The Impact of Oil Price Shocks on the Malaysian Economy

Nora Yusma Mohamed Yusoff, Dr.
Email: nora@uniten.edu.my
College of Energy Business and Economics
University Tenaga Nasional (UNITEN), Malaysia

ABSTRACT

The purpose of this paper is to analyze the symmetric effect of oil price shocks on the Malaysia's economy. Annual data for the oil prices, real GDP, oil revenue, non-oil revenue, government total expenditure and total subsidy variables are applied .The co-integration test; impulse response function;variance decomposition analysis, under VAR methodology, are employed. The findings suggest that in the short run, Malaysia economy is benefitted from oil price shocks as it has positively affectedthe oil revenue, even in a short-term phenomenon and seem to retard in a long run growth. In longer time path, oil price shocks exhibit an increasing manner for both GDP and total subsidy. Also, the results confirmed that the fluctuations of world oil price would have a significant short term impact on total government expenditure. These would confirm that that fiscal policy is the main mechanism channel that transmits the oil price shocks to the economy. Also, the results suggest that the adoption of expansionary fiscal policy during the oil price shocks can facilitate rapid economic growth in the longer time path, as long as there is a stability and persistence of economic policies within the framework.

Keywords:Oil price shock; DynamicEffect; Fiscal Policy Response;Volatility; Malaysia.

INTRODUCTION

Since Malaysia became independent in 1957, Malaysia's economic record has been one of the successful developing countries (World Bank, 2008). In 2010, the economy of Malaysia was ranked the 13th largest economy in Asia. However, real GDP grew by an average of 6.5 per cent per year, from First to Ninth Malaysia Plan,for the year (1966 -2010 period) (Figure 1). Performance peaked in the early 1980's through the mid 1990's as the economy experienced sustained rapid growth averaging almost 9.5 percent annually. High levels of foreign and domestic private investment played a significant role as the economy diversified and modernized. Once heavily dependent on primary products such as rubber and tin, Malaysia today is a middle-income country with a multi-sector economy based on services and manufacturing industries.

Malaysia now is one of the world's largest exporters of electronic components and communication technology (ICT) products. However,the per capita income measured at about US$8,373 in 2010 and it has been moving from low-income agrarian economy to an upper-middle-income country.

The recent rise of global oil prices, 2007 and 2008, was characterized by tremendous price hike for fossil fuels on the global market and high price volatility severely affect global economies. This caused an intense global debate on energy security and the role of fossil fuels that were consequently linked to the issues of rapid growth of global development (in China and India as well as climate change issues). Malaysia economyis a small open economy with a large external trade sector and its economy is more energy intensive in production and hence more sensitive to oil price increases. As such, despite any price control or external price shock will ultimately be transmitted into the domestic economy. The price shocks also have given rise to political and economic instability (Al Amin et al., 2008). In the wake of its peak, this crisis has brought to the world a state with high oil prices and other commodity prices; and casting doubts if such crisis will again recur in the near future.

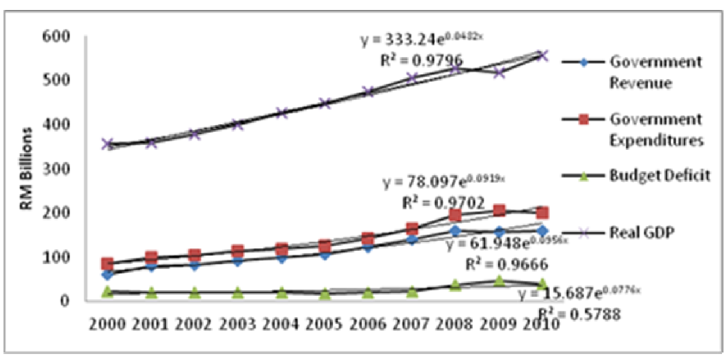


Fig 1: Malaysia: Revenues, Expenditures, Real GDP and Deficit, 2000-2010 (RM Billion).

As an oil exporting economy, higher world energy price is expected to have a beneficial impact in the Malaysian economy as the positive gains from higher oil prices could offset any negative impact on the economy (i.e. through oil tax revenues, petroleum royalties, dividends and indirect tax revenues). This is done through pump priming whereby revenue from higher oil prices can be channeled back into the domestic economy through government expenditure channels. Fig. 1 shows that the revenue growth rate is on average at 9.5 per cent of the (2000-2010) period while the average expenditure growth rate for the (2000-2010) was slightly below then revenue (9.1 percent). Nevertheless, the net impact of high oil prices on Malaysia's economic performance would also depend on the exposure of the Malaysian economy to oil, and also to energy elasticity of demand, particularly in terms of domestic consumption even on energy consumption and the extent of the spillover effect of the increase in costs on other products and services. Although there is broad agreement that high oil prices would have negative effects on macroeconomic variables, the magnitude and duration of the effects are uncertain.

Generally, when the fuel price increases in the economy, it will have a spillover effect of the increase in costs on other products and services. As the price level in the economy increases, the purchasing power, and monetary wealth of households and business declines, thus resulting in a decline in quantity demanded of goods and services in the economy. Furthermore, high oil prices would then spread throughout the economy, driving up production and distribution costs on a wide variety of goods that will induce firms to reduce the output. This in turn will affect to the number of labor employed in the economy. The increase in production and distribution costs would be caused by factors such as the rise in the expected price level, workers demanding higher wages (wage push) and increases in non-labor inputs such as raw materials in which will put pressure on the labor market (Frederic, 2007). Although other factors were important, high oil prices played a critical role in substantially reducing economic growth in most of these cases.

On the other hand, it is no doubt that rising energy price strain the government's budget in subsidy, which wasretained in the Malaysian economy for almost 10 years. This is owing to its price cap for the electricity and petroleum products and market price become widen. This has contributed to a large fiscal deficit which has been growing progressively from RM5 billion in 1998 to RM 36.5 and RM48 billion for 2008 and 2009, respectively or by averaging the growth was at 7 percent of the (2000- 2010) period (See Figure 1). Moreover, should oil prices continue to increase, the amount of government subsidies on fuel and other essential items would also increase [5]. Hence, the Government's expenditure will rise and non-oil tax revenues would fall resulting in an increase in the country's fiscal deficit or imbalance of current account. In terms of per oil revenue, fuel subsidies accounted for 31.35% of oil revenues for the year 2005 and decrease to 12% and 11.5% for the year 2008 and 2009, respectively It also shows that fuel subsidy has increased sharply from0.22% of RGDP for the year 2005 and rose to 0.36% by the year 2010.

