowed for tax exemption on interest earned since the fiscal incentives were introduced. These initiatives incarnated that in terms of size and market

infrastructure, Malaysian bond market showed prompt expansion over the 1990s into one of the region's most developed bond markets.

1.1.2 Background of Sukuk in Malaysia

According to Islamic Financial Services Board (2018), Sukuk defined as investment certificates which representing a proportional undivided ownership in the underlying assets. The underlying assets could be an investment activity or project that is Shari'ah-compliant in order to generate lawful (halal) income for the Sukuk holders. The ownership right over the assets are transferred from the original owner (Sukuk issuer) to the Sukuk holders over the maturity period. In other means, the risk and return associated with cash flows generated from the underlying assets are assumed by the Sukuk holders. This reflected the risk and profit-sharing concept in Sukuk which are not exist in conventional bonds. Besides, the most apparent characteristic that differentiate Sukuk from conventional bonds is that Sukuk holders earn profit rather than interest. Today, Sukuk are commonly classified into either asset-based or asset-backed. According to Herzi (2016), in the first category, the Sukuk holders only have the beneficial ownership of the underlying asset. In other words, the originator still holds the legal ownership of the underlying asset because there is no true sale of asset to the Sukuk holders. The issuance of Sukuk does not transfer the assets from the originator's balance sheet to those of the Sukuk holders. In fact, in a case of default, the Sukuk holders only have recourse to the originator, not the underlying asset. On the other hand, asset-backed Sukuk will legally transfer the ownership rights of the underlying asset to Sukuk buyers. This indicates that Sukuk holders will have ultimate control of and realize the asset's value. In the event of default by originator, they only have recourse to the asset.

Sukuk are often considered as one of the most promising segments within Islamic finance. Global Sukuk market has successfully attracted the attention from business communities around the world including governments, corporations, and other types of entities. Many companies and

governments are tended to issue about US$30 billion of Islamic bonds during the next three years in order to raise fund for the huge infrastructure projects from the Gulf region and across the Muslim world, as well as there will have investment opportunities in substantial projects that worth over $1 trillion was projected in the next decade in the Gulf region (Al-Bashir and Al-Amine, 2008). The responsibility of Sukuk market is to secure these funds. Moreover, interestingly, conventional company, Shell MDS, is the world's first Sukuk issuer but not Islamic financial institution.

Before the financial crisis, public thought that Islamic finance was just an illusion and did not take it seriously. Since a large pool of investors that can only invest in Shari'ah-compliant assets, there also only 4,650 deals have taken place in 2005 and issuance has declined from peak (Bernato, 2016). However, International Monetary Fund claimed that Sukuk market continues to develop, face new challenges and opportunities; therefore, Sukuk was receiving much attention because of their fast-growing in size and reach popularity in order to encompass capital market regulations and financial innovation (Ahmed, 2008). Furthermore, The Star Online reported about Employees Provident Fund (EPF) announced that an initial fund size of RM100 billion will be used to kick off its fully Syari'ah-compliant investment scheme. This may due to the investors are increasingly getting positive about Syari'ah-compliant funds. Investors' interest was being awakened and condition of requiring more institutional investment was being created were due to the large Sukuk issues in recent years (Tee, 2016).

Malaysia is known as the most active country in Sukuk market as it was holding for nearly 67% of outstanding global Sukuk and Malaysia Islamic Financial Report 2015 stated that Malaysian Sukuk market is made up of 96% (US$431,65 billion) local currency issues and 4% (US$17.44 billion) foreign currency issues. Besides conventional bonds, there are still a lot of capable Islamic financing alternatives in Malaysia (Ahmad et al., 2015). In the other hand, Indonesia, Pakistan, Singapore, Brunei and Hong Kong are the countries that have potential signs in developing Sukuk. Based on Figure 1.1, Ministry of Finance (2015) in its media had released that Asia owned the highest allocation of Sukuk investors (50%) in the 10-year tranche,

following by Middle East countries (25%), Europe (16%), and United States (10%). As for 30-year tranche, the highest Sukuk offered and allocated also to Asia (50%). A 29% contributed by United States, 19% and 2% was distributed to Europe and Middle East countries respectively. This reflected that the Malaysian economy is highly competitive and Sukuk issuance and trading have become a popular form of investment to the investors have the strong confident to invest in Sukuk due to the fast growth of market (Salah, 2013).

In recent decades, Ahmad and Haron (n.d.) found out that Syari'ah-compliant funds perform better than conventional funds since banking stocks tend to underperform during recession and Islamic funds are not disclosed to the banking sectors. According to Michael, Sukuk significantly outperform conventional bonds over the 10 years period. Even though there was a severe dropped of Sukuk in the region of 2008 and 2009, which also the event of global financial crisis, but it can be seen the Sukuk is still available and secure in the recent market after later years of recovery. This concludes that Islamic bonds are relatively more stable than conventional bonds and the average yield to maturity of Sukuk would comparatively greater than conventional bonds (Fathurahman and Fitriati, 2013). Despite the debate on various aspects of Sukuk such as their originality, their compliance and their performance, Sukuk have become promising alternative instruments of financing consistent with portfolio theory and financial planning. Most publications agree that Sukuk offers an alternative investment, but the debate about if Sukuk is an innovative instrument of investment in global basis is extremely open and wide.

1.2 Problem Statement

The rapid growing of Sukuk issuance in Islamic bond market amidst financial doubtfulness and gained a lot of attention all around the world. This raised questions whether there are some differences between Sukuk and conventional bond. Generally, the criticisms of Sukuk rate is mimicking against conventional bond rate are seems to be most detrimental to the reputation of Islamic bond market.

According to Chong and Liu (2009), there was a unidirectional Granger causality between conventional deposit rates and Islamic investment rate in Islamic banking. This infers that Sukuk rate behaves similar and mutual correlated towards conventional rate. Furthermore, the returns from Islamic investment deposits tend to follow conventional deposits due to the competitive pressure in conventional banking (Sukmana and Ibrahim, 2017). This ends up with Islamic deposits is not interest free which is violated the fundamental Shari'ah principles. Therefore, this triggered more studies to further investigate the integration between Sukuk rate and conventional bond rate in Islamic bond market whether they also mimicking the benchmark rate from conventional bond.

In fact, there are some arguments proposed an asymmetric movement between Sukuk rate and conventional rate. According to Sukmana and Ibrahim (2017), Sukuk rates react faster in the increment than reduction of the conventional rates at same order of magnitude. This indicates that Sukuk rate and conventional rate are co-integrating but they are not completely segmented with each other. Therefore, there are some needs of evidences and further research to verify the results of existing literature and justify the issues of whether Sukuk rate is mimicking the conventional bond rate in order to clarify the doubt of those questioning the originality of Islamic finance. In a nutshell, the mimicking issue of Sukuk rate is an aging issue which continues to be a hot topic of intense debate among advocators and researchers (Ibrahim, 2015).

1.3 Research Objectives

The main purpose of this study is to examine the correlation between conventional bond rate and Sukuk rate in bond market. Secondary data which is journal published is used in order to have a better understanding the returns of both bonds of Malaysia in bond market.

The objectives of this study are as follows:

- The general objective this study is to investigate the relationship between conventional bond rate and Sukuk rate of Malaysia in bond market.
- The more specific objectives can be divided into three:

i. To investigate the long run integration of conventional bond rate and Sukuk rate.
ii. To investigate the short run integration of conventional bond rate and Sukuk rate.
iii. To study the causality relationship between the conventional bond rate and Sukuk rate.

1.4 Research Questions

This study consists of two research questions:

- Is there any significant difference between conventional bond rate and Sukuk rate in Malaysia bond market?
- Is there causality relationship between the conventional bond rate and Sukuk rate in Malaysia bond market?

1.5 Significance of Study

There are two key aspects in this study are important. First of all, with the aim of investigating the co-integration between Sukuk rate and bond rate, this study provides an enhancement in result which improves the previous literature. To anticipate the test results in this study, Sukuk rates tend to be move in asymmetric form to corresponding conventional bond rates in the long run. This finding is to prove that Sukuk rate are not exactly peg to conventional bond rate.

Apart from that, this study provides a more distinguished judgment for the relationship between Sukuk rate and conventional bond rates. The argument in this study is straightforward. Islamic finance is offering the products that simply imitation of conventional ones and thus violated the Shari'ah principles. To study the causality between Sukuk rate and conventional bond rate, some test is carried out in this study to investigate the relations between the bond rates. The results in chapter 4 are important to prove that Sukuk is not mimicking the conventional bond which Sukuk does not violate Shari'ah principles.

1.6 Conclusion

This chapter has summarised the background of this study by discussing the growing of Islamic finance and the origin of the Sukuk and conventional bond. The objectives are to figure out the integration between the Islamic and conventional in long run as well as short run by using their rates as the benchmark. The issue and the significance of this study provide an orientation to complete this study. The following chapter will present the different perspectives of various researchers about the differentiation or identical of Islamic and conventional.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

Although Sukuk and conventional bonds are bought and sold by investors in the same financial market under the same clearing mechanism and competing for financial resources from the same pool of investors, there are numerous valid fundamental differences between these two financial instruments. Similar to bonds, Sukuk holders will receive a stream of income until maturity date is reached. Although the Islamic rule (Shari'ah) is the underlying principle to differentiate Sukuk from conventional bonds, it is very important to investigate the fundamental comparison between these two funding securities. By surveying the literature, there are various studies aimed to provide evidence on the controversy whether these two securities are identical in nature. Many studies attempt to make comparisons by examining Sukuk and conventional bonds on their risk and return, properties, and also their structures. Some researchers even conducting research to see how the market (investor) perceives these two investment securities. Therefore, in this chapter, there are two parts summarizing the literature review regarding the relationship between conventional bond and Sukuk based on the previous studies. The first part of this chapter provides the studies on the emerged Shariah issue under the Sukuk while the next section reviews on the risk and return, stock market reaction and also the comparison of mean rate return on both conventional bond and Sukuk.

2.1 Criticism of Sukuk Mimicking Conventional Bond

The major threat to the Islamic finance industry is the criticism of Sukuk mimicking the conventional bonds. Lahsasna and Lee (2012) in their studies addressed that Sukuk were increasing developed in a way that structured exactly behaving like

conventional bonds. They raised four particular Shari'ah issues that supporting the criticism of Sukuk mimicking conventional bonds: (1) charging of late payment penalty on Sukuk issuer, (2) introduction of debt trading which occur at discounted price, (3) purchase undertaking in Mudharabah and Musharakah structures, and (4) practices in asset-based Sukuk. Besides, Ayub (2007), Al-Amine (2008), and Zadeh (2016) also pointed out similar arguments relating to the emerged Shariah issues. Thus, ambiguity as to whether Sukuk are fully Shari'ah compliant significantly arises.

2.1.1 Late Payment Charges/Penalty

Lahsasna and Lee (2012) proposed that the imposition of penalty on late payment will create an opportunity to "Riba" because the penalty proceeds is more likely to be converted as a source of unjustified or effortless income to the creditors (Sukuk holders). This had created an ambiguity since it had violated the Islamic beliefs. This is because Islam has always urged human beings not to engage in activities which are unethical and involving Riba. Further to this, there are different types of Riba which have been mentioned and proven in the Holy Quran and Prophet's Sunnah. Among them, one has been termed as Riba al-Jahiliyyah. It is a penalty imposed after default which requires the borrower or debtor to pay additional amount over the principal. This has indeed created a problem in the Islamic finance as people might relate the late payment charges structured in Sukuk to the Riba al-Jahiliyyah. As opposed to the riba,

Sukuk should be structured in a manner allowed for delayed payment, without having to compensate the holders (Bothra, 2011). Because of the rapid growth of Islamic capital market, this issue had received substantial attention and finally it has been brought into discussion by the Shari'ah Advisory Council (SAC) of the Securities Commission Malaysia (SC). After a series of meetings, as at 8th November 2000, a resolution is reached which specifying that the late payment charge is permissible. The provison established is as follows, "ta`widh payment for (i) arrears and (ii) failure to pay after the due date, is permissible for Islamic financing formulated based

on `uqud mu`awadhat (exchange contracts) including Islamic debt securities. Ta`widh can be imposed after it is found that mumathil (deliberate delay in payment) is utilised on the part of the issuer to settle the payment of the principal or profit. The rate of ta`widh on late payment of profit is one per cent per annum of the arrears and it cannot be compounded. While the ta`widh rate on failure to settle the payment of the principal is based on the current market rate in the Islamic interbank money market, it too cannot be compounded."

More importantly, the proceeds from the penalty must be channelled merely for charitable purpose. It must not be an income source for the creditor. Otherwise, it will constitute a practice of Riba.

2.1.2 Debt Trading at Discounted Price

As mentioned by Zadeh (2016), debt trading is distinct from commodity trading. Since Shari'ah rules permits only the sale of debt which equivalent to its principal amount. Hence, the innovation of Sukuk in introducing the trading of debt at discounted price has raised criticism on whether the practicing of "Riba" is permissible in Sukuk. Regarding this issue, Islamic Fiqh principle of 'dha' wa ta'ajjal' has to be introduced in order to explain throughout the condition. According to Islamic Finance news (n.d.), it is an action of forfeiting part of the debt if the debtor makes early settlement. Generally, there were two main views by the past Islamic jurists on 'dha' wa ta'ajjal'. Indeed, most of the Islamic jurists did not permit the sale of securities at a price lower than the par value.

"Their argument was that there is a similarity between the concept of 'dha' wa ta'ajjal' and Riba, in the prohibition of the increase in payments. The similarity lies in using time/duration to determine the price. This is made clear when an extension in time results in an increase in price, and vice versa when a reduction in time results in a reduction in price", as stated in Resolutions of the Shari'ah Advisory Council of the Securities Commission Malaysia (2007). However, the SAC permitted the use of 'dha' wa ta'ajjal'

principle in issuing the Islamic capital market securities after discussing the issue through a series of meetings. Now, it is no longer an issue as it is justified and legalized. As derived from the conclusion made by a past Islamic jurist who permit the practice of 'dha' wa ta'ajjal', Ibnu Qayyim, proposed that “Riba is not present in this issue whether in reality, language or `Urf. As a matter of fact, Riba is something that increases whereas this does not happen in dha` wa ta`ajjal. Those who have forbidden it have compared it to Riba, whereas there is a clear difference between the two in the words used: (a) Either you increase the payment (due to late payment), or settle the debt (in time) – this is Riba; and (b) Quickly settle your debt with me and as an incentive I will discount part of it – this is dha` wa ta`ajjal.”.

