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THE EFFECT OF OIL PRICE IN MALAYSIA ECONOMY SECTORS

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Abstract

The objective of this study is to examine long-run relationship between oil price and Malaysia's economy sectors, which include of agriculture, manufacturing and services sectors. Time series data for the period from 1980 to 2014 is applied such as Unit Root test, Johansen Cointegration test and Granger Causality test. Augmented Dickey-Fuller and Phillip-Perron tests results indicated that the variable proved to be integrated in order one I(1) at first difference. After testing Cointegration test, a long-run relationship between the variables was found and oil price does granger cause sectoral output in short-run. Hence, this study is important for policy makers to restructure economic policies on oil price in Malaysia economy sectors.

JEL Classification: C32, E3, O41
Keywords: *Oil price; Agriculture; Manufacturing; Services; Malaysia*

1. Introduction

Malaysia is a newly industrialized economy and aim to become a developed nation by 2020. Malaysia is classified as high middle-income country with a diversified economy dominated by services (55% of GDP), followed by manufacturing (25% of GDP), and agriculture (7% of GDP) in 2014 (Economic Report 2014/2015). Basically, crude oil comes from offshore fields where the oil reserves are located in the Malay basin. According to IMF (2015), Malaysia's crude oil production was about 590,000 barrels per day during the first 11 months in 2014, but sharp decline from a peak about 844,000 barrels per day in early 2000s.The decline was mainly caused by oil fields matured and Malaysian government attempted to seek for joint ventures in order to provide incentives to enhance oil exploration and prolong the life of mature oil fields.

Moreover, crude oil plays an important role in determining other prices. This is because oil price fluctuation will affect other economy sectors especially

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agriculture, manufacturing and services sectors. These sectors are contributing higher percentage to the GDP of Malaysia. At the same time, rise in energy price can caused other prices increase which resulted the cost of production becomes higher and a reduction in production. Malaysia is an oil producing and oil exporting country however the global oil fluctuation can affect the economy even Malaysia's is only contributing a small percentage of world's oil production.

Recently, the falling of oil price in late 2014 has raised some issue. In June 2014, a barrel of oil is selling at $115. As of January 2015, a barrel of oil is selling at $49. The reason of falling oil prices is the supply of oil is more than the demand for oil in 2014 (Plumer, 2015). Furthermore, U.S. has found an unconventional way to extract the oil from shale formation. The Wall Street Journal reported in an article entitled "Democrats Warming to the Energy Industry" March 2008, oil production has increased 58% and natural-gas output has risen 21%, make the U.S. is the world's largest producer of fuels. In addition, U.S. has contributed 4 million extra barrel of crude oil per day to the global market since 2008 (Harder, 2014). Meanwhile, the members of OPEC especially Saudi Arabia is not going to cut its production and let the price fall with an intention to keep its market share. A survey done by IMF (2015) stated that oil prices have declined more than 55% since September 2014. The drop is estimated to have been driven by both supply and demand factors, which is higher than expected supply, particularly from the United States was not offset the production cuts by the Organization of the Petroleum Exporting Countries (OPEC) members.

Moreover, manufacturing sector is the second largest contributor to national GDP of Malaysia. High oil price has affected the cost and quantity of raw materials purchased mainly for manufacturers (Bolaji and Bolaji, 2010), as oil price might influence the shipping costs of raw materials purchased for production. The falling of oil prices brings a benefit to the sector as oil is an essential process to run the machine. As lowering of oil price enable producer to increase the number of production that will lower the products price and thus increase the consumer demand. However, fluctuation in oil price also threatens the services sector mainly from transportation sector. Delsalle (2002) explained that as oil price increases, transportation costs are affected, and transport demand is reducing.

Throughout this paper, agriculture, manufacturing and services sectors are the main economic sectors contribute to Malaysian GDP. Previous studies like Syed (2010), Ito (2008), and Mallik and Chowdhury (2011) commented that if economic growth is unaffected by oil price shocks, policies formulation on oil price are unnecessary. From the literature researches, Alper and Torul (2009), Hanson et al. (2010), and Shaari et al. (2013) who are scholars investigated the effects of oil price shocks on economic sectors. The main contribution of this paper is focus on exogenous shocks on oil price affect in Malaysia's economy sectors unlike the previous study look into macroeconomics variables. Therefore, this study intends to examine the long-run relationship between oil price and Malaysia's economy sectors.

