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The Impact of World Crude Oil Price Changes on the Malaysian Economy: an Input-Output Analysis

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Abstract: By using an input-output model, this paper attempts to examine the economic impact on the Malaysian economy resulting from an increase in crude oil petroleum price. By simulating different levels of crude oil prices, we found that an increase in the world crude oil petroleum price gives more capacity to the economy in generating output and revenue collected by the government in the form of direct and indirect taxes. However, it is very clear that if the crude oil price reaches USD60/barrel, the government will be required to subsidise about RM8.27 of the petrol retail price in order to maintain the current price level.

Keywords: Economic impact, input-output analysis, oil price, Malaysian economy
JEL classification: C67, E66

1. Introduction

Malaysia has experienced three decades of sound economic growth and development. Over the years from the sixties to the seventies, the nation witnessed an easier phase of growth based on low labour cost and strong public sector support. Nevertheless, in the 1980s, Malaysia experienced a setback to the economy due to external shock when commodity prices collapsed twice, first in 1980 and then in 1985. The economic growth thereafter was not remarkable, though some recovery took place in 1987. This was the time when the manufacturing sector for intermediate goods expanded and led the economy. This established a new structural change from merely producing primary commodities to basic manufacturing and advanced manufacturing including electric semiconductors and components of electric products. In mid-1997, the economy had to face another economic disaster when the financial crisis that began in Thailand, later spread to all the ASEAN countries including Malaysia. In fact, the exchange rate badly affected most of the ASEAN countries. ASEAN countries had no choice other than to liquidate their current assets in order to offset their losses resulting from the currency devaluation.

Malaysia's economy resumed growth in 2002 and 2003, following a stall in 2001 due to slow demand for Malaysian exports. Following growth of only 0.3 per cent and a decline in real Gross

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Domestic Products (GDP) in 2001, the economy experienced a 4.4 per cent growth in real GDP in 2003.The nation's merchandise trade surplus rose sharply in 2003, after having fallen in 2001 and 2002. Along with this export surplus trend, crude oil price also continued to increase from late 2003. Statistics reveal that world crude oil price has increased from USD25.26 (RM95.99) per barrel in 2003 to USD52.00 (RM197.60) per barrel in mid-October 2004. This increase could be attributed to the war in Iraq, the violence in Nigeria, oil worker strikes in Venezuela and also a decrease in US oil production by 2 per cent per year. It is most likely that much of the reaction to the oil price increase at the end of the decade is permanent and is not likely to respond to lower prices with increased demand for oil.

Though Malaysia is an oil producing country, quantity produced is relatively small compared to other oil producing countries. The pressure of crude oil price has also affected the Malaysian economy. On 1 October 2004, the government announced a 5 cent per litre increase in petrol retail price as well as a 5 cent per kilogram (KG)increase in liquid petroleum gas (LPG) due to an increase in world crude oil price to USD47.78 (RM 181.57) per barrel. In an effort to cut down on fuel subsidy, the government moved to increase the prices of petroleum products along with the increase in crude petroleum price in the world market. The government is expected to pay RM9.9 billion in subsidies if the crude oil breaches USD60/barrel. By allowing some increment in the petroleum price, the government will save RM4.4 billion a year and this savings will be spent on other development projects.

Therefore, considering the above scenario, the purpose of this study is to examine the total economic impact on the Malaysian economy as a result of an increase in crude oil price. In addressing this issue, we shall simulate the effect of various changes in the crude petroleum price on sectoral output and revenue collected by the government by employing the general equilibrium of the input-output model which will capture both direct and indirect production effects. This paper is structured as follows: Section 2 outlines the analytical framework of the input-output model together with data coverage associated with this study. Section 3 presents the empirical findings of the crude petroleum price simulations on output and revenue while the concluding remarks follow in Section 4.

2. Methodology and Data Sources

Though the input-output model is employed as a major framework, this study also uses an econometric approach for forecasting the quantity and price of exports and imports of crude petroleum. The estimated values of imports and exports will then be used as exogenous components in the final demand vector of the input-output model.

