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Economic Impact of Removing Energy Subsidies in Malaysia

Edited by

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Economic Research Institute for ASEAN and East Asia (ERIA) and the Institute of Energy Economics Japan (IEEJ) prepared this report under the supervision of the First Secretary General's Office, Ministry of Energy, Green Technology and Water, Malaysia (KeTTHA). All related stakeholders have agreed to use a certain data and the proposed methodologies as discussed in the kickoff and final meetings. Data and methodologies may differ from those used typically and/or officially in Malaysia. Therefore, this study may not be viewed as Malaysia's official analysis.

FOREWORD

According to the Economic Research Institute for ASEAN and East Asia (ERIA) Energy Outlook and Energy Saving Potential in East Asia 2016, which consists of the ASEAN's 10 member states and the +6 countries (Australia, China, India, Japan, Korea and New Zealand), energy demand in the region will increase to almost double from 2013 to 2040 in terms of total primary energy supply and total final energy consumption. This increasing energy demand is largely driven by the stable economic growth and the intentionally low energy prices due to energy subsidy policy applied by several developing countries of the East Asia Summit.

Many international fora such as the International Energy Agency, Asia Pacific Economic Cooperation, and the East Asia Summit have been advocating that East Asia Summit countries remove their ineffective energy subsidies. Accordingly, some countries are starting to reform their energy subsidy policies. While it is widely known that an energy subsidy leads to inefficient resource allocation and overconsumption, the removal of subsidy will certainly lead to price increases across economic sectors. Therefore, an assessment on economic impact of energy subsidies removal becomes crucial as this will allow countries to formulate effective mitigation policies in order to minimise the impact of a subsidy removal.

Malaysia is one of the East Asia Summit countries that has an energy subsidy policy. Its Ministry of Energy, Green Technology and Water (KeTTHA) has been urged to phase out the subsidy on electricity and transport fuel (gasoline and transport diesel oil). In this regard, KeTTHA has requested ERIA to study the economic impact of energy subsidies removal. Thus, ERIA proposed four approaches to KeTTHA: (i) price impact analysis using the Malaysian input-output (I-O) table; (ii) macroeconomic impact analysis using Malaysia's macroeconomic model; (iii) study on the energy saving potential using an econometrics forecasting model; and (iv) the application of the Computable General Equilibrium approach. Out of the four approaches, three approaches are selected: the I-O table approach, macroeconomic approach, and energy saving approach. The Computable General Equilibrium approach has been postponed due to time constraint.

While ERIA is responsible for conducting the price impact analysis, Institute of Energy Economics Japan (IEEJ) is assigned to the macroeconomic impact analysis. As the Malaysia Energy Commission (ST) is still estimating energy demand functions, this report includes results of these two studies: the price impact analysis using the 2010 Malaysia Input-Output Table, and macroeconomic impact analysis.

On behalf of the study team, I wish that the results in this report will be useful to KeTTHA and truly help in the formulation of effective policies and programmes to mitigate economic disruption in Malaysia.

Mr Shigeru Kimura

Team Leader

June 2016

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Mr Shigeru Kimura

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June 2016

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LIST OF ABBREVIATIONS

ASEAN	Association of Southeast Asian Nations
APEC	Asia Pacific Economic Cooperation
CGE	Computable General Equilibrium
CPI	Consumers price index
EAS	East Asia Summit
ERIA	Economic Research Institute for ASEAN and East Asia
GDP	Gross Domestic Product
GST	Goods and Services Tax
IEA	International Energy Agency
IEEJ	Institute of Energy Economics Japan
IO	Input-Output
KeTTHA	Ministry of Energy, Green Technology and Water, Malaysia
OLS	Ordinary least square
WPI	wholesale price index

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EXECUTIVE SUMMARY

Compared to some of ASEAN member countries, Malaysia is considered as a developed country whose total primary energy consumption is estimated to increase by 2.9 percent annually from 2012 to 2035 (business-as-usual scenario). The share of its demand for oil and coal-based energy will remain the largest (59 percent) in 2035 (ERIA, 2015). This increasing energy demand is largely driven by the stable economic growth and the intentionally low energy prices due to the energy subsidy policy on electricity and transport fuel (gasoline and transport diesel) across the sector. Although the share of electricity and transport fuel subsidy is currently declining, the energy subsidy in Malaysia in 2010 accounted for 4.1 percent of the total GDP, with per-capita subsidy amounted to US$200 (IEA, 2015).

The petroleum subsidy alone was over RM20 billion, which corresponds to around 10 percent of the total government expenditure. Malaysia's fiscal deficit was 4.5 percent of the gross domestic product (GDP) in 2012, and the government aims to reduce it to 3 percent by 2015 and to 0 percent by 2020. The country has already started implementing policies to phase out the fuel subsidies. In December 2014, the government of Malaysia officially removed subsidy for fuels and introduced the "managed float system." The Special Industrial Tariff for electricity will also be abolished by 2020. If the subsidy in natural gas being sold to electricity companies is removed, electricity price could increase to almost double. However, the Automatic Price Mechanism on transport fuel, such as gasoline, has shifted to the flotation method per 1 December 2014. Currently, the retail price of gasoline and diesel are influenced by market price. Consequently, the price hike in transport fuel after the removal of energy subsidies turned out to be overestimated.