However, it could not be denied that higher oil price shock has caused a substantial increase in the Malaysian fuel subsidies.Thus,this has put much pressure on the government budget as well as revenue losses due to tax exemption. Moreover, should oil prices continue to increase, the amount of government subsidies on fuel and other essential items would also increase (EPU, 2010). Hence, the Government's expenditure will rise and non-oil tax revenues would fall resulting in an increase in the country's fiscal deficit or imbalance of current account. Due to these reasons, the Malaysian Government has reinforced to revise its retail price of fuel products and designed several fiscal policies to lessen the worst impacts on its fiscal deficit. So, in line with this, in the year 2008, a series of gradual fuel subsidy removal policies has been introduced. This is purposely to reduce the substantial increase in the fuel subsidies as well as the revenue losses due to tax exemption. Also, the gradual removal of fuel subsidy could help government to reduce the level of fossil energy use in the economy and shift to the alternative green energies sources that could reduce the carbon emission in the environment. This in turn could support the Malaysia commitment to the Kyoto Protocol II which is a voluntary reduction of up to 40 percent in terms of emissions intensity of GDP in 2020.

Also, according to "Supply-Side Economy", lowering/ eliminating subsidies to the appropriate level can reduce government burden and raise government revenue by transferring back to the economy and causing faster economic growth. This led the supply-siders to advocate large incremental in marginal income and capital gains tax rates to encourage reallocation of income distribution via welfare redistribution, which would in turn generate more income and produce more supply in the economy. The increased aggregate supply would then result in decrease prices in turn increased aggregate demand.

Thus, it is believed that the findings of this research of oil price shock are crucial, as it will provide some valuable policy lessons particularly in relation to the importance of having well established frameworks for fiscal policy, and well-affix inflation expectations. In this regard, the current paper attempts to explore the impact of the symmetric oil price shock on the Malaysian economy and to simulate the effects of oil price shock on real GDP, government expenditure and revenue in the Malaysian economy. The empirical finding of this study is significant especially to help government and policy planner in giving policy guidelines especially in designing a proper fiscal policy instrument in the macroeconomic level planning. Specifically, in assessing the channel of higher oil prices transmitted to the rest economy and how the fiscal policy would respond to it. In order to analyze the oil price shocks impacts the GIRF and VDC under VAR model were employed. The VAR model is still the most widely applied empirical approach used to determine the relationship between oil prices and macroeconomic variables (Gronwald, 2012).

PAST STUDIES

The relationship between oil price shocks, economic growth and fiscal policy response is now well established in the literature, as the finding of the price simulation has important policy implications in future. Generally, there are two groups of oil price shock effects can be found. First, is a group use an asymmetric effect and the second group of study that use a symmetric approach of oil price shocks. But the methodology uses vary.

Firstly, a group of study that uses asymmetric effects of oil price shocks on the economy. For instance Zhang (2008) analyses the asymmetric effect between oil price shocks and economic growth in Japan by using the nonlinear approach. The empirical evidence confirms the existence of nonlinearity between these two variables. The idea is that negative oil price shocks (price increase) tend to have a larger impact on growth than do positive shocks. Lardic and Mignon (2008) analyze the long-term relationship between oil prices and economic activity, GDP for the US economy, G-7, Europe and Euro economies. The results indicate that there is evidence for asymmetric co-integration between oil prices and GDP but the standard co-integration is rejected. For oil-importing countries, Mehrara (2008) for instance confirms that oil revenue shocks tend to affect output in asymmetric and non-linear ways. The finding suggests that negative oil shocks affect output growth adversely, while positive shocks play a limited role in stimulating economic growth. However, Mehrara and Oskoui (2007) find that oil price shocks are the main source of output fluctuations of oil-producing countries such as Saudi Arabia and Iran but not so in Kuwait and Indonesia. Tan (2009) investigates the asymmetric impacts of crude oil price shocks on the Malaysian industrial output and inflation in the economy. The study uses the impulse response function (IRF) and variance decomposition (VDC) based on the unrestricted vector autoregressive (VAR) model. The findings found that oil price shocks affect industrial output and inflation. Oil price shocks on output are asymmetric but not inflated. On the contrary, the response of terms-of-trade to oil price shocks is statistically insignificant. On the other hand, Mork (1989) found an asymmetry between the responses of the GDP and oil-price increases and decreases.The main concluding is that the decreases were not statistically significant. Thus, his results confirmed that the negative correlation between GDP and increases in oil-price was persistent when data from 1985 onwards were included.

Secondly, a group of study that uses a symmetric approach of oil price shock on the economy. Many researchers have concluded that there is a negative correlation between positive or increases in oil prices and the subsequent economic downturns in the United States (For example, see Hamilton, 1983; Burbidge and Harrison, 1984; Gisser and Goodwin, 1986; Mork, 1989; Hamilton, 1996; Bernanke et al., 1997; Hamilton and Herrera, 2001; and Hamilton, 2003). Also, other studies found that strong correlation or co-integration relationship between higher world oil prices and macroeconomic variables exist in the long run (For instance, Hamilton, 2003; Jones et al., 2004; Rodrigues and Sanchez, 2004). Besides, Lorde et al. (2009) found that oil price has been the major determinant of economic activity of the country. Also, Hutchison (1993) found that positive oil price shocks do exert a negative impact on real GNP growth and inflation variance in USA and Japan. For Korea, Glasure (2002) investigates the positive effect of oil price shocks on real national income and a non-oil producing country. The results confirm that positive oil price shocks affect real national income adversely. On the other hand, Lee and Ronald (1995) reported that the response of the GDP to an oil-price shock depends greatly on the environment of oil-price stability. An oil shock in a price stable environment is more likely to have greater effects on GDP than one in a price volatile environment. Earlier, Abeysinghe (2001) concluded that net-oil exporting countries do not exempt from the negative impacts of high oil prices that is a positive shockon their economies. The positive effects of high oil prices would dampen trade and hinder growth through a contractionary effect of trading partners.