The rest of this paper is structured as follows. The second section discusses the literature review. The third section describes data and model specification whereas empirical evidence is presented in section four. The final section

concludes the paper with important findings and policy implications.

2. Literature Review

Currently, the issue of oil price fluctuation has attracted many researchers to investigate undesirable effects of oil price fluctuation in Malaysia's economy sectors. The impact of oil price has been conducted by numerous of studies. Darby (1982) is the earliest econometric studies to estimate the effects of oil price shocks. He figured out that oil price shock's effect on the economy was statistically significant and oil shock caused a total cumulative decrease in GNP of 2.5%.

Cunado and Gracia (2005) investigated oil price impact on 15 European countries but the finding was showed mixed results. There is no exit any long-run relationship between oil prices and economic activity except for the United Kingdom and Ireland. Then, the authors continued extend their analysis by conducting a comparative study about the influences of oil price changes for small and open economies for Asian countries, including Malaysia, Singapore, Philippines, Thailand, and OECD countries. The results demonstrated that oil prices have a statistically significant effect on both economic growth and inflation although the impact is limited to the short-run. In the case of Iran, a study was done to investigate the relationship between oil price shocks and two economic sectors. Johansen Cointegration test and Vector Error Correction Model was employed and the results showed that oil price is negatively connected with agricultural sector and industrial sector.

Abeysinghe and Forbes (2001) and IMF (2006) surveyed on the impact of oil price in Malaysia. IMF (2006) analyzed that increase in oil price will detrimental on global economy. This statement only gives greater impact for developed countries than the developing countries. In regional analyses, the results obtained were different because it is depending on the relative size of oil importing to exporting countries. The study also figured out that oil price changes on oil-importing countries is different from those of oil exporting and small open economies. This is caused by different oil intensity levels in domestic production, exports and imports, and degree of openness of an economy.

In that case, Abeysinghe (2001) narrow down IMF (2006) studied on the impact of oil price changes by focusing 12 economies, which includes Indonesia, Malaysia, Singapore, Philippines, and Thailand. This study utilized VAR model to evaluate direct and indirect effect of oil prices on GDP growth using the data for the period 1978 to 1998. The findings demonstrated that higher oil prices can affect the economies directly and indirectly. In other words, a shock to one country wills statistically significant impact on other countries even if the country's is minor bilateral trading partners. As a result, net oil-exporters such as Indonesia and Malaysia are shown to be unable to avoid the negative impacts of high oil prices.

Shaari et al. (2013) explored oil price effects on different economic sectors in Malaysia. The author employed quarterly time series data from 2000 to 2011 that includes agriculture, construction, manufacturing and transportation sectors for analysis. Johnson Cointegration Maximum Likelihood Method was applied to observe the long-run relationship after ADF unit root test is stationary. Long-run dynamics among variables were detected. To estimate causality direction, Granger Causality test was used. Shaari et al. (2013)

concluded that agriculture and construction sector are relies on oil prices. Therefore, Malaysia's government should cautiously control oil prices in order to avoid negative effects on different economic sectors.

Park and Ratti (2008) investigated the impact of oil price shock on real stock returns in the U.S. and 13 European countries. They reported that Norway as an oil exporter showed a statistically significantly positive response on real stock returns to an oil price increase. While, the variance decomposition analysis displayed that oil price shocks have statistically significant at 6% of volatility in real stock returns. As many European countries increased volatility of oil prices significantly, it can depress real stock returns. In overall, Park and Ratti (2008) reported oil price shocks have a statistically significant impact on real stock returns for U.S. and 13 European countries.

Another study by Alper and Torul (2009) scrutinized the relationship between oil prices and manufacturing sub-sectors in Turkey. Vector Autoregressive Model was employed and the results explained that increase in oil price does not have any effect in manufacturing sectors in aggregate term. However, it affected the real production growth rate in several manufacturing sub-sectors such as wood products, furniture, chemical products, rubber and plastic products, and electrical machinery. In contrast, Rodriguez and Sanchez (2005) also employed same method to examine the effects of oil price shocks on the real economic activity in OECD countries. The results revealed that change in oil prices will yield different effects in OECD countries' real output as well as real economic activity. In United Kingdom, a rise in oil prices is negatively affects the economic growth compare to Norway is positively affected by oil prices.

