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The Influence of Oil Price Shocks on Stock Market Returns: Fresh Evidence from Malaysia

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ABSTRACT

This study investigates the influence of oil price shocks on Malaysia stock market returns by including interest rate, real effective exchange rate, industrial production index and inflation, as important factors of the stock market returns in Malaysia over the period of January, 1991 to December, 2016. Narayan and Popp (2010) test was applied to check the stationary property of the variables. Autoregressive distributed lag (ARDL) bounds test showed the existence of a long run relationship among the variables. ARDL long run analysis results showed that oil price, interest rate, real effective exchange rate have negative impact on the stock market return of Malaysia, whereas industrial production has a positive impact. However, the inflation impact on the stock market return was insignificant. The vector error correction model granger causality results confirmed the existence of the long run causality. However, the short run causality showed that only interest rate and real effective exchange rate granger cause the Malaysian stock market returns.

Keywords: Oil Price Shocks, Malaysia Stock Market Returns, Autoregressive Distributed Lag
JEL Classification: C32, O53, Q43

1. INTRODUCTION

Stock exchange plays an essential function in assisting buyers and sellers of equities to meet at specific prices. Liberalization and globalization effects on various developed and developing countries make the role of financial market more crucial in facilitating capital mobilization. This, in turn, can lead to a high industrial and commercegrowth of these countries, including Malaysia. Stock market of Malaysia is represented by Bursa Malaysia as an exchange holding company that previously recognized as Kuala Lumpur Stock Exchange which controls a number of exchanges in the country's capital market. Malaysian stock market index was familiar as Kuala Lumpur Composite Index as the major index that represents the performance indicator of 30 top companies that are listed in the main market of Bursa Malaysia since 1986. The main financial markets in Malaysia are namely Financial Times Stock Exchange (FTSE) Bursa Malaysia FBMKLCI as Malaysian stock market performance indictor (FTSE Russel, 2016). Currently, they are one of the top growing globally financial markets in Southeast Asia, which offers competitive services and infrastructure and adopts standards regulations to enhance global recognition of Malaysia stock market.

The financial market is becoming more globalized and sophisticated than ever before. Malaysia is becoming an open economy that is more vulnerable to volatility of other markets. For instance, the global financial crisis of 2008/2009 had impacted many stock markets around the world including Malaysia (Syahira, 2009 and Angabini and Wasiuzzaman, 2011). Therefore, the major concern is about the future unpredictable changes in the stock market performance. There are many studies in literature which analyzed the influence of oil price fluctuations on stock market in various advanced economy regions like U.S, U.K and European countries. Most of these studies reached to the conclusion that oil price fluctuations significantly impact the stock market returns (Jones and Kaul, 1996; Basher and Sadorsky, 2006; Fatima and Bashir, 2014 and Raza et al. 2016). In contrast to this large volume of academic research, there are limited studies conducted in Malaysia. Therefore, the question arises is whether oil price shocks influence the stock market returns in a growing economic country like Malaysia. Hence this study aims to investigate the influence of oil shocks on the stock market return of Malaysia. This study is expected to provide relevant information to assist policy-makers in decision making process and it will also contribute to the body of literature, since there are very limited studies focused on this area.

This paper contains five parts. The first part gives an introduction of the research and problem. The second part summarizes the relevant empirical literature on oil shocks impacts on stock market returns. The third part explains the methods used to test the relationship between oil price shock and stock market return. The forth section discusses the major results and findings. The fifth section gives a summary of the study and suggested policy implications based on findings.

2. LITERATURE REVIEW

It is not deniable that petroleum as a source of energy represents the backbone of the world's industrializations, where businesses depend on it for many purposes such as; transportations, day to day operations and other daily activities. Due to the growing important role of oil in the economy that continues to be the biggest economic driver, oil price is very important. Hence, the relationship between oil shocks and stock market is very critical to be understood because oil price changes lead to uncertainty in major economic sectors and economic instability in both oil importing countries and oil exporting countries. In today modern economy, oil and stock market play a major role, hence many researchers are motivated to study the relationship between oil price changes and the stock market. The relationship between oil shocks and stock market returns has been extensively documented in literature. Several studies found that oil shock impacts world economic activities such as (Hamilton, 1983; Mork, 1989 and Mork et al., 1994). While many other studies found that oil price fluctuations have a significant impact on stock returns including (Jones and Kaul, 1996; Sadorsky, 2001; Papapetrou, 2001; Cong et al., 2008; Ciner 2001). Currently, there exists a wealth of documented works focusing on the economic properties of oil and their impact on different economic types, for example: (oil-exporter or oil-importer, developed or emerging economic etc.). Furthermore, many studies considered the impact of oil shocks by considering some specific economic variables because stock market is influenced by a number of interconnected complex macroeconomic factors such as GPD, inflation, interest rate, exchange rate, industrial production and others.