2.1 Econometrics

In the econometric analysis, we employed the log-linear of the constant elasticity model to measure elasticity of price of crude oil based on ordinary least squares (OLS). The slope coefficient measures the elasticity of value of exports and imports with respect to price of crude oil as shown in Equation (1).

$$\text{Log } Y_i = \beta_1 + \beta_2 \log P - \text{Log } Y_{i-1} + D \tag{1}$$

where Y_i is value of imports and exports of crude oil, P is price of exports and imports of crude oil and D is the dummy variable.

These applications presume the time series involved to be stationary. Stationary is defined as the tendency of a variable to return to its original value following a distribution. A time series is said to be stationary if the variable moments (e.g. its means and variance) are constant over times. This is a requirement for many statistical tests such as classical *t*-test and *F*-test. When the time series are non stationary, the estimated coefficients are likely to be inconsistent.

2.2 Input-Output Model

The input-output model is concerned with the inter-dependence or inter-industry relationships between producing and consuming sectors in the economy. The input-output model which was developed by Leontief (1951) has been widely used both in developed and developing countries to examine the economic impact on the economy due to changes in exogenous variables. Sakurai (2004) used the input-output model to investigate how increased trade has affected labour demand at different levels of skills in Japanese manufacturing since the 1980s. Valadkhani and Mitchell (2002) applied the input-output price model to assess the petroleum price shocks on inflation and household expenditures in Australia. In this study, we applied the model used by Rashid and Shahwahid (1994) by taking into account the net trade effect. The basic relationship in the input-output model can be simplified as follows:

X_i = total output of sector j
X_{ij} = output in sector i used in sector j
Y_i = total final demand for sector i's product

If there are n sectors, the following is true for each of them:

$$X_i = \sum_{j=1}^{n} X_{ij} + Y_i \qquad i = 1....\text{n} \tag{2}$$

If all the sectors are arranged accordingly, they could be interpreted as an accounting identity. Under equilibrium conditions, the quantity of output supplied equals the quantity of output demanded. In this form, the demand of any sector's input is proportionate to the demanding sector's output or sector *j's* demand for the output of sector i is proportionate to the total output of industry j. It could then be written as follows:

$$X_{ij} = a_{ij} Xj \tag{3}$$

where a_{ij} is the input coefficients.

This coefficient value could be zero if sector j does not consume any input from other sector i .This value must be positive and lie between one and zero. Substituting (3) into (2), we obtain,

$$X_{ij} = \sum_{j=1}^{n} a_{ij} X_j + Y \quad , \qquad i = 1 \ldots n \tag{4}$$

Based on the above series of Equation (4), in the first equation we see that X_1 is multiplied by unity and $-a_{11}$, while in the second equation X_2 is multiplied by unity and $-a_{22}$, and so on. Therefore we can rewrite the equations in the matrix form for clarity.

$$\begin{pmatrix} 1-a_{11} & -a_{12} & ..... & -a_{1n} \\ -a_{21} & 1-a_{22} & ..... & -a_{2n} \\ ..... & ..... & ..... & ..... \\ -a_{n1} & -a_{n2} & ..... & 1-a_{nn} \end{pmatrix} \text{X} \begin{pmatrix} X_1 \\ X_2 \\ ..... \\ X_n \end{pmatrix} = \begin{pmatrix} Y_1 \\ Y_2 \\ ..... \\ Y_m \end{pmatrix} \tag{5}$$

If A is defined as the input coefficient, then we can rewrite (5) as follows:

$$\text{A} = \begin{pmatrix} a_{11} & a_{12} & ..... & a_{1n} \\ a_{21} & a_{22} & ..... & a_{2n} \\ ..... & ..... & ..... & ..... \\ a_{n1} & a_{n2} & ..... & a_{nn} \end{pmatrix} \tag{6}$$