According to this study using the 2010 Malaysian Input-Output (I-O) Table, any increase prices in electricity and transport fuel leads to a serious price impacts to other sectors in Malaysia. Looking at other price changes historically, the rise of Production Price Index in Malaysia, such as wholesale price index and consumer price index was around 9 percent and 4.9 percent, respectively, from 2000 to 2012. When compared to these numbers, the price impact of a subsidy removal ranges from 5 percent to 6 percent is considered significant and hence mitigation measures such as phasing out subsidies particularly for the highly impacted sectors are increasingly important. Electricity price hikes largely affect the hotel and restaurant sector relative to other sectors. On the other hand, a transport fuel price hike affects several sectors widely.

Our study shows the overall effects of subsidy removal and accordingly we propose two options on the usage of the subsidy budget. First, the Malaysian government can use its energy subsidy budget to reduce the fiscal deficit. This option can lower GDP (1.5 percent lower compared with the reference case), with deficit improvement of 0.9 percentage.

Second, the government can also use the subsidy budget for expenditures on other sectors – for example, for investments in social infrastructure and education sectors. This option leads to higher GDP (0.7 percent) but lesser deficit improvement (0.3 percentage). This study

advocates this second option. However, both subsidy removal and higher prices could result in lower real private disposable income despite the higher GDP. The negative effect of subsidy removal will last for a couple of years. In this regard, we suggest the following strategies for further consideration:

1. Removing the inefficient energy subsidies could accelerate economic growth by reducing fiscal deficit. As both economic stability and fiscal reform are very important issues, Malaysian policymakers should strike a balance between these issues.
2. The Malaysian government can reallocate the subsidy budget to other areas such as social infrastructure, healthcare and education, which will bring future economic growth. This reallocation can help drive economic growth despite the increasing prices.
3. The government can phase out the energy subsidy gradually, enough for it to manage the negative impacts on real disposable income after the general price hikes. Appropriate subsidy reforms require careful explanation and foreseeable plan.

Part I

PRICE IMPACT ANALYSIS ON OTHER INDUSTRIAL SUBSECTORS BY REMOVING ENERGY SUBSIDIES IN MALAYSIA: APPLYING THE 2010 MALAYSIAN INPUT-OUTPUT TABLE

1.1 Introduction

Compared to some of ASEAN members, Malaysia is one of the developed countries with its total primary energy consumption is estimated to increase by 2.9 percent annually from 2012 to 2035 (business-as-usual scenario). The share of demand for fossil fuel-based energy (i.e. coal and oil) will remain the largest (59 percent) in 2035 (ERIA, 2015). This increasing energy demand in Malaysia is largely driven by the stable economic growth as well as the relatively low energy prices due to its previous energy subsidy policy on electricity and transport fuel (gasoline and transport diesel) across sectors. In many countries, including Malaysia, the government administratively determines energy prices instead of using the market mechanisms. The energy subsidy is mainly designed to achieve several objectives, particularly to make energy more affordable for all. Consequently, the government has to pay a high level of subsidy on the consumption of energy. In 2010, energy subsidy in Malaysia accounted for 4.1 percent of the total gross domestic product (GDP) with per-capita subsidy amounting to US$200 (IEA, 2015). Although electricity and transport fuel are subsidised, the share of the subsidy is now declining due to Malaysia's energy subsidy rationalisation programme implemented since 2010. For the electricity sector, subsidised prices are applied to piped natural gas *per se.* While other types of fuel are charged at the market price such as coal, liquefied natural gas, medium fuel oil, and distillate. However, the subsidy for piped natural gas is being tapered by RM1.50/MMBtu every 6 months. Removing the subsidy in stages for piped natural gas in the electricity sector will be phased out until the price reaches market parity. In the case of transport sector, fuel subsidies were previously given to motorists who use RON95 and diesel. Starting 1 December 2014, fuel prices were floated and pegged according to the market price, which also advocates that transport fuel was no longer receiving government subsidies.

Having the increasing fiscal and environmental pressures generated by energy subsidies, international organisations such as the Asia-Pacific Economic Cooperation (APEC) has been advocating its member states to remove subsidies gradually and completely. Malaysia is one of the member countries challenged to remove its energy subsidies that comprise of subsidy for electricity, petroleum (gasoline), and transport diesel. Energy subsidy reforms will inevitably bring structural changes at all economic levels. In the short run, subsidy removal will increase prices in other industrial subsectors through price infection mechanism. This paper aims to estimate the price impact on other industry subsectors in circumstances where

transport fuel and electricity prices increase due to the removal of energy subsidies using the 2010 Malaysian I-O table. To begin with, this paper will explain the data and methodology used to estimate the price impacts. Subsequently, the paper draws out the result and the last part attempts to conclude based on its findings.