Clearly, the practice is accepted because it does not constitute any kinds Riba (interest) at all.

2.1.3 Purchase undertaking practices in Mudharabah and Musharakah

The concept of Mudharabah and Musharakah guarantees the investors with capital payback also contributing to dispute because it violates the most basic features of Shari’ah rules, the principles of risk and sharing. Meanwhile, Al-Amine (2008) pointed out that the issue of guarantee not only challenge the Mudharabah and Musharakah contract, but also the Ijarah contract The issue becomes intensely heated when Usmani proposed a statement in 2017 stating that 85 percent of Sukuk issues in the market (those issued under Mudharabah and Musharakah structure) do not strictly adhere to the profit and loss sharing features that always emphasized in Islamic culture. In other means, those issues may not have been fully Shari’ah compliant. This issue raised an ambiguity in understanding Sukuk mainly due to the structure of Sukuk formulated on the basis of Mudharabah and Musharakah which represent a form of partnership contract. The practice of “purchase undertaking” had become the key discussion point by scholars and Islamic jurists. According to Ellias, Haron and Mohammed

(2013), the Sukuk holders' initial capital is indirectly guaranteed through the pre-determined formula because the assets underlying the Sukuk contract are purchased at pre-agreed exercise price rather than actual market price at maturity date. As supported by Uddin, Sultan, Hosen and Ullah (2015), it is the most controversial issue in Sukuk. This practice tends to depart from the Islamic law. As stated by Tan (2009), whether the asset is appreciating or depreciating in value, Sukuk holders must realize the true asset value. In other words, Sukuk are mirroring the payout structure of conventional bonds. Subsequently, this issue had been the priority subject for further investigation by the AAOIFI Shari'ah Board. Later, AAOIFI Shari'ah Board had formulated a standard to resolve this issue which tends to go against the Islamic laws. According to AAOIFI Shari'ah Board (2015), under Shari'ah Standard (12), which quoted as:

"It is permissible for a partner to issue a binding promise to buy, either within the period of operation or at the time of liquidation, all the assets of the Sharikah as per their market value or as per the agreement at the date of buying. It is not permissible, however, to promise to buy the assets of the Sharikah on the basis of face value."

Significantly, this standard is used to eliminate the practice of guaranteeing the Sukuk holders' profit and principal in order to resolve the dispute and maintain the credibility of Islamic finance, more importantly the Islamic Law. On the other hand, in Malaysia context, to resolve the controversy, the SAC has permitted the purchase undertaking in Sukuk at a price equals to the fair value at maturity or following an event of default. Moreover, the SAC has restricted the guarantee on capital in both Mudharabah and Musharakah transactions. However, the guarantees of capital in both transactions are allowed if misconduct or negligence is proved in manager.

2.1.4 Asset-based Sukuk Structures

Asset-based Sukuk are subjected to securitization transaction which make them behave like conventional bonds (Dusuki and Mokhtar, 2010). The

mimicking of bond structure is mainly due to the market pressures. According to Wouters (2011), Sukuk had been structured in a way that satisfies the needs and aspirations of diverse investors. There is a tremendous rise in maximizing the cash flow to potential investors and provide them with higher profit expectations. Further to this, the global financial crisis which occurred in 2008 had resulted the first ever default of any Sukuk in modern history had critically raised the Shari'ah issue in Sukuk. On the face of it, profit and loss sharing (PLS) should assure that Sukuk have no risk of default. This is why the asset-backed Sukuk did not default during the economic crisis because they were structured to share realized profit and loss. In fact, as compared to the asset-based Sukuk, asset-backed Sukuk are eventually closer to the spirit of Shari'ah (Dusuki and Mokhtar, 2010). The debt structure was being incorporated into the asset-based Sukuk contracts. The interest and principal guarantees that make conventional bonds a specific instrument in the market are found in Sukuk structuring (Abdullah, 2012). The Sukuk holders' profit is guaranteed and it means that the profits are pre-determined and totally not based on the actual business performance. The profits are not realized and there is no risk taking at all in order to claim for the profits. Besides, as there is no true sale of the asset underlying the Sukuk contract to the Sukuk holders, thus they have no recourse to the underlying asset. As stated by Ellias, Haron and Mohammed (2013), the underlying relationship between Sukuk issuer and holder is merely creditor-debtor. They do not possess legal right to the asset; however, they only attain the beneficial ownership of the asset. Dusuki and Mokhtar (2010) further support the argument stating that Sukuk holders only perceive to the rights as being a creditor. Hence, when economic downturn strikes in 2008, it caused most of the issuer unable to distribute the promised cash flow to the Sukuk holders which subsequently lead to significant number of default cases. This is due to the asset-based Sukuk has replicated the risk perceived to all conventional debt instrument, the default risk. After the incident of default in Sukuk, this issue emerged and has been a heated and debatable topic among the Islamic jurists. As stated by Herzi (2016), the Sukuk issuances are not merely governed by Islamic Law, however, common law still exerts significant effects. It is crucial to resolve the

dilemma between the Shari'ah concern, legal framework and market factor. In order to develop the Islamic capital market instruments, SAC resolved the dispute by permitting the asset securitization process in Sukuk. All the asset securitization must be free from any prohibited elements. Basically, the Islamic jurists were concerning about the potential great risks (default risk) exposed to the Sukuk holders. Hence, in Malaysia context, Bank Negara Malaysia and Securities Commission are using regulation and surveillance to eliminate the risk and safeguard the rights of investors. As suggested by Ghani (2018), effective parameters must be developed to avoid the uncertainty associated with the attributes of ownership while structuring any Islamic financial instrument.

2.2 Identical Nature of Sukuk and Conventional Bond

2.2.1 Risk Exposure

Tariq and Dar (2007) try to trace the risk that revolving in the underlying structure of Sukuk and attempted to diversify the risk by referring to the concept and recommendation. Their research makes contribution to prove that the Sukuk are different with the conventional bond. Their research stated the Sukuk provides sound and stability of financial markets to the issuers and investors. Besides, Sukuk also provides competitive investment opportunity to the investors and created a foundation for Islamic financial securities.

Furthermore, Afshar (2013) also found out ten different risks between Sukuk and conventional bond, there are operational risk, call risk, liquidity risk, interest rate risk, foreign exchange risk, Shari'ah- non-compliance risk, purchasing power risk, price risk, business risk, as well as business risk. Usmani (2002) mentioned that due to the restriction of Shari'ah, the relevant contracts such as Murabahah, Salam and Istis'na Sukuk certificates cannot be traded in the secondary market. Because there is a conflict between the nature of the secondary market and Sukuk securities, one is speculative in

nature and another is non-speculative in nature. In short, Sukuk are less risky than conventional bond is because of the non- speculative nature.

In the other hand, Cakir and Raei (2007) figured out that the Sukuk and conventional bond that issued by the same sovereign are associated with different level of risks. They mentioned that the Sukuk carried less risk than the conventional bond because it able to diversify easily. They positioned monte-carlo simulation method and delta-normal approach by applying the VaR (value at risk) to measure the risk for Sukuk and conventional bond. They built up two hypothetical portfolios, the first portfolio comprised only conventional whereas, the second portfolio comprised of higher percentage of conventional bond and lower percentage of Sukuk. Thus, it can be concluded that the VaR has been reduced by the inclusion of Sukuk in the second portfolio.

In other cases, Ramasamy et al. (2011) employed the maturity and convexity measurements to detect the sensitivity of Sukuk and conventional bonds in the Malaysia market. In general, the longer the duration of a bond, the more sensitive the bond is; therefore, the lower the risk of the bond and generates the lower return, vice versa. The results concluded that Sukuk is less risky than conventional bond due to its high sensitivity. Hence, the return generated from Sukuk will be lower than conventional bond.

In addition, Hassan (2012) carried out research regarding the diversification of portfolio and he measured the risk of three portfolios, first portfolio only comprised of conventional bonds, second portfolio consist of Sukuk only and the third portfolio included both conventional bond and Sukuk. His finding concluded that the inclusion of Sukuk able to provide the diversification benefit. In short, Sukuk are different from conventional bonds because of the risk differences and the diversification benefit.

2.2.2 Stock Market Reaction

The structure, properties and the way of market treats Sukuk and conventional bonds as special investment alternatives have captured the

interest of public to study on it. There are few studies emphasized on the differences of the stock market perspective between Sukuk and conventional bonds. Godlewski, Turk-Ariss and Weill (2013) employed the event study methodology to examine the response of the investors in Malaysia regarding the Sukuk and conventional bonds issuance. The differences in cumulative abnormal average returns (CAARs) and cumulative average standardized abnormal returns (CASARs) between the conventional bonds and Sukuk event for selected sample listed companies sufficiently concluded that the announcement of the conventional bond issuance does not stimulate any investors' reaction. It means that the market participants are neutral to the security issuance. In opposite, the stock market is found reacts negatively to the announcement of the Sukuk issue. Further to this point, the authors commented that the underlying reason might due to the increasing popularity of the Islamic financial instrument and many investors incurred losses due to the poor performance of the issuer. This attributed to the securities issuances mostly made by low-quality firms as they wanted to take advantage from the profit and loss sharing mechanism.

Likewise, Ashhari, Chun, and Nassir (2009) examined the effect of Sukuk and conventional bonds announcements on the shareholders' wealth in Malaysia between 2001 and 2006. They discovered that the conventional bond distinct completely from Sukuk because investors' wealth insignificantly influenced by the conventional bonds announcement whereas Sukuk announcement did show significant wealth effect. There is a positive wealth effect from the Sukuk issues announcement. Although the result does not entirely consistent with the study by Godlewski, Turk-Ariss and Weill (2013), but both study correspondingly supported that Sukuk and conventional bonds are different. There are different reactions from the market investors towards the announcements of issuance of both instruments. Furthermore, another study by Ibrahim and Minai (2009) regarding the shareholder wealth effect associated to the announcements of Sukuk and conventional bonds issues in Malaysia between the periods of 2000 to 2006 sufficiently concluded that investors react positively and significantly to the Sukuk issuance but remain indifferent to conventional

bonds issuance. This results undoubtedly in line with the conclusion by Ashhari, Chun, and Nassir (2009). Besides, the results revealed that shareholders benefit through wealth increment when companies tend to issue Sukuk rather than conventional bonds. According to them, wealth enhancement arises from the Sukuk issues were due to the cost reduction. Increasing subscription of Sukuk among diverse market investors lowering down the cost of capital, directly benefit the shareholders.

In another study, similar to the study by Godlewski, Turk-Ariss and Weill (2013), Alam, Hassan, and Haque (2013) employed the method of cumulative abnormal average returns (CAARs) to compare the wealth effect on stockholder from the announcements of Sukuk and conventional bonds issues. The study had been segmented into pre-financial crisis, during financial crisis and post-financial crisis. In general, the stock market has adverse response towards the Sukuk issuance before and during the global financial crisis that happened in 2008. While the stock market reaction was significantly positive after the financial crisis. On the other side, there is a positive market reaction towards the conventional bonds issuance before crisis whereas negative market reaction is found during and after crisis period. Overall, there is notable difference in the stock market reaction to the issuance of the two instruments in each period. However, when under a larger time frame, the author was able to prove that there was an absence of significant stock-market response to the announcements of both Sukuk and conventional bonds issues.

2.2.3 Comparison on rate basis

Due to some similar features from conventional bonds are found in Sukuk, mass media often termed Sukuk as Islamic bond. This had motivated Ariff and Safari (2012) to conduct a study to examine whether Sukuk are similar to conventional bonds. According to them, such generalization might be wrong because both instruments do not share the same funding purpose. In order to have an empirical test on the relationship between Sukuk and conventional bonds, Ariff and Safari (2012) used 64 pairs of securities

issued by the same issuer and under same maturity to conduct comparison using sample t-test. All the rate data extracted from four major securities issuer in Malaysia, which comprised of government, quasi-government, financial institution and business corporation. The sample period adopted was spanning from 2005 to 2011. From the plotted rate curve, it proved that rate of Sukuk are higher than conventional bonds'. Although Sukuk tend to offer lower rate compared with conventional bonds in short-term period for financial institution and corporation, but the rate tend to increase with time. With maturity more than 10 years, Sukuk offer greater rate than conventional bonds. This result is consistent with a study by Fathurahman and Fitriati (2013) which indicated that Sukuk are more attractive compared to conventional bonds. From the paired sample t-test, Ariff and Safari (2012) were able to find out that Sukuk are significantly different from conventional bonds in terms of mean rate also the median rate. From a total of 64 pairs, 46 cases showed significant differences in mean rate while 48 pairs are proved to have non-identical median rate. These results are able to ascertain that they are not the same. This result moved in line with the study of Haque, Chowdhury, Buriev, Bacha, and Masih (2017) which further indicated that Sukuk offer a less volatile return to investors. However, Rodoni and Setiawan (2016) yielded an opposing results compared with the formers. From the three different test (independent t-test, Mann Whitney test and Kruskal Wallis test), Rodoni and Setiawan (2016) concluded that both instruments are insignificantly different in their rates.

From the Granger Causality Test by Ariff and Safari (2012) , at 0.05 significance level, only 10 pairs indicated that Sukuk granger cause conventional bonds. On the other side, rate of conventional bonds granger cause rate of Sukuk in only 13 pairs out of 64 pairs. Besides, only 5 pairs showed a bi-directional Granger causality. Generally, it can be concluded that there is no causal link between these two funding instrument. Furtherly, Ariff, Safari, and Mohamad (2013) through another study were able to yield the same findings which supported Sukuk are not identical to conventional bonds. They conducted paired sample t-test and Granger Causality Test in the same manner. Their final results confirmed that significant differences

exist between the mean rates of both instrument issued by the same issuer and under the identical rating and maturity period. Besides, in a total of 34 pairs of securities, only 9 pairs indicated a causal relation between them. While 14 pairs showed a Granger causal link between conventional bonds and Sukuk. Further to this, bi-directional Granger causality only exist in 7 pairs of sample. In short, both of the studies provided solid evidence to prove that Sukuk are not replicas of conventional bonds. However, Haque, Chowdhury, Buriev, Bacha, and Masih (2017) obtained different conclusion showing the existence of causal relationship between them. By using securities with 3 months, 6 months, 1 year, 3 years and 5 years maturity, Sukuk rate does not Granger cause the rate of conventional bonds only found in 5 years maturity while conventional bonds were found Granger cause Sukuk in each adopted period. Finally, there is a bi-directional Granger causality between securities in 3 months, 6 months, 1 year and 3 years. This result showed that Sukuk and conventional bonds tend to Granger cause each other in short-term period.

