COMPARISON BETWEEN PERFORMANCE OF SUKUK AND CONVENTIONAL BOND IN MALAYSIA

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DECLARATION

We hereby declare that:

(1) This undergraduate research project 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 research project 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 research project.

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LIST OF ABBREVIATIONS

ADF	Augment Dickey Fuller
AIC	Akaike's Information Criterion
ARCH	Autoregressive Conditional Heteroscedasticity
BNM	Bank Negara Malaysia
BPAM	Bond Pricing Agency Malaysia
BPAMC	Thomson Reuters BPAM Index of Conventional Bond
BPAMS	Thomson Reuters BPAM Index of Sukuk
CPI	Consumer Price Index
et al.	et cetera (and the rest)
FEM	Fixed Effect Model
GARCH	Generalized Autoregressive Conditional Heteroscedasticity
GCC	Gulf Cooperation Council
GDP	Gross Domestic Product
GLS	Generalized Least Square

INF	Inflation
INT	Interest rate
OLS	Ordinary Least Square
OPEN	Openness of Economy
PP	Philips- Perron
P-value	Probability value
Q	Quarter
REM	Random Effect model
RESET	Regression Specification Form
RM	Ringgit Malaysia
SC	Securities Commission
SIC	Schwarz's Information Criterion
SSA	Sub-Saharan African
TR	Thomson Reuter
T-statistic	Test statistic

UAE	United Arab Emirates
VAR	Vector auto-regressive
VIF	Variance Inflation Factor

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PREFACE

This research paper is submitted as a part of the requirement to fulfill for the Bachelor of Finance (Hons) course. The title chosen for this research project is "Comparison between Performance of Sukuk and Conventional Bond in Malaysia".

Since 2008, the global Sukuk issuance has been increasing and peaked in the year of 2012. Sukuk has been gaining popularity and also experiencing heightened attention that not only in the Muslim world. Sukuk is believed that it could continue to perform well especially with continuous strong investor demand arises from Islamic financial institutions, asset managers and high-net-worth individuals as they are attracted by Sukuk risk-management nature (Ahmad & Radzi, 2011).

The Malaysian Sukuk market is expected to keep growing and predicted to have a bigger potential to grow further compared with conventional bonds. In Malaysia, the Sukuk market now plays an essential role in the economy as it has already accounted for more than 50% of the country's total debt both in terms of balance outstanding and issuance. It can be seen that Sukuk is getting more popular among the investors. Thus, the research study is driven to compare the performance of Sukuk and conventional bond in Malaysia (Ahmad & Radzi, 2011).

ABSTRACT

The purpose of this research is to study on the performance of Sukuk and conventional bond in Malaysia from 2007 Q1 to 2014 Q3. This research has employed multiple Ordinary Least Square (OLS) regression model to study on the performance of Sukuk and conventional bond in Malaysia. The four independent variables that have been chosen in this research are interest rate, inflation, Gross Domestic Product (GDP) and openness of economy. The result reveals that there is a significant negative relationship between interest rate and inflation and performance of conventional bond and Sukuk. On the other hand, GDP and openness of economy are found to have significant positive relationship with performance of conventional bonds and Sukuk. In addition, the performance of Sukuk has found to be affected more by the macroeconomic conditions during the period of 2007 Q1 till 2014 Q3.

CHAPTER 1: RESEARCH OVERVIEW

1.0 Introduction

The aim of this study is to make comparison between the performances of conventional bonds and Sukuk in Malaysia starting from the year of 2007 Q1 to 2014 Q3. In addition, this study also aims to investigate the economic factors such as interest rate, inflation rate, Gross Domestic Product (GDP) and openness of economy that will affect the performance of conventional bonds and Sukuk in Malaysia. This chapter will discuss the research background, problem statement, research objectives, research questions, hypothesis of study, significance of study, chapter layout and conclusion.

1.1 Research Background

Bond is a debt instrument which can be issued to the public by corporation or government with purpose of raising capital. In general, the issuers of bonds are obliged to pay a certain sum of money on a certain date. The certificate is an evidence of a lender-creditor relationship. Bonds also can be said as fixed income securities as all these payments are determined as parts of the contract (Syamni & Husaini, 2010). There are three basic characteristics of bonds and each of them plays a crucial role in determining the value of bonds. The first characteristic is the face value. Keown, Martin, Petty and Scott (2005) mentioned that face value is referred to the amount of money paid from an issuer to a bondholder at the maturity date, it also known as par value. Usually, bonds are issued in denominations of 1,000, but some of the bond can be issued even larger (Mobius, 2012). He also stated that every bond issue has its maturity date. The investor's par value and applicable interest will be paid by the

issuer on the maturity date (Keown et al., 2005). Mobius (2012) suggested that bond's maturity is very important to the investors because the maturity of the bonds will affect the total return of the bond investment. Coupon rate is another key element of the bond. Keown et al. (2005) mentioned that coupon rate is an amount of coupon payment which is stated in the term of percentages that the issuer paid to the bondholder regardless of the issuer makes profit or not. The coupon rate will be paid on a quarterly, semiannually, or annually basis, it depends on the bond's issuer (Mobius, 2012).

Sukuk is alike with conventional bonds in certain ways. It has maturity date and fixed income stream over the life. Muslims can buy Sukuk but not conventional bonds. However, for non-Muslim, they are able to buy both conventional and Islamic bonds. Conventional bonds yield interest which is strictly prohibited under Shariah law for Sukuk. Sukuk is also similar with common share as its return is not guaranteed. It is because that Sukuk represents an ownership claims in a pool of assets and also represents a share in a business or project. On the other hand, conventional bonds are merely debt obligations and they do not have ownership on any assets (Syamni & Husaini, 2010; Godlewski, Ariss & Weill, 2011; Alam, Hassan & Haque, 2013; Godlewski, Ariss & Weill, 2013; Saad & Haniff, 2013).

In addition, the sale of conventional bonds is just the sale of debt while the sale of Sukuk denotes a sale of an asset's share (Vishwanath & Azmi, 2009). Therefore, the relationship between conventional bondholder and bond issuer is lender and borrower while for Sukuk is seller and buyer relationship. Afshar (2013) said that returns for conventional bonds are fixed and they would not change even though the bond issuer earns more profits. On the other hand, the investors for Sukuk may enjoy a higher return as there is a possibility of capital appreciation. Sukuk prices are usually determined by the market. Therefore, it can be said that Sukuk may have fixed or variable rates of return compared to a fixed rate in conventional bonds.

1.1.1 History of Conventional Bonds in Malaysia

Conventional bond is a long-term debt agreement which an investor borrows money to an entity (corporate or government) and requires the entity to repay the borrowed money with specified amount of interest on the maturity date (Syamni & Husaini, 2010). In 1693s, the first bond had been issued by the Bank of England due to the England government needs to raise money to fund a war against France. During the First World War, the United States government noticed that the tax received was not sufficient to cover the cost for war. Therefore, the United States government had started the United States Treasury bond market in order to raise fund by borrowing money from other countries to assist the military operation. After that, the trend of issuing bonds has been started by other governments to raise fund for other government spending. Besides, bondholders are also the first claimer if the issuers are facing bankruptcy. Over the year, demand for bonds has been increased because bonds are relative safe and stable than other investments (Melicher, Norton & Town, 2007). As a result, there are several types of bonds available in the bond market.

In 1970s, Malaysian government started to issue bonds to the public due to the government was in need of a huge amount of funds for development expenditure (Ibrahim & Adrian, n.d.). Private sectors in Malaysia act as the main driver of the economic growth. So they need a lot funds to improve their businesses. However, most of the private sectors depend on banks to lend money to them to expand their businesses. During 1997s, the Asian financial crisis began and it has affected most of the Asian countries which including Malaysia. Ibrahim and Adrian (n.d.) stated that the Asian financial crisis happened because most of the credit loans in the nation took place via the banking system and the bond market in Malaysia was not well-developed. Therefore, when there were potential credit withdrawals during the Asian financial crisis, the private sectors were the one which suffered a lot from it.

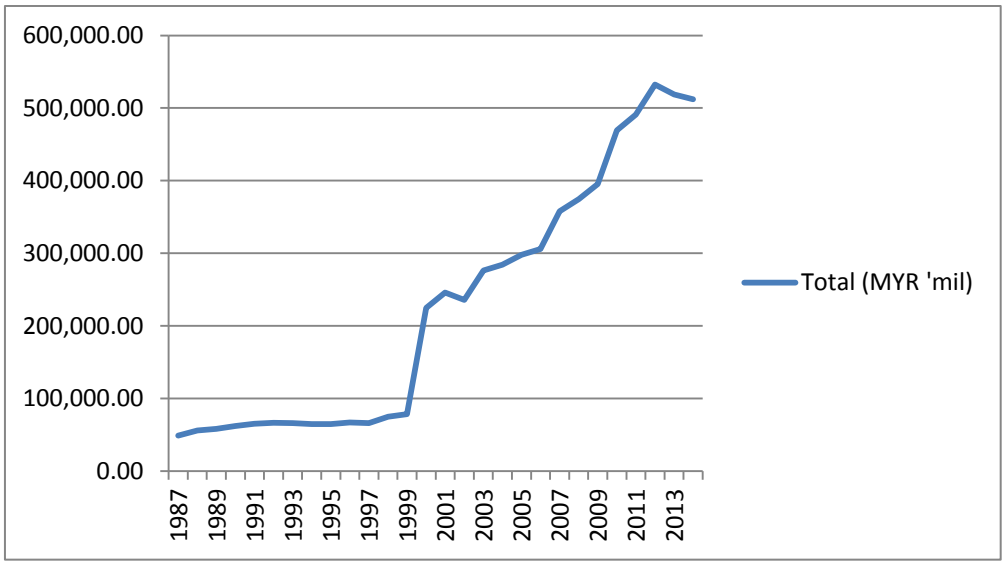
The Asian financial crisis has led the Malaysia government to emphasize on the importance of risk and realize that risk should be diversified through another way within the financial system (Ibrahim & Adrian, n.d.). The Securities Commission (SC) was established by the Bank Negara Malaysia to play the role as the regulatory body in order to stimulate the expansion of the capital market in March 1993. The expansion of bond market in Malaysia can provide another alternative source of finances to the private sector as well as reduce the funding mismatch. As a result, Malaysian government is more aware of the importance of developing corporate bond market. During the fiscal surplus of 1993 to 1997, the Malaysian government has kept on issuing government bond due to the increased market demands for government bond.

Furthermore, the present of Securities Commission (SC) and market participants, the size of issuance in the corporate bond market since 2000 also has 8% of average annual growth. They have developed considerably over the years. Nowadays, Malaysia bond market has many different types of bond like fixed coupon-bearing bonds, asset-backed securities, callable bonds, convertible bond and floaters (Bursa Malaysia, 2014). Generally in Malaysia the bond issuers are the Bank Negara Malaysia, Government of Malaysia, corporations, multilateral development banks (MDBs) and also quasi government institutions.

Referring to Figure 1.1, the outstanding issuance of bond has been increasing drastically from the year 1987 to 2013. The bond issuance has been increasing for approximately 287% in year 2000 compared to year 1999, which valued RM 224,907.23 million. This is because on July 2000, the sole regulator for corporate bond market in Malaysia has been formed which is Securities Commission and the market has approached to a full disclosure-based regulatory tactic with guidelines on the Offering of Private Debt Securities. Therefore, companies can commence private debt securities issues easily as long as they comply with the guidelines, which contributed to the increasing

in the outstanding amount of issuance since 2000 (Securities Commission Malaysia, 2014).

Figure 1.1 Outstanding issuance of conventional bonds in Malaysia from 1987 to 2013



Source: Bond Info Hub (2014)

1.1.2 History of Sukuk in Malaysia

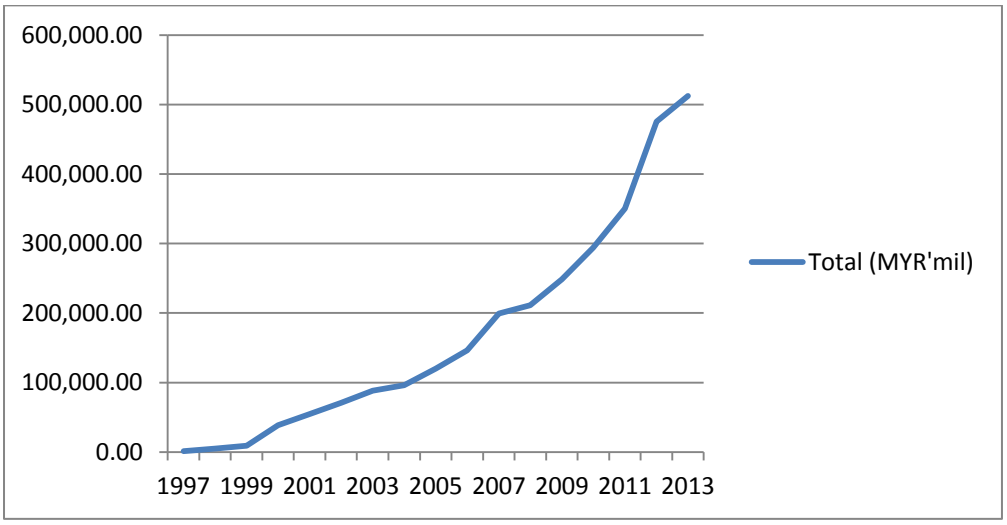
Many years ago, Islamic finance has not been taken into mind seriously and many people thought that it was just a wishful thinking. However, the recent developments and researches proved that Sukuk is not only a productive and effective method of financial intermediation, but also very feasible. The Malaysia Sukuk market has grown together with the Malaysia economics, which have become well diversified. Besides, it has also expanded on private sectors instead of dominating by government. Hence, the liquidity and depth of Malaysia Sukuk market have contributed to the financial system stability of Malaysia (Zin et al., 2011)

Malaysian Sukuk market was started in 1990, with the first non-Islamic corporation, Shell MDS, to issue a Sukuk that mounts an amount of RM125 million. During the year 2002, Malaysia reached another target where the government was able to raise 600 million USD by issuing the first global sovereign Sukuk, which eventually became the international global Sukuk benchmark and attracted investors from all over world (Sukor, Muhamad & Gunawa, 2008).

Since then, there are more and more sovereign Sukuk issuance in the international capital market and Malaysia has achieved lots of 'the world's first' in pioneering Sukuk issuance (Ahmad & Radzi, 2011). After that, Malaysia government also issued Musharakah Residential Mortgage Backed Securities which funded around RM 2 billion in 2005. It was also the first residential mortgage backed securities that was rated based on the Islamic principle. Asset managers, corporations, financial institutions and insurance companies have bid crazily for this issue, oversubscription amounted to around RM 11 billion (Sukor et al., 2008).

Figure 1.2 shows the outstanding issuance of Sukuk in Malaysia from the year of 1997-2013. In recent years, Sukuk market in Malaysia has grown berserk, averaging an annual growth rate of 21% during the stretch between year 2001 and 2008, which allows the Malaysian Sukuk market to raise more funds than the conventional bonds in year 2007 (Ahmad & Radzi, 2011). Actually, there are several reasons that contribute to the increment of the size of Sukuk issuance in Malaysia. The first few factors are the government's supports and incentives, difference in Sukuk schemes provided and also the firm managers' increased awareness on Sukuk market. According to Alam et al. (2013), Malaysia Islamic bonds market has grown to the level that Malaysia is able to use it to create a significant competitive advantage in the region as well as global market over the other countries.

Figure 1.2: Outstanding issuance of Sukuk in Malaysia from 1997 to 2013



Source: Bond Info Hub (2014)

Such lucrative market also attracted many of the corporations and agency firms to raise funds and invest in the Malaysia Sukuk issues. As times goes on, there are more and more innovative schemes as well as number of foreign currency issues being issued out. These issues not only successfully achieve its main purpose, to raise funds, and also allow Malaysia to strengthen the bonds with the Middle East and other Asian countries, which are having dynamic growth in economics (Sukor et al., 2008).