Regarding oil-importing and oil-exporting countries, the influence of the oil price crisis on the stock market perceived a lot of researchers' attention. Several studies showed that oil exporting countries' stock markets tend to have positive influences on oil shocks, because high oil prices raise the government's income, country's wealth as well the level of the public expenditure on infrastructure, thereby this increase leads to higher stock value (Al-Fayoumi, 2009). Also, Akinlo (2014) applied vector error correction approach vector error correction model (VECM) to study the relationship between oil price and stock market growth in Nigeria as the largest oil exporting country in Africa. A monthly data from 1981-2011 was obtained. The finding indicated there is cointegration between oil price and exchange rate and stock market development, yet this positive influence of oil price on Nigerian' stock market was in short-run. The VECM showed there is unidirectional causality from oil price to stock market growth. The finding also indicated that the stock market growth hugely replies on the changes in oil price. The positive impacts of oil shocks on the stock market returns in oil exporting countries were also supported by studies provided by (Bjornland, 2009; Sadorsky, 2001 and Arouri and Rault, 2011). On the other hand, a number of scholars claimed that the negative impacts of oil shocks mostly exist in oil-importing countries because they pay more for their local energy demand, these studies include Cong et al. (2008) and Kang and Ratti (2015) who examined the case of China as the largest oil importing country in the world.

Emerging countries' literature on the influence of oil shock on the stock market returns isstill growing, an example of these studies is Basher and Sadorsky (2006) used international multifactor model to study oil price risk influence in 21 emerging stock markets. The findings showed that oil price risk impacts these emerging markets and suffers more oil price risk because they consume large amount of world oil shares of oil-importing countries and they also become important players in the global financial market. Also, Fatima and Bashir (2014) investigated oil price volatility on the stock market for developing countries; China and Pakistan. The study covered the period 1998-2013 both multivariate cointegration analysis and VECM were used. The finding exhibited that oil price negatively influences emerging countries stock market as these countries are oil-importing countries. By using nonlinear autoregressive distributed lag (ARDL), Raza et al. (2016) examined the impact of oil on some emerging countries' stock market. They found that oil price has negative impacts in all emerging countries in both long and short term, for sample countries including Malaysia, because emerging markets are more affected by bad news and events which eventually impacts its economic conditions. Basically, the oil shocks found to be undesirable for emerging countries' stock market.

In addition, Henriques and Sadorsky (2008) investigated the relationship between energy companies' stock prices, technology stock prices, oil prices, and interest rates. They employed vector autoregression model. They concluded that oil shocks have little significance on the energy companies' stock prices, in comparison to technology stock prices. Maysami et al. (2004) studied the relationship between some macroeconomic variables and stock market return in Singapore. Their findings showed that interest rate adversely influences the Singapore stock market while inflation, exchange rate and industrial production have positive impacts on the stock market returns. The increase in interest rate makes the cost of firm borrowing more expensive, that's why it is negatively related with stock market returns. On the other hand, industrial production has a positive impact on the stock market return because if there is an industrial growth volume, it is a sign that industries are performing well and this good reputation attracts many investors, which eventually reflect on the stock market. This finding is consisted with a study by Chen et al. (1986). Also, Thang (2009) examined the impact of interest rate and exchange rate on Malaysian stock market returns by using

Johansen cointegration test and VECM and Granger Causality. The results showed that interest rate and exchange rate have significant negative impact on Malaysian stock market returns in both long run and short run.

In line with Portfolio balance model hypothesis, Granger et al. (2000) used some Asian countries to examine the impact of currency depreciation on the stock market and other currencies in 1997. Their findings showed there is a bi-directional negative relationship between REER and stock price. Also, their findings found there is bivariate causality where stock price unclearly moves with exchange rates. The author used multinational companies' balance sheet to examine the effect of the currency changes. Furthermore, the researcher found a disparity of results which depend on the classification of the country as export or import country. Stock price depreciation encourages foreign investors to sell their financial assets and hold respective currency, which eventually lead to a decline in currency value. Also, Tsai (2012) examines the impact of exchange rate on six Asian countries' stock prices. Tsai's found there is a negative relationship, where an increase in stock exchange leads to decrease in stock price and vice versa and local currencies of those countries move relatively to the foreign currencies. Seong (2013) used Engle-Granger Cointegration and VARs Granger causality to study the impact of the exchange rate on Malaysian stock market. The study's findings showed there is both long and short run negative relationship between exchange and Malaysian stock market. The results also found a bidirectional causality between the stock market and stock market return. In contrast, Narayan and Narayan (2010) examined the influence of oil shocks on stock market by adding the exchange rate as additional determinate of the stock value on the Vietnamese market. Vietnam is considered as crude oil exporter and superior oil-importing country. They used a number of methods to test the impact by using a daily data over the period 2000-2008. The results concluded that oil price changes as well exchange rates have significant positive impacts on Vietnam's stocks price in the long- run.

A number of studies considered inflation as an important factor influencing the stock market return. The relationship between the two variables was earlier documented by Fisher (1930) hypothesis, where it indicated that inflation is positively correlated with stock value, the study also provides hedging technique for investors. The study indicated that inflation pressure causes the value of shares to increase as well. Inflation impacts on the stock mark were inconclusive where different studies found different results. Kalu and Solomon (2013) examined how stocks are able to protect investor from inflation impacts in Nigeria over the period 1985 to 201 by using Engle-Granger model and co-integration test. Their findings showed that CPI was correlated with stock market in long-run however; it was insignificant in short-run which means the investors are protected by using shares only in the long-run. In contrast to these studies, Bhatti and Pak (2013) studied the relationship between inflation and stock market in Kazakhstan, Russia and Ukraine. Their findings indicated that there is no relationship between inflation and stock market in these countries. Moreover, they found that stock market investment is not good hedging tool against inflation.