2.3 Conclusion

Obviously, in the first section of this chapter, all the issues highlighted by the researchers critically challenging the credibility of Islamic finance particularly in Sukuk market. However, these criticisms were not sufficiently enough to conclude that Sukuk are replicas of conventional bond. Instead, previous researchers were able to prove that both instruments are different asset categories. There are solid evidence to show that Sukuk and conventional bond are not identical, thus rejecting the view of Sukuk mimicking conventional bond.

CHAPTER 3: METHODOLOGY

3.0 Introduction

Several methodologies have been included in this study such as Unit Roots Test, Augmented Dickey-Fuller (ADF) Test, Kwiatkowski, Phillips, Schmidt, and Shin (KPSS) Test, that used to examine the stationary status of the variables. Besides, Error Correction Model Test is used to measure how fast the variables adjusted back to long-run equilibrium. Asymmetric Error Correction (AECM) Model is used to detect the existing long run relationship between conventional bond rates and Islamic bond rates. To capture the asymmetric relation between the underlying variables, Threshold Autoregressive (TAR) Model and Momentum Threshold Autoregressive (MTAR) Model are being applied. The purpose of using Granger Causality Correlation Test is to analyze whether bond rates cause Sukuk rates or Sukuk rates cause bond rates. Five years of time series data including 1 year, 2 years, 3 years, 5 years and 10 year have been taken in presenting the testing. In addition, Impulse Response Function traced the effects of shock on the variables while Variance Decomposition is conducted to examine the short run relationship between the variables. For the diagnostic checking, Cumulative Sum (CUSUM) and Cumulative Sum of Square (CUSUMSQ) Test are executed to capture the stability between Sukuk rates and conventional bond rates over different periods. However, the details of each test will be explained clearly in this chapter.

3.1 Scope of Study

This research concerns on secondary data which are sourced from Bloomberg. Data collected is from May 2013 to May 2018 and is measured in percentage form. The sampling method included 60 observations and monthly data. The country selected in this study is Malaysia. Sukuk rate and conventional bond rate are the variables

used in this study. Sukuk rate is defined as the return of Islamic bond while conventional bond rate is return of conventional bond. Sukuk rate and conventional bond rate in this study are representatives of Bank Negara Malaysia Government Securities Islamic and Conventional Indicative YTM with the 1 year, 2 years, 3 years, 5 years and 10 years. The reason of choosing BNM Government Securities as the proxy of bond rate is because they are commonly known as the risk-free interest rates. It is easier to study the movements of the bond return without the influences of external factors, such as inflation and changes in government policy.

3.2 Research Framework

In order to capture the speed of adjustment, Error Correction Model is established in this research to specify the co-integrate relationship between Sukuk rate and Conventional bond rate. Equation 3.1 and Equation 3.2 have shown the integration of Sukuk rate and conventional bond rate.

ECM model:

$$\Delta SR = \alpha + \beta_1 ECM + \sum_{i=1}^{n} \beta_2 \Delta SR_{t-i} + \sum_{i=1}^{n} \beta_3 \Delta BR_{t-i} + \varepsilon_t$$

(Equation 3.1)

$$\Delta BR = \alpha + \beta_1 ECM + \sum_{i=1}^{n} \beta_2 \Delta BR_{t-i} + \sum_{i=1}^{n} \beta_3 \Delta SR_{t-i} + \varepsilon_t$$

(Equation 3.2)

Where,

SR = Sukuk rate, the yield of Islamic bond (%)

BR = Conventional Bond rate, the yield of conventional bond (%)

ε = Error term

TAR and MTAR is further conducted to investigate the existence of asymmetric relations between Sukuk rate and conventional bond rate. Through TAR and MTAR, the asymmetric relation is justified among the variables. Therefore, Asymmetric Error Correction Model (AECM) is developed to demonstrate the asymmetric relations between Sukuk rate and Conventional bond rate. In order to study the

asymmetric relations of Sukuk rate and Conventional bond rate, Equation 3.3 and Equation 3.4 are designed in this research.

AECM model:

$$\Delta SR = \alpha + \beta_{1\rho} ECM + \beta_{2(1-p)} ECM + \sum_{i=1}^{n} \beta_3 \, \Delta SR_{t-i} + \sum_{i=1}^{n} \beta_4 \, \Delta BR_{t-i} + \varepsilon_t$$

(Equation 3.3)

$$\Delta BR = \alpha + \beta_{1\rho} ECM + \beta_{2(1-p)} ECM + \sum_{i=1}^{n} \beta_3 \, \Delta BR_{t-i} + \sum_{i=1}^{n} \beta_4 \, \Delta SR_{t-i} + \varepsilon_t$$

(Equation 3.4)

Where,

SR = Sukuk rate, the yield of Islamic bond (%)

BR = Conventional bond rate, the yield of conventional bond (%)

ρ = Positive Shock

1-ρ = Negative Shock

ε = Error Term

There are two variables included in Equation 3.3 and Equation 3.4 which are Sukuk rate and conventional bond rate. All the measurements of the variables are in percentage form. The involvement of lag variables is important in this model. The current changes in Sukuk rate depend on the changes in the Sukuk rate and conventional bond rate of previous period. In the case if the lagged variables are not taken into consideration, the error term may signify a significant trend that constitutes autocorrelation (Gujarati and Porter, 2009).

From the equation 3.3 and equation 3.4, α is the constant algebraic while β is the slope coefficient for independent variable. The error term in the equation is to capture any vagueness of theory, insufficient of data, and measurement error.

Commonly, the dependence of Sukuk rates on conventional bond rates is examined by means of the standard time series econometrics. Therefore, co-integration tests, ECM model and AECM model are conducted to verify the presence of a long run

relation between Sukuk rates and Conventional bond rates. These approaches assume symmetric and asymmetric relations among the variables.

3.3 Unit Roots Tests

Unit root test is used to detect the stationary of the time series variables and it is important tool in estimating econometric regression models. A stationary model means that it consists of constant mean, variance and covariance over the course of time (Iordanova, 2007). In contrast, changes in mean and variance across the time period define that the variable is non-stationary. Meanwhile, stationary variable implies does not have unit root while non-stationary variable implies that it has unit root. All the variables have to be in stationary form so that the correlation between the Sukuk and conventional bond rates in the regression model are said to be adequate. Thereto, if a model consists of unit root or non-stationary will cause the tests became invalid and many standard results to be unreliable; thus, the model needs to be treated in differently.

3.3.1 Augmented Dickey-Fuller (ADF) Test

According to Dickey and Fuller (1979), the Augmented Dickey-Fuller Test (ADF) is one of the unit root tests to test the model stationary. In time series analysis, the results will be affected by the existence of unit root. As compare to Dickey-Fuller (DF) tests, ADF test can handle more complex models, hence it is said to be more powerful. ADF test can be used with serial correlation. By including lagged term to the right-hand side dependent variables of the regression as shown in equation 3.6, ADF test can use to control the higher order correlation and assumes the series of dependent variable follows the AR(p) process. The model indicates the changes of dependent variable is regressed by the independent variables that included the lagged level in terms, $\alpha\ Y_{t-1}$, optional independent variable which may consist of constant and with trend, X_t, δ and the white noise disturbances ε_t as shown in equation 3.5.

Therefore, the ordinary DF test is carried out by approximating the equation,

$$y_t = \rho y_{t-1} + x_{t'}\delta + \varepsilon_t \text{ (Equation 3.5)}$$

After eliminating the lag term of dependent variable y_{t-1} from both sides of the equation, the standard DF test is carried out as the equation.

$$\Delta y_t = \alpha y_{t-1} + x_{t'}\delta + \varepsilon_t, \text{ where } \alpha = \rho - 1 \text{ (Equation 3.6)}$$

The null and alternative hypotheses may be written as,

H_0: $\alpha = 0$ (Y_t has unit root or non-stationary), $\delta = 0$

H_1: $\alpha < 0$ (Y_t has no unit root or stationary), $\delta < 0$

The decision rule is null hypothesis is being rejected when test-statistic is negatively less than critical value (Gujarati and Porter, 2009). So it can conclude that the series is stationary. In other word, the series has no unit root. In this study, the result obtained should be in non-stationary. In order to obtain non-stationary result in the level form, the null hypothesis should not be rejected with the t-statistic greater than critical value. The greater is the t-statistic, the lesser the chance that the null hypothesis will be rejected.

The formulae to calculate the value of t-ratio by using the conventional t-ratio:

$$t_\alpha = \frac{\hat{\alpha}}{se(\hat{\alpha})} \text{ (Equation 3.7)}$$

where $\hat{\alpha}$ is the estimated α, and $se\ (\hat{\alpha})$ is the standard error coefficient.

Under the null hypothesis of a unit root, t statistic shown in Equation 3.7 will not follow the conventional t-distribution, yet they will originate asymptotic results and emulate the critical values for various test and sample sizes (Dickey and Fuller, 1979). MacKinnon (1991, 1996) conducted a set of simulations which much larger than those tabulated by Dickey and Fuller. Furthermore, MacKinnon estimated the surface of responses for the simulation results and permitted the calculation of Dickey-Fuller, critical values and p-values for arbitrary sample sizes. The simple Dickey-Fuller unit root (DF) test shown in equation 3.4 is valid only if the series is a $AR(1)$. The assumption of white noise disturbances ϵ_t will be violated if the series

included higher order lags. This is the reason that ADF test is powerful than DF test. As mentioned earlier, the Augmented Dickey Fuller (ADF) test constructs a parametric correction for higher order correlation by adding lagged terms to the right-hand side of the equation and assuming that the y series follows a $AR(\rho)$ process:

$$\Delta y_t = \alpha y_{t-1} + x_t' \delta + \beta_1 \Delta y_{t-1} + \beta_2 \Delta y_{t-2} + \ldots + \beta_p \Delta y_{t-p} + v_t \quad \text{(Equation 3.8)}$$

where $\propto = \rho - 1$ and ρ, δ, β_1, β_2, and β_p are parameters to be estimated

An important result obtained by Fuller is that the asymptotic distribution of t-ratio for α is independent of the number of lagged first differences included in the ADF regression.

An interesting outcome obtained by Fuller is that the asymptotic distribution of t-ratio for α is not related to the number of lagged differences in the ADF regression. In addition, the assumption of y follows an autoregressive (AR) process may seem constrictive. Said and Dickey (1984) stated that the ADF test is asymptotically valid in the existence of a moving average (MA) component, which shown there are sufficient lagged difference terms are included in the regression.

3.3.2 Kwiatkowski, Phillips, Schmifdt, and Shin (KPSS) Test

Kwiatkowski, Phillips, Schmidt and Shin (KPSS) test is based on the linear regression and it is one of the stationary tests that used to verify the stationarity of time series data. KPSS test is oppose to the unit root test as the I0 is stationary or no unit root while I_1 is non-stationary or has unit root. Kwiatkowski, Phillips, Schmidt and Shin (1992) derived an equation that involved three elements:

$$y_t = \beta_t + r_t + u_t \,, r_t = r_{t-1} + u_t \quad \text{(Equation 3.9)}$$

where β_t is the deterministic trend, $r_t$represents the random walk and $u_t$is stationary error term (Stephanie, 2016). The u_t is independent identical

distributed $(0, \sigma_\mu^2)$, it treated as constant and served as an intercept in the model. The null and alternative hypotheses can be formulated as:

$$H_0: \sigma_\mu^2 = 0 \text{ } (Y_t \text{ is stationary})$$

$$H_1: \sigma_\mu^2 \neq 0 \text{ } (Y_t \text{ is not stationary})$$

The main difference of the KPSS test and ADF test is that the I(0) of KPSS test has no unit root against the I(1)of the presence of unit root. This approach has highlighted the shortcoming of ADF test has lower test power. Besides, a time series that found non-stationary through ADF test can be detected as stationary by using KPSS test. However, the statistical testing is merely a probabilistic; therefore, the result for both stationary test will be combined in order to capture the ideal result or unit root testing. If ADF test found stationary for a trend, then definitely the KPSS test will show the identical result. Nevertheless, there are quite often that if ADF test obtained unit root from a time series data, KPSS test will be marked as stationary status (Kocenda and Cerny, 2015). In such case, the validity of the stationarity of KPSS and non-stationarity of ADF should be checked accordingly so that it will not influence the final conclusion.

3.4 Econometric Model

3.4.1 Threshold Autoregressive (TAR) Model

$$\Delta\mu_t = \begin{cases} \rho_1 \mu_{t-1} + \epsilon_t & if\ \mu_{t-1} \geq 0 \\ \rho_2 \mu_{t-1} + \epsilon_t & if\ \mu_{t-1} < 0 \end{cases} \qquad \text{(Equation 3.10)}$$

The ordinary idea of threshold model is a process may behave differently when the value of a variable surpasses a certain threshold. TAR model considers as a threshold model that is stationary and has unit-root behaviour in one regime respectively. Following by the stationary of ADF statistics, then TAR model can only be carried out and the least square estimates of ρ_1 and ρ_2 have an asymptotic multivariate normal distribution (Enders and Siklos, 1998). TAR model is defined as below:

$$\Delta\mu_t = I_t\rho_1\mu_{t-1} + (1 - I_t)\rho_2\mu_{t-1} + \epsilon_t \qquad \text{(Equation 3.11)}$$

I_t, indicates the Heaviside indicator and the function is as follow:

$$I_t = \begin{cases} 1 & if\ \mu_{t-1} \geq 0 \\ 0 & if\ \mu_{t-1} < 0 \end{cases} \qquad \text{(Equation 3.12)}$$

The function above shown that the Heaviside indicator, I_t has the impact on the changes of μ_{t-1}. Assume μ_{t-1} is Islamic bond rate; therefore, if Heaviside indicator is 1, this indicates that conventional bond rate will change whereas if Heaviside indicator is 0, it means the conventional bond rate will not have effect. In contrast, if μ_{t-1} is conventional bond rate, and the rate is more than or equal to zero, Islamic bond rate will have impact on it. Besides, if the rate is less than zero, Islamic bond rate will not have any changes. The purpose of this test is to investigate whether the independent variable has positive or negative discrepancies and how this change will affect the dependent variable when positive or negative shock arises.

$$H_{o:}\ \rho_1 = \rho_2$$

$$H_{1:}\ \rho_1 \neq \rho_2$$

In the other hand, F-equal tests help to determine whether the dependent variable and independent variable are symmetric or asymmetric adjustment. The null hypothesis is being rejected when t-statistic is greater than critical value and it shows there is asymmetric adjustment. Otherwise, there is a symmetric adjustment.

$$H_{o:}\ \rho_1 = \rho_2 = 0$$

$$H_{1:}\ \rho_1 \neq \rho_2 \neq 0$$

Besides, F-joint tests are used to detect whether the dependent variable and independent have long run relationship or co-integration. The null hypothesis is not rejected when t-statistics is smaller than critical value and it indicates that the long run relationship does not exist or it can be said co-integrated.

