



Oil Price, Exchange Rate and DJIA: Effect to Malaysian Stock Market

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ABSTRACT

The prolonged slump in crude oil prices and the exchange rate uncertainty can adversely impact global stock market. Malaysia also feel the pinch where in August 2015, its stock market index has plunged to its lowest level in more than three years since June 2012. Thus, this study is conducted to discover the relationship between crude oil prices and exchange rate to the Malaysia stock market index. Crude oil price, exchange rate and Dow Jones Industrial Average (DJIA) are chosen as independent variables while Malaysia stock market index as the dependent variable is proxy by FBMKLCI. This study used monthly time series data covering 74 observations from July 2009 to August 2015. Employing correlation matrix test, our result shows that all independent variables have significant relationship with FBMKLCI. On the other hand, regression analysis indicates that only exchange rate and DJIA is significant in determining the movement of FBMKLCI while crude oil price is not significant. The finding further indicates that changes in DJIA will positively affecting FBMKLCI while changes in exchange rate have negative influence on FBMKLCI.

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Introduction

An energy price has been a critical uncertainty since 2009 which highlights the issue's long-lasting importance to energy leaders. In 2015, price volatility remains a key concern, demonstrated by more than 50% drop in price over seven months where a barrel of crude oil (Brent) was priced at USD108 in January 2014, reached its peak price of USD112 in June before falling below the USD50 benchmark in early 2015. Over 5 years we are seeing the lowest prices in oil market due to oversupply and weak demand from Europe and China. In year 2015, the oil prices is below USD50 per barrel which is significantly below the critical USD70 as the 'survival threshold' for many high-end cost producers in the US and Canada.

Currency uncertainty and currency devaluation risks also negatively impact energy operations and investments. The impact of currency uncertainty is perceived to be much bigger in Asia rather than the world as a whole. As Malaysia is one of the Southeast Asia countries, oil price and currency uncertainty will give some impact to the Malaysian economy such as Malaysian capital market. For example, as at August 17, 2015 the FBM KLCI has plunged to its lowest level in more than three years since June 22, 2012 due to dragged by the continued slump in energy prices and the Ringgit (Source: <http://www.theedgemarkets.com>). Another possible reasons also due to devaluing of Yuan which affected the regional market as well, the possibility of a US interest rate hike, the domestic political uncertainties to name a few. Due to that, this study intends to examine the above mentioned issue which might impact to Malaysian capital market which is equity market. Numerous studies had been conducted to examine the impact of energy prices volatility and exchange rate uncertainty toward the stock index in many countries. For examples, Sensoy & Sobaci, 2014 (Turkey); Al-Qudah, 2014 (Jordan); Barnor 2014 (Ghana); Tajudeen & Abraham 2010

(Nigeria); Pan, Fok, & Liu, 2007 (East Asia countries). Besides that, previous research also had been done in Malaysia to observe the energy prices volatility and exchange rate uncertainty toward the stock market index (FBM KLCI). Among them are Lim & Sek, (2013), Johan, Sipon & Md Kamdari (2012); Mohd Hussin, Muhammad, Mohd Fauzi, & Azila, (2012). This study also attempts to discover the relationship between crude oil prices and exchange rate to the stock market index (FBMKLCI) in Malaysia with an addition of another variable which is US stock market index known as Dow Jones Industrial Average (DJIA). Additionally, this study also aims to determine the major factors in influencing the stock market index (FBMKLCI) in Malaysia. Do oil price, exchange rate uncertainty and DJIA give an impact to Malaysian stock market? Thus, the research hypothesis is:

Hypothesis 1

H_0 : There is no significant relationship between oil price, exchange rate and DJIA to the stock market index (FBM KLCI) in Malaysia

H_1 : There is significant relationship between oil price, exchange rate and DJIA to the stock market index (FBM KLCI) in Malaysia

Hypothesis 2

H_0 : There is no significance influence to the stock market index (FBM KLCI) in Malaysia

H_1 : At least one of independent variables (oil price, exchange rate and DJIA) will influence the stock market index (FBM KLCI) in Malaysia

Literature review

Sensoy & Sobaci, 2014 had studied the effects of volatility shocks on the dynamic linkages between exchange rate, interest rate and the Turkey stock market. Their study covers from January 2003 to September 2013 and found that there is positive relationship between dollar appreciation against Turkish lira and Turkish stock market returns.

