The Fiscal and Macroeconomic Impacts of Reforming Energy Subsidy Policy in Malaysia

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***Abstract*—**The rationalization of a gradual subsidies reforms plan has been set out by the Malaysian government to achieve the high-income nation target. This paper attempts to analyze the impacts of energy subsidy reform policy on fiscal deficit and macroeconomics variables in Malaysia. The Computable General Equilibrium (CGE) Model is employed. Three simulations based on different groups of scenarios have been developed. Importantly, the overall results indicate that removal of fuel subsidy has significantly improved the real GDP and reduced the government fiscal deficit. On the other hand, the removal of the fuel subsidy has increased most of the local commodity prices, especially energy commodities. The findings of the study could provide some imperative inputs for policy makers, especially to identify the right policy mechanism. This is especially ensures the subsidy savings from subsidy removal could be transferred back into the domestic economy in the form of infrastructure development, compensation and increases in others sector output contributions towards a sustainable economic growth.

***Keywords*—**CGE, deficit, energy, reform, subsidy.

I. Introduction

MALAYSIA, as other countries around the world, pays a high level of subsidies on food, energy, education and other social sectors. This is particularly to improve poor households' access to many commodities, especially modern forms of energy, and reduce poverty. This country has spent around 18.8% of government operating expenditure on subsidies in 2010, which is about 4.1% of total GDP [1]. As claimed by the government, the subsidy reduction would save at least MYR 1.1 billion (or approximately US$0.27 billion) by the end of 2013, and MYR3.3 billion (US$0.74 billion) in a full year or approximately 5% of total government debt [2]. Besides enlarging the operating expenditure budget, the Malaysian government also lost revenues from collecting taxes by exempting the fuel tax on the fuel consumption. This is owing to the reason that fuel subsidies contribute a substantial amount of government operating expenditure shares, and thus, their reform could significantly reduce the fiscal deficit and national debt level. As of 2013, Malaysia's fiscal deficit of 4.5% of GDP. The national target is to reduce this 3% by 2015 [3]. In terms of its debt, Malaysia's national debt, with a debt-to-GDP ratio of 53.3%, also stands out regionally where it is the second-highest among Asian emerging markets, after Sri Lanka.

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In July 2010, subsidy reform has initiated in Malaysia specifically for fuel, sugar and other products. In the Budget 2015, the Prime Minister of Malaysia announced that 95 RON, diesel and LPG is to be exempted from the Goods and Services Tax (GST) that came into effect in April 2015. Also, during this budget, the government announced that the dual-pricing system for 95 RON was set to be implemented with those belonging to a 'high-income group" or those who are earning five figures a month having to pay the full market price for 95 RON petrol, while those are earning between RM5, 000 and RM10, 000 will receive partial subsidy. Individuals classified under the 'low-income group' will be able to continue filling up at the current subsided rate or receive the full subsidy.

Fig. 1 shows the total subsidies, fuel subsidies and deficit for Malaysia from the 1990 to 2015 period. Based on these figures, it shows that the annual growth rate for fuel subsidies in Malaysia is estimated at 31% of the studied period. Specifically, Malaysia fuel subsidies have been growing progressively from RM8.154 billion in 2005 to RM24.73 billion and RM23.46 billion for 2012 and 2013, respectively. Due to the higher world oil price in 2008 and 2009, it is clearly shown that the amount of fuel subsidy had increased significantly and settled at RM15.378 billion in the year 2009. The large fuel subsidies lead to a substantial amount of fiscal deficits in Malaysia, which had increased to RM41.852 billion in the year 2009. Indeed, the rise fuel subsidies would translate into increased fuel consumption, which was not in-line with the 1970 National Depletion Policy, which is to reduce dependency to depleted fossil fuel consumption [4].

Fig. 2 shows the annual average growth rate of non-fuel subsidies and fuel subsidies per TGE and per GDP for the 1980-2015 period. We found that the average growth rate of subsidies, which are non-fuel and fuel subsidies per GOE and per GDP both continue increasing year by year. For instance, in 1990, the annual growth rate of non-fuel subsidy per TGE (NFS-TGE) and fuel subsidy per TGE (FS-TGE) were only at 1.18% and 0.08%, respectively, and have increased to 4.92% and 2.94% per annum in 2001, respectively. Also, in 2008, the amount of fuel subsidy per TGE (FS-TGE) and fuel subsidy per GDP (FS-GDP) was peaking at 8.77% and 2.74%, respectively. Indeed, the fuel subsidy of year 2009 (RM15.378 billion) was among the highest record of fuel subsidy per GDP in the Malaysia economic history [1]. This was owing to the world oil price shock in the previous year, 2007, which resulted in a huge fiscal budget to cover the subsidy allocation for petrol and diesel. Indeed, the uncertainties in the global world oil price environment have enforced the Malaysian Government to implement a wise expansionary fiscal policy, especially to stimulate domestic economic activities.