3.4.2 Momentum Threshold Autoregressive (M-TAR) Model

$$\Delta\mu_t = \begin{cases} \rho_1\mu_{t-1} + \epsilon_t & if\ \Delta\mu_{t-1} \geq 0 \\ \rho_2\mu_{t-1} + \epsilon_t & if\ \Delta\mu_{t-1} < 0 \end{cases} \qquad \text{(Equation 3.13)}$$

TAR model is difficult to evaluate the threshold variable and predict the threshold value as well as there is lacking of appropriate modeling procedure; hence, TAR model has not been widely used now (Tayyab, Tarar and Riaz, 2012). Nevertheless, M-TAR model is most popular among non-linear models whereby it captures the steepness of the data and measure the speed of adjustment of the dependent variable. The M-TAR model is defined by Enders and Siklos (1998) as:

$$\Delta\mu_t = I_t\rho_1\mu_{t-1} + (1 - I_t)\rho_2\mu_{t-1} + \epsilon_t \qquad \text{(Equation 3.14)}$$

The Heaviside indicator, I_t in TAR model is relies on the level of μ_{t-1} whereas the Heaviside indicator, M_t in M-TAR model indicates the previous period's change, $\Delta\mu_{t-1}$. M_t, the Heaviside indicator and the function are as follow:

$$M_t = \begin{cases} 1 & if\ \Delta\mu_{t-1} \geq 0 \\ 0 & if\ \Delta\mu_{t-1} < 0 \end{cases} \qquad \text{(Equation 3.15)}$$

Although the function above shown M-TAR model is slightly different from TAR model but they are almost similar with each other and the dummy of 1 and 0 carry the same meaning as in TAR model. The Heaviside indicator, M_t, is also depends on the level of μ_{t-1}, yet M-TAR model is able to detect the fluctuation of data and smooth it out soon. Moreover, M-TAR model comprised of the momentum speed of adjustment in the dependent variable. For example, the Sukuk bond rate will change depends on the percentage change of conventional bond rate, vice versa. In short, the arising of positive and negative shock will influence one bond's rate and M-TAR model can be used to ascertain the momentum change of another bond's rate.

F-equal and F-joint tests are also involved in the M-TAR model.

$$H_{o:}\ \rho_1 = \rho_2$$

$$H_{1:}\ \rho_1 \neq \rho_2$$

The null hypothesis is viewed as the independent variable and dependent variable do not have existence of long run relationship. In contrast, the rejection of null hypothesis indicates that the variables are co-integrated.

$$H_{o:}\ \rho_1 = \rho_2 = 0$$

$$H_{1:}\ \rho_1 \neq \rho_2 \neq 0$$

Furthermore, the rejection of null hypothesis indicates that both variables have asymmetric adjustment between each other whereas it is in opposed to the null hypothesis.

3.4.3 Error Correction Model (ECM)

A proficient time series model will efficiently reflect both of the short run dynamics and the long run equilibrium simultaneously. To deal with the short run dynamics specifically, Error Correction Model (ECM) should be further developed. This model has a long tradition in time series econometrics since year 1964 (Siklos and Enders, 1998). It is interesting to mention that ECM deals with both long run and short-run dynamics. The long-run relationship measures any relation between the levels of the variables under consideration while the short-run dynamics measure any dynamic adjustments between the first differences of the variables. Initially the error correction is defined as:

$$\xi_t = y_t - \beta x_t \qquad \text{(Equation 3.16)}$$

The β is a co-integration coefficient while ξ is the error from a regression of $y_t$on x_t.

ECM is then further defined as:

$$\Delta y_t = \alpha \xi_{t-1} + \gamma \Delta x_t + \mu_t \qquad \text{(Equation 3.17)}$$

Where μ_t is independent and identically distributed (iid). The ECM equation says that $\Delta y_t$is explained by the lagged ξ_{t-1} and Δx_t. Note that ξ_{t-1} is an equilibrium error that happened in the previous time period. To make sure the model is equilibrium, this figure should equal to be zero.

Recall that β is called the long-run parameter, and α and γ are known as short-run parameters. Hence the ECM involved both long-run and short-run properties in its model. The lagged error correction term ξ_{t-1} and the short-run behaviour is partially but captured by the error correction parameter, α. All the variables in the ECM are not unit root in level, which indicates ECM has no spurious regression problem.

3.4.4 Asymmetric Error Correction Model (AECM)

Asymmetric Error Correction Model is designed to outline asymmetric behaviour. The asymmetric ECM describes both long run asymmetric and short run asymmetric. The short run price asymmetries are often appeared in the asymmetric ECM specification and the TAR-ECM (Manera and Grasso, 2005).

Models with the asymmetric dynamics are common but significant because they involved many stylized facts of the modern economies (Dufrénot and Mignon, 2002). Due to several reasons, macroeconomic variables are generally trapped into asymmetric dynamics. (1) Business cycles are asymmetric in nature which displayed by the fact that contraction periods is last longer than the expansions period due to recoveries. (2) Microeconomic behaviour reflected in partial adjustment models. (3) Capital constraints on good markets. (4) Monopoly which known as market imperfection lead to rigidities on credit, goods, services and labour markets that influence the dynamics of the whole economy (Dufrénot and Mignon, 2002).

3.4.5 Granger Causality Test

Granger Causality assumes that the future values cannot be used to predict the accuracy of estimation while the past values cause the present and future, which means that the prediction can be more accurate by considering the past values. The Granger (1969) approach helps to examine whether one variable can help to predict the future values of another variable (Foresti, 2007). If one variable is able to forecast the future values of another variable, it is said as the former variable causes the latter variable. This test also further helps to determine whether the explanation can be enhanced by adding lagged values of the variables. For instance, Islamic bond rate is said Granger-causes conventional bond rate and vice versa if the coefficients on the lagged values of Islamic bond rate are statistically significant or if Islamic bond rate can help to forecast the future value of conventional bond rate. However, if Islamic bond rate causes conventional bond rate, it does not indicate that conventional bond rate causes Islamic bond rate as well. Narayan and Smyth (2004) found out that Granger causality measures precedence and information content but do not by itself indicate causality in the more common use of the term. The Granger causality equations can be specified as:

$$Yt = \alpha 0 + \alpha 1yt - 1 + \ldots + \alpha tyt - 1 + \beta 1xt - 1 + \beta tx - 1 + \xi t$$

$$Xt = \alpha 0 + \alpha 1xt - 1 + \ldots + \alpha txt - 1 + \beta 1yt - 1 + \beta ty - 1 + \mu t$$

(Equation 3.18)

3.4.6 Impulse Response

An impulse response function demonstrates the time profile of the effects of shocks on the adjustment of a series (Koop, Hashem and Simon, 1996). The shocks to economic variables resound through a system can be computed and assessed by impulse responses. Besides, impulse response functions can be produced after implementing the Vector Error Correlation Model (VECM) or Vector Autoregressive (VAR) commands.

The present and future values of the endogenous variables or the consequence of a one standard shock to one of the innovations are being tracked by impulse response. A shock to the *i*-th variable will transmit to other endogenous variables through the dynamic structure of the VAR; it also specifically influences the *i*-th variable (Thorbecke and Hsieh, 2013). The interpretation of impulse response is not vague if the innovations, $\in_t$ are uncorrelated simultaneously. The *i*-th innovation is simply a shock to the *i*-th endogenous variable.

$$u_t = P_{\in_t} \sim (0, D) \qquad \text{(Equation 3.19)}$$

Nevertheless, a common element which are not related with a specific variable may be considered as the innovation, $\in_t$; and it is usually correlated. A transformation *P* should be applied to the innovations in order to let the innovations become uncorrelated when interpreting impulses, where D above is a diagonal covariance matrix (Thorbecke and Hsieh, 2013).

3.4.7 Variance Decomposition

A variance decomposition (VD) or forecast error variance decomposition (FEVD) is also used to interpret the forecasted linear or non-linear multivariate time series models of a Vector Autoregression (VAR) model once it has been fitted (Lanne and Nyberg, 2016). The difference between the impulse response and variance decomposition is that impulse response traces the values of one endogenous variable to one of the innovations in the VAR; whereas the variation in an endogenous variable is separated by variance decomposition into the component shocks to VAR. Hence, variance decomposition able to provide each significant random innovation that may influence the variables in the VAR (Bagchi, Dandapat and Chatterjee, 2016).

In addition, the variance decomposition tells that each variable has contributed how much information to the other variables in the VAR. It also helps to estimate the contribution of each type of shock to the forecast error variance that is explained by the exogenous shocks from the series. When

the proportion of the estimated error variance is greater and or the series is shocked, it can be attributed to other innovations rather than other series innovations. Besides, the forecast errors from the variance decomposition are used to further detect the nature of short-term relationship (Bagchi, Dandapat and Chatterjee, 2016).

3.5 Diagnostic Checking

Brown, Durbin and Evans (1975) have introduced CUSUM test and CUSUMSQ test to check the constancy of parameter in a model. Scaled recursive residuals is analysed in order to prepare a diagnostic tool, but not prepared a formal testing procedure to examine the unknown structural changes. Besides, these tests consist of the significant benefit over Chow tests which are also used to test of unknown structural breaks. CUSUM and CUSUMSQ tests do not requiring prior knowledge of the point at which the hypothesized structural break takes place (Turner, 2010). Even though these two tests perform almost the same function but they are still holding different properties between each other.

3.5.1 Cumulative Sum (CUSUM) Test

The inference of CUSUM test is based on a sequence of sums, or sums of square of recursive residuals. CUSUM test involved the sequence of zeros and ones, where the zeros are converted to negative ones. The optimum distance from zero of a random walk is defined by the cumulative sum of the sequence. The statistics within the zeros and ones region indicates of non-randomness. This option plots the cumulative sum together with the 5% critical lines. In short, if the cumulative sum series is inside of the recursive regression, then this shows the model in stable whereas the model is instability if the statistics is out of the area between the two critical lines.

The CUSUM test is conducted through the statistic:

$$W = \sum_{r=k+1}^{t} W/S \qquad \text{(Equation 3.20)}$$

for $t = k + 1, \ldots \ldots, T$, where W is the recursive residual defined above, and S is the standard deviation of the recursive residuals W_t. If the β vector remains constant from period to period, $E(W_t) = 0$, but if β changes, W_t will tend to diverge from the zero mean value line. The significance of any departures from the zero line is assessed by reference to a pair of 5% significance lines, the distance between which increases with t. The 5% significance lines are found by connecting the points below. A movement of outside the critical lines is an indicator of coefficient instability.

3.5.2 Cumulative Sum of Square (CUSUMSQ) Test

The CUSUMSQ test is conducted through the test statistic:

$$S_t = \left(\sum_{r=k+1}^{t} w \quad \begin{matrix} 2 \\ r \end{matrix}\right) / \left(\sum_{r=k+1}^{T} w \quad \begin{matrix} 2 \\ r \end{matrix}\right) \quad \text{(Equation 3.21)}$$

The expected value of St under the hypothesis of parameter constancy is:

$$E(S_t) = \frac{t-k}{T-k} \quad \text{(Equation 3.22)}$$

which goes from zero at t = k to unity at t = T. The significance of the departure of S from its expected value is assessed by reference to a pair of parallel straight lines around the expected value.

A study about the power properties of CUSUM and CUSUMSQ tests has been carried out. They find out that CUSUMSQ test is more powerful than CUSUM test due to the limit distribution of the test depends on the nature of the error process in the regression model able to prevent by CUSUMSQ test (Deng and Perron, 2008). Nevertheless, Turner (2010) found out that the parameter stability of CUSUM and CUSUMSQ test is relies on the nature of structural change taking place. CUSUM test has the higher power when the break is in the intercept of the regression equation while the CUSUMSQ test consists of higher power when the slope coefficient or the variance of error term is involved in the structural break.

3.6 Conclusion

In this chapter, the data collected from Bloomberg had been processed by using Unit Root Tests and other diagnostic checking. All of the tests and methods employed have been explained in details above. These tests will then be utilized to determine the asymmetric effect of one's bond rate due to the changes in another bond rate. The following chapter will discuss with outcomes and interpretation of the results.

CHAPTER 4: DATA ANALYSIS

4.0 Introduction

This chapter will focus on interpreting the empirical results from the methodologies which stated in Chapter 3. In this chapter, the tests involved are Unit Root Test which is divided into Augmented Dickey Fuller Test (ADF) and Kwiatkowski, Phillips, Schmidt and Shin Test (KPSS), which used to detect the stationarity of the variables. Other than that, Error Correction Model (ECM) has been used to estimate the speed of adjustment of the dependent variable return to long run equilibrium. Next, Asymmetric Error Correction Model (AECM) which included Threshold Autoregressive Model (TAR) and Momentum-Threshold Autoregressive Model (M-TAR) has been used to detect the asymmetric relation of the variables. Granger Causality Test is used to check whether the changes of dependent variable will be caused by the independents variable or vice versa. In addition, Impulse Response Function been used to detect how the dependent variable responses when the shock happened in the independent variables or vice versa. Variance Decomposition has been used to indicate the amount of information from each variable contributes to other variables in the different time period. Lastly, the diagnostics checking which included CUSUM and CUSUM of Square Test for the 5 different maturities are used to check the stability of the variables. The E-view results will be presented in table form and graphical followed by interpretation and analysis.

4.1 Unit Root Tests

Before going ahead with the study, Augmented Dickey-Fuller test (ADF) and Kwiatkowski, Phillips, Schmidt and Shin test (KPSS) have to be carried out in order to uncover the stationarity for the variables. This requirement is needed to prevent the spurious result to appear. For the Augmented Dickey-Fuller test, all the

variables should obtain the non-stationary result in which the null hypothesis, should not be rejected in the Level form but have to be rejected in first difference form so it can be concluded that those variables comprise of one-unit root I (1). Furthermore, Kwiatkowski, Philips, Schmidt and Shin test stated that the variables are stationary in level form if the hypothesis is not rejected. Thus, null hypothesis should be rejected; however, it cannot be rejected in the first different form.