From Equation (6), the multiplication of a matrix on the left side of the equation is equal to the identity matrix minus the matrix of input coefficient. This product is multiplied by the output (n x1) matrix (or column vector); it can be denoted as X which is equal to the final demand (n x 1) matrix (or column vector) called Y. The input-output system can then be rewritten as follows:

$$(I - A)_{nxn} X_{nx1} = Y_{nx1} \tag{7}$$

If Equation (7) is multiplied on both sides by the inverse matrix we get

$$(I-A)^{-1}(I-A)X = (I-A)^{-1}Y$$

Since $(I-A)^{-1}(I-A) = I$

$$IX = (I-A)^{-1}Y$$

$$X = (I-A)^{-1}Y \tag{8}$$

Equation (8) holds on the condition that matrix $(I–A)$ has an inverse matrix. This condition will be met if the Y vector has at least one non-zero element (Richardson 1972). The matrix $(I–A)$ is also known as the *Leontief matrix*. The concept in Equation (8) will be used to calculate the economic impact analysis for this study, knowing that X is the total output that is equal to the inverse matrix multiplied by the final demand, Y. Any change in the final demand when multiplied by the inverse matrix will change the total output.

An increase in the crude oil price will increase the export and import value of crude oil for Malaysia. If we assume the current final demand vector for net export value to be Y (net export value with current crude oil price) and Y^* (new vector of net export value with new crude oil price), we can multiply the inverse matrix with this final demand vector, to yield the potential contribution of those changes to the sectoral output that can be shown in Equations (9) and (10).

In the first calculation the total output with the current crude oil price is

$$X = (I - A)^{-1} Y \tag{9}$$

where

Y = vector of net export of current crude oil price

$(I - A)^{-1}$ = inverse matrix
X = vector of output at current crude oil price

In the second and subsequent calculations, the total output with new crude oil price is equal to

$$X^* = (I - A)^{-1} Y^* \tag{10}$$

where

Y^* = new vector of net export at new crude oil price.

Next, the input-output allows us to estimate revenue collected by government in terms of direct and indirect taxes due to changes in sectoral output. The potential contribution of changes in net export of crude oil to indirect taxes for sector i can be calculated by the following expression:

$$T = t(Y^* b_i), \qquad i = 1, 2, \ldots n \tag{11}$$

where T is the total indirect taxes collected, and t is the column vector whose elements are δ and λ representing domestic and import commodities taxes coefficients respectively, after transposing their row vectors, while b is the element in the Leontief inverse matrix that can be interpreted as the indirect taxes partial multiplier. For direct taxes, we estimated the value by multiplying value of export crude oil by 10 per cent ad valorem tax as gazetted by the Ministry of Finance.

2.3 Data Sources

In this study, we collected published data from the 2000 input-output (I-O) tables which was the latest table published for Malaysia. The original 2000 I-O table was compiled with 92 industries; however for simplicity purposes, the aggregated version of 36 industries was employed in this study. This table was compiled using industrial classification of the Malaysian Standard Industrial Classification (MSIC) on the basis of the 1993 System of National Accounts (SNA). Data for exports and imports, and price of the crude petroleum were obtained from the economic reports published by the Ministry of Finance. All the variables are annual figures from 1960 to 1999, and expressed in Ringgit Malaysia and barrel for value and quantity, respectively.

3. Analysis of Results

3.1 Econometrics

The time series data have been analysed by using the econometric method. In order to ensure the estimated coefficients are valid for forecasting, unit root tests have been applied. The determination on the order of integration of series is a necessary procedure that precedes the analysis of long run relationships among variables. The Dickey-Fuller (DF) test and/or Augmented Dickey-Fuller (ADF) test were applied to the data in level and in first differences. The results of the unit root test on the level and its first difference of the series are given in Table 1. In all the cases for the unit root tests on the first difference, the absolute value of test statistics are greater than the absolute critical value of McKinnon suggesting that null hypothesis of unit root can be rejected and all the series are stationary.