Several studies provided empirical support that oil price changes influence the country's stock market in a positive way, which means if oil price increase (decrease) then the stock returns increase (decrease) mostly in the oil exporting countries. Other studies documented this positive relationship in non-exporting countries, be it developed and non-developed countries. The adverse consequence of oil price on stock market also occurs in advanced economy nations such as the U.S. or China as they are well known to be the world largest oil-importing country. There are debatable studies regarding the relationship between oil shocks and specific economic variables, where many focus on the relationship between oil shocks and equity value in various developed and developing countries. However, in the context of Malaysia, there are limited works documented in the literature regarding this relationship. Moreover, many of the previous studies utilized different time-series and panel data regressions, without taking into consideration the structural breaks effects which can lead to spurious regression results and errors on the econometrics outcome. Therefore, in order to fill the gap, this paper aims to study the influence of oil shocks in Malaysia stock market by incorporating interest rate, real effective exchange rate, industrial production and inflation as crucial factors of the stock market movement. We augment the Narayan and Popp (2010) unit root test and ARDL with structural breaks in order to avoid any misleading regression outputs.

3. METHODOLOGY

This study examines the influence of independent variables: Oil price shocks, interest rate, real effective exchange rate, industrial production and inflation on Malaysian's stock market as the dependent variable. The data was collected on monthly basis for the period of January 1991 to December 2016 for all the mentioned variables, dictated by the availability of the data for some variables which was obtained from Bloomberg official database. ARDL model was used to test the impacts of oil price shocks, interest rate, real effective exchange rate, industrial production, and inflation rate on the Malaysian's stock market returns. The stock market return is the study's dependent variable, thus the model equation is exemplified as follows:

$$LnFBMKLCI_t = \alpha + \beta_1 \ln OP_t + \beta_2 \ln IR_t + \beta_3 \ln \ln REER_t + \beta_4 \ln IPI_t + \beta_5 \ln CPI_t + \varepsilon_t \quad (1)$$

In the above equations: α represents the intercept, β_1: β_2: β_3: β_4: β_5 are the coefficients

LnFBMKLCI is the log of the Malaysia aggregate stock market returns at year t

LnOP is the natural log of global price of WTI Crude (US dollars per barrel) at year t

LnIR is the natural log for Malaysia monthly base lending rate with expected negative relationship at year t

LnRRER is the natural log of the real effective exchange rate (unit of Malaysian ringgit against U.S dollar) at year t

LnIPI is the natural log for industrial production at year t

LnCPI is the natural log for Malaysia consumer price index at year t

3.1. Stationarity Tests

It is essential to run a number of preliminary tests in order to check the data structure to avoid any errorless outputs. One of these important preliminary tests is stationarity test. In econometric, the data must be stationary otherwise it will have no economic meaning. Therefore, in order to test the data series stationarity, the unit roots tests are set. According to Philips (1987) the results from regression analysis that uses non-stationary data will be biased and the inferences from those results will not represent the actual phenomena. There are many old traditional unit roots available such as augmented Dickey fuller (ADF) (1979), Phillips-Perron (PP) (1988) and Perron (1997), which were criticized in literature for being biased toward rejecting the hypothesis, especially in the presence of the structural breaks. To address this issue, a number of studies tried to determine the stationarity by considering the structural breaks. We applied arecent unit root test which accommodates for the structural breaks; Narayan and Popp (2010).

3.1.1. Narayan and Popp (2010)

Narayan and Popp (2010) developed a new version of ADF which allowsfor two structural break in the series set in both trend and slop at unknown break dates. Apergis and Payne (2010) applied NP to examine the stationarity of the data in their study.

$$Y\_t=d\_t+u\_t \tag{2}$$

$$U_t=\rho u_t+\varepsilon_t \tag{3}$$

$$\varepsilon_t=A(L)^{-1}B(L)e_t \tag{4}$$

The time series y_t has two components that are deterministic and stochastic as represented by d_t and u_t respectively. $A(L)^{-1}B(L)e_t$ lag polynomials are included because they will allow breaks to happen slowly in the order of p and q respectively. NP M2 allows for the structural breaks in both slop and level. Model Mt is given as follows:

$$dM_2=\alpha+\beta t+[A(L)^1B(L)e_t](L)(\theta_1 DU_{1,t}+\theta_2 DU_{2,t} \\ +\gamma_1 DT_{1,t}+\gamma_2 DT_{2,t} \tag{5}$$

θ_1 represents the level break

$$DU_{i,t}=1(t>T_{B,i})$$

$$DT_{i,t}=1(t>T_{B,i})(t-T_{B,i}),\ i=1,2$$

$T_{B,i}, i=1,2$ denotes the break dates

γ_i is the slope breaks. $A(L)^1B(L)e_t$ lag polynomials which are included, because it will allow breaks to happen slowly. Therefore, we derived the test regression by merging 2,3,4, and 5 equations to reduce forms. Thus, the test equation of M2 is exemplified as;

$$y_{m2}=\rho y_{t-1}+\alpha_1+\beta t+k_1 D(T_B)_{1,t}+k_2 D(T_B)_{2,t}+\delta_1 DU_{1,t-1} \\ +\delta_2 DU_{2,t-1}+\gamma_1 DT_{1,t-1}+\gamma_2 DT_{2,t-1}+\sum_{j=1}^{k}\beta_j\Delta y_{t-j}+e_t \tag{6}$$

Where, $K_i=(\theta_i+\gamma_i)$, $\delta_i^*=(\gamma_i-\varnothing\theta_i)$, $\gamma_i^*=-\theta_i\gamma_i, i=1,2$. Basically, M2 accounts for the break in both trend and slop. NP test the unit root the null hypothesis $\rho=1$was checked against the alternative hypothesis of $\rho<1$. Therefore, the break dummy coefficient k_1 where $k_1=\delta_1=\gamma_2=0$ was selected based on maximum t-value.