1.2 Data and Methodology

1.2.1 Data

Data used for this analysis are obtained from the 2010 Malaysian I-O Table. This table describes the production and consumption (of goods and services) relationships between producers and consumers within the economy (OECD, 2015). In particular, this study uses a symmetric I-O table (activity by activity) on the Absorption Matrix of Domestic Production at Basic Prices, 2010. The table is a non-competitive import type of I-O table, where the intermediate demand and final demand cover domestic products and exclude imports volume. Therefore, changes in the non-competitive I-O table – for example, the energy subsidy removal – would directly impact domestic production. It is appropriate to use the non-competitive I-O table is for this analysis since imported petroleum products is not significant, accounting for 6.7 percent (RM10.85 billion) from January to March 2016 (MATRADE, 2016). Similar to petroleum products, electricity imports to Malaysia are marginal (IEA, 2014). The table is compiled based on the System of National Accounts (SNA) 2008 and prepared in monetary values. In regards to SNA's recommendations, the Financial Intermediation Services Indirectly Measured in the 2010 I-O table is estimated by using reference rates. While Research and Development as well as Military Weapons Systems are compiled as part of Gross Fixed Capital Formation (Statistics Malaysia, 2014). The I-O table consists of three sectors: intermediate input and demand, final demand, and value-added. The intermediate input and demand calculates the consumption of different inputs used by industries to meet their production needs. The final demand sectors estimate the commodities consumed that are divided into domestic final demand and external demand. The value-added sector shows the distribution of national income, which consists of wages and salary to employees, depreciation of fixed capital, operating surplus, indirect tax, and subsidies.

The general structure of an I-O table is shown in Figure 1.1. There are 124 activities included in the symmetric I-O table used in this study. To avoid the occurrence of negative elements in the matrix structure, the symmetric I-O table is underpinned by the industry technology assumption: i.e. that commodities produced by industries have the same input structure (Statistics Malaysia, 2014).

Figure 1.1. General Structure of the 2010 Malaysian Input-Output Table

Source: Statistics Malaysia (2014).

1.2.2 Aggregation to 28 Sectors

Considering that this study aims to assess the price impact to the larger industrial sectors rather than to identify the price impact per activity/ies, the identified activities need to be aggregated into sectors. Table 1.1 shows the aggregation of 124 activities to 28 sectors.

Table 1.1 Aggregation to 28 Sectors

No.	***Sector***		***Activity***
1	*Agriculture, Fishery and Forestry*	1.	Paddy
		2.	Food Crops
		3.	Vegetables
		4.	Fruits
		5.	Rubber
		6.	Oil Palm
		7.	Flower Plants
		8.	Other Agriculture
		9.	Poultry Farming
		10.	Other Livestock
		11.	Forestry and Logging
		12.	Fishing
2	*Crude Oil and Natural Gas*	13.	Crude Oil and Natural Gas
3	*Mining and Quarrying*	14.	Metal Ore Mining
		15.	Stone Clay and Sand Quarrying
		16.	Other Mining and Quarrying

No.	*Sector*		*Activity*
4	*Food, Beverage, and Tobacco*	17.	Meat and Meat Production
		18.	Preservation of Seafood
		19.	Preservation of Fruits and Vegetables
		20.	Dairy Production
		21.	Oils and Fats
		22.	Grain Mills
		23.	Bakery Products
		24.	Confectionery
		25.	Other Food Processing
		26.	Animal Feeds
		27.	Wine and Spirit
		28.	Soft Drink
		29.	Tobacco Products
5	*Textile*	30.	Yarn and Cloth
		31.	Finishing of Textiles
		32.	Other Textiles
		33.	Wearing Apparel
		34.	Leather Industries
		35.	Footwear
6	*Wood and Wood Product*	36.	Sawmilling and Planning of Wood
		37.	Veneer Sheets, Plywood, Laminated & Particle Board
		38.	Builders' Carpentry and Joinery
		39.	Wooden and Cane Containers
		40.	Other Wood Products
7	*Paper*	41.	Paper and Paper Products and Furniture
		42.	Publishing
		43.	Printing
8	*Petroleum Refinery*	44.	Petroleum Refinery
9	*Chemicals*	45.	Basic Chemicals
		46.	Fertilisers
		47.	Paints and Varnishes
		48.	Pharmaceuticals, Chemicals, & Botanical Product
		49.	Soap, Detergents, Perfumes, Cleaning, & Toilet Preparations
		50.	Other Chemicals Product
		51.	Tyres
		52.	Rubber Processing
		53.	Rubber Gloves
		54.	Rubber Products
		55.	Plastics Products
10	*Non Metal and Mineral*	56.	Sheet Glass and Glass Products
		57.	Clay and Ceramic
		58.	Cement, Lime, and Plaster

