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Impact of exchange rate and oil price on the yield of sovereign bond and *sukuk*: Evidence from Malaysian capital market

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ABSTRACT

This study analyses the impact of exchange rate and oil prices on the yield of sovereign bond and sukuk for Malaysian capital market. This study aims to ascertain the effect of weakening Malaysian Ringgit and declining of crude oil price on the fixed income investors in the emerging capital market. This study utilises daily time series data of Malaysian exchange rate, oil price and the yield of Malaysian sovereign bond and sukuk from year 2006 until 2015. The findings show that the weakening of exchange rate and oil prices contribute different impacts in the short and long run. In the short run, the exchange rate and oil prices does not have a direct relation with the yield of sovereign bond and sukuk. However, in the long run, the result reveals that there is a significant relationship between exchange rate and oil prices on the yield of sovereign bond and sukuk. It is evident that only a unidirectional causality relation is present between exchange rate and oil price towards selected yield of Malaysian sovereign bond and sukuk. This study provides numerical and empirical insights on issues relating to capital market that supports public authorities and private institutions on their decision and policymaking process.

1. Introduction

The capital market has witnessed a rapid expansion and development of *sukuk* in Malaysian Islamic capital market. Malaysian *sukuk* market was established in 1990 with the first non-Islamic corporation was Shell MDS, which issued a *sukuk*, amounted to RM125 million. In 2002, the issuance of *sukuk* has risen to USD600 million through the issuance of the first global sovereign *sukuk* and eventually became the international global *sukuk* benchmarks, which attracted investors globally (Sukor et al. 2008). As in July 2013, Bank Negara announced that the Sovereign of Malaysia started to issue Sovereign Investment Issue (GII) by using *Murabahah* structure. It is essentially a certificate of indebtedness arising from the deferred markup sale transaction of an asset including commodity like crude palm oil, which complies with Shariah principles. There are a huge range of products and services under capital market which

includes mutual funds, Islamic unit trust, conventional and *shariah* securities, exchange traded fund (ETF), Real estate investment trust and bond and Islamic bond or known as *sukuk* (Saad, 2013). Despite other products, *sukuk* are among the products that show a rapid growth by becoming the largest *sukuk* market in Asia (Boey, 2012). The *sukuk* market which lays under the Islamic capital market (ICM) is rapidly growing and shows its significance in the economy as a whole. The statistics has illustrated that more than 50% of the Malaysia's total debt are from the balance outstanding issuance of *Sukuk* bought by Muslims as well as non-Muslims (Ahmad & Radzi, 2011). Over the years, the Malaysian capital market has experienced tremendous development and expansion, which affected the overall financial sector. It includes the development of securities market in Malaysia that has started to be highlighted globally especially *sukuk*. As in 2015, there are 42.3% of global *sukuk* was issued by Malaysia, which is the largest percentage among other countries.

Malaysian capital market plays a vital role in generating the economic growth and financial stability of Malaysia. It carries a significant impact on the economic conditions where the downturn of capital market may lead to an economic crash and obstruction of the financial market. During the Asian financial crisis, Malaysian capital market was affected significantly. Malaysian government has taken measures to support the capital market with the establishment of Dana Harta Nasional Berhad, Dana Modal Nasional Berhad and corporate debt restructuring committee (CDRC) in 1998. The establishment aims to strengthen the resilience of the financial system due to the financial crisis. In addition, the issuance of Dana Harta Bond, a zero coupon Malaysian Sovereign-guaranteed bond by Pengurusan Danaharta Nasional Berhad aimed to finance the acquisition of nonperforming loans (NPL) from financial institutions. On the other hand, Danamodal bonds were issued by DanaModal Nasional Berhad to recapitalise distressed financial institutions following the Asian Financial crisis 1997 (Bank Negara Malaysia, 2015).

Despite the growth in Malaysian capital market and financial crisis, the capital market also exposes to the global financial parameters, include exchange rate and oil price. Malaysian exchange rate against US dollar was fluctuated during the crisis and Malaysian ringgit continuously to drop until at the end of March 2016. Figure 1 shows the fluctuation of exchange rate of Malaysia with respect to U.S. dollars.