3.2. ARDL

ARDL was introduced by Pesaran and Shin (1999) and it was developed by Pesaran et al. (2001). In this study, we employed ARDL in order to achieve the main study's objectives in investigating the cointegration, long-run and short-run coefficient between variables. ARDL has myriad advantages such as it can examine both the long- run and short-run relationship. It also, can be employed regardless of the variables order as long as they are not I(2) for applications of ARDL bonds test for cointegration (e.g., Narayan, 2005; Tiwari et al., 2013 and Al-Mulali et al., 2016). Firstly, ARDL bounds test is employed for cointegration in the time series variables. The second part of ARDL, we examine the long and short run coefficients. ARDL bounds test for cointegration is formulated in the following equation:

$$\begin{aligned}\Delta \ln FBMKLCI_t=&\sum_{n=1}^{p}X_0\Delta\ln FBMKLCI_{t-i}+\sum_{n=1}^{p}X_1\Delta\ln OP_{t-i}\\&+\sum_{n=1}^{p}X_2\Delta\ln IR_{t-i}+\sum_{n=0}^{p}X_3\Delta\ln REER_{t-n}\\&+\sum_{n=0}^{p}X_4\Delta\ln IPI_{t-n}+\sum_{n=0}^{p}X_5\Delta\ln CPI_{t-n}\\&+\lambda_0\ln FBMKLCI_{t-1}+\lambda_1\ln OP_{t-1}\\&+\lambda_2\ln IR_{t-1}+\lambda_3\ln REER_{t-1}+\lambda_4\ln IPI_{t-1}\\&+\lambda_5\ln CPI_{t-1}+\alpha_0+\alpha_1 T+\alpha_2 D_1+\alpha_3 D_2+\upsilon_t\end{aligned} \tag{7}$$

Where Δ denotes the first difference operator, λ_0 is the drift components, υ_t is the error term and λs indicates long-run and short-run coefficients. The null hypothesis which means there is no cointegration is represented as: $H0:\lambda_0=\lambda_1=\lambda_2=\lambda_3=\lambda_4=\lambda_5=0$. On the other hand, the alternative hypothesis which means there is cointegration exists and represented as $H1:\lambda_0\neq\lambda_1\neq\lambda_2\neq\lambda_3\neq\lambda_4\neq\lambda_5\neq 0$ in the equation. The next step, we are going to calculate the F-statistic with critical value. Therefore, if the F-statistic test is more than the upper critical values, then null hypothesis H0 is rejected and it means there is cointegration among the series. On the other hand, if the calculated F-test is less than the critical values, then we reject the alternative hypothesis which implies there is no cointegration between series variables. Finally, if the calculated F-statistic test is in between the bounds value, then the decision is inconclusive. After we confirmed the existence of cointegration, we are going to examine the long-run and short-run coefficient among the variables using ARDL estimates. Hence, the model long-run and short- run equations are stated accordingly:

$$\ln FBMKLCI_t = \lambda_0 lnFBMKLCI_t + \lambda_1 lnOP_t + \lambda_2 lnIR_t + \lambda_3 lnREER_t + \lambda_4 lnIPI_t + \lambda_5 lnCPI_t + \lambda_6 + \lambda_7 T + \lambda_8 D_1 + \lambda_9 D_2 + \upsilon_t \quad (8)$$

$$\Delta \ln FBMKLCI_t = \sum_{j=1}^{q} \alpha_0 \Delta lnFBMKLCI_{t-j} + \sum_{j=1}^{q} \alpha_1 \Delta lnOP_{t-j} + \sum_{j=1}^{q} \alpha_2 \Delta lnIR_{t-j} + \sum_{j=1}^{q} \alpha_3 \Delta lnREER_{t-j} + \sum_{j=1}^{q} \alpha_4 \Delta lnIPI_{t-j} + \sum_{j=1}^{q} \alpha_5 \Delta lnCPI_{t-j} + \alpha_6 + \alpha_7 T + \alpha_8 \Delta D_1 + \alpha_9 \Delta D_2 + \alpha_{10} ECT_{t-1} + \upsilon_t \quad (9)$$

3.3. VECM Granger Causality Test

After the existence of cointegration is verified, the next step is to run VECM Granger causality models to test the long-run and short-run Granger causality. The long-run Granger causality is conducted by t-test of coefficients of the lagged error correction term ECT_{t-1} whereas short-run Granger causality is conducted by employing Wald test. The VECM Granger causality model is represented in the following equations:

$$\Delta \ln FBMKLCI_t = \alpha_{11} + \sum_{j=1}^{q} \alpha_{12} \Delta lnFBMKLCI_{t-j} + \sum_{j=1}^{q} \alpha_{13} \Delta lnOP_{t-j} + \sum_{j=1}^{q} \alpha_{14} \Delta lnIR_{t-j} + \sum_{j=1}^{q} \alpha_{15} \Delta lnIPI_{t-j} + \sum_{j=1}^{q} \alpha_{16} \Delta lnREER_{t-j} + \sum_{j=1}^{q} \alpha_{17} \Delta lnCPI_{t-j} + \alpha_{18} T + \alpha_{19} \Delta D_1 + \alpha_{110} \Delta D_2 + \alpha_{111} ECT_{t-1} + \upsilon_t \quad (10)$$