No.	*Sector*		*Activity*
		59.	Concrete & Other Non-Metallic Mineral Products
11	*Iron and Steel Products*	60.	Iron and Steel Products
12	*Basic Precious and Non-Ferrous Metals*	61.	Basic Precious and Non-Ferrous Metals
13	*Metal Product*	62.	Casting of Metals
		63.	Structural Metal Products
		64.	Other Fabricated Metal Products
14	*Industrial Machinery*	65.	Industrial Machinery
		66.	General Purpose Machinery
		67.	Special Purpose Machinery
15	*Electrical Machinery*	68.	Domestic Appliances
		69.	Office, Accounting, and Computing Machinery
		70.	Electrical Machinery and Apparatus
		71.	Other Electrical Machinery
		72.	Insulated Wires and Cables
		73.	Electric Lamps and Lighting Equipment
16	*Precise Machinery*	74.	Semi-Conductor Devices, Tubes, and Circuit Boards
		75.	TV, Radio Receivers & Transmitters, & Asso. Goods
		76.	Medical, Surgical and Orthopaedic Appliances
		77.	Measuring, Checking & Industrial Process Equipment
		78.	Optical Instruments and Photographic Equipment
		79.	Watches and Clocks
17	*Transport Machinery*	80.	Motor Vehicles
		81.	Motorcycles
		82.	Building & Repairing of Ships & Boats, Manufacture of Bicycle
		83.	Other Transport Equipment
18	*Other Machinery*	84.	Other Manufacturing
		85.	Repair & Maintenance
19	*Electricity and Gas*	86.	Electricity and Gas
20	*Water*	87.	Waterworks
		88.	Sewerage, Waste Collection, & Remediation Activities
21	*Construction*	89.	Residential
		90.	Non Residential
		91.	Civil Engineering
		92.	Special Trade Works

No.	*Sector*		*Activity*
22	*Wholesale & Retail Trade, and Motor Vehicle*	93.	Wholesale & Retail Trade, and Motor Vehicle
23	*Hotel and Restaurants*	94.	Accommodation
		95.	Restaurants
24	*Transport and Communications*	96.	Land Transport
		97.	Water Transport
		98.	Air Transport
		99.	Other Transport Services
		100.	Port and Airport Operation Services
		101.	Highway, Bridge and Tunnel Operation Services
		102.	Communications
		103.	Publishing Activity
		104.	Telecommunications
		105.	Cinema, Video and Television Activity
		106.	ICT & Computer Services
25	*Finance and Insurance*	107.	Banks
		108.	Financial Institution
		109.	Insurance
		110.	Other Financial Institution
26	*Real Estate and Ownership of Dwellings*	111.	Real Estate
		112.	Ownership of Dwellings
27	*Business and Private Services*	113.	Rental and Leasing
		114.	Research and Development
		115.	Professional
		116.	Business Services
		117.	Private Non-Profit Institutions
		118.	Amusement and Recreational Services
		119.	Other Private Services
28	*Government Services*	120.	Public Administration
		121.	Education
		122.	Health
		123.	Defence and Public Order
		124.	Other Public Administration

Source: Malaysian Input-Output Table (2010), as compiled by authors.

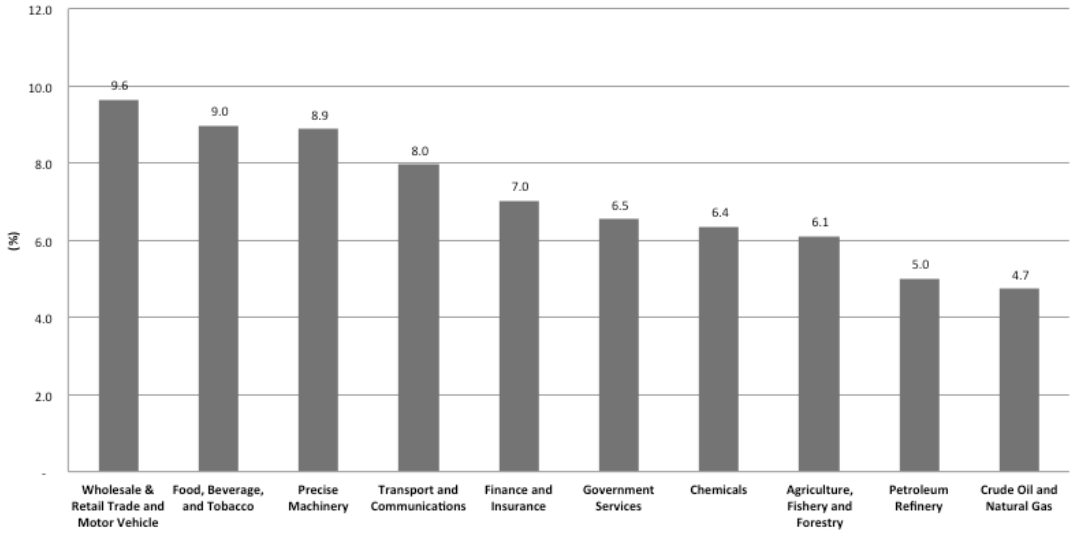
1.2.3 Review of Current Industry Activity in Malaysia

Malaysia's production output in all its industry sectors (including agriculture and service sectors) reached RM2,074 billion in 2010. Looking at the demand side, the intermediate demand accounted for RM866 billion (42 percent) while final demand, including export, reached RM1,212 billion (58 percent). The final demand is broken down into its major components that are including: private consumption, RM356 billion (30 percent); government consumption, RM101 billion (8 percent); capital formation, RM100 billion (8 percent); and export, RM644 billion (53 percent). The fact that the share of export was higher than other

domestic demands implies that Malaysia's production activities in Malaysia are largely depend on exports. Export demand nearly doubled that of private consumption.