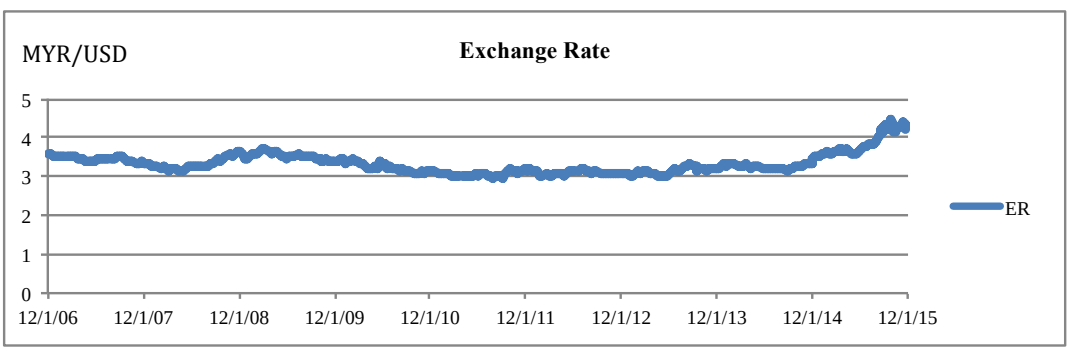

Fig. 1. Exchange rate of MYR/USD
Source: Bloomberg (January 2016)

Figure 1 exemplifies the fluctuation of rate of Malaysian ringgit against U.S. dollars from year 2006 until 2015. It shows that the exchange rate for Malaysian ringgit significantly increased from year 2014 until 2015. It reached until RM4.5 per dollar during the first quarter of year 2015. The ringgit will be continuously under pressure since it hit the Bursa Malaysia and all the stocks listed in the capital market (Shanmugam, 2016). Foreign investors might lose the confidence towards the Malaysian securities and it will plunge and make the Malaysian capital market even worse. In addition, the oil price started to become an economic highlight since the global price of oil are falling due to few reasons including over produce of oil and the comeback of Iranian oil production in global oil market. The economy witnessed a

continuous drop in the crude oil price since year 2013. Figure 2 shows the movement of crude oil price from year 2006 until 2015.

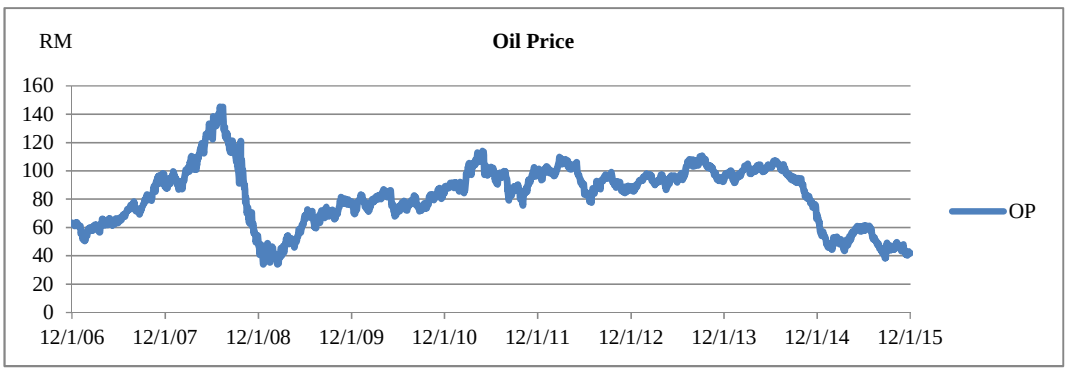

Fig. 2. Oil Price/RM
Source: Bloomberg (January 2016)

Figure 2 presents the movement of crude oil price from year 2006 until 2015. It was found that there was a sharp decline on oil price from year 2007 until 2008, which was during the phase of subprime crisis and the global financial crunch. However, the oil price started to recover from year 2009 until 2014 the oil price started to weaken again. From year 2014 until 2015, the oil price seems to weaken stagnantly. Even though crude oil currently trades below the breakeven price and equilibrium cost of shale price, there is not much that can be done to curb the crisis since it will affect the global and local markets (Ramanathan, 2016). Since oil price gives a direct causation effect towards the capital market instrument and trading services like stocks and bonds (Kang et al., 2014), there are a lot of arguments that debate and discuss on the stability of capital market instruments especially the government. Likewise, according to Agrawal (2010), the fluctuation and vacillation of exchange rate creates a doubt and skepticism towards the sturdiness of the capital market products and the market, as a whole. Due to that, it is crucial to fill the gap with this study to prove and test on the impacts of exchange rate and oil price towards the yield of sovereign bond and *sukuk* in short and long run as well as in the Granger's sense.

This is a vital issue since foreign direct investment plays an imperative role in the nation economic growth as a whole (Sarwar & Haq, 2017). Additionally, oil prices started to become an economic highlight since the global price of oil are falling due to few reasons including over production of oil and the resurgence of Iranian oil production in global oil market. In this context a few questions arise: How do the government borrowings spur economic growth or give adverse impacts on the Malaysian economy? How do the government debts affect sustainability of the economy in the short and long run? Thus, the outcomes of the present study will certainly propose an insight of the impact of government debt on the sustainability of the economic growth in Malaysia.This paper is organised as follows: Section 2 presents the literature review. Section 3 describes the data and methodology. Section 4 discusses the findings and finally, Section 5 draws the conclusions.