$$\Delta \ln OP_t = \alpha_{21} + \sum_{j=1}^{q} \alpha_{22} \Delta lnFBMKLCI_{t-j} + \sum_{j=1}^{q} \alpha_{23} \Delta lnOP_{t-j} + \sum_{j=1}^{q} \alpha_{24} \Delta lnIR_{t-j} + \sum_{j=1}^{q} \alpha_{25} \Delta lnIPI_{t-j} + \sum_{j=1}^{q} \alpha_{26} \Delta lnREER_{t-j} + \sum_{j=1}^{q} \alpha_{27} \Delta lnCPI_{t-j} + \alpha_{28} T + \alpha_{29} \Delta D_1 + \alpha_{210} \Delta D_2 + \alpha_{211} ECT_{t-1} + \upsilon_t \quad (11)$$

$$\Delta \ln IR_t = \alpha_{31} + \sum_{j=1}^{q} \alpha_{32} \Delta lnFBMKLCI_{t-j} + \sum_{j=1}^{q} \alpha_{33} \Delta lnOP_{t-j} + \sum_{j=1}^{q} \alpha_{34} \Delta lnIR_{t-j} + \sum_{j=1}^{q} \alpha_{35} \Delta lnIPI_{t-j} + \sum_{j=1}^{q} \alpha_{36} \Delta lnREER_{t-j} + \sum_{j=1}^{q} \alpha_{37} \Delta lnCPI_{t-j} + \alpha_{38} T + \alpha_{39} \Delta D_1 + \alpha_{310} \Delta D_2 + \alpha_{311} ECT_{t-1} + \upsilon_t \quad (12)$$

$$\Delta \ln REER_t = \alpha_{41} + \sum_{j=1}^{q} \alpha_{42} \Delta lnFBMKLCI_{t-j} + \sum_{j=1}^{q} \alpha_{43} \Delta lnOP_{t-j} + \sum_{j=1}^{q} \alpha_{44} \Delta lnIR_{t-j} + \sum_{j=1}^{q} \alpha_{45} \Delta lnIPI_{t-j} + \sum_{j=1}^{q} \alpha_{46} \Delta lnREER_{t-j} + \sum_{j=1}^{q} \alpha_{47} \Delta lnCPI_{t-j} + \alpha_{48} T + \alpha_{49} \Delta D_1 + \alpha_{410} \Delta D_2 + \alpha_{411} ECT_{t-1} + \upsilon_t \quad (13)$$

$$\Delta \ln IPI_t = \alpha_{51} + \sum_{j=1}^{q} \alpha_{52} \Delta lnFBMKLCI_{t-j} + \sum_{j=1}^{q} \alpha_{53} \Delta lnOP_{t-j} + \sum_{j=1}^{q} \alpha_{54} \Delta lnIR_{t-j} + \sum_{j=1}^{q} \alpha_{55} \Delta lnIPI_{t-j} + \sum_{i=1}^{q} \alpha_{56} \Delta lnREER_{t-j} + \sum_{j=1}^{q} \alpha_{57} \Delta lnCPI_{t-j} + \alpha_{58} T + \alpha_{59} \Delta D_1 + \alpha_{510} � D_2 + \alpha_{511} ECT_{t-1} + \upsilon_t \quad (14)$$

$$\Delta \ln CPI_t = \alpha_{61} + \sum_{j=1}^{q} \alpha_{62} \Delta lnFBMKLCI_{t-j} + \sum_{j=1}^{q} \alpha_{63} \Delta lnOP_{t-j} + \sum_{j=1}^{q} \alpha_{64} \Delta lnIR_{t-j} + \sum_{j=1}^{q} \alpha_{65} \Delta lnIPI_{t-j} + \sum_{j=1}^{q} \alpha_{66} \Delta lnREER_{t-j} + \sum_{j=1}^{q} \alpha_{67} \Delta lnCPI_{t-j} + \alpha_{68} T + \alpha_{69} \Delta D_1 + \alpha_{610} \Delta D_2 + \alpha_{611} ECT_{t-1} + \upsilon_t \quad (15)$$

Δ represents the first difference operator, α_{11} is the constant term, j represents the speed of the adjusted coefficient ECT_{t-1} is the lagged error correction term, in equation (10) $\alpha_{12},\alpha_{13},\alpha_{14},\alpha_{15},\alpha_{16},\alpha_{17},\alpha_{18},\alpha_{19},\alpha_{110},\alpha_{111}$ denotes the slope parameters and υ_t is the term error. Therefore, the Wald tests f-statistic is significant-test of coefficients of the lagged error correction term $ECT_{t-1}$for long-run Granger causality. Therefore, a significant ECT coefficient indicates that past equilibrium errors are important determinants of current value. A case in point, if coefficient α in equation (10), then oil shocks, interest rate, industrial production index, exchange rate, and inflation Granger cause the Malaysian's stock market returns in the long-run. The same concept is applied to all the other remaining equations (Table 1).

4. RESULTS AND DISCUSSION

According to M2, all the variables were stationary at first difference, with exception of the real effective exchange rate and industrial production which they were stationary at level. The major breaks occurred in the 2000s where oil had witnessed many shocks, which led to the volatility of the other macroeconomic factors such as interest rate, real effective exchange rate, industrial production and inflation (Table 2).