In the past, many studies have focused on how oil price fluctuations impact on conventional stock market returns. Jammazi and Aloui (2010) examined stock market variables respond negatively to the crude oil changes temporarily during moderate (France) and expansion (UK and France) phases but not fall into a level of recession phase. When there is occurred in expansion period, the effect of West Texas Intermediate (WTI) has driven the Japanese stock market into a recession phase. This study clarified to policy makers to offset inflationary impact of higher prices with monetary policy particularly in UK and France. This interpretation contrast with policy maker in Japan who is unable to counteract the increased variability of oil shocks, which contributed to the vulnerability of stock market in Japan.

In summary, although many different studies have been done but there is a few papers study about the effect of oil price in Malaysia's economy sectors. Hence, this study needs further investigation.

3. Data and Model Specification

To carry out this study, time series data from 1980 until 2014 was collected. There are 35 observations in this study. The data for Malaysia's country was extracted from World Development Indicator (2015) and International Financial Statistics (IFS) of the International Monetary Fund (IMF). The simple OLS model has been shown as below:

$$\text{InSectoral output}_t = \beta_0 + \beta_1 \text{InOP}_t + \varepsilon_t \quad (1)$$

In equation (1), InSectoral output$_t$ and InOP$_t$ are the natural logarithms logs of sectoral output which includes agriculture sector's GDP, manufacturing sector's GDP and services sector's GDP while InOP$_t$ is the natural logarithms logs of oil price in Malaysian Ringgit. The coefficients β_1 is elasticity and ε_t is error term.

Three econometrics tests were run in this study to analyze the regression model. First, a stationary test was performed to determine the order of integration for each time series using the augmented Dickey-Fuller test (ADF) and Phillips-Perron test (PP). Second, to conduct the Cointegration test, the standard maximum likelihood method of Johansen (1988) and Johansen and Juselius (1990) was applied. Cointegration analysis is interpretation of a long-run equilibrium relationship between the variables. Last, the Granger causality test was used to analyze the causality between oil price and sectoral output. According to Granger (1988), the existence of cointegration between X and Y must be checked before running the causality test. If a cointegrating relationship is found, then there must exist causality in at least one direction.

4. Empirical Results

4.1 Unit Root Test

The Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests were employed to test the stationarity of the time series data sets. The results of the ADF and PP tests are reported in Table 1. As shown in the table, the results obtained indicated that all variables had unit roots in levels. However, after first differencing, all variables became stationary or were integrated of order one, I (1).

Table 1
Unit Root Test

	ADF Test		**PP Test**	
Variables	***Intercept***	***Intercept and Trend***	***Intercept***	***Intercept and Trend***
Lsectoral output	4.7961	0.115	7.5213	0.8086
LOP	-0.4465	-2.0206	-0.4523	-2.1868
	First Difference			
Lsectoral output	-3.7248**	-5.2554***	-3.8179**	-6.7169***
LOP	-4.1212***	-4.4647**	-4.8303***	-4.6918***

Note: *** and ** denotes significant at 1% and 5% significance level. The optimum lag length selected based on Akaike Information Criterion (AIC).

4.2 Johansen Cointergration Test

After variables are confirmed to be stationary at first differences, then Johansen Cointegration test was used to test the long run relationship between the variables. Under this testing procedure, there were trace and maximum eigen value tests that emphasized Trace Statistic and Max-Eigen Statistic values. The results of Johansen's procedure are summarized in Table 2. If the Trace Statistic or Max-Eigen Statistic was more than the critical value, the null hypothesis was rejected. Therefore, there was a long-run cointegration relationship between

the dependent and independent variables. As reported in Table 2, the results show that both of the Trace and Max-Eigen tests were statistically significant to reject the null hypothesis of r=0 at 5% significance level. Therefore, this study implies that only one long-run cointegration relationship between sectoral output and oil price.

Table 2
Johansen-Juselius Cointegration Test Results

Hypothesized	Trace	Max-Eigen	Critical Values (5%)	
No. of CE(s)	Statistic	Statistic	Trace	Max-Eigen
r=0	18.2364**	18.1765**	15.4947	14.2646
r≤0	0.0599	0.0599	3.8415	3.8415

Note: ** denote significant at 5 significance level.