Production output of energy subsectors in Malaysia, which consists of – crude oil and natural gas, petroleum refinery, and electricity & gas – amounted to RM238 billion (12 percent). However, the share of oil and gas sector, both upstream and downstream, was 10 percent despite of this sector being one of the major industry subsectors in Malaysia. The share was only 10 percent at monetary basis due to the low energy pricing as a result of ineffective energy subsidies. The highest production output shares was marked by wholesale & retail trade (9.6 percent); food, beverage and tobacco (9.0 percent); precise machinery (8.9 percent); and transport and communications (8.0 percent). Those numbers demonstrate that Malaysian industrial production was mainly led by the service sector, primary sector, and partly by the manufacturing sector (Figure 1.2).

Figure 1.2. Production Output Share by Sectors (Highest 10)

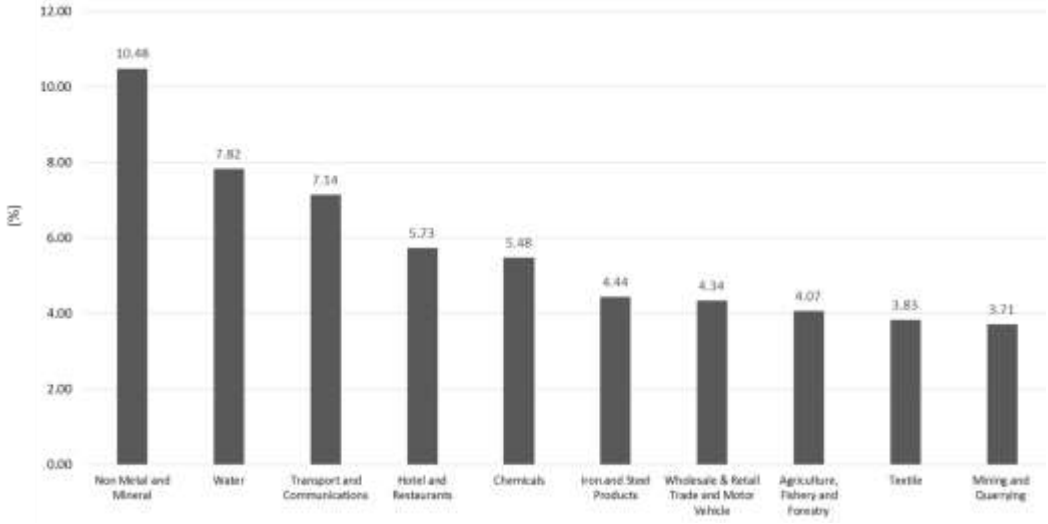


Source: Malaysia's Input-Output Table (2010).

Figure 1.3 illustrates the extent of Malaysian sectors' dependence on energy consumption. In this case, energy is defined to consist of petroleum products, electricity, and gas (downstream). The upstream oil and gas types were removed since more than 90 percent of the oil and gas output was inputted by the petroleum refinery sector.

Sectors with high dependency on energy include non-metal and mineral (mainly cement, 10.5 percent); water (7.8 percent); transport and communication (7.1 percent); and hotel and restaurants (5.7 percent). These sectors will be highly affected by price hikes in transport fuel and electricity when energy subsidies are removed.

Figure 1.3. Energy Dependency by Sectors



Source: Malaysia's Input-Output Table (2010).

1.2.4 Segregation of Electricity and Gas Sector

Electricity subsidies in Malaysia are for electricity users and electricity generators (IISD, 2013). In the 2010 Malaysian I-O Table, however, electricity and gas (downstream) are merged into one activity. As the energy subsidy is only applicable to electricity, electricity and gas sector should be separated into electricity sector and gas sector otherwise it would not provide a precise assessment of the impact of electricity subsidy removal. Two steps are needed to split the electricity and gas into electricity sector and gas sector, respectively. Firstly, separate electricity and gas input by other sector into electricity input and gas input, respectively, based on the share of electricity and gas consumption in industry sector. Information on electricity and gas consumption in the industry sector is also available in the Malaysia National Energy Balance Table 2010 (Appendix B). The share of input for electricity and gas is calculated as follows:

- *Sector 1*
  Share of gas = 0.00
  Share of electricity = 1.00
- *Sector 2-18, 20-21*
  Gas consumption in industry sector = 5935 Ktoe
  Electricity consumption in industry sector = 3994 Ktoe
  $$\text{Share of gas} = \frac{5935}{5935 + 3994} = 0.60$$
  $$\text{Share of electricity} = 1 - 0.6 = 0.40$$
- *Sector 19*
  $$\text{Gas consumption for power generation} = 12553 + 1025 = 13578 \text{ Ktoe}$$
  Gas consumption for gas sector = 1431 Ktoe
  Electricity consumption for electricity sector = 796 Ktoe

$$\text{Share of gas} = \frac{13578 + 1431}{13578 + 1431 + 796} = 0.95$$
$$\text{Share of electricity} = 1 - 0.95 = 0.05$$