The result of ADF test in the level form and first difference form are presented in the Table 4.1.1. The test- statistic of the chosen variables for the different year of maturity of government bond are greater than 1%, 5% and 10% of critical value, therefore, all the variables are insignificant to reject the null hypothesis of the level form. Thus, the Augmented Dickey-Fuller test of first difference form had been conducted to test the dynamic stationary of those variables. Whereas, the test-statistic of those variables in ADF test of the first difference is smaller than critical value of 1%, 5% and 10% which indicates that the null hypothesis is rejected. In short, it can be concluded that the variables that are being used in this study are non-stationary at the level form and integrated of order one, I (1) or have unit root in the first difference form.

In addition, the result of KPSS test in the level and first difference form are presented in Table 4.1.2. KPSS test was conducted to further strengthen the result which obtained in the ADF test. In table 4.1.2, the null hypothesis for the 5 bonds are rejected, since, the test-statistic are larger than the 10%, 5%, 1% of critical value. Therefore, it can be concluded that the chosen variables are significant in the level form. However, the results for the first difference form show that all the chosen variables are insignificant, because the test- statistic not big enough to reject the critical value of 1%, 5% and 10 % and thus the null hypothesis is not reject. In short, all the chosen variables of 5 bonds are non-stationary at the level form. Whereas, all the variables which contained of integrated of order one, I (1) or a unit root in first difference form.

Table 4.1.1 Result of Unit Root Test (ADF test)

Level	Intercept					Trend and Intercept				
Bond type	1 year	2 years	3 years	5 years	10 years	1 year	2 years	3 years	5 years	10 years
Level										
Variables										
SR	-4.9180(0)	-5.5954(0)	-4.3371(0)	-5.7073(0)	-3.1741(0)	-5.8738(0)	-5.5436(0)	-3.2821(0)	-5.6437(0)	-6.1563(0)
BR	-5.1955(0)	-6.3997(0)	-5.7850(0)	-6.7583(0)	-4.8334(0)	-6.1565(0)	-6.3422(0)	-4.7253(0)	-6.6845(0)	-7.7909(0)
1st Difference										
Variables										
SR	-7.5975(1)***	-8.3712(1)***	-8.6269(1)***	-7.7518(2)***	-8.2626(1)***	-7.5219(1)***	-8.3009(1)***	-8.5614(1)***	-7.6969(2)***	-8.2153(1)***
BR	-8.9667(2)***	-9.9597(1)***	-7.8656(2)***	-8.2049(1)***	-9.6639(1)***	-8.8950(2)***	-9.8821(1)***	-7.8656(2)***	-8.1589(1)***	-9.6046(1)***

Note: *,**,*** indicates the rejection of null hypothesis at 10%, 5%, and 1% of significance level. Number in parentheses is the number of 1 bandwidth. Lag length for the ADF unit root test are based on Schwarz Criterion. The bandwidth for the KPSS unit test is based on the Newey-West estimator using the Default (Barlett Kernel). The unit root tests include a constant and linear time trend. The null hypothesis under ADF test is the presence of a unit root while KPSS test is stationary.

Table 4.1.2 Result of Unit Root Test (KPSS test)

Level	Intercept					Trend and Intercept				
Bond type	1 year	2 years	3 years	5 years	10 years	1 year	2 years	3 years	5 years	10 years
Level										
Variables										
SR	1.5059(11)***	1.1602(9)***	0.7492(9)***	1.1141(9)***	0.9492(8)***	1.1296(11)***	1.6535(9)***	1.7472(9)***	0.9049(9)***	0.6193(8)***
BR	0.8307(11)***	0.7116(9)***	1.1823(9)***	1.4007(9)***	0.8053(8)***	1.4321(11)***	1.6948(9)***	0.7685(9)***	1.4502(9)***	1.3804(8)***
1st Difference										
Variables										
SR	0.0252(9)	0.1036(11)	0.0765(9)	0.2666(10)	0.2243(13)	0.2233(10)	0.1022(12)	0.0726(9)	0.0421(9)	0.0241(14)
BR	0.0577(8)	0.1608(11)	0.1041(10)	0.2900(11)	0.4747(12)	0.2070(8)	0.1604(11)	0.0142(10)	0.3042(8)	0.0961(12)

Note: *,**,*** indicates the rejection of null hypothesis at 10%, 5%, and 1% of significance level. Number in parentheses is the number of 1 bandwidth. Lag length for the ADF unit root test are based on Schwarz Criterion. The bandwidth for the KPSS unit test is based on the Newey-West estimator using the Default (Barlett Kernel). The unit root tests include a constant and linear time trend. The null hypothesis under ADF test is the presence of a unit root while KPSS test is stationary.

4.2 Threshold Autoregressive Model (TAR) and Momentum Threshold Autoregressive Model (M-TAR)

Threshold Autoregressive Model (TAR) and Momentum Threshold Autoregressive Model (MTAR) have been used to detect the asymmetric relation. To prove the market is asymmetric, F-equality value in TAR and MTAR model is being used.

Based on the Table 4.2.1, 4.2.2 and Table 4.2.9, F-equality for 1 year maturity Sukuk rate, 1 year maturity conventional bond rate and 10 years maturity Sukuk rate are significant in rejecting the null hypothesis at 5% of significance level. This shows that the rate of these two different maturities of government bond rate is asymmetric. On the other hand, the F-equality value in 2 years, 3 years, 5 years maturities for both Sukuk rate and conventional bond rate and 10 years maturity conventional bond rate which is from Table 4.2.3 to Table 4.2.8 and Table 4.2.10 are insignificant in rejecting the null hypothesis at 5% significant level. In other words, it shows that the rate of 2 years, 3 years and 5 years maturity of both Sukuk rate and conventional bond rate are symmetric, but 1 year maturity Sukuk rate and 1 year conventional bond rate and 10 years maturity Sukuk rate are asymmetric. It is clearly stated the result of F-equality is to prove whether the market is asymmetry.

Table 4.2.1: Result of TAR and MTAR for 1 year Sukuk

	TAR: 0	TAR: ukn	MTAR: 0	MTAR: ukn
Above Threshold	-4.8216	-4.8555	-4.9792	-5.1395
Below Threshold	-4.5141	-4.4380	-4.5271	-4.5770
Tau	0.0000	-0.0302	0.0000	0.0527
F-joint	21.8325*	23.6803*	24.3223*	25.0236*
F-equality	2.2010	4.2065	4.9039*	5.6644

Note: * indicate the rejection of null hypothesis at 5% significant level

Table 4.2.2: Result of TAR and MTAR for 1year Conventional Bond

	TAR: 0	TAR: ukn	MTAR: 0	MTAR: ukn
Above Threshold	-5.8454	-5.9156	-5.6764	-5.6491
Below Threshold	-6.2557	-6.4930	-6.1813	-6.1971
Tau	0.0000	0.0358	0.0000	0.0085
F-joint	28.6601*	34.6174*	31.7577*	33.5096*
F-equality	5.1038*	11.0546*	8.1980*	9.9480*

Note: * indicate the rejection of null hypothesis at 5% significant level

Table 4.2.3: Result of TAR and MTAR for 2 years Sukuk

	TAR: 0	TAR: ukn	MTAR: 0	MTAR: ukn
Above Threshold	-3.4159	-3.1683	-3.3069	-3.1586
Below Threshold	-3.6223	-3.6386	-3.5917	-3.5194
Tau	0.0000	0.0213	0.0000	0.0132
F-joint	13.2532*	15.6076*	13.7380*	4.3817*
F-equality	0.7573	3.8165	1.3873	2.2236

Note: * indicate the rejection of null hypothesis at 5% significant level

Table 4.2.4: Result of TAR and MTAR for 2 years Conventional Bond

	TAR: 0	TAR: ukn	MTAR: 0	MTAR: ukn
Above Threshold	-4.6062	-4.6144	-4.6042	-4.6531
Below Threshold	-4.5612	-4.3437	-4.4718	-4.9520
Tau	0.0000	-0.0406	0.0000	0.0764
F-joint	17.3661*	18.5451*	17.6229*	8.5532*
F-equality	0.0414	1.3986	0.3371	1.4079

Note: * indicate the rejection of null hypothesis at 5% significant level

Table 4.2.5: Result of TAR and MTAR for 3 years Sukuk

	TAR: 0	TAR: ukn	MTAR: 0	MTAR: ukn
Above Threshold	-3.8194	-3.8465	-3.8044	-3.4373
Below Threshold	-3.8338	-4.0205	-3.6423	-2.7417
Tau	0.0000	-0.0301	0.0000	-0.0440
F-joint	13.7540*	14.1371*	14.0888*	18.2830*
F-equality	0.0036	0.4869	0.4260	5.7178

Note: * indicate the rejection of null hypothesis at 5% significant level

Table 4.2.6: Result of TAR and MTAR for 3 years Conventional Bond

	TAR: 0	TAR: ukn	MTAR: 0	MTAR: ukn
Above Threshold	-5.1518	-5.3757	-5.1227	-5.3068
Below Threshold	-5.0820	-5.2243	-5.0728	-5.1807
Tau	0.0000	0.0311	0.0000	0.0330
F-joint	16.4718*	16.7730*	16.4196*	16.6578*
F-equality	0.1178	0.4729	0.0563	0.3371

Note: * indicate the rejection of null hypothesis at 5% significant level

Table 4.2.7: Result of TAR and MTAR for 5 years Sukuk

	TAR: 0	TAR: ukn	MTAR: 0	MTAR: ukn
Above Threshold	-4.6990	-4.7361	-4.7651	-4.6301
Below Threshold	-4.3953	-4.2703	-4.4632	-4.1014
Tau	0.0000	0.0135	0.0000	-0.0541
F-joint	17.0983*	19.4302*	16.9399*	19.7290*
F-equality	2.0105	4.8256	1.8193	5.1863

Note: * indicate the rejection of null hypothesis at 5% significant level.

Table 4.2.8: Result of TAR and MTAR for 5 years Conventional Bond

	TAR: 0	TAR: ukn	MTAR: 0	MTAR: ukn
Above Threshold	-4.8374	-4.7235	-4.6590	-4.3973
Below Threshold	-5.1050	-5.1657	-4.9678	-4.9040
Tau	0.0000	0.0303	0.0000	0.0541
F-joint	15.6116*	18.6315*	15.9921*	19.4960*
F-equality	2.0370	5.8233	2.5141	6.9072

Note: * indicate the rejection of null hypothesis at 5% significant level

Table 4.2.9: Result of TAR and MTAR for 10 years Sukuk

	TAR: 0	TAR: ukn	MTAR: 0	MTAR: ukn
Above Threshold	-4.4431	-4.3376	-4.4201	-4.3532
Below Threshold	-4.0318	-3.8541	-3.9269	-3.7561
Tau	0.0000	-0.0310	0.0000	0.0350
F-joint	21.4223*	23.4408*	23.3418*	26.7817*
F-equality	5.9854*	8.3662*	8.2493*	12.3066*

Note: * indicate the rejection of null hypothesis at 5% significant level

Table 4.2.10: Result of TAR and MTAR for 10 years Conventional Bond

	TAR: 0	TAR: ukn	MTAR: 0	MTAR: ukn
Above Threshold	-4.8360	-4.7390	-4.6418	-4.3632
Below Threshold	-5.0850	-5.0443	-4.9081	-4.8119
Tau	0.0000	-0.0310	0.0000	0.0320
F-joint	13.5305*	14.4221*	13.5871*	16.4670*
F-equality	2.2527	3.4387	2.3279	6.1586

Note: * indicate the rejection of null hypothesis at 5% significant level

4.3 Symmetric Error Correction Model (ECM) and Asymmetric Error Correction Model (AECM)

After verified the existence of co-integrating relationship, Symmetric Error Correction Model (ECM) should be conducted which takes care of short-run dynamics of variables and speed of adjustment towards the long run relationship. Therefore, a speed of adjustment coefficient can then be estimated by using Symmetric Error Correction Model (ECM).

ECM with threshold co-integration finds long run asymmetry for conventional bond rate and Sukuk rate in five different maturities in Malaysia. In contrast, Asymmetric Error Correction Model (AECM) is a test for asymmetric relationship between conventional bond rate and Sukuk rate.

The results of ECM are shown as below in Table 4.3.1 and Table 4.3.2. From the Table 4.3.1, the 2 years value ECM for Sukuk rate is -2.3097 which is significant in 1%, 5%, and 10% significant level. While the 3 years Sukuk rate is -0.4974 but it failed to significant in all three significant level, however 5 years Sukuk rate is 2.3083 which is significant in 10% significant level.

On the other hand, from the Table 4.3.2, the ECM value for 2 years conventional bond rate which is -0.5769 insignificant in all three different significant levels but the ECM value shown in 3 years bond rate, -2.4143 is totally different from 2 years conventional bond rate which is significant in 3 different significant level. Next, the 5 years and 10 years conventional bond rate are shown as -1.1819, and -1.5119 are significant in 10% and 5% respectively.

Alternatively, the results of the AECM model are presented as in the Table 4.3.3 and Table 4.3.4 below. Both tplus and tminus (mplus and mminus) are essential elements in conducting the asymmetric error correction model (AECM). This is because it helps to determine whether the Sukuk rate will affect the conventional bond rate asymmetrically and vice-versa. Based on the coefficient value of tplus and tminus in TAR model, either one is negative and significant at the 1%, 5%, and 10% significance level, the effect of the Sukuk rate variables toward the conventional bond rate is said to be asymmetry.

In the case of 1 years and 10 years maturity which is shown in Table 4.3.3, Sukuk rate is proved to have asymmetric. Given that 1 year MTAR model with known threshold value, the mplus value is 1.3807 in Sukuk rate is significant at 1%, 5%, and 10% significant level, it implies that the positive shock significantly affect the conventional bond rate, meanwhile the speed of adjustment to long run equilibrium is 138.07%. Conversely, the mminus 1.4704 which means that the speed of adjustment is 147.04% is significant in all significant level which is 1%, 5%, and 10%. This point to the negative shock on Sukuk rate has sufficient evident in affecting the bond rate.

Nevertheless, Table 4.3.3 shows the tplus value of 10 years maturity in TAR model while with known threshold value for Sukuk is 1.5965, which is significant at 10% significance level. This indicates that Sukuk adjusts to long run equilibrium at the speed of 159.65% in responding to the positive shock. On the other hand, the tminus

of 0.9504 is significant at 10% significant level. Hence, it evidenced that Sukuk rate is more responsive to negative shock compared to positive shock. Conversely, the outcomes of tplus in TAR model with threshold value is unknown for Sukuk is 1.0686, which is significant in all three significant levels but the tminus is 1.8153 which is only significant in 10% and 5% significant level. Hence, it proved that Sukuk rate is more alert to positive shock compared to negative shock.