Since then, Sukuk market has become a very significant force in raising funds to finance the economy, which totals up more than 50% of the country's total debts, in both outstanding balance and issuance. Most of Malaysia Sukuk market is formed up by the infrastructure as well as utilities which take away more than half of the Islamic Bonds market (Ahmad & Radzi, 2011).

In compare to the rest of the world, Malaysia has emerged into the largest Sukuk issuance country, with 68.9% of the world's Sukuk issuance in the year 2007. However, the financial crisis in year 2008 hurts Malaysia as the Sukuk issuance was down to almost half when compared to the previous year, from

RM 58 billion to RM 20.8 billion. But this does not last long as Malaysian Sukuk market has 65 Sukuk issues across the year 2009 and this mounts the comeback of Malaysia Sukuk market. Then, Malaysia remains as the leader of global Sukuk issuance till now (Ahmad & Radzi, 2011).

1.2 Problem Statement

Both Sukuk and conventional bonds attempt to mobilize funds from surplus spending units (households) to deficit spending units (firms). Conventional bond issuer creates this debt instrument which they assure the payment of principal and interests, while Sukuk issuer raises funds from investors based on existing asset. The Islamic Law prohibits the receipt or payment of interest by both parties. Hence, the profit or loss of the utilization of the asset is then shared among the Sukuk issuer and holder. Bonds play important role in an investor's portfolio as they can aid to preserve capital and offer diversification in many different market environments. Therefore, bonds have been one of the rapid growing financial instruments in the world. However, both of these financial instruments may be different and cause the difference in their performances.

Since 2008, the global Sukuk issuance has been increasing and peaked in the year of 2012, Sukuk has been gaining popularity and also experiencing heightened attention that not only in the Muslim world, but also globally because of their natural risk-management characteristics and having some similarities that have it described as equivalent to conventional bond by the market participants, mass media, public policy makers and scholars (Ahmad & Radzi, 2011). Sukuk is believed that it could continue to perform well especially with continuous strong investor demand arises from Islamic financial institutions, asset managers and high-net-worth individuals as they are attracted by Sukuk's risk-management nature. However, there is less evidence to show that the Sukuk's performance is really more resilient to economy conditions and compare it with the performance of conventional bond.

The Malaysian Sukuk market is expected to keep growing and predicted to have a bigger potential to grow further compared with conventional bonds. According to Ahmad and Radzi (2011), the Sukuk market now plays an essential role in the economy as it has already accounted for more than 50% of the Malaysia's total debt both in terms of balance outstanding issuance as Sukuk is not only can be bought by Muslims but also an alternative for non-Muslims especially those from foreign countries. Sukuk and conventional bonds are parts of capital market Therefore, it is necessary to determine the reason behind the popularity of Sukuk among the investors.

Furthermore, there are also some fundamental differences that distinguish Sukuk and conventional bond even though they may be equivalent due to their similarities. The increased popularity of Sukuk can be caused by other economic factors such as Gross Domestic Product (GDP) and openness of economy that might contributed to the higher demand and issuance of Sukuk in today's world compared to conventional bond. The performances of Sukuk and conventional bond are different in the market given that they have the same economic factors and periods. However, not all economic conditions can be used to determine the performance of conventional bond and Sukuk. Even with the same economic conditions, the results of conventional bond and Sukuk performance may differ, however, not all economic factors are suitable to evaluate the performance of conventional bond and Sukuk. Thus, it will be interesting to find out the economic factors that can be used to evaluate and compare the performances of conventional bond and Sukuk in Malaysia.

1.3 Research Objectives

The primary objective of this study is to study and compare the performance of conventional bonds and Sukuk in Malaysia for the period of 2007 Q1 to 2014 Q3, under the same given economic factors.

1.3.1 General Objectives

To investigate the economic factors that are affecting the performance of the conventional bond and Sukuk in Malaysia from the year 2007 Q1 to 2014 Q3, and compare the performances of both conventional and Islamic bond.

1.3.2 Specific Objectives

- To investigate the relationship between both bonds performance and interest rate in Malaysia.
- To investigate the relationship between both bonds performance and inflation rate in Malaysia.
- To investigate the relationship between both bonds performance and Gross Domestic Product in Malaysia.
- To investigate the relationship between both bonds performance and openness of economy in Malaysia.
- To compare the performance of conventional bonds and Sukuk in Malaysia.

1.4 Research Questions

- Do the conventional bond and Sukuk influence by interest rate in Malaysia?
- Do the conventional bond and Sukuk influence by inflation rate in Malaysia?
- Do the conventional bond and Sukuk influence by Gross Domestic Product in Malaysia?
- Do the conventional bond and Sukuk influence by openness of economy in Malaysia?
- Do the performance of conventional bonds and Sukuk differs?

1.5 Hypotheses of the Study

1.5.1 Interest Rate

H_0: There is no relationship between interest rate and both bonds performance.

H_1: There is a relationship between interest rate and both bonds performance.

1.5.2 Inflation Rate

H_0: There is no relationship between inflation rate and both bonds performance.

H_1: There is a relationship between inflation rate and both bonds performance.

1.5.3 Gross Domestic Product

H_0: There is no relationship between gross domestic product and both bonds performance.

H_1: There is a relationship between gross domestic product and both bonds performance.

1.5.4 Openness of Economy

H_0: There is no relationship between openness of economy and both bonds performance.

H_1: There is a relationship between openness of economy and both bonds performance.

1.6 Significance of study

1.6.1 To the Researcher

This study will provide an extra knowledge or insights about conventional bonds and Sukuk in the capital market to the other researchers particularly about the effect of macroeconomic conditions and openness of economy on performance of Sukuk and conventional bond. Since there are only limited studies to compare Sukuk and conventional bonds' performance by considering the effect of macroeconomic conditions, this study will fill in the gap for the studies. In addition, this study will also provide a clear and better picture of development on the capital market in Malaysia. Thus, this study may inspire other researchers heading towards the same direction of this study in other countries as macroeconomic conditions that affect the performance of Sukuk and conventional bonds of Malaysia may affect other countries as well.

1.6.2 To the University

This study will be contributed as the new resources for references to the students and benefits the university. Necessary or useful information regarding the capital market in Malaysia can be obtained in this study by those who have interests to do the same study in the future. This study can provide guidance to them in completing the same study or similar study. They may extract, capture and learn from the best part of study which is well done and further improve on the limitations of this study.

1.6.3 To the Investors

This study about the effects of macroeconomic conditions and openness of economy on the performance of conventional bonds and Sukuk can be served as a guidance or signal to investors in making capital investment. This may aid them in making the right decision to invest in Sukuk or conventional bonds that yield high returns for them by properly analyzing the conditions of the economy of the countries they intend to invest in as Sukuk and conventional bonds may have vary performances due to the economy of the country. In addition, investors can also have a clear picture and well understanding on the differences between conventional bonds and Sukuk, and types of return provided by both of them. Therefore, they can opt to invest in Sukuk or conventional bonds that suit their preferences.

1.6.4 To the Government

Sometimes, countries may need to acquire sufficient funds for the development of their countries and they would need to issue Sukuk or conventional bonds to the public or in another country to acquire funds they need. This study can provide guidance for government in choosing the options between issuing Sukuk or conventional bonds in order to reduce the cost of borrowing since the performance of the conventional bonds and Sukuk may be affected by the macroeconomic conditions.

1.6.5 To the Policy Makers

This study can provide insights on the relationship between the macroeconomic conditions with Sukuk and conventional bonds' performance to the policy makers. Furthermore, this study can be used as guidance for

them to develop more extensive capital market. The policy makers are responsible in giving advice to government in respect to economic development and budget.

1.7 Chapter Layout

This research paper has been divided into 5 distinct chapters. The layout of this study is as follow:

1.7.1 Chapter 1

This part of the research has given an overview of this study by including research background, description of problem statement, research objectives, hypothesis and significance of this study.

1.7.2 Chapter 2

This part has included the literature review about factors that affecting the performance of conventional bonds and Sukuk.

1.7.3 Chapter 3

This part has presented methodology that would be used to determine the performance of conventional bonds and Sukuk. Besides, research design, data collection method and data analysis are also included in this part.

1.7.4 Chapter 4

This part will present the results and findings of this study. Discussions and analysis of the findings are also further discussed in this part.

1.7.5 Chapter 5

This last part will present summary of the analysis and discussions of major findings of this study. Besides that, this chapter will discuss on limitations of study and recommendations for future research.

1.8 Conclusion

In this chapter, research background and problem statement have been introduced to provide a better understanding on the background of conventional bonds and Sukuk to the readers. Besides, research objectives, research questions, hypotheses and significance of the study are also included in this chapter. Literature review of this study will be presented in the following chapter.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

Previous studies on investigating factors such as interest rate, GDP, inflation and trade openness that affect the performance of conventional bonds and Sukuk will be reviewed in this chapter. In addition, theoretical models that used in previous studies to study the performance of conventional bonds and Sukuk also will also be reviewed in this chapter.

2.1 Review of the Literature

2.1.1 Interest Rate

Adelegan and Bak (2009) found out that interest rate has a significant inverse relationship on conventional bond performance in sub-Saharan Africa as higher interest rates tend to have a depressing impact on issuance of bond market development because only a small number of firms can manage debts when the interest rates are high. Furthermore, Syamni and Husaini (2010) also support Adelegan and Bak (2009) statement by explaining that when the market interest rate increases, the market values of the bonds in Malaysia will reduce because the bond's coupon rates are fixed and the present value of a bond's stream of interest payments fluctuates. Consequently, the investors may be afraid of this situation and are encouraged to sell their bond, which leave the fund managers no choice but to sell the long-term bonds at a discounted price in order to generate cash for redemptions.

In addition, Bhattacharyay (2013) measured interest rate variability to the performance of conventional bonds in Asia. There will be a negative significant relationship of interest rate variability and the performance of the conventional bonds due to the lowered encouragement and willingness of investors to invest in long-term bonds when the interest rates are variable. The investors will perceive there will be a significant risk and the purchasing power of fixed-rate long-term bond could be reduced when the interest rate variability is higher. Therefore, this may unfavorably influence the demand for long-term bonds and when there is a high variability in interest rates.

Syamni and Husaini (2010) and Said and Grassa (2013) have proven that interest rate does not significantly influence the Islamic bonds as Islam prohibits interests. Saad and Haniff (2013) also support this statement as Sukuk forbids the issues that involved gambling and Riba (excessive interest rate charging) in order to comply with Syariah's rules and principles. Conversely, Elkarim (2012) stated that interest rate has negative significant relationship to performance of Sukuk. When the interest rate rises, the price of fixed income securities for Sukuk will decrease and vice versa. This is because interest rates can affect the value of Sukuk indirectly as interest rate is a common economic indicator that will affect Sukuk even though Sukuk does not involve in interest bearing instruments.

2.1.2 Inflation Rate

Inflation is defined as the general increase of prices for goods and services which is measured in annual percentage. Campbell and Ammer (1993) from United States have suggested that inflation news and bond market are significant negatively correlated. If the inflation is expected to increase in the future, it will bring bad news to the bond market and cause the demand of bond to reduce. Elkarim (2012) found out that inflation has a significant

positive impact on conventional bond performance. This result is inconsistent with Campbell and Ammer (1993). They found out that there is a significant inverse relationship between conventional bond performance and inflation.

Moreover, there is a study shows that inflation has significant inverse and relationship on Sukuk performance by Elkarim (2012). Ahmad, Daud and Kefeli's (2012) findings are also consistent with Elkarim's (2012) findings. Higher inflation rate will lead to lesser number of Sukuk issued by the financial institution due to the decrease of demand for Sukuk. However, the result from Said and Grassa (2013) shows that inflation does not have a strong influence on the performance of the Sukuk market.

Furthermore, Saad (2009) found out that increasing in inflation will lead to a better performance of Sukuk in the market while decreasing in inflation will reduce the performance of Sukuk. This shows that there is a positive relationship between inflation and performance of Sukuk. Stable inflation is favorable to the number of bond issuance in the market because stable economy will lead to a stable rate of return that will attract more investors to invest in the market.

2.1.3 Gross Domestic Product

Gross Domestic Product (GDP) is the market value of all final goods and services produced within a nation in a given period of time. The components of GDP include investment, consumption, net exports and government expenditure. There are three distinct ways to view GDP which includes production approach, expenditure approach and income approach (Ahmad & Radzi, 2011).

GDP is found to be insignificant positive related to the total conventional bond performance from 1990 till 2009 in Malaysia (Ahmad & Radzi, 2011). However, Elkarim (2012) has found out that there is a significant inverse relationship between performance of conventional bonds and GDP during the period of 1990-2011 in Malaysia which has included Asian financial crisis in the year 1997 and the global financial crisis in the year 2007-2008. The difference arises from the findings may be due to the methodology used differs between Ahmad and Radzi (2011) and Elkarim (2012) as Ahmad and Radzi (2010) used simple regression analysis while Elkarim (2012) applied multiple regression analysis.

According to Saad (2009) in Malaysia, GDP is found to be significant positive in affecting performance of Sukuk. When the GDP increases then it will further improve the Sukuk performance. However, when the GDP decreases then the Sukuk performance will also deteriorate. This suggests that the positive growth of GDP in Malaysia is due to the expansion in public and private consumption and this subsequently leads to increase in Sukuk issuance. Investors have more money to invest in bonds as the growth of economy brings in more income for the country. Similarly, Said and Grassa (2013) also found out that GDP and Sukuk issued as share of GDP is significant positively correlated in most of Sukuk issuers' countries such as Malaysia, UAE, Saudi Arabia, Qatar, Pakistan, Kuwait, Nahrain, Indonesia, Brunei and Gambia during the period of 2003-2012.

Furthermore, Ahmad and Radzi (2011) found out that GDP has significant positive effect on the Sukuk performance in Malaysia. During the financial crisis period, the Malaysia's GDP has gone low and the growth of Sukuk performance has deteriorated as well. This suggests that Sukuk is less stable and vulnerable to deterioration of GDP. However, there is an exception stating that there is a negative significant relationship between performance of Sukuk and GDP according to Elkarim (2012). This is because during low GDP

period; Malaysia would raise funds from the domestic capital market to finance development expenditures such as highways, roads, railways and other amenities. This has directly increased the issuance of Sukuk. Thus, the performance of Sukuk would improve when the country's GDP decrease. A peculiar finding from Ahmad et al. (2012) is they found out that Sukuk performance Granger cause GDP in Malaysia which means that the given past history of Sukuk performance, it is unlikely that the information on GDP will help to predict Sukuk performance. Ahmad et al. (2012) have applied vector auto-regressive (VAR) model by including lagged values of explanatory variables and contributed to this different finding.

2.1.4 Openness of Economy

Openness to economy, also known as trade openness, measured with the ratio of export to GDP, is a factor to attract more foreign investments to enter into domestic markets, mainly countries with huge domestic demand (Bhattacharyay, 2013).

Bond markets will be able to do well in a more opened economy, but banks, the dominating finance sources, usually want to protect their influence in market by limiting the development of securities market towards the foreign market. When an economy is more open to foreign investors and exposed to foreign rivalry, banks have few powers to suppress the competition. It is because the established interests are sometimes very difficult to implement into an exposed international competition, therefore the bond market will still develop as usual. Countries would not allow all forms of foreign capital flow into to the country since foreign investors demand significant safeguard on their investments. Subsequently, this adds burden and risks to the domestic

banking system to provide them such an offer that did not exist in the past (Rajan & Zingales, 2001; Adelegan & Bak, 2009).