2. Literature Review

Bond and *sukuk* are among the capital market instruments, which generate return to the investors or also known as bondholders or *sukuk* holders. The return on bond or *sukuk* can be in terms of yield to maturity (YTM); the internal rate of return by a particular bondholder who buys a bond certificate and holds it until the maturity as agreed by the bondholder and the bond issuer (Safari et al., 2013). Rahman (2009) analysed the relationship between the external value of dollar with respect to both instruments; U.S. 10-year T-bonds and 3-month T-bills. Hsing's (2015) study on the factors that cause the Spanish

government bond yield to fluctuate. In order to find the equilibrium point for government bond yield, a regression on reduced-form was estimated and the demand and supply of loanable funds were solved. This study opting the same approach used by Rahman (2009) and Ho (2015) in using different maturity of bonds; short term and long term to examine and test with exchange rate and oil prices on the long and short run relationship among the variables.

Meanwhile, exchange rate can be defined as the price of other foreign currency. For instance, the exchange rate of Japanese yen and the U.S. Dollar is stated as YEN/USD or Yen per USD (Frankel, 2008). Hence, this study defines exchange rate as Ringgit Malaysia with respect to U.S. dollar (MYR/USD). In this study, the movement of exchange rate will be tested with respect to the yield of Malaysian sovereign bond and *sukuk*. Pericoli and Taboga (2012) examine the joint dynamics between bond yields and macroeconomic factors, which include exchange rate. It was found that the change of exchange rate has a negligible and insignificant impact towards the yield slope. According to Jahjah et al. (2012), the policy of exchange rate affects directly on the bond spread where any currency that are over-evaluated tend to issue more bond than the others. It was based on their study regarding the effect of exchange rate policy on issuance of bond and the pricing involved. Gadanecz (2014) found that there is a significant relationship between exchange rate volatility with the bond yields that will benefit by the bondholder during year 2005 until 2013. Based on the time series analysis, Rahman (2009) found that there is an evidence of two-way short run Granger causality between exchange rate and the bond. According to Hsing (2016), it was found that if the exchange rate decreases, it causes the Spanish government bond yield to increase. Therefore, there is a negative relationship between the exchange rate and Spanish government bond yield. Based on the literatures, this study adopts Gadanecz (2014) modus in analysing the impact of exchange rate towards the bond yields while combining with one of the methods used by Rahman (2009) as well as Sosvilla-rivero and Ramos-herrera (2012) in employing Granger causality to test on causality relationship among the variables. Hence, this study analyses the impact of exchange rate which represented by MYR/USD on the yield of Malaysian sovereign bond and yield for both short term and long term maturity.

Oil price refers to the price of crude palm oil on which is imposed to buyer from the market. In this study, the definition of oil price is further defined as the generic West Texas Intermediate (WTI) crude oil price and the price is quoted in Malaysian Ringgit (RM). Miller and Ratti (2009) aim to analyse the long-run relation between world price of crude oil and international stock market from 1971 until 2008. By opting vector error correction model (VECM), they found a clear long-run relationship between the variables for six OECD countries from 1971 until 1980. Ravischandran (2010) examines the influence of oil price towards the stock market of Gulf Cooperation Council (GCC) which consists of Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and United Arab in three consecutive years started from 2008 until 2010. They concluded that there is significant effect by oil price on the market returns in the long term run. Imarhiagbe (2010) analyses the impact of price of oil towards the stock prices on selected major oil producing and consuming countries from year 2000 until year 2010. Using GARCH model, Sariannidis et al. (2010) observe the influence of macroeconomic factors including oil price towards Dow Jones Sustainability from January 2000 until January 2008. The outcomes show a positive correlation between crude oil prices with 10-year bond returns in U.S. stock market. Aloui et al. (2012) also investigated the impacts and relations between oil price shocks towards the stock market in several emerging countries. From 25 emerging countries that they selected, they discovered that oil price has the relation on the stock market as a whole. Kang et al. (2014) examined the significance of the global crude oil market toward the U.S. bond returns. It was discovered that there is negative relationship between the oil price and bond return where an increase of crude palm oil price will decrease the aggregate bond return and vice versa. They argued and commented on the insufficiency and gap on the literature that illustrate the impact of oil prices towards bond market as compared to its effect on stock market and economy as a whole. Based on the literature relating to oil price, this study employ Kang et al. (2014), which aim to analyse the impact of global oil price on the return of sovereign bond. By referring to Kang et al. (2014), this study used

crude oil price as one of the factors affecting the movement of yield of short-term and long-term sovereign bond and *sukuk* specifically in Malaysia.