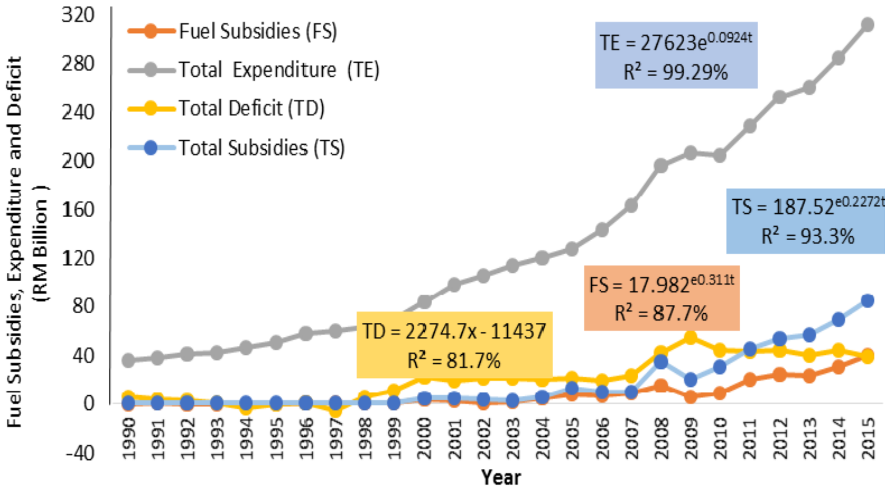

Fig. 1 Subsidy, Expenditure and Deficit, (1990-2015) [1]

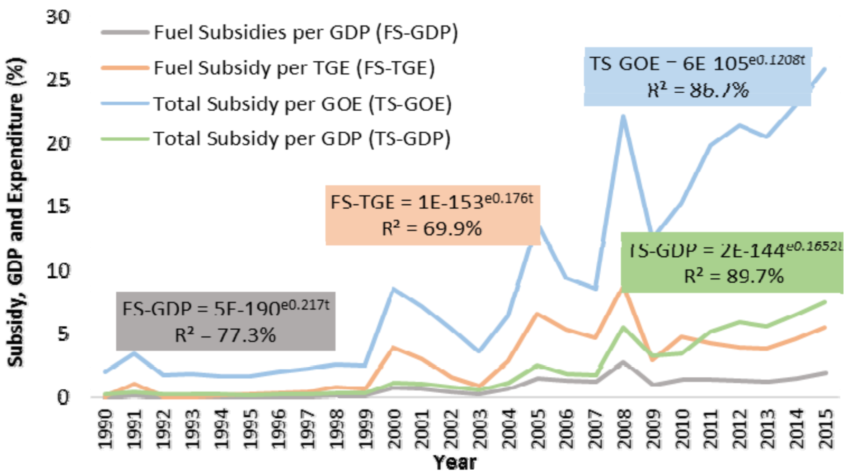

Fig. 2 Subsidy per Government Expenditure and GDP, 1990-2015 [1]

