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Causality Relationship between Crude Oil Variables and Budget Variables in Malaysia

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ABSTRACT

As an oil and gas exporter, Malaysia profited from higher world energy prices. However, the fall in oil prices from highs in 2014 significantly affected Malaysia's government revenue (GR), hence its expenditure since the Malaysian GR still largely depends on oil revenues. Malaysia also has problems with high spending on energy subsidy, shrinking in its net crude oil export, and narrowing the gap between its crude oil production and consumption. Given this scenario, not only shocks in crude oil price could affect Malaysian GR and expenditure, but also other variables such as crude oil production, export, import, and consumption. However, the long-term impact of these crude oil variables on Malaysia's GR and expenditure is still empirically unclear. Therefore, the main objective of this paper is to examine the causality relationship between crude oil variables and budget variables in Malaysia. The findings show that crude oil variables studied have no long run causality relationship with government expenditure (GE) but significantly cause the Malaysian GR in the long run. In short run, however, only crude oil consumption was found to Granger causes GE thus indicates the impact of fuel subsidy on the GE. For GR, there is short-run causality running from production, export and import to the GR.

Keywords: Oil Prices, Government Expenditures, Budget deficit, Malaysia
JEL Classifications: 043, Q43, Q47

1. INTRODUCTION

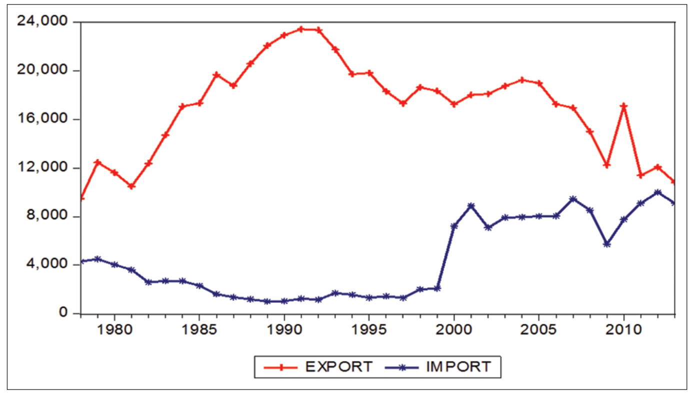
The impacts of oil price shocks on macroeconomic variables have been studied extensively by many researchers. Most of the studies on this relationship were focused on the impact of oil price movements on gross domestic product, gross domestic product (GDP) (for example, study by Hamilton, 1983; Hooker, 1999; Guo and Kliesen, 2005). Hamilton (1983), for instance, documented a negative and significant relationship between oil price change and future GDP growth of the USA. Several studies have been conducted to examine the impact of oil price shocks on other macroeconomic variables. For example, Korhonen and Juurikkala (2009); Koranchelian (2005); Zalduendo (2006); Hanson et al. (1993); Adeniyi et al. (2012) studied the impacts of oil price shocks on exchange rates. There is also a fairly sizeable literature that studied the link between oil price movements and stock price. Basher et al. (2012), for example, examined the dynamic relationship between oil price and emerging stock market prices on top of its relationship with exchange rates. Filis et al. (2011) investigated the dynamic correlation between stock market and oil prices for oil-importing and oil-exporting countries. Moreover, Harri et al. (2009) explored the relationship between oil prices and primary commodity prices, in addition to exchange rates. Lescaroux and Mignon (2008) investigated the link between oil prices with a number of macroeconomic and financial variables such as gross domestic product, consumer price index (CPI), household consumption, unemployment rate and share price.

Several studies have also been conducted on the impact of oil price shocks on budget variables: Government revenue (GR), government expenditure (GE) and budget deficit. Sachs (1981), for example, found that oil price shock of 1973 increased the budget deficit in developed oil importing countries. Most of these studies are concentrated in the developed oil importing countries. Unlike oil-importing countries, net oil exporting countries stand to gain whenever oil prices are high. Conversely, low oil price could hurt their budget variables. However, only several studies focused on the impact of oil price shocks on budget variables in the case of net oil-exporting countries. For instance, Eltony and Al-Awadi (2001) examined the impact of oil price fluctuation on three key macroeconomic variables in Kuwait. The variables involved in their study were oil revenue, the CPI, the value of import, and three policy variables: Money supply (M2), government current expenditure and government development expenditure. The empirical results highlight the causality running from the oil prices and oil revenues to government development and current expenditures and then towards other variables. Rahma et al. (2016) explored the impact of oil price shocks on the main variables of Sudan's government budget. The empirical results suggested that significant decrease in oil price influences oil revenues, current expenditure and budget deficit of Sudan. In Nigeria, Iwayemi and Fowowe (2011) found that positive oil shocks have not caused output, GE, inflation, and the real exchange rate.