3. Methodology

According to Williams (1938), the bond valuation theory suggests that the value of bond by the bondholder can be present by the present value of the instrument. It refers to a measurement in determining the value or particular bond. There are a lot of methods or approaches to value bond including present value approach, stochastic calculus approach and arbitrage free pricing approach. The common approach is the present value (PV) where it involves calculation on the present value of the bond's future interest payment. Additionally, yield to maturity can also be one of the approaches to value bond in any range maturity; short, medium and long. Bond valuation theory supports that yield to maturity (YTM) can be used to measure the value of bond and *sukuk*. It also can be used to measure the performance of bond and *sukuk* by comparing the YTM of each instrument. This approach was applied by Awaluddin and Masih (2015) in explaining the dynamic of *sukuk* pricing related to the yield curve of the Malaysian *sukuk*. Hence, bond valuation theory was opted in this study in elucidating the performance of bond and *sukuk* using the yield for each instrument. By opting bond valuation theory, each instrument represented by short term bond (MGS3), short term *sukuk* (GII3), long term bond (MGS10) and long term *sukuk* (GII10) can be compared using their yield with respect to the movement of exchange rate and oil price from year 2006 until 2015.

Ross (1976) has developed the arbitrage pricing theory to connect a link on macroeconomic variables with stock market return. The theory has several assumptions, which include homogeneous expectations, perfectly competitive markets and frictionless capital markets. He added, the primary factor that influences the stock returns are some economic forces such as (1) unanticipated shifts in risk premiums; (2) changes in the expected level of industrial production; (3) unanticipated inflation and (4) unanticipated movements in the shape of the term structure of interest rate. The arbitrage pricing theory is related with this study where it illustrates that there are connections between macroeconomic factors with stock market return. Hasan (2010) adopted this theory by analysing and examining the relation between expected returns and systematic risk from macroeconomic factors. Likewise, Jecheche (2011) also opted the Arbitrage pricing theory to test the existence of causality between variables such as inflation, exchange rate and Gross Domestic Product (GDP) using Granger Causality test. Henceforth, this study opted this theory to analyse the impact of exchange rate and oil price with the yield of sovereign bond and *sukuk* in Malaysia. It is in line with the concept and philosophy of APT theory, which explains on the connection of macroeconomic factors towards the return on stock or products specifically in the capital market.

Bond Valuation theory and the Arbitrage Pricing theory (APT) were opted to support the intention of this study which is to examine the linkage between exchange rate and oil price towards the yield of short term and long term Malaysian sovereign bonds and *sukuk*. Bond valuation theory supports the use of yield of each bond to analyse the value of Malaysian sovereign bond and *sukuk*. Likewise, the APT was opted since the yield of sovereign bond and *sukuk* were tested with the variables like exchange rate and oil price, which classified among the macroeconomic factors. Therefore, both theories related with this study by creating a connection between exchange rate and oil price with respect to the yield of sovereign bond and *sukuk* in Malaysia.

3.1 Theoretical framework

The theoretical frameworks of this study consist of two main macroeconomic factors that affected the yield of sovereign bond and sukuk in Malaysia. Following Banerji et al (2014), this study includes two macroeconomic factors which are exchange rate and oil prices while the yield of sovereign bond and sukuk of Malaysia are further divided into short-term and long-term bonds and sukuk. Four main models

were constructed, which consist of two sovereign bonds and two sovereign sukuk. Both bond and sukuk will be divided according to their maturity; short-term (3 years) and long-term (10 years). Below are the models that were used in this study:

Table 1. Models of sovereign bond and sukuk

Model 1: Short-term bond
Sovereign bond's yield (LMGS3) = Exchange rate (LER) + Oil Price (LOP)
Model 2: Short-term sukuk
Sovereign sukuk's yield (LGII3) = Exchange rate (LER) + Oil Price (LOP)
Model 3: Long-term bond
Sovereign bonds yield (LMGS10) = Exchange rate (LER) + Oil Price (LOP)
Model 4: Long-term sukuk
Sovereign sukuk's yield (LGII10) = Exchange rate (LER) + Oil Price (LOP)

3.2 Sample of the study

This study utilises time series data on Malaysian Government Securities (MGS) and Government Investment Issue (GII) from 31 December 2006 until 31 December 2015 (daily-5 days a week). The yield of MGS and GII were compared by analysing their maturity; short term (3-years) and long term (10 years) on sovereign bond and sukuk with respect to exchange rate and oil prices. Furthermore, all data is in log form. The variables used in this study are LMGS3, LGII3 represent the short-term sovereign bond and sukuk, LMGS10, LGII10 represent the long-term sovereign bond and sukuk, LER for exchange rate and LOP for oil price.