Second, separate the input of other products in the electricity & gas sector into electricity sector and gas sector based on the output share of electricity & gas. Information regarding the output share of electricity and gas can be derived from the Malaysia National Energy Balance Table 2010 (APEC, 2010). The share of output for electricity and gas is calculated as follows:

- *Sector 1-18, 20-28*
  Electricity consumption in final sector = 8993
  Gas consumption in final sector = 6217
  $$\text{Share of electricity} = \frac{8993}{8993 + 6217} = 0.59$$
  $$\text{Share of gas} = 1 - 0.59 = 0.41$$
- *Sector 19*
  Electricity sector
  Share of electricity= 1.00
  Share of gas = 0.00
  Gas sector
  $$\text{Share of electricity} = \frac{13578}{1431 + 13578} = 0.90$$
  $$\text{Share of gas} = 1 - 0.90 = 0.10$$

1.2.5 Segregation of the Petroleum Refinery Sector

Transport fuel subsidies in Malaysia cover petrol (gasoline) and transport diesel (IISD, 2013). In the 2010 Malaysian I-O Table, note that petroleum products are merged under a single activity (petroleum refinery). Therefore, petroleum refinery should instead be split into: gasoline & transport diesel and other petroleum products so as to identify the price impact of the subsidy removal. Similar to the process used to separate the electricity from the gas, there are two steps undertaken to split petroleum refinery into the gasoline & transport diesel sector and other petroleum sector.

The first step is to separate the input for petroleum products by other sector to gasoline & transport diesel and other petroleum products. Information on the consumption of gasoline and transport diesel is derived from the Malaysia National Energy Balance Table 2010 (APEC, 2010). The shares of input for gasoline & transport diesel and other petroleum products are calculated as follows:

- *Sector 1-7, 9-28*
  Gasoline for transport = 9560 ktoe
  Diesel for transport = 4694 ktoe
  Total final energy consumption = 24403 ktoe

$$\text{Share of gasoline \&transport diesel} = \frac{9560 + 4694}{24403} = 0.58$$

$$\text{Share of other petroleum products} = 1 - 0.58 = 0.42$$

- *Sector 8*

  $$\text{Share of gasoline \&transport diesel} = 0.00$$

  $$\text{Share of other petroleum products} = 1.00$$

Second, separate input of other products in the petroleum refinery sector into gasoline & transport diesel and other petroleum products. Similar to the previous stage, this step also use information on the consumption of gasoline and transport diesel that is available in the Malaysia National Energy Balance Table 2010 (APEC, 2010). Shares of the output for gasoline & transport diesel, and other petroleum products are calculated as follows:

- *Sector 1-7, 9-28*

  Gasoline production = 3873 Ktoe

  Transport diesel production = 4694 Ktoe

  Total product amount of refinery = 21207 Ktoe

  $$\text{Share of gasoline and transport diesel} = \frac{3873 + 4694}{21207} = 0.40$$

  $$\text{Share of other petroleum products} = 1 - 0.40 = 0.60$$

- *Sector 8*

  Gasoline and transport diesel

  Share of gasoline and transport diesel = 1.00

  Share of other petroleum product = 0.00

  Other petroleum products

  $$\text{Share of gasoline and transport diesel} = 1.00$$

  $$\text{Share of other petroleum products} = 0.00$$

The result of separating electricity & gas sector into electricity and gas, as well as the segregation of petroleum refinery sector into gasoline & transport diesel and other petroleum products is shown at Appendix 1.

1.2.6 Methodology

Based on an input-output matrix, price of *j* sector is described below (refer to Figure 1.4):

$$p_1 a_{1j} + p_2 a_{2j} + p_3 a_{3j} + \ldots + p_{n-1} a_{n-1j} + p_n a_{nj} + v_j = p_j \qquad (1)$$

Where:

p_1: price of sector 1 product

a_{1j}: input coefficient defined as $a_{1j} = x_{1j}/X_j$

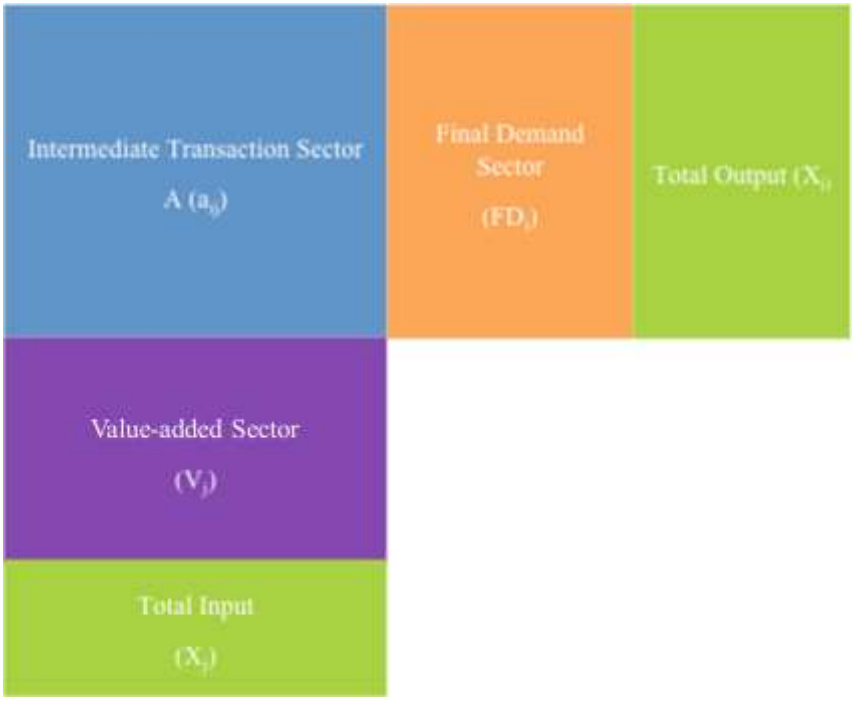
v_j: value-added ratio defined as $v_j = V_j/X_j$