Accordingly, it could not be denied that the government's subsidy rationalization program was an important step in the development of the country. The program is a bold move to put the country's economy on a strong footing, which would bring about the impact of the country's economic growth and the people's well-being. Furthermore, the superfluous subsidy will distort resource allocation and affect the need for development expenditure, specifically to the welfare and living standards of the people and country, generally. Thus, the amount of subsidies to domestic consumption should be capped at a reasonable level as government expenditure needs to be utilised more prudently and fairly and for various purposes for the benefit of the people and economic efficiency as a whole. Despite gaining economic efficiency and savings benefits, removing all fossil-fuel subsidies conversely, would not necessarily have a positive impact across the board, as fuel subsidy reforms are expected to have simultaneous effects on the economy. This is because cutting or removing the subsidies will be translated into a higher fuel price and in turn will increase the domestic fuel cost. Thus, removing fossil-fuel subsidies by government is a challenge to the government, as it would also bring potential adverse effects to the some sectors in the economy. Therefore, it cannot be denied that subsidies play an important role in the social policy of many governments [5]. Indeed, there are several ways in which the removal of fuel subsidies could potentially impact the domestic economy as a whole and the energy market. Firstly, the local prices of fuel, which will increase dramatically with the removal of the subsidies. Second, fuels are an important intermediate input in fuel intensive industries which high oil prices lead to increase in costs of production, cause these industries to innovate and become more fuel efficient, and consequently, to a shift away from fuel use towards other factors of production (substitution effect). Third, the removal of the subsidies would free up a substantial amount of government revenue [6]. Thus, reform of these types of subsidies has the potential to provide substantial gains in economic efficiency as well as reductions in carbon dioxide emissions [7]. Thus, the aim of this paper is to analyse the potential impacts of fuel subsidy reform policy on the fiscal deficit and macroeconomics variables. CGE Model and Social Accounting Matrix (SAM) for 2005 in the Malaysian economy are employed. The rest of the paper is structured as follows: Section II presents the literature review; Section III Data Sources and Methodology; Section IV Results and Discussion; and finally, policy implication has reported in Section V.

II. Literature Reviews

In Malaysia, there are few studies conducted by researcher in analyzing the impact of reforming of energy subsidy on the economy that applied the CGE model. However, there is a lack of studies given specific focus on the impact of fuel subsidy removal on the fiscal deficit or deficit per GDP ratio. Most of the studies focused on the energy carbon tax impact on emission and economy (see for example [8]-[10]. For instance, [8] used the focused CGE model to analyze the effects of subsidy reforms in the transport sector, environmental effects, household sector and economy. Specifically, they apply a poverty-CGE focus model to estimate the effects of total subsidy policy reforms on welfare, poverty and the economy in Malaysia.

The results of the impact of the subsidy removal on macroeconomic variables found that the government subsidy policy increased real GDP by about 0.02%, whereas its positive effects on nominal GDP is greater, at about 0.44%. [9]. The findings of the study found that implementing energy tariff and output-specific carbon tax reduces carbon emission and decrease GDP and trade in Malaysia. For instance, [10] explores the effects of a carbon tax on the economy and environment of each ASEAN country. The results of their study found that when the carbon tax policy, the carbon emission decreases, as well as decreasing the real GDP, household income and sectoral output.

Though, there are numerous studies that analyze the impact of reforming energy subsidies on the China's economy. For instance, [11] applied an integrated approach of CGE and the price-gap approach to identify the overall impact of China's energy subsidies. The findings highlighted the imposition of high subsidies in energy sectors such as oil products, electricity and coal. The overall policies suggested that removing subsidies has direct impact on energy demand, whereas the reallocation process can enhance sustainable economic development. Furthermore, such types of reforms also support to enhance renewable energy, which is favourable to the environment.

In another study, [12] applied a CGE model to analyze the effects of the 1994 tax reform in China. The results of the simulations showed that small aggregate welfare gains are obtained from the 1994 tax reform. However, the household groups are worse off because of the redistribution of resources from household to government sectors. The overall findings suggested an important reform that there should be improvements in the VAT tax system. The overall change in tax policies can also affect the welfare patterns.

The study by [13] showed that by removing coal or oil subsidies that the energy consumption structure could be improved by different extent, while the economic and social indexes will be influenced distinctively. Again, [11] showed that change in energy subsidies resulted in a significant impact on energy demand patterns and emissions, but inversely affect other macroeconomic variables in China.

In Egypt, [14] examined the impact of phasing out of subsidies of energy products over the short- to medium-term by using an integrated approach of I-O and the CGE models. The results of the I-O analysis showed that adjusting all prices of petroleum products to their actual domestic cost in one step would not only remove all subsidies, but would induce a serious increase in CPI. The prices of energy intensive industries; specifically transport and communications, are expected to increase significantly.