Table 1: Results of unit root tests

	Augmented Dickey-Fuller (ADF)	
Variable	Level	First difference
Exports (LXQ)	-1.4725	-4.2828***
Imports (LIQ)	-1.6882	-4.2814***
Price (LPRM)	-1.4725	-4.2828***

Notes:(i) Sample period of the table is based on annual data from 1960-1999
(ii) *** denotes 1 per cent, ** denotes 5 pecent and * denotes 10 per cent level of significance. McKinnon's critical values for the null hypothesis of a unit root with maximum lags of 4 are used.

Table 2: Results of estimated elasticity of export value of crude oil

Variable	Coefficient	Std. error	*t*-statistic	Prob.
C	0.3118	0.5976	0.5217	0.6065
LPRM	0.1672	0.0535	3.1239	0.0045
DX2	0.6104***	0.1259	4.8450	0.0001
LXQ (-1)	0.9176***	0.0583	15.7169	0.0000
R^2	0.9444			
Adj. R^2	0.9378			
D.W. stat.	2.1439			

Source: Computed from model (1).
Notes: Level of significance: *** 1 per cent, ** 5 per cent and * 10 per cent.
The dummy variable DX2 is 1 for 1971 and 1976.

Table 3: Results of estimated elasticity of import value of crude oil

Variable	Coefficient	Std. error	*t*-statistic	Prob.
C	2.3960*	1.1976	2.0006	0.0564
LPRM	-0.0863	0.0906	-0.9527	0.3498
DI1	0.4236**	0.1674	2.5293	0.0181
LIQ (-1)	0.7711***	0.1109	6.9488	0.0000
R^2	0.7372			
Adj. R^2	0.7057			
D.W. stat.	1.9102			

Source: Computed from model (1).
Notes: Level of significance: *** 1 per cent, ** 5 per cent and * 10 per cent.
The dummy variable DI1 is 1 for 1971, 1980, 1989 and 1999.

One attractive feature of the log-linear specification that has made it popular in empirical work is that the slope coefficient β_2 measures the elasticity of exports value (LXQ) with respect to price (LPRM), that is, the percentage change in LXQ for a given (small) percentage changes in LPRM. The log-linear regression can be easily estimated with the usual Ordinary Least Square (OLS). The results of the OLS regression based on log-linear model for Malaysian export and import values of crude oil are given in Tables 2 and 3, respectively.

Except for the constant, the equation of export elasticity of crude oil (Table 2) estimated coefficients are statistically significant at the 1 per cent level of significance. While the equation of elasticity of crude oil (Table 3) has indicated that value of last year import is statistically significant at 1 per cent, the dummy variable is statistically significant at 5 per cent and the constant is statistically significant at 10 per cent. This coefficient suggests that if the price of crude petroleum increases by 1 per cent, the value of exports demanded on the average increases by 0.1672 per cent whereas import value will decrease by 0.0863 per cent. This implies that the demand value of exports and imports is inelastic. Based on these estimations, the final demand can be estimated as in Table 4.

Table 4 shows the forecasted values for world crude oil prices for (USD and RM) exports and imports. The world crude oil in USD in column (1) is equivalent to RM in column (2). The figures in column (3) are the percentage changes in crude oil price. The figures in column (4) and (7) are elasticity for exports and imports of crude oil price, respectively. The values in column (5) are the forecasted values of exports of crude oil except that the values in the first row are averaged figures for 2003. The value in column (6) is the difference in export value resulting from a change in price accordingly. The same procedure is used for computing columns (8) and (9) for import crude oil value. Column (10) portrays the value of net export of the crude oil as a result of a varying level of prices.

Based on Table 4, it is very clear that the forecasted values for the crude oil exports are expected to increase when the world crude oil price increases. Table 4 shows that the average value of crude oil exports in 2003 was RM15.66 billion at the average world crude oil price of USD25.26 per barrel (RM95.99/per barrel). Malaysia is also importing crude oil but the amount is much less than the total export which is about RM6.30 billion for the same year. This implies that Malaysia is a net exporter of crude oil.