Tajudeen & Abraham (2010) had done the study on the impact of oil price on the performance of the Nigerian stock market. They used time series weekly basis data from Mondays to Fridays starting from November 2007 to July 2009. The result proved that there is positive relationship between oil prices to Nigerian stock market. Meanwhile, Al-Qudah, 2014 had studied the impact of oil price shocks and short-term interest rate on Amman stock exchange real returns. He used monthly data for the period January 2000 until June 2014. Interestingly, his result was contradicted from previous study that oil price shocks and short-term interest rate have negative significant effect on Amman stock exchange real return. Furthermore, Barnor (2014) had executed a research to investigate the relationship between macroeconomic variables (exchange rate, interest rate and inflation rate) to stock market returns using the GSE All Share Index as a proxy to stock returns during the period from January 2000 to December 2013. The result of the estimation of the model equation revealed that changes in exchange rate have both an immediate and long-term effects on aggregate stock prices on the Ghana Stock Exchange, while in the long run inflation rate does not significantly affect stock market returns in Ghana. Interest rate changes and money supply exerted a significant negative effect on stock market returns in Ghana. Agrawal, Srivastav, & Srivastava (2010) had conducted a study to examine the dynamics relationship between stock return volatility in India as represented by Nifty and exchange rate represented by Indian Rupee-US Dollar. They use daily data starting from October 11, 2007 to March 9, 2009. The result shows that there are negative relationship between Nifty and Indian Rupee-US Dollar. Difference from the above study, Pan et al., (2007) performed the study to examine dynamic linkages between exchange rates and stock prices for seven East Asian countries, including Hong Kong, Japan, Korea, Malaysia, Singapore, Taiwan, and Thailand, for the period January 1988 to October 1998. Their result shows that there is significant causal relation from exchange rates to stock prices for Hong Kong, Japan, Malaysia, and Thailand before the 1997 Asian financial crisis and no country shows a significant causality from stock prices to exchange rates during the Asian crisis. A causal relation from exchange rates to stock prices is found for all countries except Malaysia.

Similar studies also been conducted in Malaysia. Among them are Lim & Sek, (2013), they had conducted empirical analyses to model the volatility of stock market in Malaysia and also determine the factors that contribute to the stock market movements during pre-crisis 1997, during crisis and post-crisis 1997. The variables used are crude oil price and exchange rate which covers from 2nd January 1990 to 30th December 2010. They found that exchange rate and crude oil price have significant impacts on the Malaysia stock market volatility in the pre-crisis and post-crisis periods but the impact is not significant during the crisis period. Johan, Sipon & Md Kamdari (2012) had studied the effect of oil price, inflation and exchange rate toward stock market in Malaysia. The difference of their study as compared to others is they used exchange rate transition after financial crisis that is pegging exchange rate and floating exchange rate. The result shows during pegging exchange rate, oil price and inflation rate were found to have significant impact toward the stock market (FBMKLCI) in Malaysia while exchange rate is not significant. Meanwhile during floating exchange rate, they found that inflation and exchange rate were found to be significant to FBMKLCI. For both situations that is pegging

and floating exchange rate, oil price also show positive relationship towards the FBMKLCI. While other studies concentrated on FBMKLCI, Mohd Hussin et al., (2012) had conducted similar studies but focused on Islamic stock market (FBM Emas Shariah) in Malaysia. Their findings showed that oil price is positively related to Islamic stock market while exchange rate is negatively related to Islamic stock market.

Other studies which used US stock market as one of independent variables is Muthukumar, Raja, & Palanichamy, (2015). The objective of the study is to examine the impact of Global Financial Crisis in Indian stock market and its integration of US stock market. They used the daily average index prices which cover from January 1, 1999 to December 31, 2008. They found that there are positive correlation between the Indian Stock Market and US Stock Market. (Wuthisatian, 2014) had performed a study to investigate the long-run relationship between the stock market of Thailand and its 11 major trading markets (Hong Kong, Japan, London, NYSE, NASDAQ, Australia, the Philippines, Singapore, Korea, Indonesia and Malaysia). He uses daily data for the period of 1997 until 2013. The result shows that there is a weak long-run relationship between the stock markets of Thailand and its major trading partners.

Lingaraja, Selvam & Vasanth (2015) had conducted a study on a dynamic linkage between emerging Asian stock market indices and developed stock market. Asian stock market were represented by India, Malaysia, Philippines, china, Jakarta, Korea, Taiwan and Thailand while developed stock market was represented by US (Dow Jones Industrial Average). The result shows that India, Malaysia, Philippines has dynamic linkages to Dow Jones Industrial Average while China, Jakarta, Korea, Taiwan and Thailand has no dynamic linkages to Dow Jones Industrial Average. Njiforti (2015) conducted a study impact of the 2007/2008 global financial crisis on the Nigerian capital market. The dependent variable used is All Share Index (ASI) was used as proxy for the performance of the Nigerian Capital market, while the independent variables are Credit to the Private Sector, crude oil price, Money Supply and Dow Jones Industrial Average (DJIA). The findings discovered that the 2007/2008 global financial crisis significantly impacted on the Nigerian Capital market both in the short-run and in the long –run. The DJIA, Credit to the Private Sector, crude oil price and money supply were all affected during the crisis, which caused negative impact on the performance of the Nigerian Capital market.