Unlike previous studies, which mainly focus on the impact of oil prices on budget variables on top of oil prices, this paper attempts to explore the impact of other oil variables on the budget variables in Malaysia. This paper argues that in the case of Malaysia, not only oil prices could significantly affect government budget variables but other variables such as crude oil production, consumption, export and import could also potentially influence the GR and expenditure. In regards to these variables, Malaysia is a net exporting crude oil country since the 1970s (Figure 1). Starting from 1993, however, Malaysia's crude oil exports were in the decreasing trend. In contrast, its imports increased sharply starting from year 2000. This results in narrowing the gap between Malaysia total crude oil export and total import, hence making Malaysia a marginally net oil exporting country. According to the statistics, Malaysia crude oil import increased from 7,218 ktoe in 2000 to 9,101 ktoe in 2013, while its export decreased from 17,254 ktoe in 2000 to 10,823 ktoe in 2013. As a result, the net crude oil export reduced from 10,036 ktoe in 2000 to only 1,722 ktoe in 2013, a reduction of about 82.8% (Malaysia Energy Statistics Handbook, 2015). The same pattern can also be observed on the Malaysia crude oil production and consumption (Figure 2). Figure 2 clearly shows that starting from 2013, Malaysia's crude oil consumption has outstripped its production.

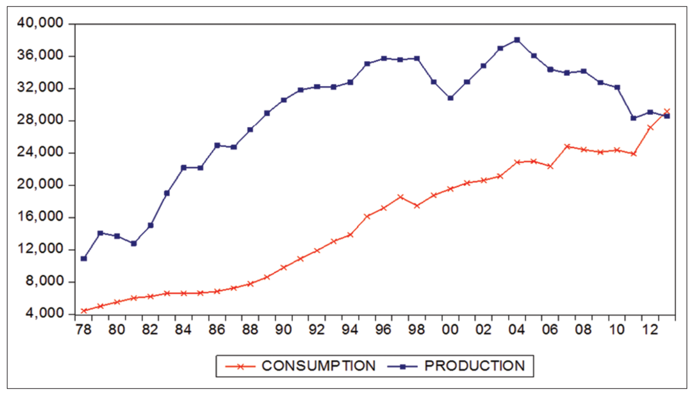
Malaysia's oil exports are made up of two main components: Crude oil and liquefied natural gas (LNG). In contrast to crude oil exports, Malaysia stills a large net exporter of LNG. Due to this, the contribution of the oil and gas industry to the Malaysia economy is still significant. In 2014, crude oil, condensates and gas constituted the second largest exports after electrical and electronic goods. In the 40 years following its corporation, PETRONAS (a national petroleum company) alone has contributed a staggering RM881 billion to the government's coffers in the form of dividends, royalties, duties and taxes. From 2010 to 2013, total oil-related revenues to government grew from RM55.313 billion to RM64.923 billion, but its share shrank from 34.65% to 30.26%. Oil sector's share in Malaysia GDP has also shrunk from 10.8% in 2010 to 9.9% in 2013. This is because revenues from other economic sectors have been growing faster than the oil sector, and Malaysia GRs streams have gradually been diversifying away from oil.

Figure 1: Malaysia import and export of crude oil in ktoe, 1978-2013



Source: Malaysia Energy Statistics Handbook, Energy Commission, 2015

Figure 2: Malaysia production of crude oil and consumption of petroleum products in ktoe, 1978-2013



Source: Malaysia Energy Statistics Handbook, 2015

As an oil and gas exporter, Malaysia has previously profited from higher world oil prices. However, a series of falls in oil prices from highs in 2014 significantly affected the GR and expenditure since Malaysia GR still largely depends on oil revenues. Malaysia budget is in the deficit since 1998 and the government plans to achieve a balance budget by the year 2020. On top of this, Malaysia government has a problem with high spending on energy subsidy consumption. In 2013, the government spent about RM29 billion on fuel subsidies, up from RM27.9 billion in 2012. Low crude oil price, combined with sustained budget deficits, narrowing gap between export and import, decreasing trend in crude oil production and increase in crude oil consumption hence high fuel subsidies spending forced the Malaysian government to cut its expenditures, and to expand its tax base by implementing goods and service tax in 2015.