DATA SOURCES AND METHODOLOGY

Annual data for macroeconomic variables covering the period 1980-2010 are used. Theoil prices (OILP), real GDP (RGDP), oil revenue (OR), non-oil revenue (NOR), government total expenditure (GOE)and total subsidy (SUB)macroeconomic variables are applied. The realGDP dataare collected from the Department of Statistics whilethe GOE,OR, NOR, SUB and OILPdata are collected from the Economic Planning Unit (www.epu.gov.my). Furthermore, all these variables were measured in constant price (2000 as a base year) and transformedinto a logarithm base. Also, all these time series data usedlogarithmic differences as a proxy for growing rates. This procedure is used to ensure that all variables are in stationary and to reduce heteroscedasticity[Sari and Soytas, 2006].

The current paper utilized the co-integration test, impulse response function (IRF) and variance decomposition (VDC) analysis, under vector auto-regression (VAR) framework. For reliable results all macroeconomic series should be stationary. For this reason, the properties of the variables were checked by the unit root test. In this study, the ADF (1979)approaches employed.Thus, the null and alternative hypothesis of unit root tests can be written as follows:

H_0: $\alpha = 0$ (Y_t is non-stationary or there is a unit root).

H_1: $\alpha < 0$ (Y_t is stationary or non-unit root).

For macroeconomic theory and meaningful results all the timeseries data should be co-integrated.So that, Johansen and Juselius (J-J) approach (1990)used.The J-J procedures specify two like hood ratio testsstatistics referred to asγ_{trace} andγ_{max}. Furthermore, we employed the concept of co-integration to investigate the long run equilibrium between the variables in the multivariate Models. The analysis will base on these following equations:

$$\Delta\, lnY_t = \alpha_0 + \Sigma\, \beta_i\, \Delta lnY_t + \Sigma\, \chi_j\, \Delta lnX_t + \varepsilon_t$$

$$\Delta\, lnX_t = \gamma_{20} + \Sigma\, \sigma_i\, \Delta lnX_t + \Sigma \tau_j\, \Delta lnY_t + \varepsilon_t$$

Where *(Y_t, X_t)* i.e. are dependence variables, Δ is a different operator, ε_t is a random error term with mean zero, βi and χ_j are the coefficient estimates for independent variables. To perform the co-integration test, we create the null hypothesis as there is no co-integration among variables. If trace statistics or max-eigenvalue exceed the critical value, we will reject the null hypothesis of no co-integration (r=0) which means that coefficient values of independent variables is not equal to zero. This would mean that, co-integration exists between two variables (Y_t, X_t).

Having specified the model, the next step is to find the appropriate lag length of the co-integration,as the result of the co-integration test is sensitive to the lag chosen. The lag length chosen is based on information provided by the selection of lag length information criteria. In the current study, we use AIC, H-Q and SBC criteria's in deciding the number of lags. The lowest values of these criteria used to represent the better estimated model. Once the order of the VAR has been determined, a test for misspecification should be performed. For autocorrelation test on VAR residual, we thus employ the Lagrange Multiplier (LM) tests. However, the root of the AR

Polynomial test employed to test the stability of the estimated VAR model and to confirm that there is no root lies outside the unit circle.

The dynamic interactions between the world oil priceand macroeconomic variables were analyzed by the IRF and VDC, which are based on the VAR system. We applytheGeneralizedIRFs (GIRF) procedures to simulate a positive standard error unit shock on current and future values of the variable[19]. GIRFs are more robust as compared to Cholesky decomposition and Orthogonalized IRFs which is sensitive to the ordering of the variables. Specifically, this test is used to determine the extent to which real GDP variables and fiscal policy component's response to an oil price shock and to what extent these shocks are persistent.The VDC for each series is further disaggregated to indicate the attributes of innovations within the system of endogenous variables. It indicates how much of the forecast error variance of the variable can be explained by exogenous shocks (changes) or by own changes to the variables in the same VAR model.

The study employed the VAR model to simulate a positive standard error unit shock on oil price.In order to explain how a VAR is estimated we assume that each equation contains k lags values of Y and X variables. In this case, it can estimate each variable by using the OLS method:

$$Y_{t=} \alpha + \sum_{j=1}^{k} \beta Y_{t-j} + \sum_{j=1}^{k} \gamma X_{t-j} + U_{1t} \qquad (1)$$

$$X_{t=} \alpha' + \sum_{j=1}^{k} \delta Y_{t-j} + \sum_{j=1}^{k} \gamma X_{t-j} + U_{2t} \qquad (2)$$

Where, the $U_t = (U_{1t}, U_{2t})$is the stochastic error terms for $t=1, 2.....T$. In addition, $U_{1t}$and U_{2t} are assumed independent and with zero mean, i.e. E (U_{1t}) = 0, k is the lag length criteria, $\alpha and \alpha'$are constant terms, β, γ and$\delta$are the coefficient estimate for independent variables. The VAR model (Equations 1 and2)will be extended to comprise 6 major endogenous economic variables. Theseare OILP,RGDP, OR, NOR,SUB and GOE.

EMPIRICAL RESULTS AND FINDINGS

This section analyzes the time series properties of the data during the (1980-2005) period. The units-root test is performed at both levels and the first differences of ADF test for all variables, as can be seen in Table 1. Table 1shows that all variables have a unit root in their level, since the *p*-value for all series are not significant at all levels. Based on these estimated results, we fail to reject the null hypothesis of unit roots even at the 10% significance level. However, when we performed the ADF test at first difference, *I(1)*, the results indicate that all variables are *I(1)* since the *P*-value is significant at 1% and 5% level. This means that after we have taken the first difference of all variables, there is no evidence of the existence of unit roots..ADF tests suggested that all variables appear to be integrated at an *order of I(1)* since the P-value are significant at 1% and 5%, hence they are qualified for inclusion in a long term equilibrium relationship.

Table 1: ADF Unit Root Tests results for Stationary.