While for MTAR model in 10 years maturity from Table 4.3.3, mplus value with known threshold value is 0.8004 described that the changes in Sukuk rate will adjust to long run relationship at the speed of adjustment of 80.04% in responding to the positive shock as mminus is 1.6562 is significant in all 3 significant level. In contrast, unknown threshold value in mplus 1.3110 and mminus is 1.1977 for Sukuk rate are both found to be significant in all three varies significant level in MTAR model. The result clarifies that Sukuk rate responds to both positive shock and negative shock asymmetrically. During positive announcement, the Sukuk rate will adjust to the long run equilibrium at the speed of 131.11%, while only 119,77% during negative shock.

The result of 1 year conventional bond rate is shown in Table 4.3.4. Given the tplus 0.4929 and tminus 0.8788 both are insignificant at 1%, 5% and 10% significant level in the TAR model with known threshold value. It denotes that the positive shock and negative shock on bond rate does not have enough evidence in affecting Sukuk rate in 1 year government bond in Malaysia. Meanwhile, the unknown threshold value of both tplus and tminus are stated as 1.7538 and 0.4062. The tplus is significant in 1% and 5% significant level but the tminus is insignificant in the three significant level. It indicates that the negative shock on conventional bond rate does not have adequate evidence in affecting Sukuk rate.

Instead, from Table 4.3.4, the conventional bond rate is set up to be change at the speed of adjustment 85.69% and 86.06% during negative shock in MTAR model with known and unknown threshold value. This study also found that bond rate to positive shock is about 57.88% and 57.05% with known and unknown threshold value but fails to detect it is significantly affected by Sukuk rate. Thus, from the aspect of momentum, the speed of adjustment illustrate that the negative shock is more significant to the Sukuk rate, while positive shock is not significant.

Table 4.3.1: Result of ECM for Sukuk

	2 years	3 years	5 years
SYMMETRIC ECM	-2.3097***	-0.4974	2.3083*
SIC	-2.7094	-2.8779	-2.5893
Wald Test			
DSR	10.4826***	10.6002***	10.6505***
DBR	17.2289***	16.0347***	18.4570***

Note: *,**,*** indicates the rejection of null hypothesis at 10%, 5%, and 1% of significance level. Lag selections are based on parsimony.

Table 4.3.2: Result of ECM for Conventional Bond

	2 years	3 years	5 years	10 years
SYMMETRIC ECM	-0.5769	2.4143***	-1.1819*	-1.5319**
SIC	-1.9630	-2.5822	-2.5538	-2.7452
Wald Test				
DSR	12.1668***	13.9443***	13.0687***	13.8595***
DBR	17.2289***	17.5217***	16.3842***	16.4278***

Note: *,**,*** indicates the rejection of null hypothesis at 10%, 5%, and 1% of significance level. Lag selections are based on parsimony.

Table 4.3.3: Result of AECM for 1 year and 10 years Sukuk

	1 YEAR				10 YEARS			
	Threshold		Momentum Threshold		Threshold		Momentum Threshold	
	Known	Unknown	Known	Unknown	Known	Unknown	Known	Unknown
Tplus					1.5965*	1.0686***		
Tminus					0.9504*	1.8153**		
SIC					-2.8727	-3.0539		
Wald Test								
DSR					6.8796***	7.1303**		
DBR					0.0224	4.27E-05		
Mplus			1.3807***				0.8004**	1.3110***
Mminus			1.4704***				1.6562***	1.1977***
SIC			-2.8836				-3.1274	-3.0187
Wald Test								
DSR			26.1532***				14.8704***	12.9937***
DBR			41.6201***				18.0221***	12.3150***

Note: *,**,*** indicates the rejection of null hypothesis at 10%, 5%, and 1% of significance level. Lag selections are based on parsimony.

Table 4.3.4: Result of AECM for 1 year Conventional Bond

	1 YEAR			
	Threshold		Momentum Threshold	
	Known	Unknown	Known	Unknown
Tplus	0.4929	1.7538**		
Tminus	0.8788	0.4062		
SIC	-1.9316	-1.8703		
Wald Test				
DSR	15.9012***	6.1473**		
DBR	33.0474***	17.5264***		
Mplus			0.5788	0.5705
Mminus			0.8569*	0.8606*
SIC			-1.8278	-1.8282
Wald Test				
DSR			15.2572***	15.2794***
DBR			13.4766***	13.5247***

Note: *,**,*** indicates the rejection of null hypothesis at 10%, 5%, and 1% of significance level. Lag selections are based on parsimony.

4.4 Granger Causality

In order to test the causal relationship between rates of Sukuk and conventional bond counterparts, granger causality test were carry out in this study. Firstly, it is tested whether change in Sukuk rate can cause change in conventional bond rate in the short run and vice-versa. Results of granger causality test on each pair of government bond among five different maturities in Malaysia are presented in Table 4.4.1 to Table 4.4.5.

Table 4.4.1 to Table 4.4.5 indicated that the change of the Sukuk rate is caused by conventional bond rate and vice-versa.

Table 4.4.1: Result of Granger Causality for 1 year

	BOND	**SUKUK**
BOND	-	7.8028***
SUKUK	10.7079***	-

Note: *, **, *** indicates the rejection of null hypothesis at 10%, 5%, and 1% of significance level. Lag selections are based on parsimony.

Table 4.4.2: Result of Granger Causality for 2 years

	BOND	**SUKUK**
BOND	-	9.7728***
SUKUK	8.8505***	-

Note: *, **, *** indicates the rejection of null hypothesis at 10%, 5%, and 1% of significance level. Lag selections are based on parsimony.

Table 4.4.3: Result of Granger Causality for 3 years

	BOND	**SUKUK**
BOND	-	8.8995***
SUKUK	16.3348***	-

Note: *, **, *** indicates the rejection of null hypothesis at 10%, 5%, and 1% of significance level. Lag selections are based on parsimony.

Table 4.4.4: Result of Granger Causality for 5 years

	BOND	**SUKUK**
BOND	-	10.6521***
SUKUK	7.4347***	-

Note: *, **, *** indicates the rejection of null hypothesis at 10%, 5%, and 1% of significance level. Lag selections are based on parsimony.

Table 4.4.5: Result of Granger Causality for 10 years

	BOND	**SUKUK**
BOND	-	15.2606***
SUKUK	8.0892***	-

Note: *, **, *** indicates the rejection of null hypothesis at 10%, 5%, and 1% of significance level. Lag selections are based on parsimony.

4.5 Impulse Responses Function

Impulse Response Function displays the consequences of shocks on the variables. An impulse response function traces the effect of a one-time shock to one of the improvements on current and future values of the endogenous variables. Impulse Response Function is presented the results in the form of graph to explain the impact to other variable from the shocks of a variable.

The graph of Impulse Response Function below are demonstrated clearly in Figure 4.5.1 to Figure 4.5.10., the impact between conventional bond rate and Sukuk rate on 5 different maturities of government bond and how long they get back to equilibrium when each of the variables is shocked. From the Figure 4.5.1 to Figure 4.5.5 which indicated that the impulse response is insignificant for all the period.

However, for the Figure 4.5.6 to Figure 4.5.10 which indicated that the impulse response is significant in the first period, which is in the short run.

Figure 4.5.1: Response of Sukuk to bond 1 year

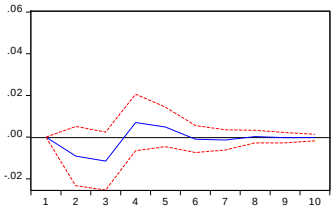


Figure 4.5.2: Response of Sukuk to bond 2 years

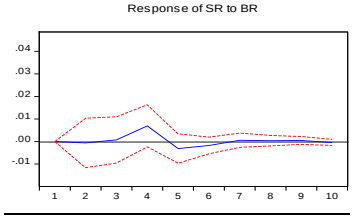


Figure 4.5.3: Response of Sukuk to bond 3 years

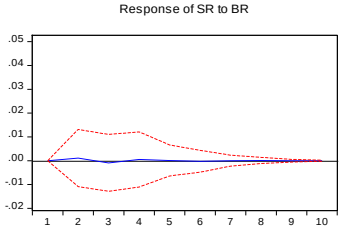


Figure 4.5.4: Response of Sukuk to bond 5 years

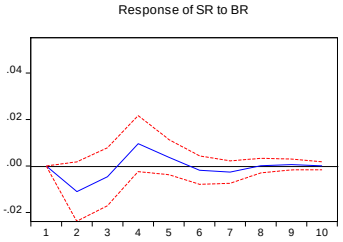


Figure 4.5.5: Response of Sukuk to bond 10 years

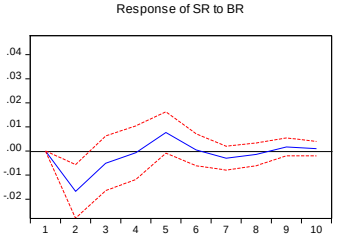


Figure 4.5.6: Response of Bond to Sukuk 1 year

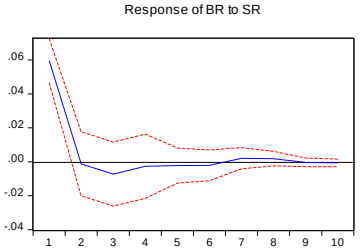


Figure 4.5.7: Response of Bond to Sukuk 2 years

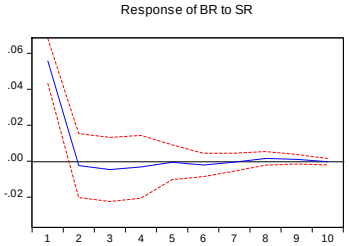


Figure 4.5.8: Response of Bond to Sukuk 3 years

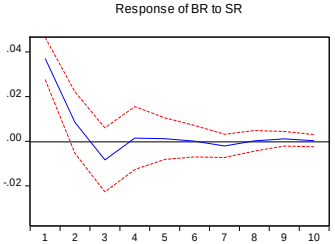


Figure 4.5.9: Response of Bond to Sukuk 5 years

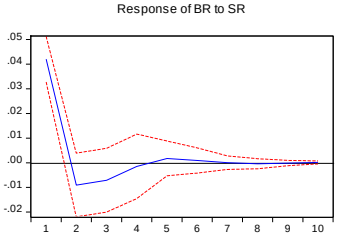


Figure 4.5.10: Response of Bond to Sukuk 10 years

4.6 Variance Decomposition

Variance decomposition is conducted to analyse short run relationship. It decomposes the variance of the forecast error of a particular variable into proportions attributable to shocks in each variable including itself in the system. The relative exogeneity or endogeneity of a variable can be determined by the proportion of the variance explained by its own past. Result between Sukuk rate and conventional bond rate in Malaysia of Variance Decomposition is presenting in the form of figures tabulation as stated in Table 4.6.1 to Table 4.6.10.

The results showing in Table 4.6.1 and Table 4.6.2 are showing that the shock in the Sukuk rate itself proves its relative exogeneity with over 92.90% of own variance being explained by their own innovation. In other words, it indicated that 1year Sukuk rate maturity possesses larger impact of 92.90% in period 2 compared to conventional bond rate which possesses a small proportion of 14.41% in Period 1. However, Table 4.6.3 and Table 4.6.4 are the results proven that the Sukuk rate possesses with its innovation with over 94.63% in period 5. Meanwhile, conventional bond rate possesses only 14.47% in period 1 which is a higher impact between these two government bond rates. Besides, from Table 4.6.5 and Table 4.6.6, the result displays that the shock in the Sukuk rate in 3 years possesses larger impact of 82.70% in bond in period 2 compared to conventional bond rate which possesses a small proportion of 30.87% impact to Sukuk in Period 1. Continuing, Table 4.6.7 and Table 4.6.8 are presenting the shock in the Sukuk rate in 5 years possesses larger impact of 96.00% in bond in period 2 compared to bond rate which possesses a small proportion of 22.54% impact to Sukuk in Period 1. Lastly, Table 4.6.9 and Table 4.6.10 are displaying that the result shows that the shock in the Sukuk rate itself proves its relative exogeneity in 10 years possesses larger impact of 96.07% in bond in period 2 compared to bond rate which owns a small proportion of 15.65% in Period 1.

Table 4.6.1: Result on Variance Decomposition for 1 years for Sukuk

Period	S.E.	SR	BR
1	0.0593	100.0000	0.0000
2	0.0674	92.8996	7.1004
3	0.07556	84.5783	15.4217
4	0.08412	85.9604	14.0396
5	0.09061	86.5035	15.0303

Table 4.6.2: Result of Variance Decomposition for 1 years for bond

Period	S.E.	SR	BR
1	0.07011	85.5946	14.4055
2	0.07908	74.1369	25.8631
3	0.08686	68.1358	31.8642
4	0.09420	72.7027	27.2973
5	0.09946	74.5903	25.4097

Table 4.6.3: Result of Variance Decomposition for 2 years for Sukuk

Period	S.E.	SR	BR
1	0.0550	100.0000	0.0000
2	0.0638	94.0939	5.9060
3	0.0789	92.7212	7.2788
4	0.0789	94.1788	5.8212
5	0.0856	94.6311	5.3689

Table 4.6.4: Result of Variance Decomposition for 2 years for bond

Period	S.E.	SR	BR
1	0.0690	85.5268	14.4731
2	0.0758	77.8442	22.1558
3	0.08064	76.4251	23.5749
4	0.08816	80.2439	19.7561
5	0.09385	82.5400	17.4599

Table 4.6.5: Result of Variance Decomposition for 3 years for Sukuk

Period	S.E.	SR	BR
1	0.0447	100.0000	0.0000
2	0.0554	82.7004	17.2996
3	0.0596	77.7393	22.2607
4	0.0670	78.3330	21.6670
5	0.0721	80.5171	19.4829

Table 4.6.6: Result of Variance Decomposition for 3 years for bond

Period	S.E.	SR	BR
1	0.0454	69.1333	30.8667
2	0.0573	54.9347	45.0654
3	0.0609	49.9884	50.0116
4	0.0657	54.0316	45.3087
5	0.0695	58.6914	41.3087

Table 4.6.7: Result of Variance Decomposition for 5 years for Sukuk

Period	S.E.	SR	BR
1	0.0464	100.0000	0.0000
2	0.0475	95.9904	4.0096
3	0.0492	89.4687	10.5313
4	0.0510	84.1728	15.8273
5	0.0523	83.2079	16.7921

Table: 4.6.8: Result of Variance Decomposition for 5 years for bond

Period	S.E.	SR	BR
1	0.0459	77.4563	22.5438
2	0.0469	76.7031	23.2969
3	0.0478	75.0477	24.9524
4	0.0479	75.0083	24.9917
5	0.0479	74.9557	24.9356

Table 4.6.9: Result of Variance Decomposition for 10 years for Sukuk

Period	S.E.	SR	BR
1	0.0444	100.0000	0.0000
2	0.0468	96.0692	3.9308
3	0.04928	87.2254	12.7746
4	0.05486	76.8583	23.1417
5	0.05669	76.9005	23.0995

Table 4.6.10: Result of Variance Decomposition for 10 years for bond

Period	S.E.	SR	BR
1	0.0513	84.3507	15.6493
2	0.0524	84.0363	15.9637
3	0.05711	76.6206	23.3794
4	0.06445	67.7627	32.2373
5	0.0665	67.9702	32.0298

4.7 Diagnostics Checking

Finally, Cumulative Sum Test (CUSUM) and Cumulative Sum Squares (CUSUMSQ) are the diagnostic checking tests that will be employed in this study. This is to examine the stability of the long-run parameters together with the short-run movement for the equations. These two tests are applied to the Symmetric ECM and asymmetric ECM model for 5 different maturities namely 1 year, 2 years, 3

years, 5 years, and 10 years between conventional bond rate and Sukuk rate in Malaysia.