In conventional bond markets, Adelegan and Bak (2009) stated in their studies that trade openness is negatively significant related to conventional bond market capitalization as a share of GDP in Sub- Saharan African (SSA) countries due to the fact that local conventional bond market will develop better when economy has lesser access to external funding. Adelegan and Bak (2009) have the same findings with Eichengreen and Luengnaruemitchai (2004). On the contrary, openness of an economy is found to have significant positive effect on the total conventional bond market size in proportion of GDP by Bhattacharyay (2013). This suggests that increased in trade openness can facilitate the conventional bond development and hence increase the total conventional bond market size in proportion of GDP.

Findings from both articles are different due to Adelegan and Bak (2009) selected Sub-Saharan Africa (SSA) countries while Bhattacharyay (2013) has chosen Asia countries. Banking sectors are playing a crucial role for external finance in most of Sub-Saharan African countries. Banks of SSA countries will protect their dominant market share from becoming worse by the effect of competition from securities markets. On the other hand, Raghavan and Sarwono (2012) have found that openness of economy has no impact on conventional bonds.

In Sukuk market, Said and Grassa (2013) stated that the expected sign must be positive since the increasing in openness of economy will improve the economy status and subsequently develops the Sukuk market. They found that trade openness has a positive and significant effect on the Sukuk issuance as share of GDP in Saudi Arabia, Kawait, Bahrain, Qatar, Indonesia, UAE, Malaysia, Pakistan Brunei and Gambia. This means that when there is a higher level of economy openness, it is easier to get access to external funding

from the foreign investors. This will improve the development of Sukuk market and help to improve the performance of Sukuk. This is consistent with the findings of Rajan and Zingales (2001). However, this is contrary to Grassa and Gazdar (2012) in which there is an inverse relationship between trade openness and Sukuk issuance as share of GDP. The difference arises due to Grassa and Gazdar (2012) only focused on the Gulf Cooperation Council countries (GCC) without including Malaysia, Brunei, Indonesia, Pakistan and Gambia in their study.

2.2 Review of Relevant Theoretical Models

This section reviews several theoretical models that used in previous studies to study the performance of conventional bonds and Sukuk. There are six methods being used to investigate the performance of conventional bonds and Sukuk including Ordinary Least Square (OLS) multiple regression model, Ordinary Least Square (OLS) simple regression model, Vector auto-regressive (VAR) model, Generalized Autoregressive Conditional Heteroscedasticity (GARCH) model, Generalized Least Square (GLS) model and panel data regression model.

2.2.1 Ordinary Least Square (OLS) Multiple Regression Model

A multiple OLS regression model is one of the most common models in business and economics to examine the relationship between an explained variable and a few explanatory variables. This is to find out that the effect of the explanatory variables on the explained variable and also determine the type of relationship exists between the explanatory variables and explained variable (Saad, 2009).

Adelegan and Bak (2009) also adopted the OLS Multiple Regression Model which was estimated using generalized least square (GLS) with correction for heteroscadasticity and panel specific autocorrelation to study influence of economic size, natural openness, size of banking sector and interest on the bond market capitalization as a share of GDP in 23 countries. Besides, OLS multiple regression model is also being used by Saad (2009) to investigate the relationship between performance of Sukuk in Malaysia and inflation rate, interest rate, gross domestic product (GDP) and stock market.

Furthermore, OLS multiple regression model has been adopted by Syamni and Husaini (2010) to examine the relationship between interest rates and currencies on conventional bonds and Islamic bonds in Malaysia after realizing bond market actually plays an essential role in emerging countries. In addition, Bhattacharyay (2013) employed the OLS multiple regression model to examine effect of size of banking system, size of economy, openness of economy, exchange rate variability, interest rate spread and stage of economic development on total bond market size in 10 Asian countries. The three independent variables are transformed using logarithms in order to prevent multicollinearity problem exists among the independent variable.

2.2.2 Vector Auto-Regressive (VAR) Model

Dynamic of market can be studied by the VAR methodology. Besides, responses of each variable to changes in other variables in the system can be estimated by using VAR model. Each of the regressands in VAR is explained by its lagged values and lagged values of all other regressands in the model. Ahmad et al. (2012) used VAR model to investigate the effect of macroeconomic conditions: inflation rate (Consumer Price Index), Gross Domestic Product (GDP) and Producer Price Index (PPI) on total Sukuk

issuance at the aggregate level. Augmented Dickey-Fuller test is used to study whether each of the variables are stationary. Stationary properties are important to avoid obtaining spurious result.

The VAR model can be explained as below:

$$X_{1,t} = a_{1,0} + a_{1,i} X_{1,t-1} + b_{1,i} X_{2,t-1} + c_{1,i} X_{3,t-1} + d_{1,i} X_{4,t-1} + \varepsilon_{1,t}$$

$$X_{2,t} = a_{2,0} + a_{2,i} X_{1,t-1} + b_{2,i} X_{2,t-1} + c_{2,i} X_{3,t-1} + d_{2,i} X_{4,t-1} + \varepsilon_{2,t}$$

$$X_{3,t} = a_{3,0} + a_{3,i} X_{1,t-1} + b_{3,i} X_{2,t-1} + c_{3,i} X_{3,t-1} + d_{3,i} X_{4,t-1} + \varepsilon_{3,t}$$

$$X_{4,t} = a_{4,0} + a_{4,i} X_{1,t-1} + b_{4,i} X_{2,t-1} + c_{4,i} X_{3,t-1} + d_{4,i} X_{4,t-1} + \varepsilon_{4,t}$$

$X_{1,t}$ is PPI, $X_{2,t}$ is CPI, $X_{3,t}$ is GDP and $X_{4,t}$ is the aggregate Sukuk issuance.

The reason of using VAR model is because Ahmad et al. (2012) expected that there will be no immediate effect of the explanatory variables on the explained variable. They also assumed the market is inefficient and will give response to the changes with a time lag. Therefore, a lagged effect is expected.

2.2.3 Generalized Autoregressive Conditional Heteroscedasticity (GARCH) Model

GARCH models are most appropriate to be used for time series data and the data has non-constant volatility. This model is popular in econometrics and finance and preferred by financial modeling professionals as it has randomly varying volatility and also closer to the real world situation when trying to make forecasts (Ruppert, 2011).

Syamni and Husaini (2010) did not just analyze data with OLS multiple regression model but also employed GARCH model to examine the effect of interest rate, currencies on performance of Islamic bonds and conventional

bonds in Malaysia. All the independent variables are proven to be significant in the equation that shows a variant of the residual model. This indicates that the GARCH model is appropriate to investigate the influence of interest rate and currencies in Malaysia on performance of Islamic bonds and conventional bonds.

2.2.4 Generalized Least Square (GLS) Model

GLS model has a similarity with random effect model as both of the models are meant to take into consideration of heteroscdasticity and autocorrelation problem. Differences in variability will be taken into consideration by applying GLS model. This model also enables corrected variable to be estimated by OLS (Bhattacharyay, 2013).

Eichengreen and Luengnaruemitchai (2004) employed GLS model with corrections for heteroscdasticity and panel specific autocorrelations to investigate whether openness of economy, size of economy, interest rate spread, exchange rate variability, size of banking system, and stage of economic development will influence the total bond size in 41 countries including 9 Asian countries. Bhattacharyay (2013) also did on a similar study with the initial dependent variable and independent variables with simple GLS regression, GLS with correction for heteroscedasticity and GLS with correction for heteroscedasticity and panel specific autocorrelation.

2.2.5 Panel Data Regression

The panel data consists of both time series data and cross sectional data. Two types of panel data regression model methods were used which are fixed effect model (FEM) and random effect model (REM). FEM is used to examine individual characteristic for each observation in the sample based on intercept term regardless of time effect. If the individual characteristics for each of the observation in sample are based on the random error terms, they are called the Random Effect Model (REM). FEM assumes that intercept of each cross sectional unit may be correlated with one or more independent variables while REM assumes that intercept of each cross sectional unit is uncorrelated with independent variables. REM is considered to be more effective in a situation where intercept of an individual unit assumed to be randomly drawn from a larger population with a constant mean value (Bhattacharyay, 2013).

Under panel data estimation, Bhattacharyay (2013) used FEM and REM to examine the effect of size of the economy, openness of the economy, stage of economic development, interest rate spread, size of banking system and exchange rate variability to the development of bond market. Hausman test is also conducted by Bhattacharyay (2013) to determine whether FEM or REM will be more appropriate to be used and choose the most suitable estimator. Individual effects are uncorrelated with the independent variables if the Hausman test does not rejects the null hypothesis and therefore Random Effect Model will be more appropriate. The test shows that REM is more appropriate in estimating the total and governments bonds while FEM is more appropriate for corporate bonds.

Similar method was employed by Said and Grassa (2013) to determine the relationship between development of bond market with the economic and

macroeconomic factors since Hausman test suggests that FEM is the most appropriate empirical model.

2.2.6 Ordinary Least Square (OLS) Simple Linear Regression Model

Simple linear regression model is a model that explains relationship between one independent variable and one dependent variable. Ahmad and Radzi (2011) used simple linear regression model to measure whether the relationship between current economic conditions and performance of Sukuk and conventional bond in Malaysia from 1990 to 2009. The current economic conditions are gross domestic product, foreign exchange rates and international liquidity. Each of this independent variable is tested by using OLS method to investigate the relationship between the independent variables and the performance of Sukuk and conventional bonds in Malaysia.

2.2.7 Bond Valuation Theory

This theory suggested that the bonds are priced via the bond valuation theory (Safari, Ariff & Shamsher, 2013). This theory suggested that the theoretical value to bondholder of a bond is the present value of the stream of payments, which are the interest coupons and the redemption value as face value, discounted by the market interest rate. The yield to maturity (YTM) is the internal rate of return earned by a bondholder who buys a bond certificate today, at market price and holds it until the maturity, entitling the bondholder to all coupon payments as well as maturity payment. The fundamental principle of bond valuation is that the bond's value is equal to the present value of its expected future cash flows.

Therefore, the bond is priced as:

$$P = \frac{M}{(1+r)^n} + \sum_{t=1}^{n} \frac{C}{(1+r)^n}$$

Where,

P = market price of a bond

C = pre-fixed periodic coupon paymments

M = maturity payment

r = yield to maturity

n = issue tenure

2.2.8 Demand and Supply Theory

In economics, the amount that people are willing to demand equals the amount that people are willing to supply at a given prices is referred as the market equilibrium. This theory is also applicable in determining the equilibrium price of the bonds. When the quantity of bonds supplied is greater than the quantity of bonds demanded, the price of the bonds will be reduced. On the other hand, when the quantity of bonds demanded is greater than the quantity of bonds supplied, the price of the bonds will be increased. There are several factors which will cause the demand and supply curve to shift which including inflation and GDP (Mishkin, 2013).

Firstly, the theory suggests that an increase in the expected rate of inflation would reduce the demand for the bonds as the investors are prefer to spend now instead of investing. This is because that less items can be bought in the future with the same amount of money today. Eventually, this would shift the

demand curve to the left and reduce the price of the bonds. On the other hand, a decrease in the expected rate of inflation would increase the demand for the bonds (Mishkin, 2013).

When the economy is growing, the aggregate wealth and the gross domestic product are increasing; it will also increase the demand for the bond. An increase in wealth will enable the bond's demand function shifting rightward as growing economy creates wealth for the people. This is because people have more wealth to invest more in the bond market when the economy is growing. In contrast, economy recession will cause the demand function to shift left as the demands for bond will decrease since people do not have enough money for investment (Rittenberg & Tregarthen, 2014).

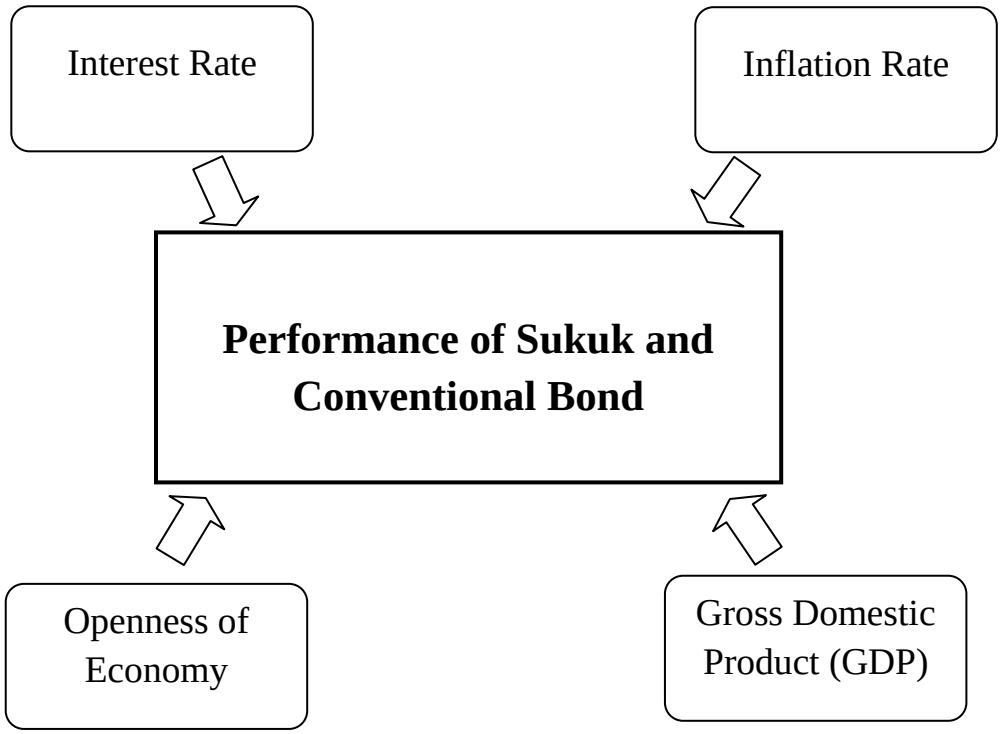
2.2.9 Transaction Cost Theory

This theory suggests that a low transaction cost environment generates financial incentives which have higher return on investment. Investors are more willing to invest in foreign country which imposes a low transaction cost as their profits would not be reduced by a high transaction cost. Low transaction cost in a country indicates there is a high level of openness of economy in that country. Those tariffs and non tariffs imposed are referred as the transaction cost for the investors for doing an investment abroad. No investor is willing to involve in any investment in a country where the country imposes tariff and non-tariff barriers on investment. The tariff would create problem and cause difficulty for the investors in remitting their profits back to their country and also reducing the returns investors earn. The degree of trade openness is likely to influence the flows of international capital in terms of risk-return relationship. Therefore, this theory suggests that there is a positive relationship between openness of economy and investment as the investment

would increase if the level of openness of economy increases (Adhikary, 2011).

2.3 Proposed Theoretical/Conceptual Framework

Figure 2.1: Proposed Theoretical/Conceptual Framework



2.4 Hypotheses Development

2.4.1 Interest Rate

H_0: There is no relationship between interest rate and both bonds performance.

H_1: There is a relationship between interest rate and both bonds performance.

2.4.2 Inflation Rate

H_0: There is no relationship between inflation rate and both bonds performance.

H_1: There is a relationship between inflation rate and both bonds performance.

2.4.3 Gross Domestic Product

H_0: There is no relationship between gross domestic product and both bonds performance.

H_1: There is a relationship between gross domestic product and both bonds performance.

2.4.4 Openness of Economy

H_0: There is no relationship between openness of economy and both bonds performance.

H_1: There is a relationship between openness of economy and both bonds performance.

2.5 Conclusion

This section covers on reviewing journal articles of previous study with the topic of the relationship between performance of Sukuk and conventional bonds and its explanatory variables. Besides that, theoretical models that used in previous studies to study the performance of conventional bonds and Sukuk also have been reviewed. Chapter 3 will discuss on the data collection and data analysis.