	AT LEVEL						**First Differences**					
	Constant and No Trend			**Constant and Trend**			**Constant and No Trend**			**Constant and Trend**		
	lags	t-stat	Prob	lags	t-stat	Prob.	lags	t-stat	Prob.	Lags	t-stat	Prob.
LOILP	0	0.334	0.9763	0	-1.11	0.9104	1	-4.19	0.0029***	1	-5.46	0.0007***
LGDP	0	-0.9835	0.7462	0	-1.145	0.9037	0	-4.38	0.0017***	0	-4.37	0.0086***
LSUB	0	-0.146	0.9351	0	-2.017	0.569	1	-4.21	0.0028***	1	-4.99	0.0021***
LGOE	3	2.674	1.00	0	-1.47	0.817	0	-5.90	0.000***	2	-4.66	0.0048***
LOR	0	0.13	0.9628	0	-1.722	0.7161	0	-5.65	0.0001***	0	-5.81	0.0003***
LNOR	0	-0.1254	0.9377	0	-1.964	0.5967	0	-5.78	0.000***	0	-5.86	0.0002***

Notes: (1)***, **,* indicate the significance level of 1%, 5% and 10%, respectively.

(2) The optimum lags lengths for ADF determined by the Schwarz Info Criterion (SIC).

Source: Output of E-Views Package Version 7

Based on ADF test, therefore, we proceed the co-integration analysis. The results of the co-integration test for multivariate via the J-J procedure are provided in Table 2. The null hypothesis (H_0) of no co-integration (r=0) among the variables for Model 1indicate that the Trace Test and Maximal Eigenvalue suggest r=2 and 1, respectively. This indicates that the H_0(r=0), is clearly rejected since the trace statistics and maximal eigenvalue exceeds the critical values at 1% and 5%. Therefore, it concludes that there existslong run relationship among the variables in

Model 1. Furthermore,these variables (OILP, RGDP, OR, NOR, GOE and SUB which are in log forms) are co-integrated and follow a common long run relationship.

Table 2: J-J Test for Multivariate Co-integrating Vector.

MODEL 1: LENG LGDP LEMP LOILP							
Hypothesized	Trace	Critical Value	Prob.	Maxi Eigenvalue	Critical Value	Prob.	Results
No. of CE(s)	Statistic	0.05			0.05		
None* (r=0)	117.73	95.75	0.0007***	45.02	40.08	0.0128**	Trace Test indicates 2 and
At most 1 (r≤1)	72.71	69.82	0.0289**	29.35	33.88	0.1578	max-eigenvalue indicates
At most 2 (r≤2)	43.35	47.86	0.1242	20.60	27.58	0.3008	1 cointegration equation
At most 3 (r≤3)	22.75	29.80	0.2586	13.79	21.13	0.3822	at 1% and 5% level

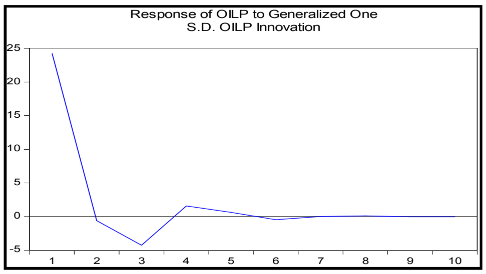
Notes:***, ** and * denote statistically significant at 1%, 5% and 10%, respectively

Having specified the model, the appropriate lag length of the VAR model is the next step of the analysis. The AIC, H-Q and SBC criteria have been performed to select the optimal number of lags. Based on the minimum AIC criteria value, the results of the lag 1 for the VAR model have been chosen (see Table 3).

Once the order of the VAR model has been determined, a test for misspecification has been performed. Table 4 reports the results of the LM test for residual serial correlation. The result suggests that there is no obvious residual autocorrelation problems exist in the model. This is because all *p*-values are larger than the 0.05 level of significance. In addition of that, for stability testing of the estimated VAR model, the root of the AR Polynomial test will be employed.However, the results confirm that there is no root lies outside the unit circle; hence the VAR models will satisfy the stability condition (See Table 5).

Referring to the entire diagnostic and misspecification test analysis above on the VAR system, we have performed the GIRFs in order to simulate a positive standard error unit shock on oil price and these results are shown in Figures2(a) to 2(f).

Figures2(a) -2(f) show the IRFs for onestandard deviation (SD) symmetric OILP shocks tocurrent and future values of endogenous variables. We conducted estimations of the GIRF overthe 10-th period ahead for each endogenousvariable based on the VAR system, where decomposition values converging to stable states.



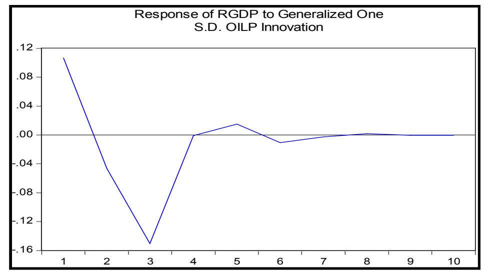
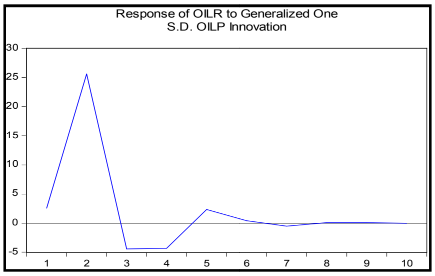


Figure 2 (a): Response of OILP to Own Shocks.

Figure 2 (b): Response of RGDP to OILP Shocks

Figure 2 (a) shows OILP shocks response to own shocks. Figure 2 (b) suggests that the OILP shock has an immediate effect, which leads to a decrease in RGDP in the short run. The larger negative impact occurs in the 3-rd period which is decreased to negative 0.15%. This is followed by a gradual increase over next periods until the 5-th period which are around 2 years. However, the impact on RGDP growth becomes stable or asymptotes to 0 after the 6-th period. This suggests that the negative impact of OILP shock on the growth rate of GDP is relatively short-lived.

It is seen that a one standard deviation (SD) of symmetric innovations has instantaneous positive and significant impact on OR at 2-nd period and there is substantial volatility in the ORover the 2-nd period(Refer Figure 2(c)). The time pathof the impulse response indicates an initial appreciation in the OR, before it decreases after the 2-ndto the 4-th period, finally asymptotes to 0 after the 6-th period. The OR has increased sharply to 26% over the next 2-th period before it falls in the next period.As far as OILPshock is concerned we confirm that an OILPshocks lead to a negative impact in NOR (see Figure 2 (d)). This situation may be partly explained by the indirect effects of OILP shocks that effects through cost channel. In other words the OILP shocks raise the marginal cost of producers.