Table 1: Narayan and Popp results

Variables	Model 1: M1				Model 2: M2			
	T-value	K	TB1	TB2	T-value	K	TB1	TB2
lnBMKLCI	−2.929	8	2001:07 0.410	2003:01 0.467	−3.013	8	2001:07 0.410	2003:01 0.468
Δ*lnFBMKLCI*	−4.413**	11	2001:03 0.397	2006:12 0.618	−4.406*	11	2001:03 0.397	2003:09 0.494
lnOP	−1.232	2	2007:02 0.625	2009:05 0.712	−4.111	4	2009:02 0.702	2009:05 0.712
Δ*lnOP*	−4.366**	9	2006:03 0.589	2007:09 0.647	−4.448**	9	2006:03 0.589	2007:09 0.647
lnIR	−3.947*	11	2003:01 0.468	2010:07 0.756	−4.025	11	2003:01 0.468	2010:07 0.756
IR	−7.646***	10	2002:06 0.446	2006:11 0.615	−8.076***	10	2002:06 0.446	2006:11 0.615
lnREER	−5.842***	12	2003:01 0.468	2010:07 0.756	−6.086***	12	2003:01 0.468	2010:07 0.756
REER	−8.175***	10	2001:02 0.394	2006:11 0.615	−8.072	10	2006:11 0.615	2010:02 0.740
lnIPI	−4.216**	10	2001:08 0.413	2006:02 0.587	−4.750	10	2001:08 0.413	2006:02 0.587
Δ*lnIPI*	−7.920***	12	2008:03 0.667	2009:09 0.724	−8.269***	12	1999:03 0.321	2008:03 0.667
lnCPI	−2.129	11	2003:01 0.468	2010:07 0.756	−3.164	11	2001:07 0.410	2003:01 0.468
Δ*lnCPI*	−8.217***	10	2001:02 0.394	2006:11 0.615	−8.229***	10	2001:02 0.394	2006:11 0.615

***1%, **5%, *10% , K: Number of lags which was set at maximum 12, M1 assumes that the two breaks are in level where M 2 assumes that the two breaks are in level. T-statistic was compare with critical value provided by Narayan and Popp (2010) Models M1 and M2

Table 2: ARDL bounds test analysis

Estimated models	ARDL bounds test			Diagnostic tests		
	Lag length	Time break	Fstatistic	χ^2 *SERIAL*	χ^2 *ARCH*	χ^2 *RESET*
$InFBMKLCI_t = f(lnOP_t, lnIR_t, lnREER_t, lnIPI_t, lnCPI_t)$	(12, 0, 11, 3, 8, 1)	2001:07 2003:01	5.819	0.1361	0.1386	0.7397

Significant level	Critical value bounds	
	Lower bounds I (0)	Upper bounds I (1)
1%	3.41	4.68
2.5%	2.96	4.18
5%	2.62	3.79
10%	2.26	3.35

The bounds test is the first part of ARDL model which enables us to determine if cointegration exists among the variables. Therefore, cointegration is confirmed in the case where the F-statistic is more than the upper bound (I1) and lower bound (I0). The above table showed that F-statistic is greater than upper bound and lower at 1%, so we can reject the null hypothesis H_o and accept the alternative hypothesis $H_{1.}$ This means there is a long run co-integration among stock market return and oil price, interest rate, real effective exchange rate, industrial production and inflation.

Upon the confirmation of cointegration among the variables showed by ARDL bounds test. The next step is to examine the short and long run impact of oil price, interest rate, real effective exchange rate, industrial production and inflation on the Malaysia stock market return. Table 3 shows the results of ARDL long run cointegration (12, 0, 11, 3, 8, 1) lags which are automatically selected based on Akaike Information Criterion. The results indicate that oil price has a negative impact on the stock market return that is significant at 1%. This means a 1% increase on the oil price reduces the stock market return by -0.174993. This is because, Malaysia as an emerging market which makes it more vulnerable to bad news and events which, in turn, can lead to high volatility in the country economic conditions, including its stock market. Therefore, it is very challenging in an inefficient market to capture and controloil prices fluctuation. The findings of adverse relationship between oil price shocks and stock market return are consistent with studies provided by (e.g., Jones and Kaul, 1996;Basher and Sadorsky, 2006; Fatima and Bashir, 2014 and Raza et al., 2016).

Also, a 10% increase in the interest rate depresses the stock market returns by0.320430. The reason is that, a high interest rate environment motivates investors to shift their funds to alternative investment options such as government bonds, savingand fixed deposit as they receive higher returns compared to equity investments. Besides, a high interest rate charges is never desirable for firms that highly depend on the external funds to finance their business activities, because the cost of funds become more expensive and if they fail to cover these costs, it will eventually