x_{1j}: transaction from 1 sector to *j* sector (*j* sector purchase x_{1j} from sector 1)

V_j: total value-added of sector *j*

X_j: total input of sector *j*

Figure 1.4. Structure of Input-Output Table



Source: Malaysian Input-Output Table (2010).

After formula (1), change the matrix form and make *n* sector independent. The following matrix is thus obtained:

$$\begin{bmatrix} a_{11}\ a_{21}\ a_{31} \ldots\ a_{n-11} \\ a_{12}\ a_{22}\ a_{32} \ldots\ a_{n-1,2} \\ . \\ . \\ a_{1n-1}\ a_{2n-1} \ldots\ a_{n-1n-1} \end{bmatrix} \begin{bmatrix} p_1 \\ p_2 \\ . \\ . \\ p_{n-1} \end{bmatrix} + \begin{bmatrix} a_{n1} \\ a_{n2} \\ . \\ . \\ a_{nn-1} \end{bmatrix} \begin{bmatrix} p_n \end{bmatrix} + \begin{bmatrix} v_1 \\ v_2 \\ . \\ . \\ v_{n-1} \end{bmatrix} = \begin{matrix} p_1 \\ p_2 \\ . \\ . \\ p_{n-1} \end{matrix}$$

It is assumed that an increase of p_n does not affect v_j and change the above formula to relation between $p_1,\ldots,p_{n-1}$ and p_n. Then change p_n to $\triangle p_n$. The formula now becomes:

$$\begin{bmatrix} \triangle p_1 \\ \triangle p_2 \\ . \\ . \\ \triangle p_{n-1} \end{bmatrix} = \left\{ \begin{bmatrix} 1-a_{11} & -a_{21} & \ldots. & -a_{n-11} \\ -a_{12} & 1-a_{22} & \ldots. & -a_{n-12} \\ . & & & \\ . & & & \\ -a_{1n-1} & -a_{2n-1} & \ldots. & 1-a_{n-1n-1} \end{bmatrix}^{-1\prime} \right\} \begin{bmatrix} a_{n1} \\ a_{n2} \\ . \\ . \\ a_{nn-1} \end{bmatrix} \triangle p_n$$

Electricity and transport fuel sector will be selected to $\triangle p_n$. Subsequently, convert the above formula into the matrix form, as follows:

$\triangle P = [(I-A)-1]'\ ICV \triangle pn$

Where:

$\triangle P$: Price vector $(\triangle p1,\ldots, \triangle pn-1)$

I : Unit Matrix $(n-1, n-1)$

A : Input Coefficient Matrix (*n-1, n-1*)

-1 : Inverse

‘ : Transpose

ICV : Input Coefficient Vector of sector n ($a_{n1,\ldots,} a_{nn-1}$)

Consequently, the following steps are required:

a. Remove electricity or transport fuel sector from input coefficient matrix: *A* (Appendix C and H)
b. Apply unit matrix: $B = I-A$ (Appendix D and Appendix I)
c. Inverse matrix: $C = B^{-1}$ (Appendix E and Appendix J)
d. Transpose matrix: $D = C'$ (Appendix F and Appendix J)
e. Price impact vector (final solution): $E = C'\ ICV$ (Appendix G and Appendix L)

1.3 Study Results

1.3.1 Price Impact by Removing Electricity Subsidies

The simulation shows that a removal of electricity subsidies increases price levels in all sectors analysed, in varying degrees. If the subsidy is removed and the electricity price increased by double (100 percent), the highest impact is seen in hotel and restaurants (5 percent). Following this sector are finance and insurance; water; and non-metal and mineral sector, which will all increase by 3 percent. A price hike equal to 2 percent will affect sectors such as government services, iron and steel products, business and private services, textile, and wood and wood products. While for other sectors, such as wholesale & retail trade and motor vehicle, gas, gasoline and transport diesel, other petroleum products, and crude oil and natural gas, the electricity subsidy removal has a small impact.

Under a scenario where electricity and gas sector are merged, an electricity subsidy removal will significantly impact the prices of water (7 percent), non-metals and minerals (6 percent), hotels and restaurants (6 percent), and iron and steel products (5 percent). The prices for some sectors increase due to electricity subsidy removal for some sectors is relatively higher than that under a scenario where the electricity sector is separate from the gas sector. For example, iron and steel products, textile, and wood and wood products are estimated to increase by 5 percent, 4 percent, and 3 percent, respectively. In contrast, if electricity & gas are separated, the price increase will only be 2 percent. Table 1.2 shows the price impact should the electricity subsidy be removed and both electricity and gas are kept as two separate sectors.