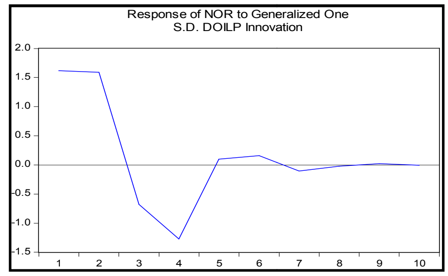
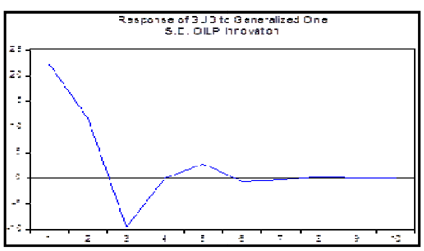


Figure 2 (c):Response of OR to OILP Shocks

Figure 2 (d): Response of NOR to OILP Shocks.

Figure 2 (e) and 2 (f) show that SUB and GOE variables respond negativelyto a one-standard deviation (sd) of symmetric innovations on a short term trend which is consistent with the symmetric trend of oil price shocks, with the negative magnitude of SUB larger than GOE.In the third period,oil price shocks exert a strong and negative impact of -10% and -0.5% on SUB and GOE variables.Thereafter in the longer horizon, the results are not significant statistically. This suggests that the impact of OILP shock on subsidies and government expenditure is a short-term phenomenon.



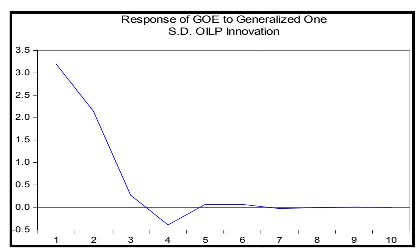


Figure 2 (e): Response of SUB to OILP Shocks
Figure 2 (f): Response of GOE to OILP Shocks

Table 6 describes the accumulated effects of one S.D. of OILP shocks on the endogenous variables.In estimating the impact of oil price shocks up to 10-th period on other endogenous variables, it can be seen that total subsidies and oil revenue growth (OR), are the most affected by the oil price shocks, which areaccumulated at 26% and 22%, respectively. The accumulated response result also inferred the oil price shocks adversely affected tothe real GDP which is by -0.08% which indicated that 1 percent increase in has slightly decreased the real GDP (RGDP), by 0.08% over the next 10-th period.At the same time, the accumulated response over 10-th period for NOR is 1.4%, which is far smaller than the impact on the OR. While the accumulated response for GOE up to the 10-th period is estimated to be positive 5.3% which indicated that 1 percent increase in OILP shocks contributes an increase in the GOE by 5.3% over the next 10-th period.

Table 7shows the *VDC* for the 6 endogenous variables with symmetric OILP shocks are estimated over the10-period horizon for each endogenous variable based on the VAR model, where the decomposition value converging to stable states. The results of VDC (Table 5) show that nearly 95% of the oil price variable is explained by its own shock. In estimating the impact of oil price shocks on other endogenous variables, it can be seen that an oil price shock is a considerable source of variation for oil revenue (OR), government expenditure (GOE) and real GDP (RGDP), which are 75%, 32% and 27.5%, respectively. On the other hand, non-oil revenue also contributes as much volatility on the real GDP growth which around 26%. In the second period and onwards, it was found that the oil price shocks also have a greater impact on GOE with variances ranging from 25% to 32%, following by the RGDP and SUB with variances ranging from 12% to 27% and 20% to 22%, respectively. Importantly, oil price shocks exert a greater impact to real GDP growth over the second period which is the volatility increasing sharply from 12.58% to 27.5%.

POLICY IMPLICATIONS

The study investigates the symmetric effects of oil price shock that is a one standard deviation (SD) of symmetric innovations in the small oil-exporting economy such as Malaysia. It uses yearly data for the (1980-2010) period. The VAR, IRF and VDC are used to estimate the oil price shocks on real GDP, fiscal policy tools: government expenditure, oil revenue, non-oil revenue and total subsidy. The findings suggest that the impact of symmetric oil price shocks has a direct and positive impact on oil revenue, even if a short-term phenomenon. This is because oil revenues constitute a large component of total government revenue, making fiscal policy directly sensitive to oil price changes.

As an oil exporting country, high oil prices in the short term, especially from year 2005 to 2008, where crude oil price has increased sharply from USD57 to USD 95 per barrel, the latter would benefit from slightly higher crude oil price. Thus, volatility in crude oil prices i.e. positive symmetric has proven to givebeneficial impact to the Malaysia economy via oil revenue, as it has to other oil producing countries.Moreover, the positive gains from slightly higher oil prices could also offset any adverse impact to the economy. This is done through pump priming whereby revenue from higher oil prices can be channeled back into the domestic economy through government expenditure via fuel subsidies and later increase others sectors output contribution. This is shown by the value of annual average growth rate of oil revenue which is at 28% whereas the annual average growth rate of fuel subsidiesand government operating expenditure is only at 15.5 % and 6.7%, respectively. (Refer Table 8 and Fig. 3).