III. Data Sources and Methodology

A. Data Sources

In the current paper, the data sources used are as follows: first, it used cross-section data for all sectors of the economy is gathered from I-O table for the year 2005. Intermediate inputs, final goods and services, production, total demand, total supply, export and import, labour and capital used and indirect taxes are employed. Second, the secondary data used for 2005 from various sources such as the National Account Statistics Data by the Department of Statistics Malaysia (DOSM), Energy Balance Data from the Malaysia Energy Centre, whereas Malaysia Government Expenditures and Revenues Data obtained from the Ministry of Finance, and finally, the Petroleum Product Subsidy Data from the Ministry of Consumers, Trade and Affairs. GAMs package version 24.02 is used in this study. Besides, based the I-O table for 2005, the SAM for 2005 is developed.

The I-O table was organized by 120 of industries and aggregated into 18 sectors (see Table I in Appendix A); this is in line with the Malaysia 12 NKEAs. The aggregation of data is based on the International Standard Industrial Classification [15]. In this paper, a special focus was given to the energy demand structures. The higher level of aggregation was also due to the difficulty in mapping between the sectors classifications used in the data with the ISIC [16]. Specifically, the data consists of 25 sectors (18 industries, three institutional agents (household, private and government sectors), two primary factor production (labour and capital), one capital account and one the rest of the world (ROW)). The petroleum refined products include gas, gasoline, automotive diesel oil, industrial diesel oil, kerosene, LPG, and other fuels. The rest of the 18 industries are shown in Table I. Energy sectors are classified into three types (Crude Petrol, Natural Gas and Coal, Petroleum Refined Products, Electricity & Gas).

B. Research Framework and Research Model.

The CGE Model and SAM for 2005 are used to simulate the impacts of removing of Malaysia's fuel subsidies on energy structures and the economy. The simulation analysis process is included in three parts: (1) Simulating the implementation of energy subsidy reform by removing fuel subsidies on consumer-side subsidies. (2) Simulating the implementation of energy subsidy reform by removing energy tax subsidies on consumer-side subsidies. (3) Simulating the implementation of energy subsidy reform by removing both fuel subsidies and energy tax subsidies on consumer-side subsidies. Furthermore, on the basis of the standardized CGE model developed by [17], the Energy-Subsidies CGE model is established. The mechanism interactions between economy and energy sectors are used in this study. To elaborate the details, we introduce some core equations of this model (30 equations). Four blocks of equations (Price, Production and Factor Block, Domestic Institution and Model Equilibrium Conditions and System Constraints) have been developed (these equations are available to the authors). Details of each block are discussed as follows:

TABLE I
AGGREGATION OF INPUT-OUTPUT 2005 [18]

Sector	Sectors number in 2005 I-O
1. Agriculture, Forestry and Fisheries	1-12
2. Crude Petrol, Natural Gas & Coal	13, 16
3. Petroleum Refined Products	44
4. Electricity and Gas	86
5. Other mining & Quarrying	14, 15
6. Petrochemical & Chemical Industries	45-50
7. Light Manufacturing	17-43
8. Heavy Manufacturing	51-85
9. Utility – Waterworks	87
10. Building and Construction	88-91
11. Wholesale and Retail Trade	92
12. Hotel & Restaurants	93, 94
13. Transportation	95-100
14. Communication	101
15. Finance Institution, Banking and Insurance	102-105
16. Real estate & Ownership of Dwellings	106, 107
17. Business and Private Services	108-112
18. Government Services	113-120

1. Price Block of Equations

This section presents the set of price equations of goods and services, commodity price, activity price and value added price. It is included, a transformation of the world price of the imports (pwm) by looking the other components such as exchange rate (EXR) and import tariff (tm) including transaction cost of the import (icm). Overall, the exchange rate and domestic import price are flexible, whereas the tariff rate and the world import price are fixed. The export price (PE) is the price received by domestic producers in export markets.

We assume that the set of exported commodities are all produced domestically. The domestically produced commodity (OX) and the marketed output value at producer prices (PX) represented as summing up domestic sales and exports, respectively. Domestic sales (QD) and exports (QE) are valued at the prices received from the suppliers. PDS and PE have been adjusted downwards to account for the cost of trade inputs. Also, the consumer price index (CPI) and the producer price index (PPI) for domestically marketed output are defined. The CPI is fixed and functions of the CPI have been important as the model is homogeneous at degree zero in prices. Basically, the simulated price and income changes should be interpreted as the numeraire price index.