4. Results and discussion

Pearson's correlation is used to test on the presence of correlation between the variables. In this study, Pearson's correlation test was employed to measure the correlation among the dependent variables. If the value of correlation is less than 0.8, it explains that there is a low correlation among the variables, while a value that is more than 0.8 indicates that there is a high correlation among the variables. In addition, a negative value specifies that there is a negative correlation between the variables while positive value indicates there is a positive correlation among them. By analyzing LMGS3, LGII3, LMGS10 and LMGII10, the results indicate that there are negative correlations and relationship between LMGS3 and LMGS10 by -0.174243, LMGS3 and LGII10 by -0.174243, LGII3 and LMGS10 by -0.167844, LGII3 and LGII10 by -0.152393. It also found that there are positive correlations between LMGS3 and LGII3 by 0.999661 and LMGS10 and LGII10 by 0.972525 (see Appendix A).

This study conducts the unit root test using Augmented Dicker-fuller (ADF) and Phillips-perron (PP). It shows that there is a mixed stationarity among the variables (see Appendix B). Hence, by referring to Papapetrou (2001), this study proceeds with Johansen cointegration test assuming the I (0) as endogenous and belonging to the long run relations. By employing Juselius Johansen approach, the result shows an availability of cointegration between variables used in a particular study. It is used to define the long run association between the dependent variables and independent variables. In order to determine the number of cointegration vectors, Juselius Johansen developed two likelihood ratio tests, which are Trace test and maximum eigenvalue test (Mukhtar & Rasheed, 2010)

Table 2. Johansen Cointegration

Short run Model	**DMGS3 DER DOP**		**DGII3 DER DOP**	
	Statistics	Prob	Statistics	Prob
Trace Statistics				
None	37.52444	0.0053***	37.55639	0.0052***
At most 1	12.99183	0.1151	12.70775	0.126
At most 2	3.779308	0.0519	3.519817	0.0606
Max Eigen Statistic				
None	24.53262	0.0159**	24.84864	0.0143**
At most 1	9.212519	0.2689	9.187935	0.2709
At most 2	3.779308	0.0519	3.519817	0.0606

Note: *** denotes significant at 1%, ** denotes significant at 5%

Long run model	**DMGS10 DER DOP**		**DGII10 DER DOP**	
	Statistics	Prob	Statistics	Prob
Trace Statistics				
None	55.78236	0***	50.15885	0.0001***
At most 1	14.92079	0.0609	16.3504	0.0371**
At most 2	0.098126	0.7541	0.015411	0.9011
Max Eigen Statistic				
None	40.86157	0***	33.80846	0.0005***
At most 1	14.82266	0.0408**	16.33499	0.0232**
At most 2	0.098126	0.7541	0.015411	0.9011

Note: *** denotes significant at 1%, ** denotes significant at 5%

Table 2 presents the results for Johansen cointegration for each model used. The decision rule is if the p-value is less than 5% (0.05), it represents that there is a cointegration between variables in the study. Otherwise, if the p-value is more than 5% (0.05), there is no cointegration between any variables in the study. Based on Table 2, in the short-term model; LMGS3 and LGII3, there is at least one cointegration between variables involved. For sovereign bond short term model (LMGS3), it was found that at least one variable is cointegrated with another where there is one p-value that is less than 5% (0.05) in Trace test and Max Eigen test which are 0.0053 and 0.0159. Similarly, in sovereign *sukuk* short-term model (LGII3), there is one variable that cointegrated with another by which in Trace statistics the p-value is 0.0052 and 0.0143 in Max Eigen test. To conclude, there is at lease a pair variables in short-term bond and *sukuk* model (LMGS3 and LMGII3) are cointegrated and will meet at equilibrium point at long run.

Conversely, it also found that there is at least one cointegration available in long-term bond (LMGS10) in trace statistics which the p-value is 0 while at least two cointegration are available using Max Eigen on LMGS10 where the p-value are 0 and 0.0408 respectively. Comparably, there are at least two cointegrations among the variables on the yield of long-term *sukuk* (LGII10). It can be illustrated by

analysing the p-values; 0.0001 and 0.0371 in trace statistics and 0.0005 and 0.0232 in Max Eigen statistics. To simplify, in long-term model of sovereign bond and *sukuk*, there are at least two pair variables which are cointegrated and will meet at equilibrium at long run. According to Jaupllari and Zoto (2013), the cointegration equations represent an occurrence of dynamics and adjustment of variables in the long-term equilibrium. Moreover, with reference to Eagle and Granger (1987), once a number of equations are cointegrated, it shows an existence of a system of equations having error-correcting form that represents the dynamic of series. Next, the study proceeds with Vector Error Correction Model (VECM) to analyse short run and long run relationship among the variables.