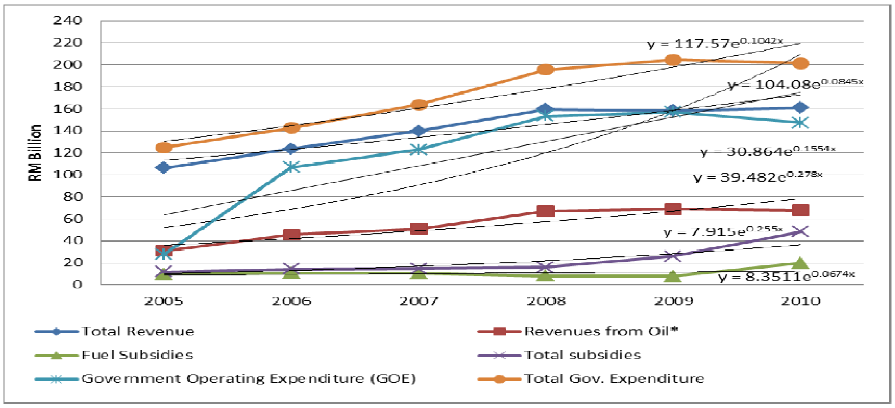


Fig.3. Malaysia Oil Revenue, Fuel Subsidies and Average World Oil Price

Source: Data taken from www.epu.gov.my

The analysis of the findings of VDC test shows that oil price shock is a considerable source of variation for oil revenue (OR), which is near to 75%. Thisresult is consisted with earlier findings (See, Villafuerte et al., (2009)[1]. The studied found that oil revenue is a critical source of fiscal revenue where fiscal oil revenue accounted for more than 25 percent of total fiscal revenue over (2005-2008) period. In Malaysia, oil revenue has contributed 29% up to 43% of total revenue for the(2005-2010) period.As oil revenue increase, the country budget move into surplus, particularly in the case of oil production is by state owned oil companies (PETRONAS in Malaysia). In 2011, moreover, crude oil is the Malaysia's biggest mineral export accounting for about 5% (RM32 billion) of total exports.Also, petroleum related income is the largest single contributor to the government revenue. It accounted about 33.9% (RM62.9 billion) of the government's total revenue (www.epu.gov.my). In 2009, it reached its highest level at almost 40% or RM 68.8 billion(Refer Table 8). This would, also, help to improve current account balance as well as narrow the deficit gap for Malaysia budget.

Table 8: Real GDP, Fiscal Components and Revenues from Oil for (2005-2007), (RM Billions and %).

	2005	2006	2007	2008	2009	2010
Real GDP	4492.5	4755.26	5049.19	5283.11	5192.18	5595.55
Total Revenue	106.3	123.5	139.9	159.8	158.6	160.9
Revenues from Oil*	31	45.5	51.1	67	68.8	68
Oil Revenues/Total Revenues	29.16	36.84	36.53	41.93	43.38	42.26
Fuel Subsidies per Total Subsidies (%)	82	75	71	50	30	41
Fuel Subsidies	9.717	10.86	10.437	8.1	7.89	19.85
Total Subsidies	11.85	14.48	14.7	16.2	26.3	48.41*

Source: Malaysia Economic Planning Unit,accessed on 30 January 2013.

Total Subsidies for the year 2010 is included other government transfer payment like pension, scholarship, cash transfer and others.

On the other hand, the accumulated effects of one S.D. of OILP shocks also shows that the oil price shock would bring greater positive impacts on the oil revenue as compared to the government expenditure, which are 22% and 5.3%, respectively, over the next 10-th period. This result would infer that positive gains from oil revenue due to higher oil price would able to lessen or counter back the adverse impacts on the economy by transferring back the oil income to the government expenditure via expansionary fiscal policy (including subsidies). Simultaneously, the positive gain from oil revenue could also bring a large increment in capital income and capital gains tax rates. This would encourage the reallocation of income distribution or welfare distribution, which in turn generate more income, produces more supply and increase aggregate demand in the economy which causing faster economic growth in the long term period (increase the GDP). The positive income from oil i.e. tax revenue, sales tax, export duty and royalties would be also transferred back to the economy through fiscal policy components i.e. government expenditure (transfer mechanism and subsidies). This is to ensure that in the medium to long term the economy would able to return back to the right track by giving a response to the exogenous shock like oil price shocks and other shocks. Figure 4 shows how the transmission mechanism channel of oil price shocks works in the economy and how fiscal policy response to it. Indeed, fiscal policy is a very important transmission mechanism, as it determines the degree of exposure of domestic variables to an external shock of this kind.

The study also found that the macroeconomic impacts of oil price shocks are greater in magnitude for real GDP in the Malaysian economy in the short term. This is based on the IRF simulated result which shows that in the 10th period ahead, the positive OILP shock has an immediate effect, which leads to a decrease in RGDP, as predicted by theory. Although it is not a direct effect, this shock could affect the real GDP in some mechanism channel that is through a fiscal policy response. In other words, the hikes of oil price would dampen the growth of economies through a contractionary effect of household consumption and private capital spending in the economy (AD components). However, the increasing proportion of variance of oil price shocks in real GDP suggests that this macroeconomic variable is vulnerable to oil price fluctuations, but only in the short term horizon (from1st till 3rd period). In the medium term,the impact on RGDP growth becomes stable after the 6-th period which means that the negative impact of OILP shock on the growth rate of GDP is relatively short-lived.

This is probably that, government has given prompt responsesor feedback to this positive shock through its expansionary fiscal policies, such as price and tax mechanism control (i.e. Fuel subsidy policies, tax collection, government transfer payment and etc.) in order to control the *adverse* effects to the economy i.e. increase aggregate demand (AD) in the economy, which in turn could help stabilize and return the economy to the right track. On the other hand, positive oil price shocks would also benefited oil export revenue and improve the current account (CA) balance for Malaysia. This in turn would also help to reduce the gap of fiscal deficit for the government. Simultaneously, fiscal policy (G and T) can be eased returning some of the increased income to the household sector and private through mechanism transfer payment i.e. cash transfer, rebates, coupon and etc. The mechanism channel of price shocks to the economy through fiscal policy response can be summarized in the Figure 4.

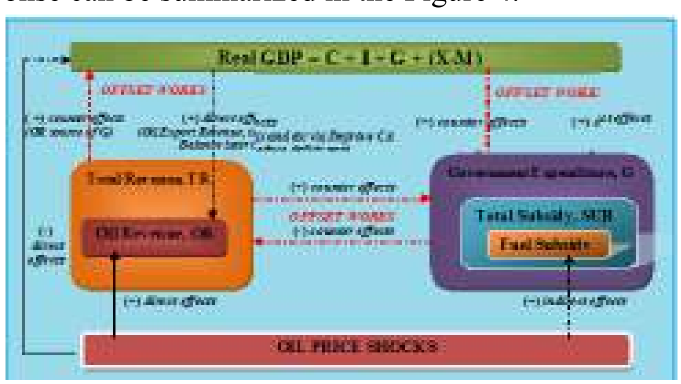


Figure 4: Mechanism Channel of Oil Price Shocks to the Economy through Fiscal Policy Response.