Material and Methods

This study uses monthly time series data ranging from July 2009 – August 2015. The dependent variable in this study is the stock market index (FBMKLCI). The independent variables are crude oil price, exchange rate (RM/USD) and Dow Jones Industrial Average (DJIA). The data of FBMKLCI, crude oil price and exchange rate were collected from the Central Bank of Malaysia (Bank Negara Malaysia Monthly Statistical Bulletin) while Dow Jones Industrial Average (DJIA) was collected from yahoo finance. There are 74 numbers of observations. The July 2009 has been used as the first year of data collection as this month is the 1st month FBMKLCI is introduced to replace Kuala Lumpur Composite Index (KLCI). The August 2015 has been used as the final point of data collection as this month show that the FBMKLCI index point has dropped to lowest point level since 2012. Before proceeding to estimate the regression, descriptive statistics analysis and unit root test were conducted to check the stationary of data and to describe the minimum and

maximum values of data. Correlation matrix was conducted to check the relationship between an exchange rate, crude oil price and DJIA towards the stock market index. The data were then regressed using Ordinary Least Square to achieve the specified objective. Diagnostic test were then was performed to check the assumptions are met.

Results

Table 1. Descriptive statistics

	FBMKLCI	EXCHANGE	OILPRICE	DJIA
Mean	1600.355	3.244691	97.72107	8757.354
Median	1604.990	3.189250	108.5800	8362.040
Maximum	1882.710	3.940000	131.9200	11062.79
Minimum	1174.270	2.955500	42.58000	6424.280
Std. Dev.	202.3868	0.215754	22.81449	1501.842
Skewness	-0.430456	1.168763	-0.626640	0.234629
Kurtosis	2.170009	3.928963	2.142723	1.650240
Jarque-Bera	4.409330	19.50824	7.109045	6.296342
Probability	0.110287	0.000058	0.028595	0.042931
Sum	118426.3	240.1071	7231.359	648044.2
Sum Sq. Dev.	2990109.	3.398132	37996.57	1.65E+08
Observations	74	74	74	74

Table 1 shows the results of descriptive statistics for FBMKLCI, exchange rate, crude oil price and DJIA. It shows that FBMKLCI hit the maximum point at 1882.71 point while the minimum level is 1174.27. The exchange rate of RM against USD dropped to the lowest value at RM3.94/USD1 while the highest value is RM2.9555/USD1. The highest crude oil price is USD131.92 while the lowest is USD42.58 per barrel. DJIA shoot up to the highest point of 11,062.79 point, while the index plunges at 6424.28 point.

Unit root test was conducted to check for data stationary. The statistical method used is Augmented Dickey Fuller (ADF). The hypothesis is:

H_0 : Data is non-stationary

H_1 : Data is stationary

Table 2. Augmented Dickey-Fuller test statistic

	t-Statistic	Prob.*
LNFBMKLCI	-8.387672	0.0000***
LNEXC	-8.288724	0.0000***
LNOILPRICE	-6.914172	0.0000***
LNDJIA	-9.829589	0.0000***

Table 2 shows that the p-value of all the variables is 0.0000. At 5% level of significant, the null hypothesis of non-stationary is rejected since the p-value (0.000) < 0.05; therefore it can be concluded that the data for all the variables is stationary.

Correlation matrix was conducted to check the relationship between an exchange rate, crude oil price and DJIA towards the stock market index (FBMKLCI). The hypothesis is:

H_0 : $\rho = 0$

H_1 : $\rho \neq 0$

Table 3. Correlation Matrix

LNFBMKLCI	LNEXC	LNOILPRICE	LNDJIA	LNFBMKLCI
Correlation	-0.476986	0.276130	0.485744	1.000000
t-Statistic	-4.572877	2.420836	4.682472	-----
Probability	0.0000***	0.0180***	0.0000***	-----

From the result in Table 3, it shows that the p-value of an exchange rate, crude oil price and DJIA is statistically significant at 5% level which can be concluded that null

hypothesis is to be rejected and exist significant relationship between exchange rate, crude oil price and DJIA towards the stock market index (FBMKLCI). It was found that crude oil price and DJIA show positive relationship while exchange rate shows that negative relationships towards stock market index (FBMKLCI) in Malaysia.