4.1 Vector Error Correction Model (VECM)

Vector Error Correction Model or known as VECM can only be employed if it is proven that all variables are cointegrated in the Johansen Cointegration test. If the result shows that there is no cointegration between variables in the Johansen Cointegration test, VECM cannot proceed. Henceforth, with reference to Table 2, it shows that there is cointegration between variables in the Johansen Cointegration test. Therefore, this study employs the VECM to test on short and long run relationship among the variables in time series and also to determine the direction of causality in Granger's sense. This model was opted to estimate the speed of dependent variables that returns to equilibrium point after being affected and changed with other variables. Under VECM, the first step is to choose the optimal number of lags using the vector autoregressive method. It was followed by the construction of long run equations among the variables, the error correction term on short run effects and Granger Causality test.

4.2 Vector Error Correction long run equation

Using Vector autoregressive test (VAR), the maximum numbers of lags for this study is 2 for LMGS3, LGII3 and LMGS10 and 7 for GII10 where the p-value is 0.041, 0.024, 0.003 and 0.001 respectively. Based on the results, the optimal number of lags can be used in Johansen Cointegration and in VECM. Hence, under VECM, the long run equations are as shown in Table 3 on the next page.

Table 3 exemplifies the long run equations for sovereign bond and *sukuk* for short-term and long-term model. Model 1, which refers to short-term sovereign bond (LMGS3) shows that there is a positive relationship between oil price and the yield of short-term sovereign bond. In model 2; short-term sovereign *sukuk* (LGII3), it shows that there is positive but insignificant relation between exchange rate and the yield of short-term sovereign *sukuk*, while there is a positive relationship between oil price and the yield of short-term sovereign *sukuk* (LGII3). Moreover, model 3; long-term sovereign bond (LMGS10) illustrates that there is a positive relationship among exchange rate, oil price towards the yield of sovereign long-run sovereign bond. Likewise, model 4; long-term sovereign *sukuk* illustrates that there is positive relationship between exchange rate, oil price and the yield of long-term sovereign *sukuk*. Hence, it can be concluded that in the long run, both short-term models; LMGS3 and LGII3 shows that there are insignificant relationship between exchange rate and the yield of sovereign bond and *sukuk*. Conversely, there are positive relationships between oil price and the yield on both models. On the other hand, in the long run, both long-term models; LMGS10 and LGII10, both exchange rate oil price shows a positive relationship towards the yields.

4.3 Granger Causality and Error Correction Term (ECT)

The Granger Causality test indicates the causation effect between variables used in a study (Mukhtar & Rasheed, 2010). The results show on whether one variable can affect and cause changes or movement of the other variables. Error Correction Term (ECT) under VECM is aim to analyse the speed of adjustment of variables involved in the study. It is to test the speed of variables to react to one change and adjust back to the equilibrium point. Both tests are interrelated where involving the analysis of

movement of one variable toward another and the speed of adjustment on variables. Below are the results of Granger Causality and error correction term on each model.

Table 3: VECM Long Run Equations

Model	Equations	
(1) LMGS3	MGS 3(-1) =	C + LER + LOP
	MGS 3(-1) =	- 7.307542 + 1.714649 LER + 1.442029 LOP
		(1.74092) (0.38326)
		[-0.98491] [-3.76249]*
(2) LGII3	GII 3(-1) =	C + ER (-1) + OP (-1)
	GII 3(-1) =	- 7.154164 + 1.808669 LER + 1.381753 LOP
		(1.65025) (0.36329)
		[-1.09600] [-3.80346]*
(3) LMGS10	MGS 10(-1) =	C + ER (-1) + OP (-1)
	MGS 10(-1) =	- 2.507986 + 1.787731 LER + 0.395846 LOP
		(0.32341) (0.07107)
		[-5.52779]* [-5.57006]*
(4) LGII10	GII 10(-1) =	C + ER (-1) + OP (-1)
	GII 10(-1) =	- 1.265382 + 1.190228 LER + 0.280329 LOP
		(0.31902) (0.07048)
		[-3.73091]* [-3.97765]*

Note: ( ) denote standard error, [ ] denote t-statistics and * denote significant