CHAPTER 3: METHODOLOGY

3.0 Introduction

The primary purpose of this study is to compare the performance between conventional bond and Sukuk in Malaysia. The bond determinants are inflation, interest rate, openness of economy, and Gross Domestic Products (GDP). Firstly, a brief introduction of this study will be stated in this chapter; followed by the research design of the study. Third section of this chapter is data collection. The measurements and sources that used to collect the secondary data will also be discussed in third section. Data analysis also will be briefly discussed in this chapter.

3.1 Research Design

Quantitative data collection and qualitative data collection are the two basic types of data collection. However, in this study, quantitative data collection will be used for this research. Quantitative data are data that can be expressed as a number or quantified. Therefore, numbers have been used in quantitative data collection to assess information. Statistical analysis will be used to further evaluate the information and enable the researchers to analyze the data meaningfully.

Quantitative data is employed for this study because it is considered as a hard science as it is very objective as compared to qualitative data, which is very subjective. Tests theory can be used for quantitative data in order to determine the cause and effect relationships easily. Besides that, data for Thomson Reuters Bond Pricing Agency (BPA) All Bond Malaysia indices for Sukuk conventional bond, economic factors such as interest rate, inflation rate, Gross Domestic Product (GDP) and openness of

economy can be found in quantitative form from the databases available. Therefore, this study will be using the quantitative data collected to run the Ordinary Least Squares (OLS) in order to analyze and compare the performance of Sukuk and conventional bond.

3.2 Research Collection Method

It is essential to determine the data collection method as the accuracy of the data collected will affect the accuracy of the result as well. Data collection methods are separated into two types which are primary data and secondary data. Secondary data will be used in this study to obtain the data needed in this research.

Secondary data is the data which is available in the public and does not require one to collect the data for itself. This type of data has been collected by someone else previously and now is available for everyone. The reason for using secondary data in this study is because of data for Thomson Reuters BPA All Bond Malaysia indices for Sukuk and conventional bonds, interest rate, inflation, gross domestic product and openness of economy of Malaysia can be obtained easily in Bond Pricing Agency Malaysia and Bank Negara Malaysia.

3.2.1 Thomson Reuters Bond Pricing Agency (BPA) All Bond Malaysia Index

Thomson Reuters BPA All Bond Malaysia index for Sukuk and conventional bonds in Malaysia will be used as dependent variable in this study. Thomson Reuters and the Malaysian Bond Pricing Agency (BPAM) created these series of indices in 2007. They also are representative of the Malaysian Sukuk and conventional bond market as the indices include the Malaysian Ringgit

denominated, long-term investment graded conventional and Islamic bonds. As of 31 December 2014, the index consisted of 1045 bonds with RM832.33 billion in total market capitalization. The index undergoes calculation and rebalancing on a daily basis. Total returns for each of the individual bonds in the index are calculated daily. The data is measured on a quarterly basis from the first quarter of 2007 till the third quarter of 2014 and they can be obtained from the Malaysian Bond Pricing Agency. The construction rules and calculation methodology of this index are based on guidance provided by European Federation of Financial Analyst Societies Standardized Rules. Therefore, this methodology conforms to international standards.

3.2.2 Interest Rate

Interest rate data is collected from Bank Negara Malaysia. It is measured in rate of return (%). The data used is from the 2007 Q1 to 2014 Q3 and the data is measured in quarterly basis.

3.2.3 Inflation

Inflation is measured by consumer prices index. Consumer prices index is calculated in terms of change in the cost to the average consumers of buying goods and services. This data for the period 2007 Q1 to 2014 Q3 can be collected in Bank Negara Malaysia. The data is measured in quarterly basis.

3.2.4 Gross Domestic Product

Data of the gross domestic product is collected from Bank Negara Malaysia. It is a quarterly data and measured in RM Million from 2007 Q1 to 2014 Q3. The gross domestic product will be measured in a natural log form.

3.2.5 Openness of Economy

The openness of economy is measured using the ratio of export to GDP. The data is collected from the Bank Negara Malaysia for 2007 Q1 to 2014 Q3 and it is in quarterly basis. The openness of economy will be measured in a natural log form.

3.3 Data Analysis

This study will be using E-view software program to do the analysis for the study's data as this program provides different types of analysis needed for this study. Basically, this study will employ Ordinary Least Square Multiple Regression Model to conduct the empirical analysis to examine the relationship between the Thomson Reuters BPAM index of conventional bonds and Sukuk with interest rate, inflation, Gross Domestic Product (GDP) and openness of economy.

3.3.1 Ordinary Least Square (OLS) Multiple Linear Regression Model

A multiple OLS regression model is one of the most commonly used models in business and economics to examine the relationship between an explained variable and a few explanatory variables. This is to find out that the effect of the explanatory variables on the explained variable and also determine the type of relationship exists between the explanatory variables and explained variable (Saad, 2009).

The regression model needs to meet the assumptions of classical linear regression such as linear in the parameters, fixed X values or X values independent of the error terms, zero mean value of error terms, the total parameters must be smaller than the total number of observations (n), error term must be normally distributed, no multicollinearity problem, no heteroscedasticity problem, no autocorrelation and lastly no specification bias (Gujarati & Porter, 2009).

OLS multiple linear regression model is used in this study to investigate the relationship between the Thomson Reuters BPAM index of Sukuk with interest rate, inflation, gross domestic product and openness of economy and also relationship between the Thomson Reuters BPAM index of conventional bonds with interest rate, inflation, gross domestic product and openness of economy.

The models derived from the Multiple Regression Model analysis are as follow:

$$BPAMC = c_1 + \beta_1 INT + \beta_2 INF + \beta_3 \log GDP + \beta_4 \log OPEN + \varepsilon_2$$

$$BPAMS = c_2 + \beta_5 INT + \beta_6 INF + \beta_7 \log GDP + \beta_8 \log OPEN + \varepsilon_1$$

Where,

BPAMS = Thomson Reuters BPAM Index of Sukuk

BPAMC = Thomson Reuters BPAM Index of Conventional Bond

INT = Interest rate

INF = Inflation rate

GDP = Gross Domestic Product

OPEN = Openness of economy

ε = Random error term

c = Intercept

3.3.2 Standard error of coefficient

The purpose of using t-test is to evaluate whether the individual independent variable is significant in explaining the changes in dependent variables. This is to evaluate whether interest rate, inflation, GDP and openness of economy are significant in influencing the Thomson Reuters BPAM indices of Sukuk and conventional bond individually in this study.

Formula for calculating t-statistic vale is as below:

$$\text{t- test statistic value} = \frac{\text{absolute value of coefficient}}{\text{standard error of coefficient}}$$

Degree of freedom (df)

df = n – k – 1

n = Number of observation

k = Number of explanatory variables

α = 0.05

Hypothesis testing for Sukuk and conventional bonds multiple regression models:

$H_0 : \beta_n = 0$
$H_1 : \beta_n \neq 0$ where n=1,2,3,4,5,6,7,8

The decision rule would be rejecting H_0 when the p-value is smaller than the significance level or the t-test statistic value is smaller or greater than the critical value. Otherwise, do not reject H_0. When H_0 is rejected, it means that the individual independent variable is significant in influencing the dependent variable.

3.3.3 F- Test

F-Statistic will be used to examine whether the overall model is reliable and significant. F-Statistics can investigate whether at least one of the independent variables or more independent variables are significant to the regression model (Gujarati & Porter, 2009).

Hypothesis testing for conventional bond multiple regression model:

$H_{0:} \beta_1 = \beta_2 = \beta_3 = \beta_4$
H_1: at least one of the $\beta_n \neq 0$ where n=1, 2, 3, 4

Hypothesis testing for Sukuk multiple regression model:

$H_{0:} \beta_5 = \beta_6 = \beta_7 = \beta_8$
H_1: at least one of the $\beta_n \neq 0$ where n=5, 6, 7, 8

When the p-value is smaller than the significance level, H_0 is rejected. Otherwise, do not reject H_0. When null hypothesis is rejected, then the regression model is significant in clarifying the changes in explained variable.

The formula of F-Statistics is at below:

$F = [R^2 / k] / [(1 - R^2) / (n - k - 1)]$

F = F-statistics

n = Number of observation

R^2 = Coefficient of Determination

k = Number of independent variable

The critical value of F statistic can be defined as follows:

$F = \alpha (k - 1, n - k - 1)$

α = 5% significance level

The null hypothesis H_0 will be rejected if the F test statistic is greater than the critical value since F test is a right tail test. On the other hand, H_0 will not be rejected if the F test statistic smaller than the critical value. The overall model is considered reliable when the null hypothesis is rejected.

3.4 Diagnostic Testing

3.4.1 Multicollinearity

The multicollinearity problem will occur when some or all of the explanatory variables are highly correlated with other explanatory variables. If this problem exists in the regression model, it is difficult to determine whether which independent variables influence the dependent variable. Consequences of having multicollinearity in regression model are getting large variances and covariances of Ordinary Least Square (OLS) estimators and wide confidence intervals. The t-test will be insignificant when the variances are large. As a result, the independent variable will become insignificant in explaining dependent variable. If this problem exists in the data, the result will be misleading (Gujarati & Porter, 2009).

There is no unique method of detecting multicollinearity. There are only informal methods to detect multicollinearity such as high R-squared but few independent variables are significant, pair-wise correlation coefficients and variance inflation factor (VIF). If the VIF of an independent variable is larger than 10, the variables are highly correlated. If the VIF between independent variables is smaller than 10 and larger than 1, the variables are less correlated (Gujarati & Porter, 2009).

The formula for VIF is as below:

$$VIF = \frac{1}{(1 - r^2)}$$

3.4.2 Normality Test

According to D'Agostino, Belanger and D'Agostino (1990) suggested that normality test is a statistical procedures designed to determine the underlying distribution of a random variable is normally distributed. In order to make sure each of the error term is normally distributed, it is assumed that the estimated error term must be zero. The second assumption is the variance of error term must be constant which means the model must not consist of heteroscedasticity problem. Lastly, each of the error term must be independently distributed therefore there are no autocorrelation problem.

Mean : $E(\mu_i) = 0$

Variance : $E[\mu_i - E(\mu_i)]^2 = E(\mu^2) = \sigma^2$

Cov (μ_i, μ_j) : $\{E[\mu_i - E(\mu_i)]\ E[\mu_j - E(\mu_j)]\} = E(\mu_i, \mu_j) = 0\ i \neq j$

$\mu_i \sim NID(0, \sigma^2)$

H_0 : error term are normally distributed.

H_1 : error term are not normally distributed.

Decision rule for normality test is rejecting null hypothesis when the p-value is lower than the significant level, otherwise do not reject. However, in this study the decision rule is based on the Jarque-Bera. The Jarque-Bera is a test of normality. The null hypothesis is rejected when the value of Jarque-Bera is more than the critical value, otherwise do not reject. The critical value is to follow the chi-square distribution. It is based on the Ordinary Least Square residuals. The formula of Jarque-Bera as below:

$$\mathbf{JB} = n\left[\frac{S^2}{6} + \frac{(K-3)^2}{24}\right]$$

The n is representing the sample size, S is representing the skewness coefficient, and the K is representing the kurtosis coefficient. Skewness is a measure of the asymmetry of the variable distribution while the value of skewness can be positive or negative or even undefined. Besides that, kurtosis has the similar concept with skewness. It measures of the peakedness or flatness of the probability of the variable distribution. In order to show that the error term is normally distributed, the null hypothesis should not be rejected. Therefore, there is sufficient evidence to conclude that the model has met the normality assumption (Gujarati & Porter, 2009).

3.4.3 Heteroscedasticity Test

One of the assumptions that must fulfill in order to use the OLS method is the model must be homoscedasticity. Homoscedasticity means that the errors terms have the same scatter regardless of the value of X. Long and Ervin (1998) defined that heteroscedasticity occurs when the variance of the error terms between the observations is different. The model is said to have heteroscedasticity problem when the scatter of the errors terms is different from one or more of the independent variables.

Heteroscedasticity will not influence the unbiasedness and consistency of OLS estimator. However, it will affect the distribution of coefficients because it has violated the minimum variance property by increasing the variances of the distribution and it caused the OLS method to be inefficient. At the same time, it influences the standard errors of the estimated coefficients. Therefore, hypothesis testing is no longer reliable because heteroscedasticity problem will tend to underestimate the variances and eventually lead to higher expected values of T statistics and F statistics.

Time series data is used in this study but not all heteroscedasticity test methods are suitable to detect the heteroscedasticity with time series data. In this case, Autoregressive Conditional Heteroscedasticty (ARCH) test is suitable to detect the heteroscedasticity problem for time series data.

Hypothesis Testing:

H_0: There is Homoscedasticity

H_1: There is Heteroscedasticity

The test statistic can be computed as below:

$$X^2_U = (n\text{-}p)\, R^2$$

Critical value for ARCH test:

$$X^2_{\alpha,p}$$

Where,

p = Lag length

α = Significance level

If the test statistic (Chi-square) is higher than the critical value or p-value is smaller than significance level, then reject the $H_{0,}$ otherwise do not reject. When the H_0 is rejected, it means that the regression model consists of heteroscedasticity problem. If the test statistic (Chi-square) is lower than the critical value or p-value is greater than significance level then do not reject the $H_{0,}$ otherwise reject. When the H_0 is not rejected, it means that the regression model does not have heteroscedasticity problem.

3.4.4 Model Specification Form

The RESET (Regression Specification Error Test) proposed by Ramsey in 1969 is a test for model specification form. This test can be used to determine whether a model is correctly specified or incorrectly specified. The RESET

test is based on the Lagrange Multiplier principle and usually using the F-distribution. When the estimated model is not in correct specification form, estimated model has systematic pattern in the error term. It is essential to make sure that the data of variables have stationary pattern (Gujarati & Porter, 2009).

Hypothesis testing for Ramsey Reset test is as below:

H_0: Specification form is correct

H_1: Specification form is incorrect

α = Significance level

The formula for calculating F-test statistic value is as below:

$$F = \frac{(R^2_{unrestricted} - R^2_{restricted})/k_{unrestricted} - k_{restricted})}{(1 - R^2_{unrestricted})/(n - k_{unrestricted})}$$

Whereby,

k = Number of independent variable

n = Number of observations

R^2 = Coefficient of determination

Critical value form F table: $F_{\alpha, 2, n-3}$

Where,

α = Significant level

n = Number of observations

When the p-value is smaller than significance level or the F- test statistic value is greater than the critical value, H_0 is rejected. Otherwise, do not reject. The estimated model has correct functional form if H_0 is not rejected.

3.4.5 Autocorrelation

Autocorrelation problem occurs when time series data is correlated with its past and future values. It will violate the classical linear regression model assumption of no autocorrelation or error terms between two periods are not correlated. If the Ordinary Least Square (OLS) estimators still have autocorrelation problem, it will bring some consequences to the model. Firstly, the OLS estimators will be unbiased and consistent because the unbiasedness and consistency do not depend on the assumption of no autocorrelation of error term. Secondly, the OLS estimators will be inefficient as they are unable to obtain estimator with lower variance.

Therefore, it will cause the estimated variances of the estimators to be incorrect and cause the estimated variances of the regression coefficients to be biased and inconsistent. Hence, the underestimated variance of estimator would tend to produce a larger t-statistic and lead to variables which are insignificant may be considered as significant. Thus, the hypothesis testing is no longer valid (Gujarati & Porter, 2009).

Breusch-Godfrey LM Test is used to test autocorrelation in time series data regression model and the hypothesis testing is as below:

H_0: There is no autocorrelation problem
H_1: There is autocorrelation problem.
The decision rule for autocorrelation is rejecting H_0 when the test statistic (X^2_U) is more than the critical value ($X^2_{\alpha\ ,\ p}$) or p-value is smaller than significance level, otherwise do not reject H_0.