4.3 Vector Error Correction Model (VECM)

If a cointegration exit in the model, then the VECM long-run model is proceed. The empirical results showed that VECM long-run equation as follows:

Table 3
VECM Long-Run Equation

LSectoral Output$_{t-1}$ = -11.0184 + 2.5627LOP$_{t-1}$		
s.e		-0.6662
t-stat		[3.8469]
Diagnostic tests		
JB	0.8927	(0.6400)**
Serial Correlation	32.4884	(0.1153)*
White test	4.6741	(0.1066)*

Note: * and ** denotes significant at 10% and 5% significance level. The values in brackets represent *p*-values.

The long run linkage among oil price and sectoral output indicates a positive and significant at 5% levels with 1% increase in oil price will increase 2.56% of sectoral output. This result is consistent with the findings of Harri (2009) and Chen (2010) who found that oil price increases will affect economy's sectors. Harri (2009) and Chen (2010) demonstrated the presence of significant long-run relationship between oil prices and sectoral output. To validate the model, several diagnostic tests are performed like Jarque-Bera normality test, Breush-Godfrey serial correlation Lagrange multiplier test, and Heteroskedasticity test. All the tests demonstrated that the models are normally distributed, the residuals are serial uncorrelated, and homoscedasticity at 5% and 10% significance level. Therefore, the empirical results reported are valid and reliable for analysis interpretation.

4.4 Granger Causality Test

After estimation of long-run VECM model, short-run Granger causality test is performed in Table 4. Since, the variables are cointegrated in the long-run, there exists an error correction term which brings together the long-run

relationship and its short-run dynamic adjustments. The coefficients of ECT_{t-1}, which measures the speed of adjustment back to the long-run equilibrium value are statistically significant at 5% level and correctly signed, that is negative. The coefficient of -0.3395 indicates the convergence to equilibrium. Therefore, these empirical results provide an evidence existence of long-run and short-run relationships between the variables. More specifically, oil price does granger cause sectoral output in short-run. These empirical findings are consistent with the earlier works by Chang and Wong (2003), Sanchez (2011) and Hamilton (2003).

Table 4
Granger Causality Results based on VECM

	Independent Variables		
Dependent	**X^2- statistics of lagged 1st differenced term**		
Variables	***ΔLSectoral Output***	***ΔLOP***	***ECT (t-ratio)***
ΔLSectoral Output	-	6.1938**	-0.3395**
		[0.0452]	(-2.2208)
ΔLOP	3.7866		0.1294
	[0.1506]	-	(0.2499)

Note: ** denote significant at 5% significance level, respectively. The figure in the parenthesis (…) denote as t-statistic and the figure in the squared brackets […] represent as *p*-value.

5. Conclusion and Policy Implication

This paper aims to examine the effect of oil price in Malaysia economy sectors. Unit root test was conducted and the results indicated the all series are not stationary in levels, but after first difference all variables are stationary and integrated of order one I(1). Furthermore, the output of VECM model and error correction model has found the evidence that there is long-run and short-run equilibrium relationship. This implies that long-run effect of oil prices in Malaysia economy's sectors are exit and the variables are moving together in the long-run relationship. These results match with the study of Obayelu (2010). Apart from that, even Malaysia has been providing crude oil subsidy to citizens to reduce the effects of worldwide oil price fluctuation. On the other hand, with the GST implementation on 1st April 2015, it will trigger global economies especially in Malaysia's economy sectors that will create arising higher inflation. Hence, Malaysian government and policy-makers should formulate policies on oil price in order to mitigate risk. Renewable energy should be implemented to substitute non-renewable energy to meet high demand from consumers for energy consumptions every day.

References

Abeysinghe, T. (2001) Estimated of direct and indirect impact of oil price on growth. Economics Letters, 73, 147-153.

Abeysinghe, T., Kristin J. Forbes. (2001) Trade linkages and output-multiplier effects: A structural VAR approach with a focus on Asia. NBER Working Paper No. 8600.

Aloui, C., R. Jammazy., I. Dhakhlaoui. (2008) Crude oil market shocks and stock market returns. Journal of Energy Market, 3, 69-96.

Alper, C. E., O. Torul. (2009) Asymmetric adjustment of retail gasoline prices in turkey to world crude oil price changes: The role of taxes. Economics Bulletin 29(2): 789-802.

Binuomote, S.O., K.A. Odeniyi. (2013) Effect of crude oil price on agricultural productivity in Nigeria (1981-2010). International Journal of Applied Agricultural and Apicultural Research, 9(1&2): 131-139.