From the discussion, on top of the oil prices, other crude-oil related variables also might influence Malaysian GR and expenditure. The long-term impact of crude oil prices and related variables on Malaysia's GR and expenditure, however, is still unclear. This is because, unlike most of oil-producing countries, Malaysia is a developing country with diversified economy. Therefore, the main objective of this paper is to empirically investigate the causality relationship between five crude oil variables (oil prices, production, consumption, exports, and imports) and the Malaysia budget variables; GR and expenditure. The purpose is to identify the short- and long-run impacts of crude oil variables on the Malaysian government budget.

The remainder of this paper is organized as follows: Section 2 discusses the literature review. Section 3 presents the methodology and source of data. This is followed by Section 4 that discusses the findings. And, finally, Section 5 provides the conclusion and policy implications.

2. LITERATURE REVIEW

The impact of oil price on the macroeconomic variables has received a great attention among economists since the oil shocks in the 1970s. This led to an abundance of studies that attempted to describe the causal relationship between oil shocks and macroeconomic activities especially in the oil-importing developed countries. An increase in oil price leads to higher production costs thus causes a slowdown of output and productivity of the country. Higher oil price increases the general prices level, and ultimately reduces the real income available for consumption, hence reduces demand. Therefore, for net oil-importing countries, high crude oil price would hurt their economy, and could increase their budget deficit. Meanwhile, for the net oil-exporting countries, high crude oil prices would increase their oil revenue; hence could positively affect the GE. Almulali and Che (2013) showed that a surge in oil price causes oil revenues to increase in OPEC countries, which in turn impact GE positively. This is consistent with the findings from Fasano and Wang (2002) that examined the direction of causality between total revenue and total government spending for GCC countries including Oman, over the period 1980-2000. Using a cointegration and error-correction models, their results show that an increase in revenue causes an increase in GE in the first period for all GCC countries, which means that GE is pro-cyclical to changes in oil revenue.

Eltony and Al-Awadi (2001) examined the impact of oil price fluctuations on seven key macroeconomics variables for the Kuwait economy using quarterly data for the period 1984-1998. They found the causality running from the oil prices and oil revenues, to government development and current expenditure. The results indicated that oil price shocks have a significant impact on GE, development and current expenditure. Ahmad and Masan (2015), used the co-integration techniques to investigate the short-run and long-run relationships between three main macroeconomic variables: The real GDP, the real GE, and the real oil revenues in Oman for between 1971 and 2013 and found a long-run relationship between these three variables. They also found that in the short-run, variations in GE are generally derived by oil revenue shocks. Ebrahim and Mohammad (2012) employed the structural vector auto-regression (VAR) model in their study and claimed that increase in oil price influences government capital expenditure and current expenditure of Iran. Meanwhile negative shocks reduced both government capital expenditure and current expenditure. In another study in Iran, Dizaji (2014) found that the contribution of oil revenue shocks in explaining the GEs is stronger than the contribution of oil price shocks. Lorde et al. (2009) studied the macroeconomic effects of oil price fluctuations in the case of Trinidad and Tobago through the Granger-causality tests, which indicated causality from oil prices to output and oil prices to GR.

Studies on the relationship between oil price shocks and budget variables in developing countries resulted in various unique conclusions. Akin and Babajidie (2011), for example, reported insignificant effect of price increase and decreases on GE. In contrast, Jbir and Zouari-Ghorbel (2009) found positive and negative oil shocks significantly affected government spending in Tunisia. Rahma et al. (2016) employed the VAR model and explored the impact of oil price shocks on government budget variables in Sudan. Their result suggests that oil price decreases significantly influences oil revenues, current expenditure and budget deficit. However, oil prices increases do not Granger causes Sudan's budget variables. Oriakhi and Iyoha (2013) used quarterly data from 1970 to 2010 to examine the consequences of oil price volatility on the growth of the Nigerian economy and found that oil price volatility directly affect the country's real GE, real exchange rate and real import. They also argued that oil price changes determine GE, which in turn determines the growth.