2. Production and Factor Block of Equations

This block displays the demand and supply side from domestic and international perspective. Mainly, it shows the first and second level production function comprises of Leontief Production and Cobb-Douglas Production functions, respectively. For both activities, the demand for disaggregated intermediate inputs is determined via a standard Leontief formulation. The aggregated output function of any commodity is defined as a CES aggregate of the output levels of the different activities producing the commodity. It reflects the assumption of imperfect transformability between these two destinations. Both CET and CES apply to commodities that are exported and sold domestically, but CES has component for negative elasticities of substitution. Imperfect substitutability between imports and domestic output sold domestically is captured by a CES aggregation function. Overall, the "Amington function" is limited for both imported and domestically produced, as elasticity of substitution between them is minus one.

3. Domestic Institutions Block of Equations

The domestic side block comprises the equations using flow of incomes to various institutions and household sector. Moreover, they counteract inter-institutional activities in the SAM framework. The all institutional incomes and expenditures will be presented in equation form. The household consumption expenditure equation becomes the reference for all domestic institutions mainly (household, enterprises, and the government, a subset of the set of institutions), which also includes the rest of the world. Total government revenue (YG) is the aggregated revenues from taxes, factors and transfers from the rest of the world. Also, the total government spending (EG), and total fuel subsidy on fuel consumption, are formulated.

4. Model Equilibrium Conditions and Constraints Block

This part imposes equality between the total quantity demanded (QF) and the total quantity supplied (QFS) for each factor. All factors are mobile between demanding activities. It, also, imposes equality between quantities supplied and demanded of the composite commodity. The demand side includes endogenous and exogenous terms for stock exchange. In the basic model, QG and QINV are fixed.

The current-account balance, which is expressed in foreign currency, imposes equality between the country's spending (imports and factors outflow to the rest of the world) and its earning of foreign exchange (export, factor inflows from the rest of the world and foreign savings). For the basic model version, foreign savings (FSAV) are fixed; the (real) exchange rate (EXR) serves the role of equilibrating variable to the current-account balance. Theoretically, the level and investment should be equal. The total savings represents the savings from domestic government and non-government institutions, the government, and the rest of the world, with the last item converted into domestic currency. Total investment is the sum of the values of fixed investment (gross fixed capital formation) and stock changes.

IV. Results and Discussions

A. Effects on the Domestic Price Level

Table II gives the simulated effects on the domestic price level with respect to the fuel subsidy reform. Our present study reveals that the phase out of the fuel subsidy in the Malaysian economy has increased the cost prices for most of domestic commodities, especially energy commodities in all scenarios, as expected. The simulation results confirm that the fuel subsidy removal (Scenario 1) brings a relatively higher price change on the domestic product price, as compared to Scenario 2 and Scenario 3, as relative to the baseline. On the other hand, there are six sectors that experienced declines in their commodity sales price, consistently in all scenarios (1, 2 and 3). These are heavy manufacturing, hotel and restaurants, building and construction, government services, transportation sector and light manufacturing. The trends of commodity price change in turn will affect other sectoral economic variables and support the demand and supply theory, which will be further explained in the next section.

TABLE II
EFFECTS OF ENERGY SUBSIDY REFORM ON THE DOMESTIC PRICE INDEX

Sectors	Domestic Price Index At Year 2005	Change From Baseline (%) Scenario		
		1	2	3
1	0.987	1.317	1.317	1.317
2	0.91	9.231	9.341	9.341
3	0.938	6.183	5.97	5.97
4	0.98	1.531	1.429	1.429
5	0.991	0.706	0.706	0.706
6	0.909	12.981	12.431	12.431
7	1.031	-0.873	-0.873	-0.873
8	1.076	-3.532	-3.532	-3.532
9	0.964	2.801	2.801	2.801
10	1.013	-1.283	-1.283	-1.283
11	0.982	1.527	1.527	1.527
12	1.00	-0.3	-0.4	-0.4
13	1.016	-1.476	-1.575	-1.575
14	0.983	1.322	1.322	1.322
15	0.975	2.256	2.359	2.359
16	0.979	1.634	1.634	1.634
17	0.997	0.502	0.502	0.502
18	1.012	-1.285	-1.285	-1.285

Sectors' name: 1-Agriculture & Forestry and Fisheries; 2-Crude Oil, Natural Gas & Coal; 3-Petroleum Products;4- Electricity & Gas; 5-Other Mining & Quarrying; 6-Petrochemical & Chemical Industries; 7-Light Manufacturing; 8-Heavy Manufacturing; 9-Utility-Water Works; 10-Buildings & Constructions; 11-Wholes & Retail Trade; 12-Hotel & Restaurant; 13-Transportation; 14-Communication; 15-Finance & Insurance; 16-Real Estate & Ownership Dwellings; 17-Business & Private Services; 18-Government.