Surprisingly, based on the IRF simulating results in a short term trend, both total subsidies and government expenditure showa decreasing trend.However, the negative magnitude of subsidies is larger than government expenditure, as subsidy is the largest component of Malaysia government operating expenditure. This is could be explained by the offset works which is gained from oil revenue due to higher oil prices canbe channeled back into the domestic economy, as summarized in the Figure 4. Also, this could probably due to the implementation of subsidy reform plan where the government has revised the fuel prices by raising it a few times between May 2004 - Jan 2011 period which is significantly reduce the total government subsidy. (Refer Table 8). Also in the year 2008, the governmentalso has introduced a broad package of policy reforms i.e. subsidy reductions, cash rebates and cash transfer (www.epu.gov.my).

Importantly, the findings of the study will help to give clear policy directions especially in designing a better policy instrument system in the macroeconomic level planning. Especially for establishing and reviewing existing policies (i.e. fuel subsidy policy, energy and environmental policy) as it can give a "representation" of the economic system. Specifically, during higher inflation phenomenon (due to higher oil price), fiscal and monetary policy will need to respond efficiently and powerfully. However, the degree of the response depends on the impact of higher prices on household income, employment and demand, and the impacts coming from global markets on export demand, investment flows, exchange rates and interest rates. In the case of small oil-exporting country and open economy like Malaysia, there are highly positive “income effects” that can offset the loss of income by householders in the short time path.

Furthermore, the impact of oil price shocks on Malaysia’s economic performance would also depend on the magnitude exposure of the Malaysian economy to oil and the extent of the spillover effect of the increase in costs on other products and services. As an oil exporting country, high oil prices would benefit the Malaysian economy as the positive gains from higher oil prices would offset any negative impact on the economy in the short term. This is done through pump priming whereby revenue from higher oil prices can be channeled back into the domestic economy through expansionary fiscal policy (i.e. beneficial transfer payment, tax rebate and others price mechanism).

Table 3: VAR Lag Order Selection Criteria

Lags	LR	FPE	AIC	SC	HQ
0	NA	7.30e+10	42.04082	42.32630*	42.12809
1	72.17074*	3.28e+10*	41.17555*	43.17386	41.78645*
2	26.66716	1.08e+11	41.96917	45.68031	43.10370

Indicates lagorder selected by the criterion and LR: sequential modified LR test statistic (each test at 5% level), FPE: Final prediction error, AIC: Akaike information criterion; SC : Schwarz information criterion; HQ: Hannan – Quinn information criterion

Table 4: Autocorrelation LM test

Lags	**LM-Stat**	**Prob.**
1	31.56762	0.6794
2	24.01849	0.9367
3	51.54928	0.0449
4	37.05750	0.4200
5	24.74366	0.9217
6	19.41582	0.9891
7	38.67450	0.3498
8	24.49801	0.9270
9	32.57211	0.6324
10	40.49417	0.2786
11	29.49010	0.7701
Notes: Probs from chi-square with 36 df.		

Table 5: Roots of Characteristic Polynomial

Root	
-0.125845 - 0.406688i	0.425714
-0.125845 + 0.406688i	0.425714
0.375882	0.375882
-0.113739 - 0.317260i	0.337032
-0.113739 + 0.317260i	0.337032
-0.018931	0.018931

Table 6: Accumulated Effect of Generalized One S.D of Oil Price Shocks.

Period	OILP	RGDP	OILR	NOR	GOE	SUB
1	24.22156	0.106523	2.581439	1.617595	3.192240	22.21308
2	23.60966	0.060351	28.21020	3.206520	5.332840	33.87064
3	19.35815	-0.090064	23.76542	2.528153	5.602170	24.24563
4	20.94323	-0.090754	19.42712	1.254769	5.209671	24.23583
5	21.56599	-0.075721	21.74376	1.352188	5.277449	26.96665
6	21.13127	-0.086131	22.14120	1.512700	5.344960	26.28924
7	21.13970	-0.088889	21.60363	1.408731	5.320761	25.92538
8	21.22858	-0.087042	21.67672	1.385496	5.315736	26.17565
9	21.20656	-0.087330	21.76600	1.406509	5.321984	26.18539
10	**21.19644**	**-0.087733**	**21.73077**	**1.403495**	**5.321596**	**26.13589**

Table 7: Decomposition of Variance for Oil Price Shocks Model.

Years	Percentage of Forecast Variance Explained by Innovation in:						
		ΔOILP	**ΔGOE**	**ΔOILR**	**ΔNOR**	**ΔRGDP**	**ΔSUB**
Relative Variance :	**ΔOILP**						
1		100	0	0	0	0	0
2		95.65	0.01	1.33	0.11	0.11	2.79
3		95.38	0.08	1.52	0.20	0.11	2.70
4		95.11	0.09	1.54	0.21	0.11	2.94
5		95.06	0.10	1.55	0.21	0.11	2.97
10		95.05	0.10	1.55	0.21	0.11	2.97
Relative Variance :	**ΔGOE**						
1		**25.57**	74.43	0.00	0.00	0.00	0.00
2		32.28	65.57	0.00	0.27	0.20	1.68
3		31.98	64.64	0.17	0.27	0.20	2.74
4		32.19	64.40	0.18	0.29	0.20	2.74
5		32.18	64.37	0.19	0.29	0.20	2.77
10		**32.18**	64.36	0.19	0.29	0.20	2.77

Relative Variance :	**ΔOILR**						
1		3.60	0.82	95.57	0.00	0.00	0.00
2		77.78	0.94	21.21	0.06	0.00	0.00
3		74.88	0.90	20.76	0.21	0.04	3.22
4		74.95	0.92	20.55	0.25	0.04	3.28
5		74.93	0.94	20.39	0.26	0.05	3.43
10		**74.89**	0.94	20.39	0.26	0.05	3.48
Relative Variance :	**ΔNOR**						
1		3.70	3.77	21.97	70.56	0.00	0.00
2		5.84	4.20	17.70	57.20	4.08	10.98
3		6.29	4.16	17.96	56.59	4.15	10.85
4		7.96	4.11	17.63	55.56	4.08	10.66
5		7.97	4.10	17.62	55.52	4.08	10.71
10		8.00	4.10	17.62	55.49	4.08	10.71
Relative Variance :	**ΔRGDP**						
1		13.01	7.75	0.41	34.56	44.26	0.00
2		12.58	6.36	9.50	32.04	37.87	1.64
3		27.53	5.65	7.76	26.25	31.34	1.48
4		27.26	5.59	7.76	26.10	31.09	2.20
5		27.35	5.58	7.80	26.06	31.01	2.20
10		**27.41**	5.58	7.79	**26.03**	30.97	2.23
Relative Variance :	**ΔSUB**						
1		**16.90**	10.37	6.51	5.74	6.19	54.29
2		19.94	9.98	6.55	5.32	5.87	52.34
3		22.14	9.67	6.37	5.16	5.71	50.94
4		22.09	9.65	6.48	5.15	5.70	50.93
5		22.26	9.64	6.47	5.14	5.69	50.80
10		**22.27**	9.63	6.47	5.14	5.68	50.80