3. METHODOLOGY

3.1. Data and Estimation Strategy

In this paper, the relationship between oil price and budget variables will be examined by the cointegration test and the Granger causality tests. These tests require the variables to be used in a given model at stationary, that is, their stochastic properties are time invariant. The standard Granger tests are also only valid if the original time series are not cointegrated. Thus, the time series analyses that appropriate for this study includes unit root tests to test the stationary properties of the series, cointegration test to determine the existence of a long-run relationship between crude oil variables and budget variables studied, and causality tests. For estimation, this study used annual data for the period from 1978 to 2014. In this study, the multivariate VAR model used in the estimation consists of six variables. Out of this, five are crude oil variables (OP, EX, IM, PR, and CO), while the other is budget variable (GE or GR). The VAR model for these variables can be written as followed:

$$V=v'[OP_t, EX_t, IM_t, PR_t, CO_t, GV_t] \quad (1)$$

Where, OP_t is world crude oil price, average ($/bbl) in period t; EX_t is crude oil export and IM_t is crude oil import, both in ktoe; PR_t is crude oil production, CO_t is consumption of petroleum products in ktoe, GV_t is government budget variable; government revenue (GR_t) or government expenditure (GE_t). In the estimation process, the budget variables (GR and GE) will be regressed with all crude oil variables, individually. Data for OP were taken from World Bank database (Pink Sheet) while data on EX, IM, PR, and CO were gathered from Malaysia Energy Commission Statistics Handbook 2015. Meanwhile, source of data for GE and GR are from DataStream.

The estimation process starts with the unit root tests to test the time series properties of the variables and its order of integration. In this paper, the unit root tests will be performed using augmented dickey-fuller (ADF) tests and Phillip-Perron (PP) tests. If a series (y_t) becomes stationary after being differenced d times, y_t is integrated of order d and denoted by y~I(d). For example, if y_t becomes stationary after being differenced once, thus y~I(1). Meanwhile, {y_{it}} is said to be co-integrated of order 1, if each of its components is integrated of order 1, which implies that two series, y_1 and y_2 are only co-integrated if they were integrated in the same order.

The next step is to examine the long-run relationship between the variables by conducting the cointegration tests. If the variables were found co-integrated, further estimation will be performed using vector error correction model (VECM). Engle and Granger (1987) demonstrated that if the variables are co-integrated, a corresponding error-correction representation always exists. However, if they are not co-integrated, the unrestricted VAR will be used. The VAR provides a framework for assessing the effects of a particular variable on other variables and because all variables are considered as endogenous variables, the structural relationships are free of prior restrictions (Farzanegan and Markwadt, 2009).

The basic idea behind the cointegration relationship is, if in the long-run two or more series move closely together, even though the series themselves are trended, the difference between them is constant. There are two tests widely used for cointegration: The single equation based Engle and Granger (1987) test and the systems based Johansen (1988) tests. In this paper, Johansen cointegration tests will be used. Finally, in order to test the causality relationship, this paper applies the Granger causality test introduced by Granger in 1969. In a bivariate framework, the variable y_1 is said to cause the variable y_2 in the Granger sense if the forecast for y_2 improves when lagged variables y_1 are included in the equation. In general, conventional Granger causality can be represented by the following bivariate system.

$$y_{1t} = \delta_1 + \sum_{i=1}^{m} \beta_i y_{1t-i} + \sum_{i=1}^{n} \theta_i y_{2t-1} + \varepsilon_{2t} \quad (2)$$

$$y_{2t} = \delta_2 + \sum_{i=1}^{q} \pi_i y_{1t-i} + \sum_{i=1}^{r} \varphi_i y_{2t-1} + \varepsilon_{2t} \quad (3)$$