The most interesting findings from the econometrics analysis is that as the world crude oil price increases, the value of Malaysian crude oil exports also keep increasing. Table 4 shows that the value of exports for crude oil has increased from RM15.66 billion at the price USD25.26/barrel to RM21.34 billion when the crude oil price increased to USD80.00/barreal. However, there is a reverse for the value of imports of crude oil whereby the import value for crude oil kept decreasing. The import value for crude oil has decreased from RM6.30 billion at a price of USD25.26/barreal to RM5.2 billion when the crude oil price increased to USD 80.00/barrel. The changes in Malaysian crude oil export values are much larger compared to the value of imports. Malaysia is expected to increase exports of crude oil to RM807.8 million when the crude oil price reaches USD33.05/barrel while the value of crude oil imports is only RM167.8 million.

3.2 Input-output Analysis

Based on the value of exports and imports estimated from the previous section, the value of net export crude oil will be inserted in the input-output framework for calculating impact on output and revenue. Six runs of input-output analysis were carried out; the first analysis used actual data for year 2003 and followed by the difference in levels of crude oil prices. Table 5 shows the economic impact results on the sectoral output as a result of an increase in world crude oil price. It has been found that the total output generated in 2003 was about

Table 4: Estimated value of exports and imports due to an increase in crude oil price

Crude oil price			Export			Import			Net
USD/ barrel	RM/ barrel	% change in price	Export price elasticity	Export values (RM'000)	Changes in export (RM'000)	Import price elasticity	Import values (RM'000)	Changes in import (RM'000)	Net export (RM'000)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
25.26[1]	95.99	-	0.1672	15,661,723[2]	-	-0.0863	6,305,293[3]	0	9,356,430
33.05	125.59	0.31	0.1672	16,469,620	807,897	-0.0863	6,137,414	-167,878	10,332,206
52.00	197.60	1.06	0.1672	18,434,918	2,773,195	-0.0863	5,729,030	-576,262	12,705,887
60.00	228.00	1.38	0.1672	19,264,595	3,602,872	-0.0863	5,556,626	-748,666	13,707,969
70.00	266.00	1.77	0.1672	20,301,691	4,639,968	-0.0863	5,341,120	-964,172	14,960,571
80.00	304.00	2.17	0.1672	21,338,787	5,677,064	-0.0863	5,125,614	-1,179,678	16,213,173

Source: Computed from Tables 2 and 3
Note: ([1]), ([2]) and ([3]) are average crude oil price, average export value and average import value respectively for year 2003.