Bolaji, B.O., Bolaji, G.A. (2010) Investigating the effects of increase in oil prices on manufacturing companies in Nigeria. The Pacific Journal of Science and Technology, 11(2), 387-390.

Chang, Y., Wong, J.F. (2003) Oil price fluctuations and Singapore economy. Energy Policy, 31, 1151–1165.

Chen, S.T., Kua, H.I., Chen, C.C. (2010) Modeling the relationship between the oil price and global food prices. Applied Energy, 87(8), 2517-2525.

Cunado, J., F. Pérez de Gracia. (2005) Oil prices, economic activity and inflation: Evidence for some Asian countries. The Quarterly Review of Economics and Finance, 45(1), 65-83.

Darby, M. (1982) The price of oil and world inflation and recession. American Economic Review, 72(4), 738.

Delsalle, J. (2002) The effects of fuel price changes on the transport sector and its emissions –Simulations with TREMOVE. European Economy, 172, 1-42.

Granger, C.W.J. (1988) Some recent development in a concept of causality. Journal of Econometrics, 39(1-2), 199-211.

Hamilton, J.D. (2003) What is an oil shock? Journal of Econometrics, 113(2), 363–398.

Hanson, K., Robinson, S., Schluter, G. (2010) Sectoral effects of a world oil price shock: Economy wide linkages to the agricultural sector. Journal of Agricultural and Resource Economics, 18(1), 96-116.

Harder, A. (2014) Democrats increasingly backing oil and gas industry. Retrieved from The Wall Street Journal: http://www.wsj.com/articles/democrats-increasingly-backing-oil-and-gas-industry-1407790617.

Harri, A., Nally, L., Hudson, D. (2009) The relationship between oil, exchange rates, and commodity prices. Journal of Agricultural and Applied Economics, 41(2), 501-510.

International Monetary Fund. (2006) Oil prices and global imbalances. World Economic Outlook, Chapter 2 April, 2006.

International Monetary Fund. (2015) Favorable prospects for Malaysia's diversified economy. World Economic Outlook, March 2015, IMF county report no.15/58, 1-78.

Ito, K. (2008) Oil price and the Russian economy: A VEC model approach. International Research Journal of Finance and Economics, 17, 68-74.

Jammazi, R., C. Aloui (2010) Wavelet decomposition and regime shifts: Assessing the effects of crude oil shocks on stock market returns. Energy Policy, 38(3), 1415-1435.

Johansen, S. (1988) Statistical analysis of cointegration vectors. Journal of Economic Dynamics and Control, 12(2&3), 231-254.

Johensen, S., Juselius, K. (1990) Maximum likelihood estimation and inferences on cointegration with application to the demand for money. Oxford Bulletin of Economics and Statistics, 52(2), 169-210.

Mallik, G., Chowdhury, A. (2011) Effect of inflation uncertainty, output uncertainty and oil price on inflation and growth in Australia. Journal of Economic Studies, 38(4), 414-428.

Obayelu, A.E., A.S. Salau. (2010) Agricultural response to prices and exchange rate in Nigeria: Application of co-integration and Vector Error Correction Model (VECM). Journal of Agriculture Sciences, 1(2), 73-81.

Park, J., R. A. Ratti. (2008) Oil price shocks and stock markets in the US and 13 European countries. Energy Economics, 30(5), 2587-2608.

Plumer, B. (2015) Why oil prices keep falling and throwing the world into turmoil. Retrieved from VOX: http://www.vox.com/2014/12/16/7401705/oil-prices-falling.

Rodriguez, R. J., S. M. Sanchez. (2005) Oil price shocks and Real GDP growth: Empirical evidence for Some OECD countries. Applied Economics, 37(2), 201 –228.

Sanchez, M. (2011) Welfare effects of rising oil prices in oil-importing developing Economies. The Developing Economies, 49(3), 321–346.

Shaari, M.S., T.L. Pei., H.A. Rahim. (2013) Effects of price shocks on the economic sectors in Malaysia. International Journal of Energy Economics and Policy, 3(4): 360-366.

Syed, N. (2010). Measuring the impact of changing oil prices and other macro economic variables on GDP in the context of Pakistan's economy. International Research Journal of Finance and Economics, 52, 41-49.