Where, δ1 and δ_2 are drifts. In the above equations, the null hypothesis, which is "y_2 does not Granger cause y_1" is rejected if the coefficients of θ_is in Equation (2) are jointly significant. The null hypothesis that y_1 does not Granger cause y_2 is rejected if the π_is in Equation (3) are jointly significant. If some of $\theta_i \neq 0$ and some $\pi_i \neq 0$ then there is feedback between y_1 and y_2. Meanwhile, in general, the relationship between y_1 and y_2 in the VECM form can be presented as follows:

$$\Delta y_{1t} = \delta_1 + \sum_{i=1}^{m} \gamma_{1i} \Delta y_{1t-i} + \sum_{i=1}^{n} \beta_{1i} \Delta y_{2t-i} + \sum_{i=1}^{r} \alpha_{1i} ECM_{r,t-1} + U_{1t} \quad (4)$$

$$\Delta y_{2t} = \delta_1 + \sum_{i=1}^{m} \gamma_{2i} \Delta y_{1t-i} + \sum_{i=1}^{n} \beta_{2i} \Delta y_{2t-i} + \sum_{i=1}^{r} \alpha_{2i} ECM_{r,t-1} + U_{2t} \quad (5)$$

Where, Δ denotes the first-difference of a non-stationary variable. In the VECM, the sources of causation can be exposed through the statistical significance of three different tests. First, from a joint test that is applied to the sum of the lags of each explanatory variable. Second, by a t-test on the lagged ECM term; this is the weak exogeneity test. And third, by a joint test that is applied to the sum of each explanatory variable and the lagged ECM terms (the strong exogeneity test). It also necessary to address the issue of long run and short-run causality implicit in the ECM represented by Equations (4) and Equation (5). Granger (1986) suggested that the ECM approach should lead to better short-run prediction and integrate the short-run variations with the long-run equilibrium. In this regard, some researchers suggested that the lagged changes in the independent variable represent the short-run causal impact while the ECM term indicates the long-run causality. In all estimations and tests, the Akaike information criteria is used to determine the optimal lag length.

4. FINDINGS AND DISCUSSION

4.1. Results from Unit Root Tests

A standard Granger causality test assumes that the time series examined are stationary. If the series are non-stationary, the implications drawn from the test are invalid. The results of unit root tests from the ADF and PP tests are presented in Table 1. At each level, it is found that the results from the PP tests are consistent with ADF, which show that all are not significant, thus indicating that the series are not stationary at level. At first difference, results from the PP tests show that all series are statistically significant at 5% level. Consistently, results from the ADF tests also found that all series studied are stationary at first difference, except for crude oil consumption. Therefore, in general, the findings from the unit root tests indicate that all series studied are stationary at first difference or integrated of order 1, I(1).

4.2. Results from Co-integration Tests

Table 2 presents the results from Johansen co-integration tests. The tests were carried out based on multivariate VAR model consists of all variables studied; OP, EX, IM, PR, CO, and GV (GE or GR). There are two sets of multivariate VAR model that

Table 1: Results from unit root tests

Variables	Level		1st difference	
	ADF	PP	ADF	PP
OP	−1.0577[0]	−1.1047[2]	−4.5200[1]*	−6.8435[1]*
	(−2.9458)	(−2.9458)	(−2.9511)	(−2.9484)
EX	−1.0339[1]	−2.0954[3]	−8.1049[0]*	−7.7322[3]*
	(−2.9511)	(−2.9484)	(−2.9511)	(−2.9511)
IM	−0.5721[0]	−0.6333[1]	−4.9169[1]*	−5.4466[3]
	(−2.9458)	(−2.9458)	(−2.9511)	(−2.9484)
PR	−2.2945[1]	−4.6375[11]	−4.9631[0]*	−4.9835[2]*
	(−2.9511)	(−2.9484)	(−2.9511)	(−2.9511)
CO	1.6638[0]	1.5881[1]	−1.1284[1]	−3.5169[1]*
	(−2.9458)	(−2.9458)	(−2.9511)	(−2.9484)
GE	1.2944[4]	−0.9761[5]	−3.5622[3]*	−4.6602[9]*
	(−2.9571)	(−2.9458)	(−2.9571)	(−2.9484)
GR	−1.2904[0]	−1.3120[5]	−4.4782[9]*	−6.0750[11]*
	(−2.9458)	(−2.9458)	(−2.9810)	(−2.9484)

Figures in parenthesis is MacKinnon (1996) critical value at 5% level. Figures in [] are optimum lag length based on AIC. *Indicates significant at 5% level. The tests were carried out with intercept. ADF: Augmented dickey-fuller, AIC: Akaike information criteria, PP: Phillip-Perron, GR: Government revenue, GE: Government expenditure