Table 5: The effect of an increase in world crude oil price on sectoral output

Sectors	Output at Different Price Levels (RM'000)					
	USD25.26 (RM95.99) / barrel	UDD33.05 (RM125.59) / barrel	USD52 (RM197.6) / barrel	USD60 (RM228) / barrel	USD70 (RM266) / barrel	USD80 (RM304) / barrel
Crude petrol, natural gas & coal	9,517,389	10,509,952	12,924,467	13,943,787	15,217,938	16,492,088
Transport & communication	287,458	317,436	390,363	421,150	459,634	498,117
Business services	246,214	271,892	334,355	360,725	393,687	426,650
Wholesale & retail trade	210,417	232,361	285,743	308,279	336,448	364,618
Industrial machinery	142,929	157,835	194,095	209,403	228,538	247,672
Hotels & restaurants	127,668	140,983	173,372	187,045	204,137	221,229
Real estate.	104,231	115,101	141,544	152,707	166,661	180,615
Ownership of dwellings	99,983	110,410	135,775	146,483	159,869	173,254
Motor vehicles, cycles & other transports	79,221	87,483	107,581	116,065	126,671	137,277
Petrol & coal products	66,955	73,937	90,923	98,094	107,058	116,021
Insurance	64,456	71,179	87,531	94,434	103,063	111,693
Agricultural products (others)	56,242	62,107	76,375	82,399	89,928	97,457
Electricity & gas	54,342	60,009	73,796	79,616	86,891	94,166
Rubber & plastic products	52,798	58,305	71,699	77,354	84,423	91,491
Livestock etc.	48,747	53,831	66,198	71,419	77,945	84,471
Electrical appliances	41,215	45,513	55,969	60,384	65,901	71,419
Oils and fats.	41,206	45,503	55,957	60,370	65,886	71,403
Fish etc.	32,645	36,049	44,331	47,827	52,197	56,568
Buildings & construction	32,364	35,739	43,950	47,416	51,749	56,081
Recreation	30,324	33,487	41,180	44,428	48,487	52,547
Grain mill products	24,205	26,729	32,870	35,463	38,703	41,943
Iron, steel & non-metal products	21,651	23,909	29,401	31,720	34,619	37,517
Meat & meat products	21,146	23,351	28,715	30,980	33,811	36,642
Repair motor & other vehicles	19,639	21,687	26,670	28,773	31,402	34,031
Confectionary & bakery products	19,134	21,129	25,984	28,033	30,594	33,156
Animal feeds	18,180	20,075	24,688	26,635	29,068	31,502
Tobacco	17,955	19,828	24,383	26,306	28,709	31,113
Printed products	17,852	19,714	24,243	26,155	28,545	30,935
Other foods	17,347	19,156	23,557	25,415	27,737	30,059
Wine, spirit, bear & soft drinks	17,160	18,949	23,303	25,140	27,438	29,735
Industrial chemicals	16,982	18,753	23,061	24,880	27,153	29,427
Health	16,823	18,577	22,845	24,647	26,899	29,151
Paper & board	16,486	18,205	22,388	24,153	26,361	28,568
Yarn, cloth and textiles	15,803	17,451	21,460	23,153	25,268	27,384
Wearing apparel.	15,148	16,728	20,571	22,193	24,221	26,249
Others	208,227	229,943	282,770	305,071	332,948	360,824
TOTAL	11,820,539	13,053,297	16,052,110	17,318,100	18,900,587	20,483,074

Source: Computed from Equation (10).

RM11.82 billion with the average crude oil price being USD25.26/barrel (RM95.99/barrel). With the increasing rise in price of crude to USD33.05/barrel (RM125.59/barrel) in January 2004, the total output generated has also increased to RM13.05 billion and this crude oil price will continue to increase over time. In the middle of October 2004, the price of crude oil reached USD52/barrel (RM197.60/barrel), which increased the total output generated to RM16.05 billion. In fact, the analysis revealed that the total output generated in the economy will increase to RM20.48 billion if the world crude oil price reaches USD80/barrel (RM304/barrel).

If the price of crude oil continues to increase in the world market, the crude petrol, natural gas and coal sector will record the highest impact on total output. At a world crude oil price level of USD25.26/barrel (RM95.99/barrel), it generated RM 9.52 billion of output or equivalent to 81 per cent of the total increase on the total output. The transport and communications sector had the second highest economic impact on output with an output value of RM287.5 million. This was followed by business services (RM246.3 million), wholesale and retail (RM210.4 million), industrial machinery (RM142.9 million), hotel and restaurants (RM127.7 million), real estate (RM104.2 million), ownership of dwelling (RM100 million) while the rest of the sectors generated less than RM100 million. In fact, all sectors had a positive effect on the output. Table 5 also shows the effect on the total output for the different levels of crude oil prices such as USD33.05, USD52, USD60, USD70 and USD80 per barrel. Since input-output is linear in nature, then total outputs for all sectors have increased linearly according to the level of crude oil price. An additional output generated in the economy as a result of an increase in crude oil price is the generation of additional taxes on production collected by the government. Our model allows for estimation of revenue collected by the government in the form of direct and indirect taxes as a result of an increase in production output.

3.3 Government Revenue Resulting from an Increase in Crude Oil Price

An increase in the crude oil price is expected to increase total output of the Malaysian economy. The government could collect direct and indirect taxes on the total output generated as a result of an increase in crude oil production. By using the input-output model, the indirect tax on the domestic and import taxes could be calculated. As shown in Table 6, the analysis has found that if the crude oil price reaches USD25.26/barrel, the government will collect RM199 million in indirect taxes which comprises RM110 million for domestic and RM88 million in import taxes. If the crude oil is expected to increase to USD80/barrel, the indirect tax that could be collected would amount to RM191 million from domestic and RM153 million from import taxes making a total of RM344 million.