Table 3: Long run and short run analysis

Dependent variable=InFBMKLCTt				
Long run analysis				
Variables	**Coefficient**	**Standard error**	**t-statistic**	**P value**
Constant	8.600970***	2.082439	4.130239	0.0000
$InOP_t$	−0.1749***	0.057820	−3.026485	0.0027
$InIR_t$	−0.320430*	0.179742	−1.782721	0.0758
$InREER_t$	−1.548634***	0.171326	−9.039110	0.0000
$InIPI_t$	1.250497***	0.225529	5.544727	0.0000
$InCPI_t$	−0.949619	0.641198	−1.481006	0.1398
$D1_{2001:07}$	−0.008775**	0.004202	−2.088440	0.0377
$D2_{2003:01}$	0.014541***	0.004579	3.175503	0.0017
Short run analysis				
$InOP_t$	−0.041801***	0.015325	−2.727717	0.0068
$InIR_t$	0.042191	0.196025	0.215231	0.8298
$InREER_t$	−0.958578***	0.141959	−6.752485	0.0000
$InIPI_t$	0.049498	0.087168	0.567849	0.5706
$InCPI_t$	0.930812	0.884763	1.052046	0.2938
$D1_{2001:07}$	−0.002096*	0.001145	−1.831365	0.0682
$D2_{2003:01}$	0.003473**	0.001342	2.588542	0.0102
ECM_{t-1}	−0.238873***	0.045300	−5.273098	0.0000
R^2	0.478761			
Fstatistic	5.598508***			
P (F-statistic)	0.000000			
Durbin-Watson stat	2.039903			
Short run diagnostic tests				
Test	**Fstatistic**		**P value**	
χ^2 *SERIAL*	1.184156		0.3077	
χ^2 *ARCH*	2.204918		0.1386	
χ^2 *RAMSEY*	0.024944		0.8746	
CUSUM	Stable		0.005	

impact the share prices and investors wealth. This finding is in line with studies documented by (e.g., Maysami et al. 2004; Henriques and Sadorsky, 2008 and Thang, 2009).

The impacts of real effective exchange rate on Malaysia stock market return is (-1.549) and at 1% significant. Thus, validating the portfolio balance model which assumes an increase (decrease) in exchange rate leads decrease (increase) in shares value. The reason is explained as follows; a drop in share price reduces the investors' gain which in turn leads to low domestic currency demand and depreciation. Currency depreciation may show economy performance unstable as its spending exceeds its earnings which leads to low foreign reserves. Due to this bad reputation, many investors lost their confidence in investing in the local stock market and they prefer to sell the local shares and buy foreign currencies. This finding is consistent with studies by (e.g., Granger et al., 2000; Tsai, 2012; and Seong, 2013) that showed that REER negatively impacts stock market returns. From an economic perspective, depreciation in the domestic currency can be good because it makes the exports cheaper than imports. Which means for Malaysia to import foreign goods and service is very expensive compared to the domestic goods and services, which in turn encourages the demand for local goods and can increase Malaysia's economy performance. The impact of the industrial production on the stock market return is positive1.250497 and statistically significant at 1 %. This means a growth of industrial production reflects on stock prices and attracts more investors. This result is supported by a number of documented studies by (Chen et al. 1986 and Maysami et al., 2004).

In addition, the study's results showed inflation has no impact on the stock market return, where the Coefficient value is 0.949619 and the p value is insignificant 0.1398. This means that share price reacts neutrally to inflation which is in line with (Bhatti and Pak, 2013). We believe that Malaysia's central bank (Bank Negara) keeps stabilizing the economy by controlling the inflation rate and that's why CPI is not a serious issue toward the stock market returns in case of Malaysia.

Finally, in order to determine if an increase or decrease of oil price influence the Malaysian stock market return, we included the structural breaks. Our results implies that the first structural break which occurred in July 2001 has a negative impact on Malaysian stock market returns by (−0.008775) at 5% level of significant which is in line with Hadi, et al. (2009). On the other hand, the second structural break happened in January 2003 which was also significant but in a positive direction. This means an increase in oil price resulted in an increase in the stock market return by (0.014541) and at 1% level of significance. In 2003, the Malaysia mining sector had witnessed a higher growth about 4.8% due to high demand petroleum products, including the crude oil, which derived a high expansion of oil production with high exporting prices. A high export volume of oil caused the price to rise from 25.55 *in* 2002 *to* 29.79 and $30.64 by early 2003. Due to some geopolitical events in OPEC countries, which contributes about 40% in supplying oil, oil production increased in order to cover the shortage in supply that occurred because of Iraq's invasion in 2003. Iraq as major oil producer in the world and OPEC, was invaded by the US which lead to sudden increase in oil price.

Therefore, Malaysia as an oil exporting country at that time gained from this increase, which is reflected in its economy including the stock market returns and on oil prices which remained strong to reach $32.15 by the end of 2003 (Bank Negara annual, 2004).

The short-run analysis results are reported in Table 3. It shows that oil price, interest rate and real effective exchange rate reduce the stock market return, while industrial production has a positive impact on the stock market return. On the other hand, the impact of inflation on the stock market return is statistically insignificant. The long run relationship is proved by ECMt−1 that is statistically significant and negative at -0.238873 which indicates the equilibrium of the short run deviation are corrected with 24% of long run equilibrium every month. The diagnostic tests results verified that our model is free from serial correlation and heteroskedasticity. Ramsey reset results indicated that our model is correctly specified in functional form. Also, CUSUM showed that our model is stable. The R^2 value showed that 47% of the stock market return is explained by the independent variables (oil price, interest rate, real effective exchange rate, industrial production and inflation). The Durbin-Watson statistic of our model is 2.039903 which means our model is free from auto correlation (Table 4).