Cholesky Ordering: DOILP DGOE DOILR DNOR DRGDP DSUB

CONCLUSIONS

In the current paper, the findings suggest that in the short run, Malaysianeconomicbenefits from higher oil price as oil price shocks has positively affect on oil revenue, even in a short-term phenomenon and seem to retard in a long run growth. However, the increasing proportions of variance from oil price shocks in real GDP suggest that this macroeconomicvariable is vulnerable to oil price fluctuations in the short term horizon. While in longer time path, oil price hike exhibit an increasing manner for both GDP and total subsidy. Also, the results confirmed that the changes of world oil price would have a significant short term impact on total government expenditure. These would confirm that fiscal policy is the main mechanism channel that transmits the oil price shocks to the economy.

Besides, these resultswouldhelp to give a clear policy direction especially in designing a better policy instrument system in the macroeconomic level planning,especially for establishing and reviewing existing policies (For example, fuel subsidy policy, energy and environmental policy). As oil reserve is a scarce and depleted, some of the revenue income gains should be saved and invested for future generation. Expenditure on green energy and energy efficiency technology should be expanded and treated as an investment in this context. This in turn could help government to reduce domestic consumption of energy especially oil. Later, this could increase the amount available for export that may generate more income to the country as well as keeping a clean environment for current and future generations.Finally, it is worth pointing out that the results of this paper do no more than suggest that the adoption of expansionary fiscal policy during the oil price shocks can facilitate rapid economic growth. In the sense that, as long as there is a stability and persistence of economic policies within the framework of an appropriate macroeconomic discipline, a higher oil price in a small oil-exporting economy like Malaysia will not necessarily be dissolute simply in terms of higher inflation but will contribute positively to assist in achieving an impressive rate of economic growth in a near term.

BIBLIOGRAPHY

Abeysinghe, T. (2001).*Estimation of direct and indirect impact of oil prices on growth*, *Economic Letters*. 73. 147-153

Bernanke, B.S.; Mark, G. and Mark, W. (1997). *"Systematic Monetary Policy and the Effects of Oil Price Shocks," Brookings Papers on Economic Activity*, 1, 91-124.

Burbidge, J. and Alan, H. (1984). *"Testing for the Effects of Oil-Price Rises Using Vector Auto regressions," International Economic Review*, 25, 459-484.12.

Dickey, D.; and Fuller, W. (1979). *Distribution of the estimators for autoregressive time series with a unit root. Journal of American Statistical Association*, 74, 427-431.

EPU.(2010). Annual report, www.epu.com.my.

Gronwald, M. (2012). Oil and U.S. Economy: *A Reinvestigation using Rolling Impulse Response. The Energy Journal*, 4, 143-160.

Hamilton J.D. (2003). *What is an Oil Shock? Journal of Econometrics* 113(2). 363-398.

Hamilton J.D. and Herrera, A.M. (2001). *Oil Shocks and Aggregate Macroeconomic Behaviour: The Role of Monetary Policy. Discussion Paper 2001-10. University of California*, San Diego.

Hamilton, J.D. (1983). *Oil and the macroeconomy since World War II.Journal of Political Science*. 91, 228-248.

Hutchison, M. (1993*). Structural change and the macroeconomic effects of oil shocks: empirical evidence from the United States and Japan*. Journal of International Money and Finance.12 (6).587-606.

IEA. (1999). *World Energy Outlook 1999: Looking at Energy Subsidies – Getting the Prices Right*. International Energy Agency: Paris.

Jones, D.W. and P.N. Leiby and I. K. Paik (2002). *Oil Price Shocks and the Macroeconomy: What Has Been Learned since 1996.* In: Proceedings of the 25th Annual IAEE International Conference, Aberdeen, Scotland, June 26-29, 2002.

Juat, H.T. (2012). "*The effects of oil price shocks on output, inflation and terms-of-trade: Evidence for Malaysia*". Journal of Business Management, 2(1).

Lardic, S. and Valerie, M. (2008). Oil prices and economic activity: an asymmetric cointegration approach. *Energy Economics*.30 (3).847-855.

Lee, K. and Ronald A R. (1995), "Oil Shocks and the Macroeconomy: The Role of Price Variability," *Energy Journal*, 16,39-56.

Mehrara, M. (2008). The asymmetric relationship between oil revenues and economic activities: the case of oil-exporting countries. *Energy Policy*.36 (3). 1164-1168

Ministry of Finance, (2010), Annual reports.

Mork, K.A. (1989), "Oil and the Macroeconomy When Prices Go Up and Down: An Extension of Hamilton's Results," *Journal of Political Economy*, 91,740-744.

Pesaran, H.H. and Shin (1998). "Generalized Impulse Response Analysis in Linear Multivariate Models", Economic Letters 58,17-29.

Rodriguez, R. and Sanchez, M. (2004). Oil Price Shocks and Real GDP Growth: Empirical Evidence for some OECD Countries. *European Central Bank Working Paper*, 362.

Sari, R. and Soytas, U. (2006). "The Relationship between Stock Returns, Crude Oil Prices, Interest Rates, and Output: Evidence from a Developing Economy". *Empirical Economics Letters* 5(4), 205-220.

Villafuerte, M. and Murphy, PL., (2009), Fiscal Policy in Oil Producing Countries During the Recent Oil Price Cycle, IMF Working Paper, 6.

World Bank. (2008). *Climate Change and the World Bank Group: Phase I: An Evaluation of World Bank Win-Win Energy Policy Reforms*. World Bank: Washington, DC.

Zhang, D. (2008). Oil shock and economic growth in Japan: a nonlinear approach. *Energy Economics*.30(5). 2374-2390.