The following regression equation is estimated to achieve the objectives of study.

$$\ln \text{FBMKLCI}_{i,t} = \beta_0 + \beta_1 \ln \text{EXC}_{i,t} + \beta_2 \ln \text{OILPRICE}_{i,t} + \beta_3 \ln \text{DJIA}_{i,t} + \varepsilon_{i,t}$$

Where,

$\ln \text{FBMKLCI}_{i,t}$: Log stock market index in Malaysia at time t

β : Coefficient Beta value

$\ln \text{EXC}_{i,t-1}$: Log exchange rate RM/USD at time t

$\ln \text{OILPRICE}_{i,t}$: Log crude oil price at time t

$\ln \text{DJIA}_{i,t}$: Lagged US stock market index at time t

$\varepsilon_{i,t}$: error term at time t

The hypothesis is:

H_0 : $\beta_1 = \beta_2 = \beta_3 = 0$

H_1 : $\beta_1 \neq 0$ for some i

Table 4. Summary of Regression Analysis and Diagnostic Test

Variable	Coefficient
C	0.361595 (0.1998)
LNEXC	-0.322628 (0.0393)***
LNOILPRICE	0.029851 (0.4040)
LNDJIA	0.207550 (0.0168)***
R-squared	0.300700
Adjusted R-squared	0.270296
F-statistic	9.890044 0.000017***
Diagnostic Test	
Jarque – Bera	1.314933 (0.518162)***
Breusch-Godfrey	5.025628 (0.0810)
Heteroskedasticity Test: White	10.73193 (0.2945)
Ramsey RESET Test:	
t-statistic	0.7689
F-statistic	0.7689
Likelihood ratio	0.7600
Variance Inflation Factor (VIF)	
LNEXC	1.603796
LNOILPRICE	1.163427
LNDJIA	1.521590

From the result in Table 4, it was found that the value of F-statistic and the p-value is 9.890044 and 0.000017 respectively. Thus we can reject null hypothesis at 5% significance level and conclude that at least one of the independent variables is significance in determining stock market index (FBMKLCI) in Malaysia. The p-value of exchange rate is 0.0393 and DJIA is 0.0168 which is lower than 5% significance level. Therefore null hypothesis is rejected. Subsequently the p-value of crude oil price (0.4040) is higher than 5% significance level thus we fail to reject null hypothesis. In conclusion, exchange rate and DJIA are two significance factors influencing the stock market index while crude oil price is not significance. Adjusted R² is 0.270296 which indicate the variation of stock market index is about

27.02% explained by the variation of independent variables in the model.

Diagnostic tests were then conducted to ensure the assumptions are met. The first diagnostic test is normality test using Jarque-Bera. The hypothesis is:

H_0 : Error term is normally distributed

H_1 : Error term is not normally distributed

The result shows that the Jarque-Bera for the sample data is 1.314933 and the p-value is 0.518162. Therefore we failed to reject null hypothesis and conclude that error term is normally distributed. Secondly, Breusch-Godfrey serial correlation was conducted to test on serial correlation of error term. The hypothesis is:

H_0 : Error term is serially independent

H_1 : Error term is not serially independent

The p-value of Prob. Chi-Square (2) is 0.0810, thus null hypothesis at 5% significance level is fail to reject and conclude that there is serial correlation for error term.

Next, White-test is used to test whether error term have constant variance for all levels of independent variables. The hypothesis is:

H_0 : Error term is homoscedastic

H_1 : Error term is heteroscedastic

The p-value of Prob. Chi-Square (9) is 0.2945 which mean that we fail to reject null hypothesis at 5% significance level. Thus it can be concluded that the error term is homoscedastic.

After that, Ramsey's Regression Specification Error Test (RESET) test is used to test on functional form.

The hypothesis is:

H_0 : No misspecification

H_1 : Error in specification

The result shows that the p-value of t-statistic, F-statistic and likelihood ratio are greater than 5% significance level. Thus we fail to reject null hypothesis and conclude that there is no misspecification of functional form. In other word the data of this study is fit multiple linear regression.

Lastly, Variance Inflation Factor (VIF) is used to check on multicollinearity between independent variables. All the values of VIF are less than 10 and close to 1. It indicates that none of independent variables have multicollinearity problem.

Discussion

The aim of this study is to identify the significance relationship between exchange rate, crude oil price and DJIA towards the stock market index (FBMKLCI) in Malaysia. Overall the finding shows that exchange rate and DJIA are two significance factors influencing the stock market index in Malaysia while crude oil price is not significance. Exchange rate (RM/USD) is found to have negative relationship to the stock market index however DJIA shows positive relationship. When exchange rate increases, it will affect investors' confidence in Malaysian economy. Thus it triggers heavy sell off from foreign investors in Malaysia which will lead them shifting their funds to other market. Consequently the FBMKLCI will moves downward. DJIA and FBMKLCI move in tandem for the past few years. Therefore the sentiment between US and Malaysia is consistent. As US is a developed stock market, the DJIA will totally influence the Malaysian stock market as an emerging stock market. Likewise, Malaysian's investors generally refer to DJIA as their performance guide. As such the relationship between DJIA and FBMKLCI is positive.

The outcome of this study is consistent with Mohd Hussin et al., (2012) who conducted their study in Malaysia using Islamic stock market and Agrawal et al., (2010) who conducted the study in India.

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