The critical value is:

$$X^2_{\alpha,p}$$

Where,

p = Lag length

α = Significant level

In order to calculate the test statistic, the formula is as below:

$$X^2{}_U = (n - p)R^2$$

Where,

n = Number of observations

p = Lag length

R^2 = Coefficient of determination

The null hypothesis should not be rejected in order to prove that the model do not contain autocorrelation problem. Hence, the estimated variances of the estimators are correct and they are unbiased and consistent. Therefore, the variance of estimator will not be underestimated and the hypothesis testing is valid. Dougherty (2012) also mentioned that using autocorrelation with command 2 can use F-test as well.

3.5 ADF Unit Root Test

Augment Dicket-Fully (ADF) unit root test is developed by Dicker and Fuller in 1981. It is used to find out whether the data is associated with the unit root problem and also test whether the time series data is first or second difference. Besides, ADF Unit Root Test also determines the outliers in the data, which is very crucial to find out non-stationary movement in the data. A stationary movement means that the variance, covariance and mean are constant over the time window of the data. The unit root test will be unreliable if there is a non-stationary movement.

There are two models of ADF Unit Root test. First is with constant and without trend and the second one is with constant and trend. Furthermore, the lag length to be used for the unit root test is determined based on the minimum AIC (Akaike's Information Criterion) and also SIC (Schwarz's Information Criterion) to make sure that the model is free from autocorrelation problem.

Model with constant and with trend:

$$\Delta Y_t = \mu + \beta t + \delta Y_{t-1} + \sum_{i=1}^{k} \alpha_i \Delta Y_{t-i} + \varepsilon_i$$

Model with constant and without trend:

$$\Delta Y_t = \mu + \delta Y_{t-1} + \sum_{i=1}^{k} \alpha_i \Delta Y_{t-i} + \varepsilon_i$$

H0: Yt is non-stationary (Yt has unit root), δ=0

H1: Yt is stationary (Yt has no unit root), δ<0

$\alpha = 0.05$

The test statistic can be calculated by:

$$Test\ Statistic = \frac{\hat{\delta} - \delta}{SE(\hat{\delta})}$$

The decision rule is that rejects H_0 when probability value is less than 5% significance level, otherwise, do not reject H_0. Rejecting H_0 shows that the model is stationary while do not reject H_0 shows that the model is non-stationary.

3.6 Philip-Perron Test (PP Test)

Philips-Perron test is developed by Philip and Perron in 1988. It is a non-parametric method to control the serial correlation to determine the unit root of time series data. It is used to fix the serial correlation and heteroscedaticity problem by changing the Dickey-Fuller test statistic. PP test's purpose is to determine the non-ADF test and modify the Dickey-Fuller statistic and therefore the serial correlation will not affect

the test statistic's asymptotic distribution. This test will not require a specific lag length for the regression model.

Model of PP test:

$$\Delta Y_t = \alpha + \pi_{2xt-1} + \varphi\left(t - \frac{T}{2}\right) + \sum_{i=1}^{m} \varphi i \Delta Y_{t-i} + \varepsilon_{2t}$$

H_0: Yt is non-stationary. (Unit Root Problem)
H_1: Yt is stationary. (No Unit Root Problem)

Decision rule is to reject H_0 when the p-value is less than 5% significance level, otherwise do not reject H_0. If H_0 is rejected, it shows that the model is stationary; if H_0 is not rejected, the model is non-stationary.

3.7 Conclusion

This chapter has provided a brief explanation into the research methodology such as research design, data collection, data analysis methods and data collection methods. Besides that, various types of diagnostic tests and the result for the data analysis will be conducted in the following chapter. Furthermore, the result of analysis will be provided in the next chapter.

CHAPTER 4: DATA ANALYSIS

4.0 Introduction

The results of empirical analysis which study on the factors that affect the performance of conventional bond and Sukuk from the year of 2007 Q1 until 2014 Q3 will be shown in this chapter. In this chapter, several diagnostic checking tests will be conducted by using Eviews software such as Jarque-Bera test, heteroscedasticity ARCH test, Breusch-Godfrey Serial Correlation LM Test, Ramsey Reset test Augmented Dickey Fuller test and Philip-Perron Test.

4.1 Diagnostic Checking

4.1.1 Normality Test

Table 4.1: Results for normality test

Types of Bonds	Jarque Bera	Probability (p-value)
Conventional Bond	0.183990	0.912110
Sukuk	0.116886	0.943232

Table 4.1 is the normality test result for conventional bond and Sukuk for the year 2007 Q1 until 2014 Q3. The purpose of testing the normality test is to ensure that all the error terms are zero mean and the error term should not be correlated with each other (D'Agostino et al., 1990). Results of normality test for conventional bond and Sukuk are normality distributed otherwise the result will be invalid. This table showed that the conventional bond has a

probability of 0.912110 and Sukuk has a probability of 0.943232 which is more than the significant level of 5%. Based on the decision rules for normality test, do not reject null hypothesis when the probability is more than the significant level. Therefore, the result shows that error terms for both conventional bond and Sukuk are normality distributed.

4.1.2 Autocorrelation

Table 4.2: Results of the Breusch-Godfrey Serial Correlation LM Test

Types of Bonds	Observation x R-squared	Probability (p-value)
Conventional Bond	6.600996	0.0565
Sukuk	5.282756	0.1063

Table 4.2 shows the results of the Breusch-Godfrey Serial Correlation LM Test for conventional bond and Sukuk for the year 2007 Q1 to 2014 Q3. Based on the decision rule, the model will consist of autocorrelation problem if the probability value (p-value) is smaller than the significance level of 5%. There is no autocorrelation problem in both conventional bond model and Sukuk model, in which both of them have p-value higher than 0.05 with 0.0565 and 0.1063 respectively. Hence, the results from Table 4.2 have proven that both conventional bond and Sukuk model do not consist of autocorrelation problem and can subsequently proceed to the next hypothesis test.

4.1.3 Heteroskedasticity

Table 4.3: Results of the Heteroskedasticity ARCH Test

Types of Bond	Observation x R^2	Probability
Conventional Bond	0.755273	0.3848
Sukuk	1.295404	0.2551

Table 4.3 is the results of the Heteroskedasticity ARCH Test for conventional bond and Sukuk for the year 2007 Q1 to 2014 Q3. Based on the decision rule, the model consists of the heteroskedasticity problem if the probability value (p-value) is smaller than the significance level of 5%. Conventional bond has the p-value of 0.3848, which is greater than 0.05; hence, there is no heteroskedasticity problem in the conventional bond model. Sukuk has the p-value of 0.2551, which is greater than 0.05; therefore, there is no heteroskedasticity problem in the Sukuk model. Thus, the results that have been shown at Table 4.3 proven that both conventional bond and Sukuk model do not consist of heteroskedasticity problem and they can further proceed to the next test.

4.1.4 Multicollinearity

Variance inflation factors (VIFs) is used to determine whether there is multicollinearity among the variables. It is used to determine how much the variance of the estimated regression coefficient is inflated by the existence of the correlation among the variables inside the model. The VIF value is usually values from 1 to 10. When the VIF is between 1 and 10, it means that there is no serious multicollinearity among the variables while the model will have a serious multicollinearity problem if its VIF is above 10. VIF is

calculated by using 1 divided by 1 minus R-squared between the two independent variables.

Table 4.4: Results of R-squared and VIF between variables

Variables	R-squared	VIF
INF and INT	0.204711	1.25740
log(GDP) and INF	0.002341	1.00235
log(GDP) and INT	0.326003	1.48369
log(OPEN) and INF	0.007933	1.00800
log(OPEN) and INT	0.362596	1.56886
log(GDP) and log(OPEN)	0.793663	4.84644

Table 4.4 shows the result of R squared and VIFs between all the variables. The highest VIF is between log(GDP) and log(OPEN) which amounted to 4.84644 and the lowest VIF is 1.00235 which falls between the variables of log(GDP) and INF. It can be seen that the VIF of log(OPEN) and INT is only 1.56886. Besides that, the VIF values between INF with INT is 1.25740 and INF with log(OPEN) is only 1.00800. Lastly, log(GDP) and INT have VIF of 1.48369. All the VIFs fall between 1 and 10 and none of them fall beyond VIF of 10. This can be concluded that there is no serious multicollinearity between all the variables in the model.

4.1.5 Model Specification Form

Table 4.5: Results of the Ramsey RESET Test

Types of Bonds	F-statistic	Probability (p-value)
Conventional bond	2.082344	0.1614
Sukuk	0.451938	0.5076

Table 4.5 is the results of the Ramsey RESET Test for conventional bond and Sukuk for the year of 2007 Q1 to 2014 Q3. Based on the decision rule, the model has been correctly specified if the probability value (p-value) is greater than the significance level of 5%. The conventional bond p-value stands at 0.1614, which is greater than the significance level of 0.05; hence, conventional bond model has a correct model specification form. The Sukuk p-value is 0.5076, which is greater than the significance level of 0.05; therefore, the Sukuk model is also correctly specified. Thus, Table 4.5 results have proven that both conventional bond and Sukuk models are correctly specified. There is no misspecification problem.

4.2 Unit Root Test

Table 4.6: Unit Root Test Results at Level Form

Variables	ADF		PP	
	LEVEL		LEVEL	
	Without Trend	With Trend	Without Trend	With Trend
BPAMC	0.9239	0.2071	0.9425	0.1777
BPAMS	0.9417	0.6071	0.9422	0.5527
CPI	0.2903	0.5513	0.2679	0.5513
INT	0.4759	0.7936	0.4469	0.7442
log(GDP)	0.3449	0.0181**	0.0795	0.0108**
log(OPEN)	0.1746	0.0860	0.1031	0.1817

Table 4.7: Unit Root Test Results at First Difference

Variables	ADF		PP	
	FIRST DIFFERENCE		FIRST DIFFERENCE	
	Without Trend	With Trend	Without Trend	With Trend
BPAMC	0.0001**	0.0008**	0.0000**	0.0004**
BPAMS	0.0002**	0.0013**	0.0002**	0.0013**
CPI	0.0002**	0.0012**	0.0002**	0.0012**
INT	0.0001**	0.0098**	0.0001**	0.0007**
log(GDP)	0.0000**	0.0003**	0.0011**	0.0003**
log(OPEN)	0.0281**	0.0832	0.0000**	0.0000**

Table 4.8: Unit Root Test Results at Second Difference

Variables	ADF		PP	
	SECOND DIFFERENCE		SECOND DIFFERENCE	
log(OPEN)	0.0045**	0.0043**	0.0001**	0.0000**

*Note: p-value in parentheses ** indicates significant at 5%.*

The table 4.6 shows that log(GDP) is stationary at level form with trend for ADF and PP. Meanwhile, log(GDP) is non-stationary at level form without trend for ADF and PP. However, the other variables such as BPAMC, BPAMS, CPI, INT, log(OPEN) are not stationary at level form either with trend or without trend for ADF and PP.

As for the first difference in ADF and PP, the result shows that all the variables are stationary at first difference level either without trend or with trend except for log(OPEN). Log(OPEN) is not stationary in the first difference level with trend for ADF but stationary at first difference without trend for ADF and with and without trend for PP. Therefore, second difference test is required to further determine whether the log(OPEN) is stationary. Finally, the log(OPEN) is stationary in the second difference for both without trend and with trend for ADF and PP.

4.3 Ordinary Least Square (OLS) Multiple Regression Model

Based on the results from this research, the regression model is:

BPAMC = -603.6793 − 10.90126 INT - 0.717608 INF + 37.97354 log (OPEN) + 60.11720 log (GDP)

BPAMS = -720.4655 − 13.61506 INT - 0.978065 INF + 47.53539 log (OPEN) + 70.79969 log (GDP)

Table 4.9: Regression results of OLS Multiple Regression Model for conventional bond

Dependent variable: BPAMC		
Independent variables	**Coefficient**	**P-value**
INT	- 10.90126	0.0014**
INF	- 0.717608	0.0009**
log(OPEN)	37.97354	0.0009**
log(GDP)	60.11720	0.0000**
R-squared	0.919937	
Adjusted R-squared	0.907620	
F-statistic	74.68613	
Probability (F-statistic)	0.000000**	

*Note: p-value in parentheses ** indicates significant at 5%.*

Table 4.9 shows the estimated parameters and p-value. The R-squared for this model is 0.919937. This indicates 91.99% of the variation in Thomson Reuters BPAM Conventional Bond Index can be explained by the variation in INT, INF, log(OPEN) and log(GDP). The adjusted R-squared for this model is 0.907620 which indicates that 90.76% of the variation in Thomson Reuters BPAM Conventional Bond Index can be explained by the variation in INT, INF, log(OPEN) and log(GDP) by taking degree of freedom into account. The F-statistic for the model is 74.68613 and p-value is 0.0000. Significance of the whole model can be tested by using F-statistic. The p-value is smaller than 0.05 which indicates that this whole model is significant at 5% significance level for explaining the performance of conventional bond.

Table 4.10: Regression results of OLS Multiple Regression Model for Sukuk

Dependent variable: BPAMS		
Independent variables	**Coefficient**	**P-value**
INT	- 13.61506	0.0006**
INF	- 0.978065	0.0001**
log(OPEN)	47.53539	0.0004**
log(GDP)	70.79969	0.0000**
R-squared	0.924502	
Adjusted R-squared	0.912887	
F-statistic	79.59533	
Probability (F-statistic)	0.000000**	

*Note: p-value in parentheses ** indicates significant at 5%.*

Table 4.10 shows the estimated parameters and p-value. The R-squared for this model is 0.924502. This indicates 92.45% of the variation in Thomson Reuters BPAM Sukuk Index can be explained by the variation in INT, INF, log(OPEN) and log(GDP). The adjusted R-squared for this model is 0.912887 which indicates that 91.29% of the variation in Thomson Reuters BPAM Sukuk Index can be explained by the variation in INT, INF, log(OPEN) and log(GDP) by taking degree of freedom into account. The F-statistic for the model is 79.59533 and p-value is 0.0000. The p-value is smaller than 0.05 which indicates that this model is significant at 5% significance level in investigating the performance of Sukuk.

4.3.1 T-test

Table 4.11 shows the t-test result obtained from Eviews output

Independent variables	p-value in Sukuk model	p-value in Conventional bond model	Significance
INT	0.0006**	0.0014**	Significant
INF	0.0001**	0.0009**	Significant
log(OPEN)	0.0004**	0.0009**	Significant
log(GDP)	0.0000**	0.0000**	Significant

*Note: p-value in parentheses ** indicates significant at 5%.*

Since the p-value of all independent variables in the Sukuk and conventional model is less than significance level of 5%, it can be concluded that all of the independent variables like interest rate, inflation, openness of economy and GDP are significantly affect the performance of Sukuk and conventional bond in Malaysia.

4.4 Conclusion

In this chapter, OLS multiple regression model has been chosen in this study to examine the relationship between four independent variables and dependent variable. In addition, several diagnostic checking tests have been conducted such as Jarque-Bera test, heteroscedasticity ARCH test, Breusch-Godfrey Serial Correlation LM Test, Ramsey Reset test and Unit Root Test. Furthermore, the next chapter will discuss about the relationship between Thomson Reuters BPAM Conventional Bond Index and Sukuk Index with four independent variables which are interest rate, inflation, openness of economy and GDP. Besides that, in the following chapter, summary of this study, policy implementation, limitation of study and recommendation will also be discussed.

CHAPTER 5: DISCUSSION, CONCLUSION AND IMPLICATIONS

5.0 Introduction

In this chapter, summary of statistical analysis, major findings on the relationship between explanatory variables and performance of conventional bonds and Sukuk, implication of study, limitation of study and recommendations of study will be discussed.

5.1 Summary of statistical analysis

This paper means find out the relationship between factors such as interest rate, inflation, GDP and openness of economy with performance of conventional bond and Sukuk. Besides that, this paper also compares the performance between conventional bond and Sukuk in Malaysia.

The first independent variable is interest rate. The result reveals that interest rate has significant negative relationship with the performance of conventional bond and Sukuk.