B. Effects on the Fiscal Budget

Table III shows the effects of fuel subsidy reform on the fiscal impacts via government expenditure and revenue. Based on the 2011/2012 figure, fuel subsidy has increased from RM8.514 billion or 1.74% of GDP in year 2005 to RM13.387 billion or 2.28% of GDP in year 2011, which has increased by 64.18% [2]. Thus, it is expected that the removal of the fuel subsidy would have a high significant impact on the government fiscal budget. The estimated results have shown that the total removal of the fuel subsidy (Scenario 1) has decreased government expenditure by 7.13% and simultaneously increased government revenue by 2.99%, as expected and theoretically supported. Nonetheless, the removal of the tax subsidy (Scenario 2) would not have a significant impact on government expenditure, but slightly improve total government revenue by 0.03%, as expected. In Scenario 3, however, the results found that government revenue was adversely affected by the mixed policy effects of fuel and tax subsidy removal, which decreased by 4.37%. Though, the magnitude of the results of Scenario 3 on government expenditure is closer to the results in Scenario 1. Importantly, the results establish that fuel subsidy removal (1) and mixed policy (3) have proven to have a favourable significant impact on the government's fiscal deficit. The fiscal deficit per GDP ratio (%) of Scenario 1 and Scenario 3 has reduced by 69.85% and 68.33%, respectively, as relatives to the baseline. The positive effects of subsidy reform on the fiscal deficit would have important fiscal policy implications. Indeed, the estimated results of the current study are in line with the government target, which is to maintain its fiscal deficit of 4% of GDP (2013), -4.5% in 2012, -3% in 2015 and a balanced budget by 2020 [1].

TABLE III
EFFECTS OF FUEL SUBSIDY REFORMS ON THE FISCAL BUDGET (RM AND %)

Fiscal Items	Value at Year 2005 (Million RM)	Change from Baseline (%) Scenario		
		1	2	3
Expenditure	134308.02	-7.13	0	-7.13
Revenue	115220.94	2.99	0.03	-4.37
Surplus/(Deficit)	-19087.09	-68.22	-0.18	-23.81
Deficit/GDP (%)	-3.88	-1.77	-3.87	-1.23

Source: Output of GAMS Version 24.02.

C. Macroeconomic Effects

Table IV presents the energy subsidy reforms effects on the macroeconomic variables. The overall results of Scenario 1 indicate that removal of the fuel subsidy has net positive effects on real GDP, through the trade-off effects between the macroeconomic variables. For instance, in Scenario 1 there is an increase in private consumption spending and the investment of fixed capital stock, which increased by 2.06% and 8.82%, respectively, which supports supply-side economies. Simultaneously, there is a reduction in government consumption spending (-1.23%) and net exports (-2.30%). Importantly, the results indicate that there are also trade-off effects between the total export and import sectors in the economy with regards to the fuel subsidy removal (Scenario

1). For instance, the exports of energy sectors receive the highest adverse effects, where the export of petroleum products and export of crude oil, natural gas has sharply decreased by 4.7% and 6%, respectively. This is due to the reason that fuel subsidy removal has decreased domestic energy demand, and hence, discourages the producer to produce more. The reduction of output production sequentially affects the available commodities for export. On the other hand, the fuel subsidy removal (Scenario 1) increased domestic energy prices, reduced domestic energy demand, and has in turn, increased the energy imports, which support the price substitution effects of imports. This is supported by the figures which show that the import value of crude oil and natural gas and petroleum products import cost has increased significantly by 3.92% and 2.37%, respectively. The increase of the energy import bill via crude oil, natural gas and coal, henceforth puts an upward pressure on the real exchange rate and energy trade balance. Subsequently, the deficit in the energy trade balance account has increased by 2.08%. In addition, the present study also finds positive effects of Scenario 1 on the total indirect tax collection, which has increased by 4.18%. This could be explained by the expansionary effects on the domestic sales for non-energy related commodities (i.e. heavy manufacturing product, buildings and construction, and other mining and quarrying industries). The increasing in domestic income sales of non-energy commodities would in turn generate a higher income for the government via an increase in sales tax revenue collections, which is supported by the supply-side economies that eliminating the subsidy removal can increase the marginal income and capital gains tax rate. This can in turn compensate the tax income loss in energy sectors and energy-related sectors.