Table 4 exhibits the results on Granger causality and Error correction term used in Vector Error Correction Model (VECM). Under Granger Causality test, the results depicts for model 1 and model 4 that there is a unidirectional causation from exchange rate towards the yield of sovereign bond and *sukuk*. Model 1 indicates that there is a unidirectional causation relation from the exchange rate (LER) on the yield of short-term sovereign bond (LMGS3). Model 4 also shows that there is a unidirectional causation relation from the exchange rate (LER) towards the yield of long-term sovereign *sukuk* (LGII10). Hence, an increase or decrease of exchange rate will directly affected the changes in the yield of LMGS3 and LGII10. Conversely, there is no other causality relation between other variables in both models. It simply shows that other variables do not cause an absolute effect towards the others. Moreover, model 2 and model 3 illustrates that there is no variable that has a causation effect towards other variables. It signifies that the changes or movement in each variable does not affect and cause the changes in other variables. Hence, it can be concluded that the change and movement of each variable in Models 2 and 3 may be caused by other external factors. In a conclusion, this study found that from all the models used, there is only two unidirectional causation relationships, which are from the exchange rate towards the yield of LMGS3 and LGII10.

Table 4: Short run Granger Causality and Error Correction term based on VECM

		Granger Causality Results based on VECM			Short Run
	Dependent Variable	Independent Variable Statistics of lagged 1st difference term (p-value)			ECT coefficient (t-ratio)
Model		LMGS3	LER	LOP	
1	LMGS3	-	7.042056**	5.241097	-0.001629
		-	[0.0296]	[0.0728]	[-3.90919]
	LER	0.683465	-	4.268173	0.00074
		[0.7105]	-	[0.1184]	[2.99724]
	LOP	1.322326	3.174848	-	0.000575
		[0.5163]	[0.2045]	-	[0.40727]
		LGII3	LER	LOP	
2	LGII3	-	4.528872	4.426506	-0.001689
		-	[0.1039]	[0.1093]	[-3.84639]
	LER	0.591951	-	4.402893	0.000805
		[0.7438]	-	[0.1106]	[3.11016]
	LOP	2.115204	3.073435	-	0.000433
		[0.3473]	[0.2151]	-	[0.29269]
		LMGS10	LER	LOP	
3	LMGS10	-	1.29004	1.978588	-0.012726
		-	[0.4429]	[0.3718]	[-5.79364]
	LER	1.781145	-	4.752745	0.002373
		[0.4104]	-	[0.0929]	[2.29802]
	LOP	1.811079	3.350877	-	-0.006866
		[0.4043]	[0.1872]	-	[-1.16441]
		LGII10	LER	LOP	
4	LGII10	-	33.98253***	6.285986	-0.010437
		-	[0]	[0.5068]	[-4.78815]
	LER	12.05586	-	6.770022	0.002252
		[0.0987]	-	[0.4532]	[1.9156]
	LOP	5.384367	5.972209	-	-0.015677
		[0.6132]	[0.543]	-	[-2.33385]

Note: ** significant at 5%, *** significant at 1%

Table 4 also illustrates the results for Error correction term (ECT), which explains on the speed of adjustment of each variable. It describes how fast the variables will return back to the equilibrium point after an adjustment has been made. ECT is consider good if the range of coefficient absolute value is between 0 to 1 but not more than 2. In terms of percentage, the coefficient absolute value of 100% is considered as rapid speed of adjustment while 0% is reflected as slow speed. ECT also should be in a negative number to be considered as significant where a negative sign on coefficient indicates volatile and not reasonable. According to Mukhtar and Rasheed (2010), the large absolute values of coefficient on the ECT indicate equilibrium agents remove a large percentage of disequilibrium in each period. Hence it indicates a rapid of speed of adjustment. Conversely, a low absolute coefficient values shows a slow speed of adjustment converge back to the equilibrium.

Model 1 shows that LMGS3 has a low speed of adjustment where the absolute coefficient value is 0.001629. It indicates that the speed of adjustment of LMGS3 is 0.1629% to get back or return to the initial equilibrium point. The ECT also shows negative signs on LMGS3, indicates that the series cannot drift and move too far apart and convergence is achieved and obtained in the long run. Since the coefficient value of LMGS3 is rather small, it indicates that the speed of adjustment of LMGS3 is slow and consume longer time to converge back to equilibrium point. In Model 2, the absolute coefficient value of LGII3 is 0.001689, which indicates that the speed of adjustment by LGII3 to converge back to equilibrium point is 0.1689%. In another word, it indicates that the speed of adjustment by LGII3 is 0.1689% of the disequilibrium is corrected in a short run. Since the coefficient absolute value of LGII3 is considered as small, it signifies that the speed of adjustment of LGII3 is slow which consume longer time to converge back to the equilibrium. In Model 3, the coefficient absolute value of LMGS10 is 0.012726, which indicates the speed of adjustment of LMGS10 is 1.2726%. As the coefficient absolute value is reflected as small, it signifies that the speed of adjustment of LMGS10 is slow and spends longer time to converge back to the equilibrium point. In model 4, the coefficient absolute value of LGII10 is 0.010437. It signifies that the speed of adjustment of LGII10 is 1.0437% where the disequilibrium is corrected in the short run. Since the coefficient absolute value is considered as small, it means that the speed of adjustment is rather slow and consumes longer time to converge back to the equilibrium point.