Table 2: Co-integration tests

Test variables (intercept in CE)	H_0: No. of CE(s)	Trace statistic	Critical value 5%	Max-Eigen statistic	Critical value 5%
Multivariate VAR					
ΔOP,	r=0	160.2940*	95.7536	68.9178*	40.0775
ΔEX,	r≤1	91.3761*	69.8188	46.3016*	33.8768
ΔIM,	r≤2	45.0745	47.8561	23.8756	27.5843
ΔPR,	r≤3	21.1988	29.7970	13.0780	21.1316
ΔCO,	r≤4	8.1208	15.4947	7.2308	14.2646
ΔGE	r≤5	0.8900	3.8414	0.8900	13.8414
ΔOP,	r=0	121.5698*	85.7536	53.3303*	40.0775
ΔEX,	r≤1	68.2394	69.8188	26.3892	33.8768
ΔIM,	r≤2	41.8502	47.8561	18.9834	27.5843
ΔPR,	r≤3	22.8668	29.7970	13.0927	21.1316
ΔCO,	r≤4	9.7741	15.4947	6.8263	14.2646
ΔGR	r≤5	2.9477	3.8414	2.9477	3.8414
Bi-variate VAR					
ΔOP,	r=0	44.0380*	15.4947	26.2529*	14.2646
ΔGE	r≤1	17.7853*	3.8414	17.7853*	3.8414
ΔOP,	r=0	33.1808*	15.4947	18.1442	14.2646
ΔGR	r≤1	15.0366*	3.8414	15.0366	3.8414
ΔPR,	r=0	36.5113*	27.0081	27.0081*	14.2646
ΔGE,	r≤1	9.5031*	9.5031	9.5031*	3.8414
ΔPR,	r=0	31.4275*	15.4947	27.0081*	14.2646
ΔGR	r≤1	11.9301*	3.8414	9.5031*	3.8414
ΔCO,	r=0	34.9831*	15.4947	31.2918*	14.2646
ΔGE	r≤1	3.6913	3.8414	3.6913	3.8414
ΔCO,	r=0	26.5166*	15.4947	21.2692*	14.2646
ΔGR	r≤1	5.2474*	3.8414	5.2474*	3.8414
ΔEX,	r=0	34.4581*	15.4947	26.0730*	14.2646
ΔGE	r≤1	8.3851*	3.8414	8.3851*	3.8414
ΔEX,	r=0	32.0084*	15.4947	18.5342*	14.2646
ΔGR	r≤1	13.4741*	3.8414	13.4741*	3.8414
ΔIM,	r=0	30.5513*	15.4947	20.7815*	14.2646
ΔGE	r≤1	9.7697*	3.8414	9.7697*	3.8414
ΔIM,	r=0	29.8722*	15.4947	21.4060*	14.2646
ΔGR	r≤1	8.4661*	3.8414	8.4661*	3.8414

*Significant at the 0.05 level. The r.denotes the maximum number of cointegrating vectors. Δ denotes first difference, and H_0 is null hypothesis. VAR: Vector auto regression

were estimated. On top of this, the cointegration tests have also been carried out based on the bi-variate VAR model consist of one crude oil variable and one budget variable, respectively. The first part of Table 2 displays the result of co-integration tests from multivariate VAR model, while the second part of Table 2 presents the results from the bi-variate VAR model.

Statistics in Table 2 shows that the trace test results for the first multivariate VAR model, which consists of all crude oil variables and GE, contain two co-integration relationships between the variables. Consistently, the maximum Eigen value test statistics also show there are two cointegrating equations at the 0.05 level. Meanwhile, in the second multivariate VAR model (GR) both trace tests and maximum Eigen value tests indicate there is one co-integration equation. From the results of cointegration tests, we can conclude the existence of long run relationship between the all variables studied. With regard to the bi-variate VAR model, there are findings of at least two cointegration equations between each crude oil variable and budget variable studied, except in the case of the bi-variate relationship between crude oil's consumption and GE, where there is only one cointegration equation. The results from the cointegration test indicate the existence of long run relationship between each of crude oil variable studied and the Malaysia's GE and revenue.

4.3. Results from Granger Causality Tests

Based on the results from unit root tests and co-integration tests, this study used a VECM to test for causality among the variables of interest. The Granger causality test was carried out using Wald restriction in order to identify the sources of causation. The results from the tests are presented in Table 3. In the case of GE, the ECM term is negative but not significant, which indicates that there is no long run causality running from OP, EX, IM, PR and CO to GE. With respect to short run causality, we failed to find support of the existence of short run causality from OP, PR, EX and IM to GE. Only crude oil consumption was found Granger causes Malaysian GE in the short run. In contrast, for GR, the ECM term is negative and significant, thus indicate that in the long run all crude oil variables studied can Granger causes Malaysia GR.