TABLE IV
EFFECTS OF FUEL SUBSIDY REFORMS ON THE MACROECONOMIC VARIABLES (RM MILLION AND %)

GDP Variables	Value at Year 2005 (RM Million)	Change from Baseline (%) 1	2	3
Private Consumption	183,709.80	2.06	0.00	2.06
Government Consumption	57,676.30	-1.23	0.00	-1.23
Investment of Fixed capital	66,117.90	8.82	0.01	8.84
Total Export	469,068.50	1.73	0.01	1.73
Total Import	-262,499.70	4.02	0.01	4.03
Trade Balance	206,568.80	-2.30	0. 00	-2.30
GDP at Factor Cost	480,258.90	5.74	-0.01	5.73
Total Indirect Taxes	12,198.00	4.18	0.31	4.50
Real DP	492,456.90	5.69	0.002	5.69
Nominal GDP	514,073.00	1.25	0.00	1.25
Export of Crude & Gas	50,303.41	-6.00	-0.02	-6.01
Import of Crude & Gas	4,255.05	3.92	-0.04	3.88
Net Export of Crude & Gas	46,048.37	-2.08	-0.05	-2.13
Export of Petroleum Products	19,299.59	-4.70	-0.05	-4.74
Import of Petroleum Products	20,612.48	2.37	-0.02	2.36
Nett Exp. of Petrol Products	-1312.88	-7.07	-0.06	-7.10

Source: Output of GAMS Version 24.02

In terms of total export values, the increases are largely driven by the sharp growth in heavy manufacturing exports, which contributes 10% of the total export value, followed by building and construction export (6%), as compared to the baseline. While, for the total import values, the large contribution of imports is coming from the other mining and quarrying sector, which its import has increased (6.8%), building and construction (5.9%) and wholesale and retail trade (5.8%). Thus, the results confirm that there is evidence that the higher domestic price of petroleum products has a substitution effect towards imported petroleum products and non-energy inputs, and hence, towards a more expensive production technique (imported technology). This is supported by the figures in Table IV, which shows that the highest positive effects are contributed by the fixed capital investment account, which has increased by 8.82% and 8.84% in the Scenario 1 and Scenario 2, respectively. In Scenario 2, removing the indirect sales tax subsidy would have positive effects on the total gained margin of tax revenue, due to the increased indirect tax collections by 0.31%, as expected.

V. CONCLUSIONS AND POLICY IMPLICATIONS

The CGE Model is used to analyze the effects of fuel subsidy reform policy on fiscal and macroeconomic performances in Malaysia. The estimated results of the current study established that fuel subsidy reforms significantly reduced the government's fiscal deficit. Indeed, the fiscal deficit per GDP ratio, which are -1.77%, -3.87% and -1.23%, in all scenarios, respectively, are below that of the government target, which aims to maintain its fiscal deficit of 4% of GDP in year 2013, -4.5% in 2012, -3% in 2015 and a balanced budget by 2020 [1].

In terms of the effects on the macroeconomic variables, the overall results indicate that removal of the fuel subsidy has net positive effects on the real GDP through the trade-off effects between the macroeconomic variables. However, some sectors are adversely affected, especially the energy sectors. The increase of the energy import bill via crude oil, natural gas and coal, which henceforth, puts an upward pressure on the real exchange rate and energy trade balance.

Thus, a comprehensive study and analysis is needed to be done in the future, especially for the sectors that are adversely affected through financial pain, those who stand to lose and to identify the effects on the differentiated user groups or user. This can be done by disaggregating households and consumers into different level of income groups. The findings of the current study are crucial, as they can help policy makers identify an alternative policy mechanism that could be put in place, so that the reallocation of income savings can foster economic development through an effective transfer mechanism, especially to adversely affected sectors and the underprivileged segments of society.

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REFERENCES

[1] Economic Planning Unit (EPU), "Tenth Malaysia Plan," 2011-2015. Kuala Lumpur: Government Printer, 2010.

[2] M. Ramasamy & C.P. Koon, "Malaysiaraises fuel prices as Najib seeks to trim budget gap," Retrieved from http://www.bloomberg.com/news/, September 2, 2013.

[3] Ministry of Finance, Annual Reports, Kuala Lumpur: Malaysia Printing Office, 2010.