4.7.1 CUSUM Test for TAR model and M-TAR model

The results of the CUSUM test for TAR, M-TAR and ECM model are display in the graphical form as below from Figure 4.7.1 to 4.7.15. CUSUM which stays within the critical 5% bounds that mean it has the long run relationship among the variables which is conventional bond rate and Sukuk rate and thus shows the stability of coefficient. A cumulative sum (CUSUM) chart is a variety of management chart used to monitor some minor movement in the process mean. It uses the cumulative sum of deviations of each sample value from the target value.

The value of the cumulative sum of residuals is plotted against upper and lower bound of the 95% confidence interval at each point which is the red colour line of the graph shown. Hence, to acquire a significant result, the recursive estimate for cumulative sum of residual should be plotted within the range of upper and lower bound of 95% confidence interval. The results below shown that the complete asymmetric ECM model and symmetric ECM models for the five different maturity bonds studied in this study is significant at 5% significant level. It clarified that the value of cumulative sum of residuals is fall inside the confidence interval and therefore, the asymmetric ECM models and symmetric are understood and interpret as accurate and in properly organized.

CUSUMSQ Test

Figure 4.7.1: 1 year Bond rate, Tar: 0

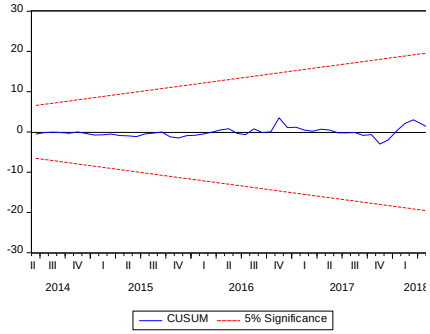


Figure 4.7.2: 1 year Bond rate, Tar: unknown

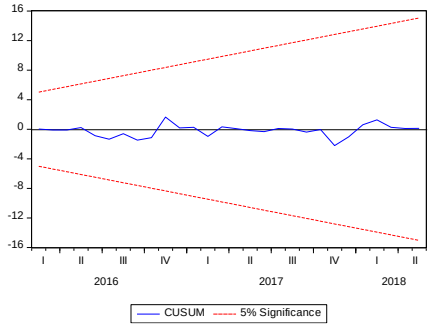


Figure 4.7.3: 1 year Bond rate, Mtar: 0

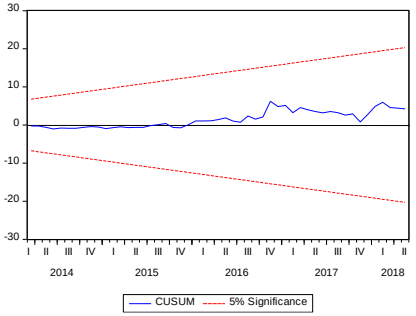


Figure 4.7.4: 1 year Bond rate, Mtar: unknown

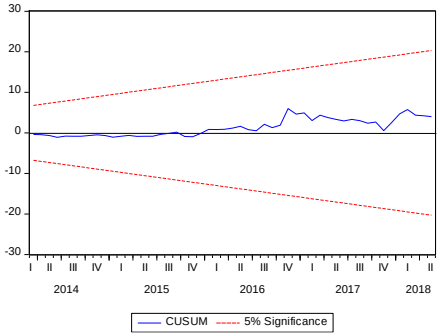


Figure 4.7.5: 1 year Sukuk rate

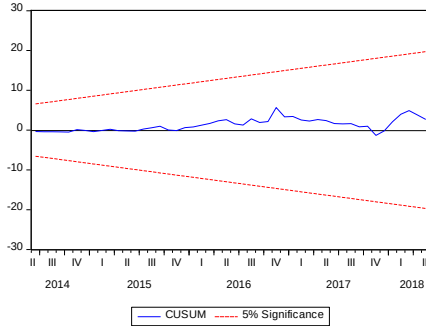


Figure 4.7.6: 2 years Sukuk rate

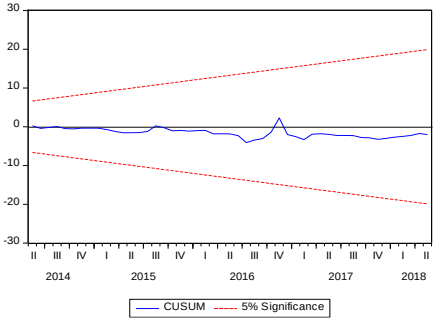


Figure 4.7.7: 2 years Bond rate

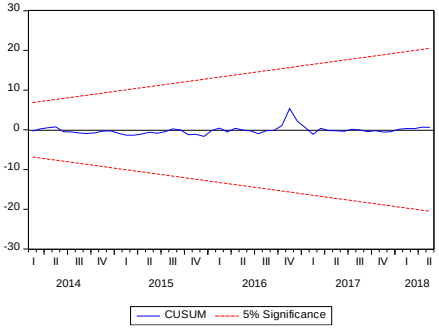


Figure 4.7.8: 3 years Sukuk rate Mtar : 0

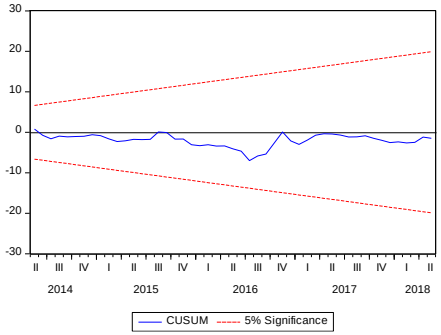


Figure 4.7.9: 3 years Bond rate

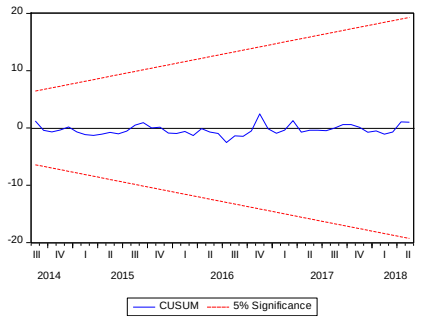


Figure 4.7.10: 5 years Sukuk rate

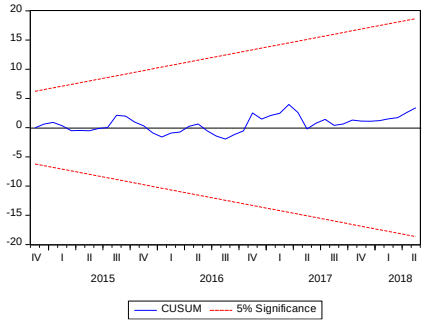


Figure 4.7.11: 5 years Bond rate

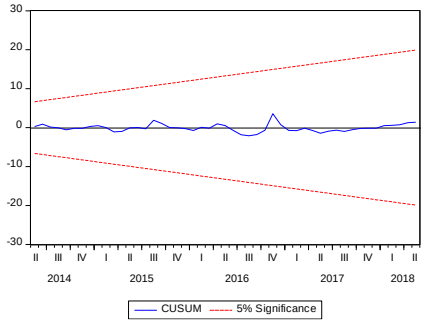


Figure 4.7.12: 10 years Sukuk rate, Tar: 0

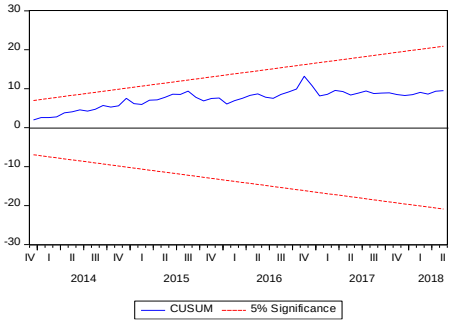


Figure 4.7.13: 10 years Sukuk rate, Tar: Unknown

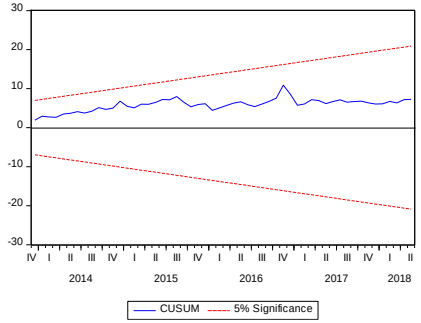


Figure 4.7.14: 10 years Sukuk rate, Mtar: 0

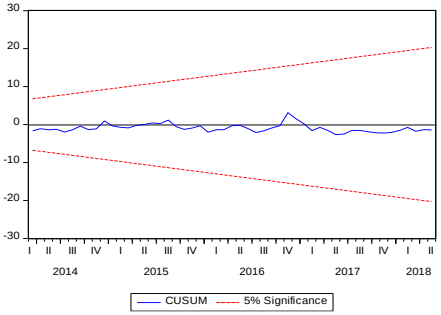
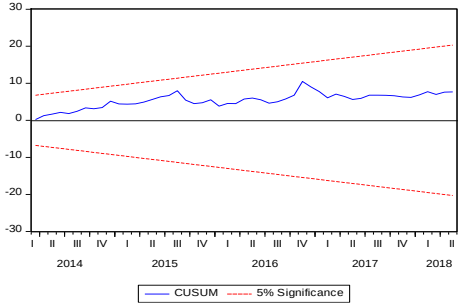


Figure 4.7.15: 10 years Sukuk rate, Mtar: Unknown



4.7.2 CUSUMSQ Test for TAR model and M-TAR model

The results of the CUSUM square test for TAR, M-TAR and ECM model are shown as below from Figure 4.7.15 to 4.7.30. Usually, this test is used to check the robust of the result for the CUSUM test. This test is something similar to the CUSUM test, the result can be considered significance when the cumulative of variance fall within the range of 95% confidence interval. To discuss further, the results shown at below proved that all the asymmetric ECM models and symmetric ECM models tend to be appropriate and in structurally stable as it is significant at the 5% of significant level for 1- year bond rate (Figure 4.7.17), 10-years Sukuk rate (Figure 4.7.27and4.7.28) in TAR model. In the other side, the 10 years Sukuk rate (Figure 4.7.29 and 4.7.30) in MTAR model is significant at 5% of significant level and for the 3-years Sukuk rate (Figure 4.7.23),3-years bond rate (Figure 4.7.24) and 5-years bond rate (Figure 4.7.26) in the symmetric ECM is significant at the 5% of significant level. However, for the 1-year bond rate (Figure 4.7.16,4.7.18and4.7.19),1-year Sukuk rate (Figure 4.7.20), 2-years Sukuk rate(Figure 4.7.21), 2-years bond rate(Figure 4.7.22) and 5-years Sukuk rate (Figure 4.7.27) that are insignificant at 5% of significance level, since the cumulative variance fall outside the range , but it is still accepted as the Asymmetric ECM and symmetric ECM for 5 different maturity of bonds are significant at the 5% of significant level.