The second independent variable is inflation. The result reveals that inflation has significant negative impact on performance of conventional bond and Sukuk.

The third independent variable is GDP and it is found to have significant positive relationship with performance of conventional bonds and Sukuk.

The last independent variable is openness of economy. It is found that openness of economy has significant positive effect on performance of Sukuk and conventional bonds from the regression result.

5.2 Discussion of major findings

The first independent variable is interest rate. Syamni and Husaini (2010) mentioned that when market interest rate is greater than coupon rate, bonds are sold at discount as the price of bond is lower than the face value. Investors are not willing to pay more for the bonds. Meanwhile, when market interest rate is lower than coupon rate, bonds will be traded at premium and investors are willing to pay more for a greater return. The market interest rate is often referred to required rate of return. It can be seen that rate of return would affect the performance of conventional bonds.

According to Afshar (2013), prices of Sukuk are usually determined by the market. Therefore, Sukuk may have variable rates of return as Sukuk holders can sell it at lower or higher price based on the market price of Sukuk. If the market interest rate is being offered at a higher rate than the return of Sukuk, the price of the bond may be reduced as there is less demand for the Sukuk. Based on above, both the performance of conventional bonds and Sukuk may be affected by the rate of return. Therefore, rate of return is being used as proxy for interest rate.

Interest rate is found to be significant negatively affecting the performance of conventional bond in Malaysia during period of 2007 Q1 to 2014 Q3 from the results. This result is consistent with the findings of Adelegan and Bak (2009), Syamni and Husaini (2010) and Bhattacharyay (2013) where they also found out that interest rate has significant negative effect on performance of conventional bonds. When market interest rate rises, the market values of the bonds will drop and vice versa because the

bond's coupon rates are fixed and the present value of a bond's stream of interest payments fluctuates.

The result shows that interest rate is significant negative related to performance of Sukuk in Malaysia during period of 2007 Q1 to 2014 Q3. The regression result of Sukuk is consistent with the findings of Elkarim (2012) as interest rate has significant negative effect on performance of Sukuk. However, this result is inconsistent with the findings of Syamni and Husaini (2010) and Said and Grassa (2013) stated that the interest rate is insignificant in explaining performance of Sukuk because interest is strictly prohibited in Islam. According to Elkarim (2012), interest rate is served as a general economic indicator and it could influence performance of Sukuk as well even though Sukuk does not invest in interest bearing instruments. When the market interest rate is being offered at a higher rate than the return of Sukuk, investors may seek for other investment vehicles and are not willing to invest in Sukuk. This would cause the performance of Sukuk to deteriorate as the demand for Sukuk is reduced.

The result is consistent with the Bond Valuation theory where the value of a conventional bond is the present value of the stream of payments discounted by the market interest rate. This indicates that there is a negative relationship between conventional bond and interest rate. When the market interest rate increases, the present value of bond will decrease. This theory is applicable to Sukuk as it has periodic cash flow as well. When the market interest rate is offered at a higher rate compared to the return of the Sukuk, Sukuk will be sold at a lower price (Safari et al., 2013).

The second independent variable in this study is inflation. Ahmad et al. (2012) measured inflation rate by using CPI as a proxy. Based on the result, inflation has a significant negative impact with performance of conventional bonds in Malaysia. The result is consistent with Campbell and Ammer's (1993) findings where there is a negative significant relationship between inflation and the performance of conventional bond. The demand of the bond will reduce if the inflation is expected to

increase in the future. Investors would prefer to spend now instead of investing. This is because that less items can be bought in the future with the same amount of money today. Since there is a low demand in bonds, the price of bond will be reduced in order to attract more investors to buy. Therefore, the performance of conventional bonds will deteriorate when inflation is expected to increase. However, this result is inconsistent with Elkarim (2012) who found out that inflation rate is significant positively affecting the performance of conventional bond.

Furthermore, result shows inflation has significant negative relationship with performance of Sukuk in Malaysia. This result is consistent with Elkarim (2012) and Ahmad et al. (2012) where the inflation has been found to have a significant negative relationship with the Sukuk performance. Higher inflation rate will lead to lesser number of Sukuk issued by the financial institution due to the decrease of demand for Sukuk as investors tend to choose other investment alternatives.

However, this result is inconsistent with the findings of Saad (2009) and Said and Grassa (2013). Said and Grassa (2013) found out that inflation does not affect performance of Sukuk but Saad (2009) findings stated that inflation has positive effect on performance of Sukuk where stable inflation will lead to a stable economy and it will lead to stable rate of return which will attract more investors to enter into the market.

The result of this study on inflation is consistent with the demand and supply theory. The theory suggests that an increase in the expected rate of inflation would reduce the demand for the bonds as the investors are prefer to spend now instead of investing. Eventually, this would reduce the price of the Sukuk and conventional bonds (Mishkin, 2013).

The third independent variable is GDP. Saad (2009) has measured GDP by RM million. Result shows that GDP will positively affect the performance of conventional bonds in Malaysia during the period of 2007 Q1 till 2014 Q3. This result is consistent

with the findings with Ahmad and Radzi (2011) in which when GDP increases; the performance of conventional bonds will also improve. The result also shows that there is a significant relationship between GDP and performance of conventional bonds in which Elkarim (2012) also found that GDP has a significant relationship with performance of conventional bonds.

Based on the result, it is shown that GDP has significant positive effect on performance of Sukuk in Malaysia. This result is consistent with the finding of Saad (2009) where he suggested that investors will have more money to invest when there is a positive growth of GDP as public and private consumption are expanding. Therefore, performance of Sukuk in Malaysia will improve when GDP of Malaysia increases. Similarly, this result is consistent with the findings of Ahmad and Radzi (2011) and Said and Grassa (2013). Ahmad and Radzi (2011) suggested that Sukuk is less stable to the deterioration of GDP. Therefore, performance of Sukuk will deteriorate when GDP has gone low.

However, the results of GDP and performance of Sukuk is inconsistent with Elkarim (2012) as he found out that there is a significant negative relationship between GDP and Sukuk's performance. This is because when GDP is declining, the Malaysia's economy is underperformed; hence Malaysia does not have enough capital to build highways, roads and other amenities. Thus, Malaysia would raise funds from domestic markets by issuing Sukuk and the performance of Sukuk will improve when the GDP of Malaysia weakens.

The result of this study on GDP is consistent with the theory of demand and supply. When the economic moves into growth which means that the GDP is higher, demand for the bonds would tend to increase and more investors are competing to buy the available bonds in the market. An increase in wealth will enable the bond's demand function shifting rightward as growing economy creates wealth for the people. Therefore, this suggests that there is a positive relationship between GDP and the performance of bonds.

Last but not least, the fourth independent variable is openness of economy. Adelegan and Bak (2009) and Said and Grassa (2013) have used ratio of export to GDP as proxy for measuring openness of economy. Exports of services to GDP will be the proxy to calculate the trade openness. Based on Francois, Pindyuk and Worz (2008), exports of services have been increasing nowadays and decline in manufacturing exports. Therefore, export of services has gained its importance relative to GDP.

Based on the result, it is found that openness of economy is significant positive related to the performance of conventional bonds. This result is also consistent with the findings of Bhattacharyay (2013) which suggested that there is a significant positive relationship between openness of economy and conventional bonds as increased in openness of economy can facilitate the conventional bond development.

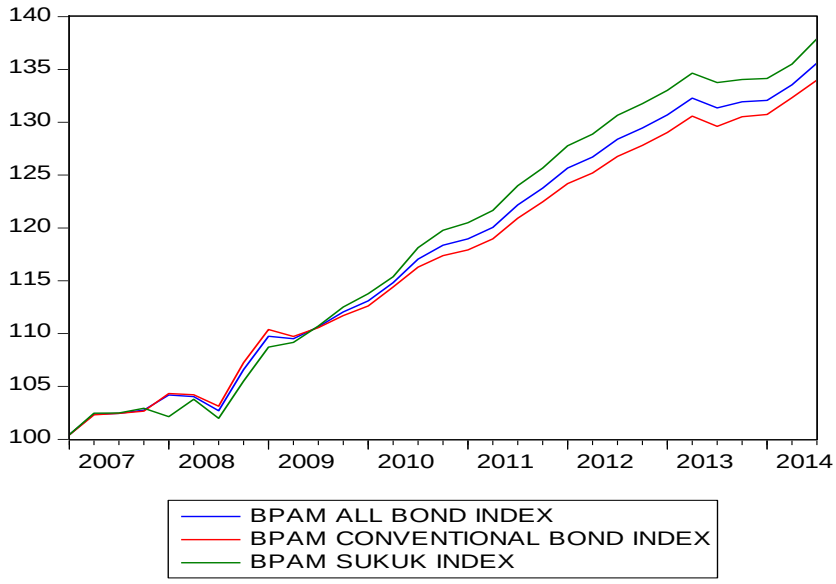
However, this result is inconsistent with the findings of Eichengreen and Luengnaruemitchai (2004) and Adelegan and Bak (2009). They found out that when economy has lesser access to external funding, local conventional market can develop better and have a better performance. On the other hand, Raghavan and Sarwono (2012) found out that openness of economy has no impact on conventional bonds. Therefore, the performance of conventional bonds in Malaysia would not be affected by the level of economy openness.

Furthermore, the result shows that there is significant positive relationship exists between openness of economy and performance of Sukuk in Malaysia. This is consistent with the findings of Rajan and Zingales (2001) and Said and Grassa (2013) who found that positive relationship exists between openness of economy and Sukuk performance. When there is a higher level of economy openness, it is easier to get access to external funding from the foreign investors. This will improve the development of Sukuk market and help to improve the performance of Sukuk. However, findings of Grassa and Gazdar (2012) have suggested that a negative relationship exists between openness of trade and Sukuk performance.

The transaction cost theory supports the positive relationship between openness of economy and performance of both conventional bond and Sukuk. Low transaction cost in a country which promotes a higher level of openness of economy will lead to higher investment on bonds and a better performance bonds. It is easier for the issuer of bonds to get access to external funding from the foreign investors in bond markets.

5.2.1 Performance of Sukuk and conventional bonds in Malaysia

Figure 5.1 TR BPAM All Bond Index in Malaysian Sukuk and conventional markets



Source: Developed for research

Figure 5.1 shows the trend of Sukuk, conventional bonds and market index from the series of TR BPAM All Bond Index in Malaysia Sukuk and conventional markets from 2007 Q1 to 2014 Q3. The indexes for the three of them are obviously moving upwards and heading to the same direction over the 8 years. In the 2008 Q2, the three

indexes slightly dropped. Starting from 2008 Q3, the indexes have taken their growth quickly and their growths for the coming year are tremendously huge. BPAM All Bond Index is used as a representative of the global market. From the early of 2007 till 2009 Q1, Sukuk Index was underperforming compared to Conventional Bond Index and All Bond Index. Meanwhile, Conventional Bond Index outperformed the All Bond Index and Sukuk Index.

However, this situation did not last long. It is because from the second half of 2009, Sukuk Index has started to accelerate its growth and outpaced the All Bond Index and Conventional Index till 2014 Q3. Conventional Bond Index unperformed compared to All Bond Index and Sukuk Index starting from 2009 Q2. This result is consistent with the findings of Mosaid and Boutti (2014) and Ahmad and Radzi (2011). They agreed that Sukuk outperformed conventional bonds as well.

The Malaysian government has started to develop the Islamic Capital Market in the year of 2009 which has contributed to the better performance of Sukuk in Malaysia. Tax incentives aimed at developing the Islamic Capital Market were offered in the 2009 Budget. The fees and profit earned by institutions undertaking activities such as underwriting and trading Sukuk issued in Malaysia and also distributed outside Malaysia will be exempted from tax. Besides, one of the efforts made by government to promote the Sukuk market is to exempt tax for special purpose vehicle (SPV) that has been set up for Islamic financing. In addition, deduction on the cost of issuance of the Sukuk incurred by the SPV will be given to the company that established the SPV (Razazila, Roudaki & Clark, 2010). These incentives provided have attracted more investors especially those non-Muslims to invest in Sukuk and also attracted more issuers to issue Sukuk in acquiring funds. Therefore, efforts made by Malaysia government have greatly contributed to the outperforming performance of Sukuk compared to conventional bonds from the year 2009 and onwards.

According to Ahmad and Radzi (2011), they found out that conventional bond is less susceptible to the economic conditions which suggest that performance of conventional bond is less affected by the economic conditions. The result is consistent with the findings of Ahmad and Radzi (2011). It can be seen that the coefficients of all independent variable from the result of this study that affecting the performance of Sukuk index are greater compare to conventional bond index.

When inflation increases by 1% point, the conventional bond index will be reduced by only 0.71% point while Sukuk index will be reduced by 0.98% point. Furthermore, when interest rate increases by 1% point, the conventional bond index will be reduced by 10.9% point while Sukuk index will be reduced by 13.62% point. When the GDP increases by 1%, the Sukuk index will be increased by 0.71% while conventional bond index will only increase by 0.60%. In addition, conventional bond index will increase 0.38% while Sukuk index will increase by 0.47% when openness of trade increases by 1%. Therefore, it can be said that macroeconomic conditions have a greater influence on the performance of Sukuk during the period of 2007 Q1 till 2014 Q3 based on the result of this study. In other word, performance of conventional bond is less affected by macroeconomic conditions compared to Sukuk in Malaysia.

5.3 Implication of study

5.3.1 To the Researcher

This study will provide an extra knowledge or insights about conventional bonds and Sukuk in the capital market to other researchers particularly about the effect of macroeconomic conditions on performance of Sukuk and conventional bonds. Thus, this study may inspire other researchers heading towards the same direction of this study in other countries as macroeconomic

conditions that affect the performance of Sukuk and conventional bonds of Malaysia may affect other countries as well.

5.3.2 To the University

This study will be contributed as the new resources for references to the students. Students in the university will be benefited as they are able to have a better understanding on Sukuk and conventional bonds from this study. Furthermore, necessary or useful information regarding the capital market in Malaysia can be obtained in this study by those who have interests to do the same study in the future. This study can provide guidance to them in completing the same study or similar study. They may extract, capture and learn from the best part of study which is well done.

5.3.3 To the Investors

This study about the effects of macroeconomic conditions and openness of economy on the performance of conventional bonds and Sukuk can be served as a guidance or signal to investors in making capital investment. This may aid them in making the right decision to invest in Sukuk or conventional bonds that yield high returns for them by properly analyzing the conditions of the economy of the countries they intend to invest in as Sukuk and conventional bonds may have varying performances due to the economy of the country. From the results, it can be seen that interest rate and inflation have negative relationship with performance of Sukuk and conventional bonds and GDP and openness of economy has positive relationship with performance Sukuk and conventional bonds in Malaysia. Therefore, investors should analyze meticulously the conditions of economy of Malaysia before deciding to invest in Sukuk or conventional bonds.

5.3.4 To the Government

Countries may need to acquire sufficient funds for the development of their countries and they would need to issue Sukuk or conventional bonds to the public or in another country to acquire funds they need. The result provides guidance for government in choosing between options of issuing Sukuk or conventional bonds in order to reduce the cost of borrowing since the performance of the conventional bonds and Sukuk are affected by macroeconomic conditions. Based on the result of this study, Sukuk and conventional bond are found to be significant negatively affected by interest rate. Therefore, government should also remove the perceptions of Sukuk which is being perceived that it is not related to interest rate and consider the effect of interest rate on Sukuk as well before issuing Sukuk to public for the purpose of developing the country.

5.3.5 To the Policy Makers

This study can provide insights on the relationship between the macroeconomic conditions and performance of Sukuk and conventional bonds to the policy makers. Furthermore, this study can be used as guidance for them to develop more extensive capital market. The policy makers are responsible in giving advice to government in respect to economic development and budget. Since all the independent variables in this study are found to be affecting the performance of Sukuk and conventional bond, the policy makers can advise the government to consider the impact of these factors before issuing Sukuk or conventional bond.