Direct tax in this analysis refers to the tax collected by the government based on the gazetted value of crude oil, at 10 per cent ad valorem. Based on the results of the econometric analysis shown in Table 4, the direct tax on crude oil export has been calculated as in Table 6 in column (6). If the crude oil price is USD25.26/barrel, the government is expected to collect direct taxes of about RM936 million. Similarly, if the crude oil price increases to USD80/barrel, the amount of direct taxes expected to be collected is about RM1.621 billion. The results also reveal that if the crude oil price is at USD25.26/barrel, the total revenue (direct and indirect taxes) which could be collected is estimated at RM1.13 billion. Government revenue is expected to increase as the crude oil price increases in the world market.

Table 6: Direct and indirect taxes collected as a result of an increase in output (RM '000)

USD/ barrel	RM/ barrel	Indirect Tax				
		Domestic	Import	Sub-total	Direct tax	Total*
(1)	(2)	(3)	(4)	(5)	(6)	(7)
25.26	95.99	110,254	88,518	198,772	935,643	1,134,415
33.05	125.59	121,752	97,749	219,502	1,033,220	1,252,722
52	197.6	149,723	120,206	269,929	1,270,588	1,540,518
60	228	161,531	129,686	291,218	1,370,796	1,662,015
70	266	176,292	141,537	317,829	1,496,057	1,813,886
80	304	191,052	153,387	344,440	1,621,317	1,965,757

Source: Computed from Equation (11).
Note: *Comprises direct and indirect taxes.

If the crude oil price reaches USD80/barrel, government revenue is expected to increase by RM1.9 billion.

Despite the fact that the government revenue is expected to increase due to an increase in crude oil price, the government also has to subsidise the imported refined petroleum for local consumption. By continuing to subsidise the price, the government has stated that it will loose about RM9.93 billion if the crude oil price reaches USD60/barrel compared to the revenue collected which will only be RM1.66 billion. At this moment, it is very clear that the government is required to subsidise petrol retail price to a value of RM8.27 billion to maintain the current price level, if the crude oil price reaches USD60/barrel.

4. Conclusion and Policy Implications

This paper attempts to examine the impact of an increase in crude petroleum price on sectoral output and revenue collected by the government in the form of direct and indirect taxes. As Malaysia is a net crude oil exporter to the rest of the world, the increase in crude petroleum oil gives more capacity to the economy to stimulate output. The results show that sectoral production output increases as oil price increases. The total output generated in 2003 is estimated to be about RM14 billion at a crude oil price level of USD2.26/barrel and the capacity of the economy to generate output can be reached at RM24 billion if the crude oil price increases to USD80/barrel. The government will collect an additional RM1.9 billion in taxes if the crude oil price reaches USD80/barrel compared to RM1.1 billion at the current price level.

However, this study does not capture the effect on sectoral costs of production and inflation in the economy. The government's decision to increase price of petroleum products will pressure the consumers and the manufacturers. This impact of higher oil prices on the economy can be traced through direct and indirect effects (Saari and Zakariah 2006). Direct impacts are the increased expenses for purchase of oil or oil products by manufacturers and consumers. On the other hand, indirect impacts include the increase in prices for other products and services passed on by higher fuel costs. The manufacturers tend to increase the prices of goods and services therefore resulting in an increase in the cost of production of goods and services in the economy, given the increase in the petroleum price inputs; this

exerts pressure on profit margins. As a result, higher prices of goods will lead to inflation in the economy. For the consumers, their welfare declines since they have to pay more money to get the same goods and services. Therefore, besides making decisions on increasing oil price, the government also has to pay special attention to its effect on manufacturers, consumer welfare and inflation in economy. A comprehensive study must be carried out to ensure that government policy makers have sufficient information before making a decision.

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