[4] N.Y. Mohamed Yusoff & H.A Bekhet "The effect of energy subsidy removal on energy demand and potential energy savings in Malaysia," Procedia Economics and Finance, pp. 189-197, 2016.

[5] C.K. Cheok, "Missing the Point: Malaysia's Debate on Fuel Price Subsidies," EKONOMIKA, Bulletin Persatuan Ekonomi Malaysia, vol.1 (1): pp.1-4, 2009.

[6] O.H. Alshehab, "Fuel subsidies and unemployment: A CGE model applied to Iran," USAEE Working Paper, pp.11-74, 2011.

[7] C. Riedy & M. Diesendorf, "Financial subsidies to the Australian fossil fuel industry," *Energy Policy,* vol.31 (2), pp.125-137, 2003.

[8] D. A. Nurdianto & Resosudarmo, "B. P. Prospects and challenges for an ASEAN energy integration policy," Environmental Economics and Policy Studies, vol. 13(2), pp.103-127, 2011.

[9] S. Solaymani & F. Kari, "Impacts of energy subsidy reform on the Malaysian economy and transportation sector. Energy Policy, vol.70, 115–125. doi:10.1016/j.enpol.2014.03.035,2014.

[10] A.Q. Al-Amin, A.H Jaafar and C. Siwar, "A Computable General Equilibrium Approach in Trade And Environmental Modelling in the Malaysian Economy," MPRA Paper 8772,2008.

[11] B. Lin & Z. Jiang, "Estimates of Energy Subsidies in China and Impact of Energy Subsidies Reform. Energy Economics, vol.33, pp. 273-283, 2011.

[12] M.H. Toh & Q. Lin, "An Evaluation of the Tax Reform in China Using a General Equilibrium Mode," China Economic Review, vol. 16(3), pp. 246-270, 2005.

[13] W. Liu & H. Li, "Improving energy consumption structure: A comprehensive assessment of fossil energy subsidies reform in China", Energy Policy, vol. 39, pp. 4134-4143, 2011.

[14] S. Abouleinein, N Kamal., M Ibrahim, A Mahmoud and H Dabbour, "Impacts of changing prices of energy on prices of goods and services," Unpublished Study for the Organization of Energy Planning, Egypt. Available online at www.docstoc.com/docs/17477011/the-impact-of-phasing-out-subsidies-of-petroleum-energy, 2009.

[15] International Standard Industrial Classification (ISIC), retrieved from http://www.ilo.org/public/english/bureau/stat/class/isic.htm, 2005.

[16] Department of Statistics, Malaysia, (2010), Malaysia Input-Output Table 2005.

[17] H. Lofgren, R. L. Harris & S. Robinson," A standard computable general equilibrium (CGE) model in GAMS", IFPRI Working Paper , vo.5, IFPRI Publication, retrieved from http://www.un.org/en/development/,2002.

[18] Department of Statistics, Malaysia, "Malaysia Input-Output Table 2005", 2010.

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2. H.A. Bekhet & N.Y Mohamed Yusoff, "Evaluating the Mechanism of Oil Price Shocks and Fiscal Policy Responses in the Malaysian Economy, In IOP Conference Series: Earth and Environmental Science," vol.16 (1), pp.012010, IOP Publishing, 2013.
3. H.A. Bekhet & N.Y. Mohamed Yusoff, "The Effect of Energy Subsidy Removal on Energy Demand and Potential Energy Savings in Malaysia," Procedia Economics and Finance, vol.35, pp.189-197, 2016.
4. H.A. Bekhet & N.Y. Mohamed Yusoff," Assessing the Relationship between Oil Prices, Energy Consumption and Macroeconomic Performance in Malaysia: Co-integration and Vector Error Correction Model (VECM) Approach," July 2009, International Business Research Journal, Canadian Centre of Science and Education, vol. 2(3), pp.152-179, 2009.

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2. Y-N. Sang, and H.A. Bekhet, "Modelling Electricity Vehicle Usage Intentions: An Empirical Study in Malaysia", Journal of Cleaner Production, vol.93, pp.75-83, 2015.
3. S.I. Mustapha, and H.A. Bekhet, "Analysis of CO2 Emissions Reduction in the Malaysia Transportation Sector: An Optimization Approach", Energy Policy, vol.89, pp.171-183, 2016.

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