5.4 Limitation of the study

The first limitation in this research study is having limited data for TR BPA Malaysia Sukuk Index and Conventional Bond Index. Therefore, the study period is restricted to only 8 years with quarterly data from 2007 Q1 till 2014 Q3. This because that the calculations for TR BPA Malaysia All Bond Index Series are only started from the year of 2007.

Besides that, this study only focused on macroeconomic conditions that will cause an impact for the performance of the bonds, which are Gross Domestic Product (GDP), interest rate, inflation rate, and openness of economy. The performance of conventional bonds and Sukuk may not only just being affected by macroeconomic conditions but also other factors as well such as the economy's stage of development. According to Bhattacharyay (2013), the economy's stage of development can affect the cost of bond financing and cultivate the bond market's development. However, due to the complexity of measuring the economy's stage of development, this factor is not included in this study.

Moreover, another limitation of this study is which the findings cannot be a representative of all the other countries regarding on the performance of conventional bonds and Sukuk. Due to time constraints, this study is only able to examine and compare the performance of conventional bond and Sukuk in Malaysia without including other countries in the field of research. The difference in cultures, economies and government policies may affect the findings of the studied country, in which the performances of Sukuk and conventional bond of other countries may differ with this study. Therefore, this finding may not be appropriate to be applied into other countries.

5.5 Recommendations for future research

There are few limitations of the study that needed to be improved by the future researcher. Firstly, the unavailability of data for dependent variable is the major problem that has been encountered in this research. Future researchers are also encouraged to find another proxy as the dependent variable which may have a longer period of data availability. It is also recommended that researchers could expand the time period of their study. Therefore, the sample size can be increased and the reliability of the results can be further enhanced as well.

Secondly, future researchers are recommended to further examine and explore other factors that are probably affecting the performance of the conventional bond and Sukuk such as the stage of development of an economy. The future researchers are encouraged to use a much simpler economy measurement for this factor which may be available in the future by including this factor in their future study. This is because countries tend to have better institution and less volatile economic condition when they have higher stages of economic development, which foster the development of financial market; therefore bonds will have better performances.

Lastly, the future researchers are encouraged to expand the study targets to other countries such as Middle Eastern countries, sub-Saharan Africa and United States in the research area in order to provide applicable findings that can be used to explain the performance of Sukuk and conventional bond in most of the countries. Future researchers are also advised to include and compare the performance of Sukuk and conventional bonds among several countries in their study in order to have a better picture of which country's conventional bond and Sukuk are outperforming the others.

5.6 Conclusion

This chapter summarized the results of statistical analysis and the major findings of the research which have investigated the macroeconomic conditions that affecting the performance of conventional bonds and Sukuk in Malaysia for the period of 2007 Q1 till 2014 Q3. The implications, limitations and recommendations of the study also have been discussed in this chapter.

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APPENDIXES

Appendix 1: Ordinary Least Square (OLS) for Conventional Bond

Dependent Variable: BPAMC

Method: Least Squares

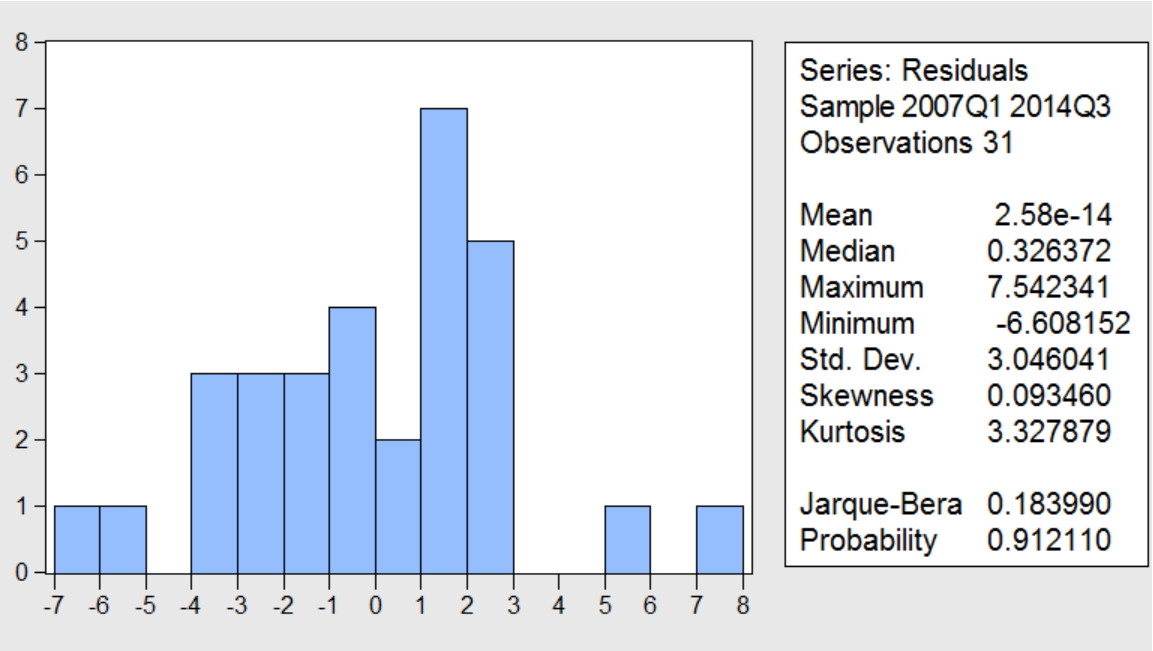
Sample: 2007Q1 2014Q3

Included observations: 31

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGOPEN	37.97354	10.18994	3.726571	0.0009
LOGGDP	60.11720	6.977824	8.615465	0.0000
INT	-10.90126	3.054039	-3.569458	0.0014
INF	-0.717608	0.192178	-3.734076	0.0009
C	-603.6793	120.3036	-5.017967	0.0000

R-squared	0.919937	Mean dependent var	117.1271
Adjusted R-squared	0.907620	S.D. dependent var	10.76515
S.E. of regression	3.271973	Akaike info criterion	5.355353
Sum squared resid	278.3509	Schwarz criterion	5.586641
Log likelihood	-78.00797	Hannan-Quinn criter.	5.430747
F-statistic	74.68613	Durbin-Watson stat	1.298009
Prob(F-statistic)	0.000000		

Appendix 2: Jarque-Bera Normality Test for Conventional Bond



Appendix 3: Breush-Godfrey Serial Correlation LM Test for Conventional bond

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	3.246524	Prob. F(2,24)	0.0565
Obs*R-squared	6.600996	Prob. Chi-Square(2)	0.0369

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Sample: 2007Q1 2014Q3

Included observations: 31

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGOPEN	1.357213	9.544770	0.142194	0.8881
LOGGDP	1.880795	6.489936	0.289802	0.7745
INT	0.741137	2.943312	0.251804	0.8033
INF	0.051162	0.187051	0.273516	0.7868
C	-34.46568	111.9195	-0.307951	0.7608
RESID(-1)	0.443068	0.210521	2.104626	0.0460
RESID(-2)	-0.385319	0.209210	-1.841782	0.0779

R-squared	0.212935	Mean dependent var	2.58E-14
Adjusted R-squared	0.016169	S.D. dependent var	3.046041
S.E. of regression	3.021314	Akaike info criterion	5.244941
Sum squared resid	219.0802	Schwarz criterion	5.568744
Log likelihood	-74.29658	Hannan-Quinn criter.	5.350492
F-statistic	1.082175	Durbin-Watson stat	2.121811
Prob(F-statistic)	0.400761		

Appendix 4: Heteroskedasticity Test for Conventional Bond

Heteroskedasticity Test: ARCH

F-statistic	0.723127	Prob. F(1,28)	0.4023
Obs*R-squared	0.755273	Prob. Chi-Square(1)	0.3848

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Sample (adjusted): 2007Q2 2014Q3

Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.794945	3.051242	2.554680	0.0164
RESID^2(-1)	0.169507	0.199334	0.850369	0.4023

R-squared	0.025176	Mean dependent var	9.164903
Adjusted R-squared	-0.009639	S.D. dependent var	14.12508
S.E. of regression	14.19300	Akaike info criterion	8.207715
Sum squared resid	5640.353	Schwarz criterion	8.301128
Log likelihood	-121.1157	Hannan-Quinn criter.	8.237599
F-statistic	0.723127	Durbin-Watson stat	1.906967
Prob(F-statistic)	0.402334		

Appendix 5: Ramsey RESET Test for Conventional Bond

Ramsey RESET Test:

F-statistic	2.082344	Prob. F(1,25)	0.1614
Log likelihood ratio	2.480192	Prob. Chi-Square(1)	0.1153

Test Equation:

Dependent Variable: BPAMC

Method: Least Squares

Date: 02/02/15 Time: 23:42

Sample: 2007Q1 2014Q3

Included observations: 31

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGOPEN	-81.56931	83.44088	-0.977570	0.3377
LOGGDP	-117.4826	123.2637	-0.953099	0.3497
INT	19.70275	21.41819	0.919908	0.3664
INF	1.336367	1.435774	0.930764	0.3609
C	1387.948	1385.192	1.001990	0.3259
FITTED^2	0.012245	0.008486	1.443033	0.1614

R-squared	0.926093	Mean dependent var	117.1271
Adjusted R-squared	0.911312	S.D. dependent var	10.76515
S.E. of regression	3.205924	Akaike info criterion	5.339863
Sum squared resid	256.9487	Schwarz criterion	5.617409
Log likelihood	-76.76788	Hannan-Quinn criter.	5.430336
F-statistic	62.65264	Durbin-Watson stat	1.144574
Prob(F-statistic)	0.000000		

Appendix 6: Ordinary Least Square (OLS) for Sukuk

Dependent Variable: BPAMS

Method: Least Squares

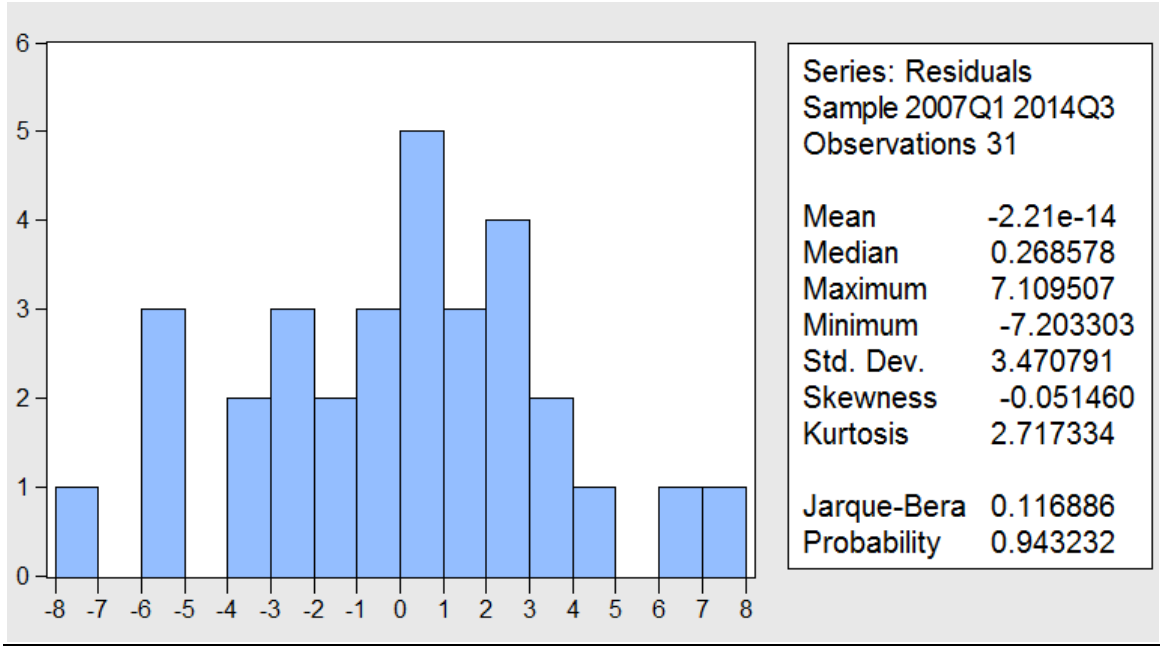
Sample: 2007Q1 2014Q3

Included observations: 31

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INF	-0.978065	0.218976	-4.466535	0.0001
INT	-13.61506	3.479904	-3.912480	0.0006
LOGGDP	70.79969	7.950836	8.904685	0.0000
LOGOPEN	47.53539	11.61086	4.094045	0.0004
C	-720.4655	137.0791	-5.255837	0.0000

R-squared	0.924502	Mean dependent var	118.8320
Adjusted R-squared	0.912887	S.D. dependent var	12.63170
S.E. of regression	3.728228	Akaike info criterion	5.616433
Sum squared resid	361.3918	Schwarz criterion	5.847721
Log likelihood	-82.05471	Hannan-Quinn criter.	5.691827
F-statistic	79.59533	Durbin-Watson stat	1.282542
Prob(F-statistic)	0.000000		

Appendix 7: Jarque-Bera Normality Test for Sukuk



Appendix 8: Breush-Godfrey Serial Correlation LM Test for Sukuk

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	2.465003	Prob. F(2,24)	0.1063
Obs*R-squared	5.282756	Prob. Chi-Square(2)	0.0713

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 02/02/15 Time: 23:58

Sample: 2007Q1 2014Q3

Included observations: 31

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INF	0.075745	0.223706	0.338594	0.7379
INT	1.103698	3.423189	0.322418	0.7499
LOGGDP	2.090206	7.603404	0.274904	0.7857
LOGOPEN	1.208420	11.12949	0.108578	0.9144
C	-40.43600	131.2461	-0.308093	0.7607
RESID(-1)	0.440497	0.218733	2.013857	0.0554
RESID(-2)	-0.293521	0.217350	-1.350453	0.1895

R-squared	0.170411	Mean dependent var	-2.21E-14
Adjusted R-squared	-0.036986	S.D. dependent var	3.470791
S.E. of regression	3.534393	Akaike info criterion	5.558640
Sum squared resid	299.8065	Schwarz criterion	5.882444
Log likelihood	-79.15892	Hannan-Quinn criter.	5.664192
F-statistic	0.821668	Durbin-Watson stat	2.034066
Prob(F-statistic)	0.564225		

Appendix 9: Heteroskedasticity Test for Sukuk

Heteroskedasticity Test: ARCH

F-statistic	1.263606	Prob. F(1,28)	0.2705
Obs*R-squared	1.295404	Prob. Chi-Square(1)	0.2551

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 02/03/15 Time: 00:00

Sample (adjusted): 2007Q2 2014Q3

Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.453980	3.571116	2.647346	0.0132
RESID^2(-1)	0.228998	0.203716	1.124102	0.2705

R-squared	0.043180	Mean dependent var	11.85217
Adjusted R-squared	0.009008	S.D. dependent var	15.75683
S.E. of regression	15.68570	Akaike info criterion	8.407717
Sum squared resid	6889.154	Schwarz criterion	8.501130
Log likelihood	-124.1157	Hannan-Quinn criter.	8.437600
F-statistic	1.263606	Durbin-Watson stat	1.816774
Prob(F-statistic)	0.270515		

Appendix 10: Ramsey RESET Test for Sukuk

Ramsey RESET Test:

F-statistic	0.451938	Prob. F(1,25)	0.5076
Log likelihood ratio	0.555398	Prob. Chi-Square(1)	0.4561

Test Equation:

Dependent Variable: BPAMS

Method: Least Squares

Date: 02/03/15 Time: 00:00

Sample: 2007Q1 2014Q3

Included observations: 31

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INF	0.150005	1.692550	0.088626	0.9301
INT	1.764853	23.14659	0.076247	0.9398
LOGGDP	-14.12899	126.5878	-0.111614	0.9120
LOGOPEN	-12.91307	90.68041	-0.142402	0.8879
C	233.5220	1425.816	0.163781	0.8712
FITTED^2	0.004885	0.007267	0.672263	0.5076

R-squared	0.925843	Mean dependent var	118.8320
Adjusted R-squared	0.911011	S.D. dependent var	12.63170
S.E. of regression	3.768155	Akaike info criterion	5.663033
Sum squared resid	354.9747	Schwarz criterion	5.940579
Log likelihood	-81.77702	Hannan-Quinn criter.	5.753506
F-statistic	62.42440	Durbin-Watson stat	1.189382
Prob(F-statistic)	0.000000		

Appendix 11: Unit Root Test (Augment Dickey-Fuller test)

BPAMC Level without trend

Null Hypothesis: BPAMC has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic based on SIC, MAXLAG=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.230374	0.9239
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	

*MacKinnon (1996) one-sided p-values.