5. Conclusion

Exchange rate and oil prices are among crucial economic factors that affected the capital market in a particular country including Malaysia. Based on the result of this study, firstly, it is found that in a short run, there is a significant relationship between the exchange rate, oil prices and the yield of sovereign bond and sukuk. Using VECM, the coefficient of ECT of all variables in each model shows a small value, which indicates the speed of adjustment of error correction, is rather in a low speed. Hence, any changes in the exchange rate and oil price will not give an instant and drastic impact towards the yield of bond and sukuk in Malaysia. Therefore, any policy imposed by the government on exchange rate or oil prices which will cause trivial or insignificant effect which might be relevant to be made because sovereign bond and sukuk would not be drastically and severely impacted. It is in line with a study by Arouri and Fouquau (2009), which they also found that, there was a significant link between oil prices and stock market of Qatar, Oman and UAE in a short run.

Secondly, the long run effect and relationship among all variables were discovered through long run equation in VECM. It can be concluded that in a long run, there are positive relationships between oil prices and the yield of sovereign bond and sukuk. Due to that, the government needs to consider thoroughly on any economic policy imposed on exchange rate and oil prices, as the capital market products will be greatly impacted in the long run. Since then, the Trans-pacific partnership agreement has been signed and Malaysia is among the twelve countries that participated in the free trade system that been upheld by the United States. In the long run, Malaysian Ringgit can be strengthening due to increment number of investors in Malaysian capital market. Thirdly, by adopting the Granger Causality test, this study is able to capture any causation relationship among variables in every model. It is found

that there are unidirectional causation relationships from the exchange rate on the yield of short-term bond (LMGS3) as well as on the long-term sukuk (LGII10). Hence, it can be established that a change of Malaysian Ringgit will change the yield of short-term sovereign bond and long-term sukuk of Malaysia.

Therefore, thorough consideration required on any economic strategy or government decisions related to the exchange rate since it might directly distressed the yield of sovereign bond and sukuk. Using Foreign Exchange Administration (FEA), Bank Negara Malaysia can continuously maintain exchange currencies rules which mainly prudential measures which aim to support the macroeconomic factors that directly maintain and preserve monetary and financial stability of Malaysia. Indirectly, the usage of FEA can promote the stability and performance of Malaysian capital market.

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Appendix A

Pearson's Correlation

	LMGS3	LGII3	LMGS10	LGII10	LER	LOP
LMGS3	1	0.999661	-0.174243	-0.157783	-0.101006	0.102909
LGII3	0.999661	1	-0.167844	-0.152393	-0.096535	0.103888
LMGS10	-0.174243	-0.167844	1	0.972525	0.273893	0.049759
LGII10	-0.157783	-0.152393	0.972525	1	0.236571	0.033586
LER	-0.101006	-0.096535	0.273893	0.236571	1	-0.734104
LOP	0.102909	0.103888	0.049759	0.033586	-0.734104	1

Appendix B

Unit Root Test

	Augmented Dickey Fuller (ADF)		Phillips Perron (PP)	
		Level		
Variable	**Without Trend**	**With Trend**	**Without Trend**	**With Trend**
LMGS3	-1.7214	-1.7307	-1.38511	-1.39
LGII3	-1.79545	-1.81223	-1.47706	-1.49599
LMGS10	-3.46923***	-3.46434**	-3.39527**	-3.3914
LGII10	-3.83035***	-3.86825**	-3.22615**	-3.26923
LER	0.158037	0.036363	0.104641	0.040073
LOP	-1.343098	-1.374852	-1.313065	-1.342964
		First Difference		
Variable	**Without Trend**	**With Trend**	**Without Trend**	**With Trend**
LMGS3	-6.57751***	-6.57266***	-44.8446***	-44.8346***
LGII3	-6.19661***	-6.18768***	-45.2195***	-45.2071***
LMGS10	-3.43294 ***	-12.7187***	-43.3229***	-43.3147***
LGII10	-3.43294 ***	-9.41728***	-42.0586***	-42.05***
LER	-48.79778***	-48.92556***	-48.80545***	-48.92289***
LOP	-50.72214***	-50.75336***	-50.81241***	-50.84995***