The test results also exhibit evidence to support the existence of short run causality from crude oil production, crude oil export and import to GR in Malaysia. Crude oil prices and consumption, however, were found not causally related to Malaysian GR.

Table 3: Granger causality results based on VECM

Dependent variable	Sources of causation					
	Short run					Long run
	ΔOP[a]	ΔPR[a]	ΔEX[a]	ΔIM[a]	ΔCO[a]	ECM[b]
ΔGE	0.7583	1.1833	0.8499	0.6583	8.0732*	−0.015
	(0.6844)	(0.5534)	(0.6538)	(0.7195)	(0.0177)	(0.8544)
ΔGR	0.3275	12.6099	14.2266	20.5498	4.2197	−0.0306
	(0.7207)	(0.0018)*	(0.0008)*	(0.0000)*	(0.1213)	(0.0021)*

*Significant at 5% levels. [a]Chi-square statistics from Wald test. [b]t-statistics. Δ denotes first difference. ( ) P value. VECM: Vector error correction model

This study also failed to find support on the short run causality running from crude oil prices to GE. The findings indicate that crude oil price does not cause the level of Malaysia GR as well as expenditure in the short run. Malaysia's diversified economy could be one of the factors that contribute to the absent of causality relationship between crude oil prices and GR, and between crude oil prices and GE in the short run. Therefore, decreases in price of crude oil would not cause the GR to drop significantly since the government still have other sources of revenue from other economic sectors. Meanwhile, for GE, on top of crude oil prices, the results also show that production, export and import of crude oil also not causally affect the Malaysia GE. Only consumption of crude oil Granger causes the Malaysian GE in the short run. The causality relationship from crude oil consumption to the Malaysia GE may indicate the impact of heavy fuel subsidy expenditure on the GE.

5. CONCLUSION

Crude oil plays an important role in determining the GR and subsequently its expenditure either in the oil exporting countries or oil importing countries. Sharp oil price increase would benefit the net oil exporting countries especially in form of higher GR. Meanwhile, for the oil importing countries, a drop in crude oil price could benefit their economy through decrease in cost of production, and hence economic growth and GR. The objective of this paper is to investigate the short run and long run causality relationship between crude oil price and the budget variables, namely GR and GE, in the case of Malaysia. The focus, however, is not only on crude oil prices but also on other crude oil variables such as production, export, import and consumption. Studying these variables will provide a better insight on the nexus between crude oil and government budget variables in the marginally net oil exporting country like Malaysia. With a long record of budget deficit, narrowing gap between crude oil's export and import as well as crude oil's production and consumption, and high subsidy expenditure on fuel consumption, not only crude oil prices could impact Malaysia GR and expenditure, but other crude oil variables are also can. Although, Malaysia economy is relatively more diversified than other oil exporting developing countries, oil revenue also still contributes quite high percentage to the Malaysian GR.

The findings from the bi-variate co-integration tests show that there is a long run relationship between all crude oil variables studies and the Malaysian GR and expenditure, respectively. The similar test in the form of multivariate VAR models also support the existence of long run relationship between budget variables and the crude oil variables studied. The causality tests based on the VECM, however, found that there is no long run causation running from crude oil variables to GE. In contrast, the test results support the existence of long run causality from crude oil variables to GR. With regard to short run causality, only crude oil consumption was found significant, indicating the crude oil consumption can causes GE in Malaysia. For other crude oil variables (price, production, export and import), this paper failed to find support on the causality relationship that run from these variables to GE. The existence of causality relationship between oil consumption and GE can be explained by the fact of high fuel subsidy expenditure by the Malaysia government. Meanwhile, for the GR, the results show that out of five crude oil variables studied, three are significant. The significant variables are crude oil production, export and import. Two variables that are not significant are crude oil price and consumption. The significant results indicate that crude oil production, export and import cause the Malaysia GR in the short run. Meanwhile, for crude oil prices and consumption, we failed to find support the existence of short run causality relationship from these two crude oil variables to the GR.

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