BPAMC Level with trend

Null Hypothesis: BPAMC has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic based on SIC, MAXLAG=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.802969	0.2071
Test critical values:	1% level	-4.296729	
	5% level	-3.568379	
	10% level	-3.218382	

*MacKinnon (1996) one-sided p-values.

BPAMC First Difference without trend

Null Hypothesis: D(BPAMC) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic based on SIC, MAXLAG=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.454957	0.0001
Test critical values:	1% level	-3.679322	
	5% level	-2.967767	
	10% level	-2.622989	

*MacKinnon (1996) one-sided p-values.

BPAMC First Difference with trend

Null Hypothesis: D(BPAMC) has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic based on SIC, MAXLAG=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.353258	0.0008
Test critical values:	1% level	-4.309824	
	5% level	-3.574244	
	10% level	-3.221728	

*MacKinnon (1996) one-sided p-values.

BPAMS Level without trend

Null Hypothesis: BPAMS has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic based on SIC, MAXLAG=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.090485	0.9418
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	

*MacKinnon (1996) one-sided p-values.

BPAMS Level with trend

Null Hypothesis: BPAMS has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic based on SIC, MAXLAG=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.943616	0.6071
Test critical values:	1% level	-4.296729	
	5% level	-3.568379	
	10% level	-3.218382	

*MacKinnon (1996) one-sided p-values.

BPAMS First Difference without trend

Null Hypothesis: D(BPAMS) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic based on SIC, MAXLAG=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.249257	0.0002
Test critical values:	1% level	-3.679322	
	5% level	-2.967767	
	10% level	-2.622989	

*MacKinnon (1996) one-sided p-values.

BPAMS First Difference with trend

Null Hypothesis: D(BPAMS) has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic based on SIC, MAXLAG=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.155346	0.0013
Test critical values:	1% level	-4.309824	
	5% level	-3.574244	
	10% level	-3.221728	

*MacKinnon (1996) one-sided p-values.

INF Level without trend

Null Hypothesis: INF has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic based on SIC, MAXLAG=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.987663	0.2903
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	

*MacKinnon (1996) one-sided p-values.

INF Level with trend

Null Hypothesis: INF has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic based on SIC, MAXLAG=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.050128	0.5513
Test critical values:	1% level	-4.296729	
	5% level	-3.568379	
	10% level	-3.218382	

*MacKinnon (1996) one-sided p-values.

INF First Difference without trend

Null Hypothesis: D(INF) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic based on SIC, MAXLAG=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.308252	0.0002
Test critical values:	1% level	-3.679322	
	5% level	-2.967767	
	10% level	-2.622989	

*MacKinnon (1996) one-sided p-values.

INF First Difference with trend

Null Hypothesis: D(INF) has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic based on SIC, MAXLAG=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.216539	0.0012
Test critical values:	1% level	-4.309824	
	5% level	-3.574244	
	10% level	-3.221728	

*MacKinnon (1996) one-sided p-values.

INT Level without trend

Null Hypothesis: INT has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic based on SIC, MAXLAG=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.588562	0.4759
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	

*MacKinnon (1996) one-sided p-values.

INT Level without trend

Null Hypothesis: INT has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic based on SIC, MAXLAG=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.536756	0.7936
Test critical values:	1% level	-4.296729	
	5% level	-3.568379	
	10% level	-3.218382	

*MacKinnon (1996) one-sided p-values.

INT First Difference without trend

Null Hypothesis: D(INT) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic based on SIC, MAXLAG=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.379645	0.0001
Test critical values:	1% level	-3.679322	
	5% level	-2.967767	
	10% level	-2.622989	

*MacKinnon (1996) one-sided p-values.

lNT First Difference with trend

Null Hypothesis: D(INT) has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 7 (Automatic based on SIC, MAXLAG=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.450728	0.0098
Test critical values:	1% level	-4.440739	
	5% level	-3.632896	
	10% level	-3.254671	

*MacKinnon (1996) one-sided p-values.

LOGGDP Level without trend

Null Hypothesis: LOGGDP has a unit root

Exogenous: Constant

Lag Length: 2 (Automatic based on SIC, MAXLAG=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.860899	0.3449
Test critical values:	1% level	-3.689194	
	5% level	-2.971853	
	10% level	-2.625121	

*MacKinnon (1996) one-sided p-values.

LOGGDP Level with trend

Null Hypothesis: LOGGDP has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 1 (Automatic based on SIC, MAXLAG=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.048797	0.0181
Test critical values:	1% level	-4.309824	
	5% level	-3.574244	
	10% level	-3.221728	

*MacKinnon (1996) one-sided p-values.

LOGGDP First Difference without trend

Null Hypothesis: D(LOGGDP) has a unit root

Exogenous: Constant

Lag Length: 5 (Automatic based on SIC, MAXLAG=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.322758	0.0000
Test critical values:	1% level	-3.737853	
	5% level	-2.991878	
	10% level	-2.635542	

*MacKinnon (1996) one-sided p-values.

LOGGDP First Difference with trend

Null Hypothesis: D(LOGGDP) has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 5 (Automatic based on SIC, MAXLAG=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.924890	0.0003
Test critical values:	1% level	-4.394309	
	5% level	-3.612199	
	10% level	-3.243079	

*MacKinnon (1996) one-sided p-values.

LOGOPEN Level without trend

Null Hypothesis: LOGOPEN has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic based on SIC, MAXLAG=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.313019	0.1746
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	

*MacKinnon (1996) one-sided p-values.

LOGOPEN Level with trend

Null Hypothesis: LOGOPEN has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 1 (Automatic based on SIC, MAXLAG=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.301261	0.0860
Test critical values:	1% level	-4.309824	
	5% level	-3.574244	
	10% level	-3.221728	

*MacKinnon (1996) one-sided p-values.

LOGOPEN First Difference without trend

Null Hypothesis: D(LOGOPEN) has a unit root

Exogenous: Constant

Lag Length: 1 (Automatic based on SIC, MAXLAG=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.239444	0.0281
Test critical values:	1% level	-3.689194	
	5% level	-2.971853	
	10% level	-2.625121	

*MacKinnon (1996) one-sided p-values.

LOGOPEN First Difference with trend

Null Hypothesis: D(LOGOPEN) has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 1 (Automatic based on SIC, MAXLAG=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.322570	0.0832
Test critical values:	1% level	-4.323979	
	5% level	-3.580623	
	10% level	-3.225334	

*MacKinnon (1996) one-sided p-values.

LOGOPEN Second Difference without trend

Null Hypothesis: D(LOGOPEN,2) has a unit root

Exogenous: Constant

Lag Length: 4 (Automatic based on SIC, MAXLAG=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.087361	0.0045
Test critical values:	1% level	-3.737853	
	5% level	-2.991878	
	10% level	-2.635542	

*MacKinnon (1996) one-sided p-values.

LOGOPEN Second Difference with trend

Null Hypothesis: D(LOGOPEN,2) has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 4 (Automatic based on SIC, MAXLAG=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.789265	0.0043
Test critical values:	1% level	-4.394309	
	5% level	-3.612199	
	10% level	-3.243079	

*MacKinnon (1996) one-sided p-values.

Appendix 12: Unit Root Test (Philip-Perron Test)

BPAMC Level without trend

Null Hypothesis: BPAMC has a unit root

Exogenous: Constant

Bandwidth: 8 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-0.084100	0.9425
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	

*MacKinnon (1996) one-sided p-values.

BPAMC Level with trend

Null Hypothesis: BPAMC has a unit root

Exogenous: Constant, Linear Trend

Bandwidth: 1 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.896158	0.1777
Test critical values:	1% level	-4.296729	
	5% level	-3.568379	
	10% level	-3.218382	

*MacKinnon (1996) one-sided p-values.

BPAMC First Difference without trend

Null Hypothesis: D(BPAMC) has a unit root

Exogenous: Constant

Bandwidth: 7 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-5.846644	0.0000
Test critical values:	1% level	-3.679322	
	5% level	-2.967767	
	10% level	-2.622989	

*MacKinnon (1996) one-sided p-values.

BPAMC First Difference with trend

Null Hypothesis: D(BPAMC) has a unit root

Exogenous: Constant, Linear Trend

Bandwidth: 7 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-5.671111	0.0004
Test critical values:	1% level	-4.309824	
	5% level	-3.574244	
	10% level	-3.221728	

*MacKinnon (1996) one-sided p-values.

BPAMS Level without trend

Null Hypothesis: BPAMS has a unit root

Exogenous: Constant

Bandwidth: 1 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-0.086781	0.9422
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	

*MacKinnon (1996) one-sided p-values.

BPAMS Level with trend

Null Hypothesis: BPAMS has a unit root

Exogenous: Constant, Linear Trend

Bandwidth: 2 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.047632	0.5527
Test critical values:	1% level	-4.296729	
	5% level	-3.568379	
	10% level	-3.218382	

*MacKinnon (1996) one-sided p-values.

BPAMS First Difference without trend

Null Hypothesis: D(BPAMS) has a unit root

Exogenous: Constant

Bandwidth: 2 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-5.259481	0.0002
Test critical values:	1% level	-3.679322	
	5% level	-2.967767	
	10% level	-2.622989	

*MacKinnon (1996) one-sided p-values.

BPAMS First Difference with trend

Null Hypothesis: D(BPAMS) has a unit root

Exogenous: Constant, Linear Trend

Bandwidth: 2 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-5.169801	0.0013
Test critical values:	1% level	-4.309824	
	5% level	-3.574244	
	10% level	-3.221728	

*MacKinnon (1996) one-sided p-values.

INF Level without trend

Null Hypothesis: INF has a unit root

Exogenous: Constant

Bandwidth: 1 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.043106	0.2679
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	

*MacKinnon (1996) one-sided p-values.

INF Level without trend

Null Hypothesis: INF has a unit root

Exogenous: Constant, Linear Trend

Bandwidth: 0 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.050128	0.5513
Test critical values:	1% level	-4.296729	
	5% level	-3.568379	
	10% level	-3.218382	

*MacKinnon (1996) one-sided p-values.

INF First Difference without trend

Null Hypothesis: D(INF) has a unit root

Exogenous: Constant

Bandwidth: 2 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-5.308282	0.0002
Test critical values:	1% level	-3.679322	
	5% level	-2.967767	
	10% level	-2.622989	

*MacKinnon (1996) one-sided p-values.

INF First Difference with trend

Null Hypothesis: D(INF) has a unit root

Exogenous: Constant, Linear Trend

Bandwidth: 2 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-5.213821	0.0012
Test critical values:	1% level	-4.309824	
	5% level	-3.574244	
	10% level	-3.221728	

*MacKinnon (1996) one-sided p-values.

INT Level without trend

Null Hypothesis: INT has a unit root

Exogenous: Constant

Bandwidth: 2 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.647154	0.4469
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	

*MacKinnon (1996) one-sided p-values.

INT Level with trend

Null Hypothesis: INT has a unit root

Exogenous: Constant, Linear Trend

Bandwidth: 2 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.659165	0.7442
Test critical values:	1% level	-4.296729	
	5% level	-3.568379	
	10% level	-3.218382	

*MacKinnon (1996) one-sided p-values.

INT First Difference without trend

Null Hypothesis: D(INT) has a unit root

Exogenous: Constant

Bandwidth: 2 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-5.389086	0.0001
Test critical values:	1% level	-3.679322	
	5% level	-2.967767	
	10% level	-2.622989	

*MacKinnon (1996) one-sided p-values.

INT First Difference with trend

Null Hypothesis: D(INT) has a unit root

Exogenous: Constant, Linear Trend

Bandwidth: 1 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-5.404561	0.0007
Test critical values:	1% level	-4.309824	
	5% level	-3.574244	
	10% level	-3.221728	

*MacKinnon (1996) one-sided p-values.

LOGGDP Level without trend

Null Hypothesis: LOGGDP has a unit root

Exogenous: Constant

Bandwidth: 22 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.738731	0.0795
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	

*MacKinnon (1996) one-sided p-values.

LOGGDP Level with trend

Null Hypothesis: LOGGDP has a unit root

Exogenous: Constant, Linear Trend

Bandwidth: 29 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.263696	0.0108
Test critical values:	1% level	-4.296729	
	5% level	-3.568379	
	10% level	-3.218382	

*MacKinnon (1996) one-sided p-values.

LOGGDP First Difference without trend

Null Hypothesis: D(LOGGDP) has a unit root

Exogenous: Constant

Bandwidth: 24 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.546863	0.0011
Test critical values:	1% level	-3.679322	
	5% level	-2.967767	
	10% level	-2.622989	

*MacKinnon (1996) one-sided p-values.

LOGGDP First Difference with trend

Null Hypothesis: D(LOGGDP) has a unit root

Exogenous: Constant, Linear Trend

Bandwidth: 28 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-5.781936	0.0003
Test critical values:	1% level	-4.309824	
	5% level	-3.574244	
	10% level	-3.221728	

*MacKinnon (1996) one-sided p-values.

LOGOPEN Level without trend

Null Hypothesis: LOGOPEN has a unit root

Exogenous: Constant

Bandwidth: 22 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.604835	0.1031
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	

*MacKinnon (1996) one-sided p-values.

LOGOPEN Level with trend

Null Hypothesis: LOGOPEN has a unit root

Exogenous: Constant, Linear Trend

Bandwidth: 29 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.882842	0.1817
Test critical values:	1% level	-4.296729	
	5% level	-3.568379	
	10% level	-3.218382	

*MacKinnon (1996) one-sided p-values.

LOGOPEN First Difference without trend

Null Hypothesis: D(LOGOPEN) has a unit root

Exogenous: Constant

Bandwidth: 5 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-6.105546	0.0000
Test critical values:	1% level	-3.679322	
	5% level	-2.967767	
	10% level	-2.622989	

*MacKinnon (1996) one-sided p-values.

LOGOPEN First Difference with trend

Null Hypothesis: D(LOGOPEN) has a unit root

Exogenous: Constant, Linear Trend

Bandwidth: 9 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-6.736648	0.0000
Test critical values:	1% level	-4.309824	
	5% level	-3.574244	
	10% level	-3.221728	

*MacKinnon (1996) one-sided p-values.

LOGOPEN Second Difference without trend

Null Hypothesis: D(LOGOPEN,2) has a unit root

Exogenous: Constant

Bandwidth: 20 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-25.93912	0.0001
Test critical values:	1% level	-3.689194	
	5% level	-2.971853	
	10% level	-2.625121	

*MacKinnon (1996) one-sided p-values.

LOGOPEN Second Difference with trend

Null Hypothesis: D(LOGOPEN,2) has a unit root

Exogenous: Constant, Linear Trend

Bandwidth: 19 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-26.38560	0.0000
Test critical values:	1% level	-4.323979	
	5% level	-3.580623	
	10% level	-3.225334	

*MacKinnon (1996) one-sided p-values.