Since all the variables are cointegrated, VECM granger causality is then employed. Results indicate the existence of long-run causality between oil price, interest rate, real effective exchange rate, industrial production, inflation and the stock market return, which is supported by negative and statistically significant ECT –0.090004. This means, the past equilibrium errors of oil price, interest rate, real effective exchange rate, industrial production and inflation are important factors in explaining Malaysia's stock market returns. This finding is consistent with previous studies provided by (Thang, 2009 and Raza etal. 2016). The short run Granger causality is explained by Wald-test F-statistic and coefficient. The result of short run causality shows that only interest rate and real effective exchange rate granger cause the stock market return. The findings also showed there is a long run causality when using the oil price or real effective exchange rate as main indicators supported by significant and negative ECT value (-0.060231) and (-0.019540) respectively. In contrast, there was no evidence of long run causality if the interest rate, industrial production and inflation were used as main indicators (Figure 1).

6. CONCLUSION AND POLICY IMPLICATIONS

This study examined the relationship between oil price, interest rate, real effective exchange rate, industrial production and inflation and the stock market returns for Malaysia. Narayan and Popp (2010) unit root test with the structural breaks was applied prior to the analysis. Then, ARDL bounds test confirmed the existence of relationship between the series. The long run results showed that oil price, interest rate, real effective exchange rate negatively impact the FBMKLCI, while industrial production has positive impact on the stock market of Malaysia. On the other hand, the inflation impacts of the Malaysian stock market return was insignificant. After confirming the existence of cointegration, we applied VECM granger causality to test the long-run and short-run causality. Therefore, the VECM results implied that oil price, interest rate, real effective exchange rate, industrial production and inflation granger cause Malaysia stock market returns in long run. However, the short run causality showed that only interest rate and real effective exchange rate granger cause the Malaysia stock market returns.

Based on the study's finding a number of recommendations can be derived for different parties. First and foremost, oil price shocks

Figure 1: Plot of cumulative sum of recursive residual

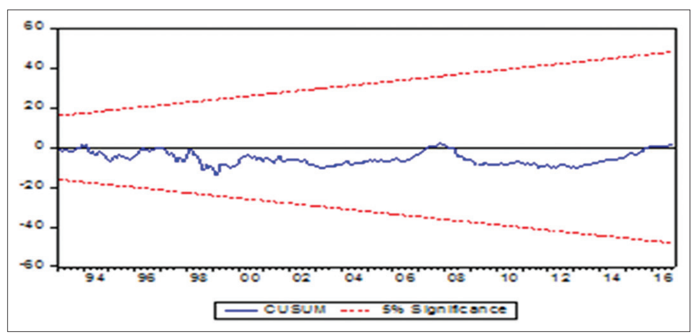

Table 4: The VECM granger causality analysis

Variable	Short run causality						Long run causality
	ΔlnFBMKLCI	*ΔlnOp*	*ΔlnIR*	*ΔlnREER*	*ΔlnIPI*	*ΔlnCPI*	ECT_{t-1}
ΔlnFBMKLCI		(0.270894)	(−3.18966)***	(−3.982875)***	(1.083860)	(0.054798)	−0.090004
		[0.7867]	[0.0016]	[0.0001]	[0.2793]	[0.9563]	[0.0009]
ΔlnOP	(1.896293)*		(0.444635)	(−2.267705)**	(−0.037765)	(0.471265)	−0.060231
	[0.0589]		[0.6569]	[0.0241]	[0.9699]	[0.6378]	[0.0010]
ΔlnIR	(1.216061)	(−0.365233)		(−0.001003)	(−1.014130)	(1.986807)**	−0.001592
	[0.2250]	[0.7152]		[0.9992]	[0.3114]	[0.0479]	[0.7449]
ΔlnREER	(−3.552574)***	(−2.892467)***	(0.916911)		(1.529431)	(1.471416)	−0.019540
	[0.0004]	[0.0041]	[0.3600]		[0.1273]	[0.1423]	[0.0003]
ΔlnIPI	(1.614059)	(4.607406)***	(−0.471361)	(0.432968)		(−0.930539)	0.005464
	[0.1076]	[0.0000]	[0.6377]	[0.6654]		[0.3529]	[0.5618]
ΔlnCPI	(0.397443)	(3.397528)***	(0.878504)	(2.192168)**	(0.126175)		0.002115
	[0.6913]	[0.0008]	[0.3804]	[0.0292]	[0.8997]		[0.0181]

() the t-statistic where [] are the probability values*indicates 10% level of significant, **indicates 5% level of significant, ***indicates 1% level of significant found to have a negative impact on the stock market returns in case of Malaysia. Therefore, we suggest Malaysia government to use financial derivatives as hedging techniques that can protect oil prices from falling or increasing by pre-contracting at a certain price. Secondly, the Malaysian government can consider saving oil by increasing its oil reserves as well as implementing alternative energy sources that consume less oil, like developed countries. They also can diversify the economy by investing in various activities and reduce its dependence on oil, to generate government revenue therefore, in the case of shocks, the entire economy will not suffer.

Furthermore, our findings implied that exchange rate risk exposure is very high in trade oriented country like Malaysia. Therefore, it is important for Malaysia policy makers to put more effort to regulate the volatility of some macroeconomic factors, such exchange rate and interest rate in order to promote economic stability of the country and to gain investor's confidence. Secondly, policy maker should also concentrate in controlling speculation activities because a heavy speculation on currency leads to a high risk exposure of macroeconomic factors and commodities including oil price. Also, the transition from the dependency on U.S dollar in transaction to limit economic and financial crisis, could be achieved through the usage of Islamic financial engineering as resolution. Lastly, to investors, this study gives a better understanding of the stock price movement to be prepared for appropriate hedging techniques in emerging market like Malaysia and choose right time for investing.

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