CUSUMSQ Test

Figure 4.7.16: 1 year Bond rate, Tar: 0

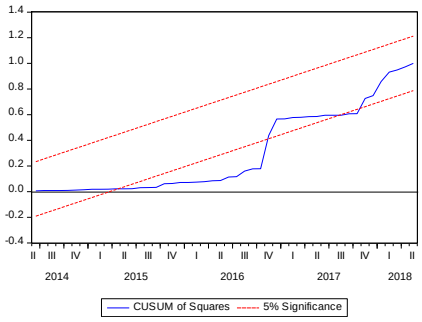


Figure 4.7.17: 1 year Bond rate, Tar: unknown

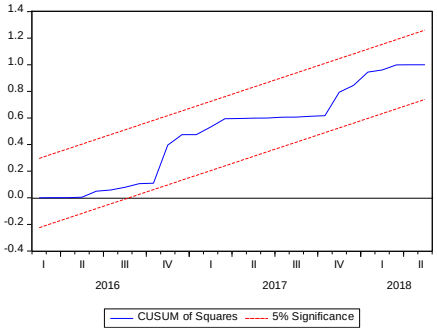


Figure 4.7.18: 1 year Bond rate, Mtar: 0

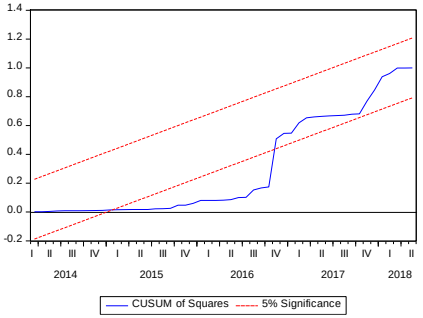


Figure 4.7.19: 1 year Bond rate, Mtar: Unknown

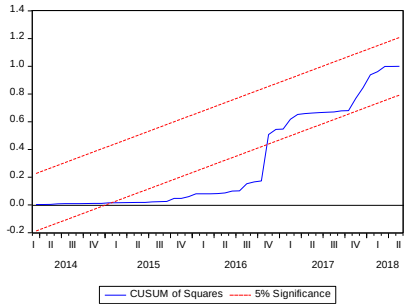


Figure 4.7.20: 1 year Sukuk rate, Mtar: 0

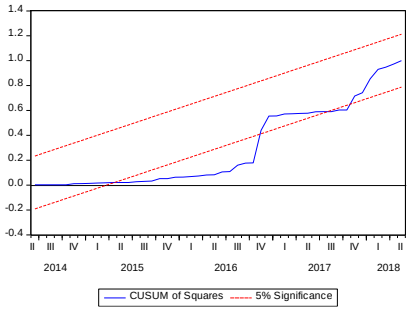


Figure 4.7.21: 2 years Sukuk rate

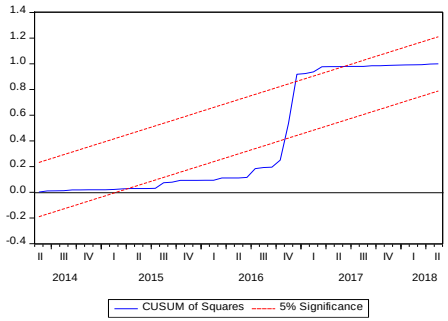


Figure 4.7.22: 2 years Bond rate

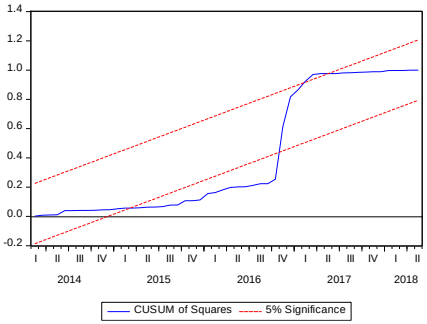


Figure 4.7.23: 3 years Sukuk rate

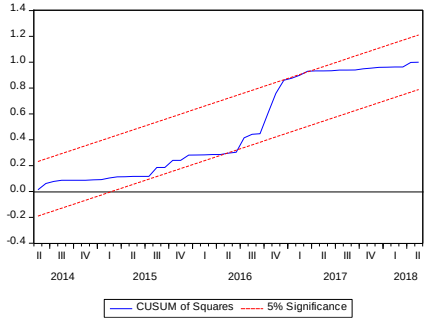


Figure 4.7.24: 3 years Bond rate

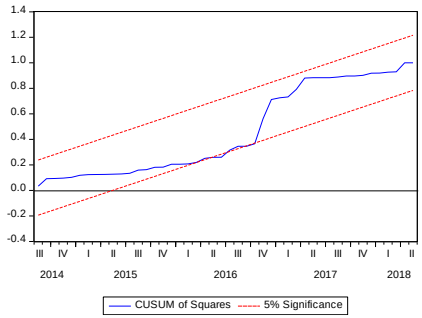


Figure 4.7.25: 5 years Sukuk rate

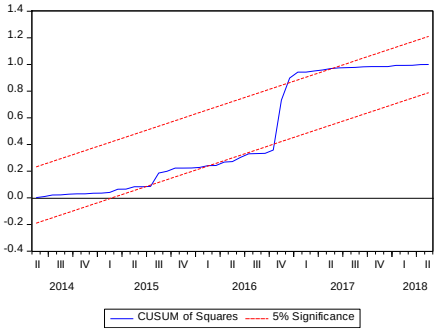


Figure 4.7.26: 5 years Bond rate

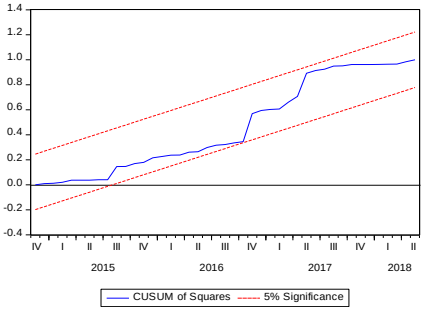


Figure 4.7.27: 10 years Sukuk rate, Tar: 0

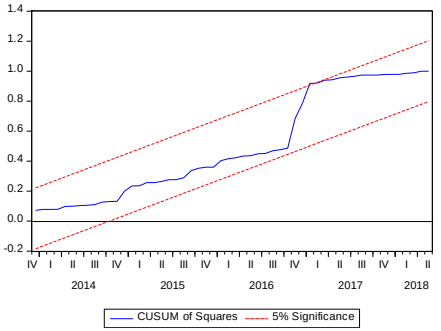


Figure 4.7.28: 10 years Sukuk rate, Tar: Unknown

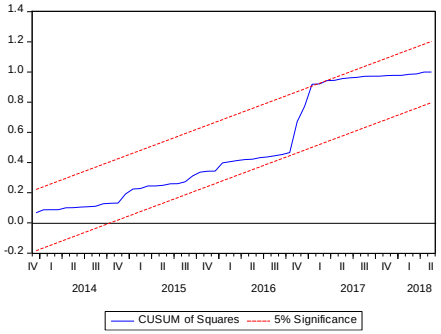


Figure 4.7.29: 10 years Sukuk rate, Mtar: 0

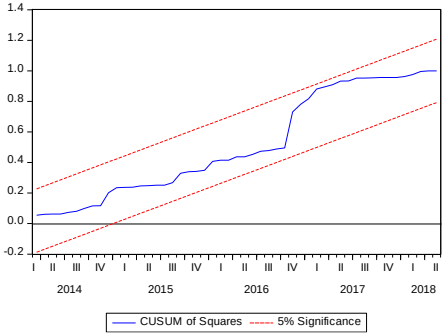
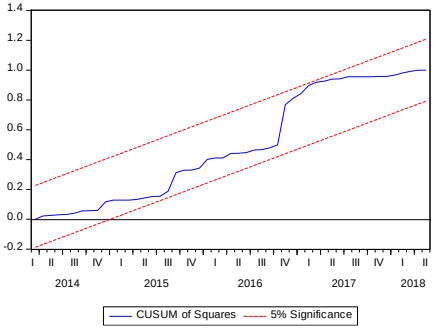


Figure 4.7.30: 10 years Sukuk rate, Mtar: Unknown



4.8 Discussion on Major Findings

The findings on the four sets of interrelated tests are reported and discussed in this section which is Granger Causality, Variance Decomposition, Symmetric Error Correction Model (ECM) and Asymmetric Error Correction Model (AECM).

As demonstrated in the result of Symmetric Error Correction Model (ECM) for the five different maturities of both Sukuk rate as well as conventional bond rate are indicated that the 2 years Sukuk rate is being rejected and concludes that there is long run relationship exist between Sukuk rate and conventional bond rate. Besides, the 3 years Sukuk rate is indicated that long run relationship does not exist between each other. While Sukuk rate in 5 years maturities have integration with conventional bond rate. On the other hand, 2 years conventional bond point out that both government bonds does not be present in long run relationship. Conventional bond rate in 3 years showed that long run happen between variables whereas 5 years and 10 years conventional bond revealed that long run equilibrium exist between two variables.

In addition, Table 4.3.3 and Table 4.3.4 which is Asymmetric Error Correction Model (AECM) result for the 1 year Sukuk rate, 1 year conventional bond rate and 10 years Sukuk rate. The M-TAR result for the 1 year Sukuk rate has been rejected which mean that there is an asymmetric relationship existed between the variables. Therefore, when the conventional bond impacted by the positive shock and negative shock, the Sukuk rate will behave asymmetrically. Besides, by according to the result obtained from the TAR and M-TAR result, the 1 year conventional bond rate has been rejected, since there is an asymmetric relationship between the variables, the TAR result showed that when the positive shock impacted on the Sukuk, the conventional bond rate will behave asymmetrically. In the other side, when the negative shock impacted on the Sukuk, the conventional bond rate will behave asymmetrically. Last but not least, The TAR and M-TAR result for the 10 years Sukuk rate has been rejected, because when the conventional bond impacted by both positive shock and negative shock, the Sukuk will behave asymmetrically. Thus, there is insufficient evidence to conclude that both of the government bonds securities have asymmetric.

Moreover, as illustrated in granger causality results for the five different maturities of both Islamic as well as conventional government bond are revealed that the changes of the Sukuk rate is caused by conventional bond rate and vice-versa. This means that both government bonds have connection between each other. Thus, the findings of this study seem to suggest that both Islamic bond rate and conventional bond rate are affected by each other.

In order to prove the results of granger causality test as provided, some studies can be relied on. According to Ariff, Cheng and Neoh (2009) stated that the attraction of Sukuk market has become larger for local consumers in Malaysia due to the control of the central bank. In relation to Bond Pricing Agency Malaysia (BPAM), there is 40% Sukuk market value in the size of both government bonds at the end of 2011. Besides, the total value of Sukuk securities outstanding in 2011 was more than RM352 billion (US$115 billion) (Ariff, Safari and Mohamed, 2013). Furthermore, bi-directional Granger causality between Sukuk rate and conventional bond rate is an evident and it has been interpreted appropriately as the results of Granger causality test highlighted on the conventional bond rate issuance refer more to Sukuk rate (Enders, 1995; Hossain, 2005).

Previously there are some researcher, Miller, Challoner, and Atta (2007) and Wilson (2008) argued that the Sukuk rate are proposed to imitate the properties of the conventional bond rate in Malaysia and Wilson (2008) further emphasized that Sukuk issuers modified the features of the Sukuk and make it similar to the conventional bond, so that, the investors will have more confident to invest and demand the Sukuk. However, according to the Variance Decomposition result obtained, it can be proven that the changes of Sukuk rate for each particular period is depends more on the changes of Sukuk rate rather than the changes of bond rates. Instead, the changes of bond rate for each particular period has a greater impacted by the changes Sukuk rate rather than the changes of the bond rate itself. The reason is Malaysia is the global Sukuk market leader which comprised of 67 percent of Sukuk issuance throughout the world since 2013, which mean that Malaysia will be more concerned on the Sukuk issuance rather than the issuance of conventional bond. Furthermore, government in Malaysia attempted to promote the Sukuk market by providing a tax exemption for the special purpose vehicle (SPV) to issue the Sukuk. Besides, the total cost of reduction on the issuance of Sukuk by the SPV

will be return fully to the corporate that set up the SPV (Razazila, Roudaki and Clark, 2010). Because of these incentives been provided, it attracted a lot of investors, majority of them are non-Muslim as well as quite number of issuers been attracted to issue Sukuk for fund raising purpose. In short, Sukuk has greater competitiveness than conventional bond in Malaysia. Therefore, conventional bond need to periodically refer to the changes of the Sukuk rate and adjust their rate accordingly, in order to have competitive advantage to compete with them.

4.9 Conclusion

In brief, it is concluded that the result under this study shows that Islamic bond rate and conventional bond rate are having long run equilibrium relationship in Malaysia's bond market. In addition, both Islamic bond rate and conventional bond rate do granger with each other. This can be supported by the results of Granger Causality test and Variance Decomposition test. Furthermore, there are diagnostic checking tests which are CUSUM and CUSUM of Squares Test have successfully proved that the symmetric Error Correction Model (ECM) and Asymmetric Error Correction Model (AECM) to determine the impacts of Islamic bond rate and conventional bond rate on bond market for both short run and long run dynamics towards bond market return.The two diagnostic checking tests have successfully proved that the symmetric Error Correction Model (ECM) and Asymmetric Error Correction Model (AECM) for each of the maturity is applicable and well structured. Hence, the conventional bond rate and Sukuk rate have contributed symmetric and asymmetric impact for the five different maturities of Islamic and conventional government bond in this study. Besides, the summary of the whole research study will be presented in the following chapter.

CHAPTER 5: CONCLUSION AND IMPLICATIONS

5.0 Summary

This research is conducted to evaluate the mutual correlation between Sukuk rate and conventional bond rate by using monthly data from May 2013 to May 2018, which comprised of 60 months. In short, according to the result obtained in chapter 4, the Sukuk rate and conventional bond rate have long run relationship and bond rate is said to be asymmetrically affected by Sukuk rates. The positive and negative news on Sukuk rates are found to be significant in affecting conventional bond rates. In contrast, there is no sufficient evidence to prove that the positive and negative shock on conventional bond rate will influence the Nevertheless, the results obtained from tplus and tminus as presented in Table 4.4.3 and 4.4.4, the speed of adjustment of Sukuk rate and conventional bond rate to long run equilibrium during positive and negative shock are different at distinct periods.

5.1 Implication of Study

This study not only brings impact to the researchers and it also provides an enhancement in results of the previous literature which stated the symmetric movement in Sukuk rate and conventional bond rate. In order to analyse the integration between the Sukuk rate and conventional bond rate, econometric test such as ECM and AECM has conducted in this study. ECM examined the integration between the Sukuk rate and bond rate in long run. Throughout the AECM test, there is an asymmetric movement among Sukuk rate and conventional bond rate at several years. The results showed that 1 year and 10 years bonds rate are move in asymmetric way while 2, 3 and 5 years bonds rate are move in symmetric ways. This justified there are both of the symmetric and asymmetric movement in Sukuk rate and Conventional bond rate.

Furthermore, this study deepens the understanding of investor towards Islamic bond market. There are a lot of judgements saying that Islamic bonds are merely imitation of conventional bonds. However, the test result in chapter 4 proved Sukuk rate is not mimic conventional bonds rate. Variance decomposition test shows that Sukuk rate is more likely to affect by themselves rather than the changes in the conventional bond rate. In case of conventional bond rate, they are more likely to affect by Sukuk rather than itself. This result evidenced that Sukuk rate and bond rate are quite different. This ends up with Sukuk are powerful than conventional bond in Malaysia bond market. There is less likely for Sukuk rate to mimic the conventional bond rate. In short, Sukuk rate does not strictly pegged to the conventional bond rate. This further clarifies the judgements and classified that Sukuk is an innovative product in Islamic bond market that do not violate any of the Shari'ah principles. Therefore, Muslim investors can invest in Sukuk undoubtedly.

5.2 Limitation of Study

As the data are extracted only from Malaysia market, this research might be appropriately to be served as a reference only for other researchers in other countries. The results and findings of this research might differ with other countries' due to different background culture, economic situation, government policy, investor reaction and many other underlying reasons. Hence, the results and findings are expected to be only applicable within Malaysia. Therefore, foreign policymakers are not encouraged to suit them into their policy decision making.

5.3 Recommendation

This research is focused on Malaysia context and the results achieved have proved that there is a significance difference between conventional bond rate and Sukuk rate. However, this result might not be able to apply for use in other countries. Hence, future researchers are recommended to extend the studies to other countries. For instances, future researchers should focus on Hong Kong, United States, United Kingdom and many other countries which recorded substantial growth in Islamic

finance in recent years. This might not only can increase the body of literature but also provides more solid evidence on the differences between conventional bond and Sukuk.

5.4 Conclusion

In a nutshell, this research has found out the Sukuk rate and conventional bond rate have positively correlated between each other. Sukuk does not mimicking conventional bond as conventional bond rate are referring to Sukuk rate. This is due to Sukuk market is become more attractive in Malaysia bond market. Above and beyond, there are some limitations and recommendations have been discussed in order to contribute to future researchers. Last but not least, the main objective of this research which is correlation between Islamic bond rate and conventional bond rate in Malaysia is achieved successfully. Findings on this study are beneficial in improving better understanding on the impact of both government bond rates in bond market.

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