Table 1.2. Price Impact of Electricity Subsidy Removal

Sector		*Price Impact (%)*
1	Hotel and Restaurants	5.00
2	Finance and Insurance	3.00
3	Water	3.00
4	Non-Metal and Mineral	3.00
5	Government Services	2.00
6	Iron and Steel Products	2.00
7	Business and Private Services	2.00
8	Textile	2.00
9	Wood and Wood Product	2.00
10	Transport and Communications	1.00
11	Paper	1.00
12	Metal Product	1.00
13	Chemicals	1.00
14	Real Estate and Ownership of Dwellings	1.00
15	Basic Precious and Non-Ferrous Metals	1.00
16	Food, Beverage, and Tobacco	1.00
17	Construction	1.00
18	Industrial Machinery	1.00
19	Agriculture, Fishery and Forestry	1.00
20	Transport Machinery	1.00
21	Electrical Machinery	1.00
22	Precise Machinery	1.00
23	Mining and Quarrying	1.00
24	Other Machinery	1.00
25	Wholesale & Retail Trade and Motor Vehicle	0.00
26	Gas	0.00
27	Gasoline and Transport Diesel	0.00
28	Other Petroleum Products	0.00
29	Crude Oil and Natural Gas	0.00

Source: Authors.

1.3.2 Price Impact by Removing Transport Fuel Subsidies

According to the simulation, removing the transport fuel subsidy will increase the prices in all sectors included in this study. If transport fuel increases by 100 percent (double), the increase in prices will range from 1 percent to 6 percent. Gas as well as non-metal and mineral will experience the highest price hikes (6 percent) due to such subsidy removal. Increase in price level equivalent to 5 percent is experienced by transport and communications, and electricity sectors, while a 4 percent price increase is only affected chemicals sector. At the same time, transport fuel subsidy removal increased price level equals to 3 percent for wholesale & retail trade and motor vehicle; construction; and agriculture, fishery and forestry. Table 1.3 presents

the impact of transport fuel subsidy removal on prices when the petroleum refinery sector is split into gasoline & transport diesel and other petroleum products.

Table 1.3. Price Impact of Transport Fuel Subsidy Removal

Sector		*Price impact (%)*
1	Gas	6.00
2	Non-Metal and Mineral	6.00
3	Transport and Communications	5.00
4	Electricity	5.00
5	Chemicals	4.00
6	Wholesale & Retail Trade and Motor Vehicle	3.00
7	Construction	3.00
8	Agriculture, Fishery and Forestry	3.00
9	Wood and Wood Product	3.00
10	Food, Beverage, and Tobacco	2.00
11	Mining and Quarrying	2.00
12	Iron and Steel Products	2.00
13	Hotel and Restaurants	2.00
14	Paper	2.00
15	Water	2.00
16	Crude Oil and Natural Gas	2.00
17	Textile	1.00
18	Metal Product	1.00
19	Business and Private Services	1.00
20	Transport Machinery	1.00
21	Other Petroleum Products	1.00
22	Government Services	1.00
23	Basic Precious and Non-Ferrous Metals	1.00
24	Finance and Insurance	1.00
25	Industrial Machinery	1.00
26	Other Machinery	1.00
27	Electrical Machinery	1.00
28	Precise Machinery	1.00
29	Real Estate and Ownership of Dwellings	1.00

Source: Authors.

If gasoline & transport diesel and other petroleum products are merged under the petroleum refinery sector, the price impact of the subsidy removal is shown to be overstated. For example, a subsidy removal leads to a 6.6 percent price increase in the electrical machinery sector. However, when the petroleum refinery sector is split, price hike for this sector is expected to be 1 percent only. At the same time, price level for non-metal and minerals, and transport and communications will increase by 8.6 percent and 1.5 percent, respectively if transport diesel & other petroleum products are merged under the petroleum refinery sector. On the other hand, if the petroleum refinery sector is splitted into two sectors, the price

increases for non-metal and minerals, and transport and communications will be equal to 6 percent and 5 percent, respectively.

1.4 Conclusion

In many developing countries, demand for electricity and transport fuel (gasoline and diesel) has been increasing rapidly driven by a stable economic growth and by the intentionally low energy prices due to the subsidy policy. Malaysia is among the ASEAN countries that impose energy subsidy for electricity and transport fuel, although the subsidy share has been declining. Currently, piped natural gas price is still subsidised; if this subsidy is removed, electricity prices could almost double. For transport sector, the Automatic Price Mechanism on transport fuel such as gasoline has shifted to the floatation method on 1 December 2014, allowing the retail price of gasoline and diesel to now be influenced by market forces. According to this study using the 2010 Malaysian I-O Table, the price increase in electricity and transport fuel, especially electricity, lead to a serious price impact in other sectors in Malaysia. Looking at other price changes historically, the increase of Production Price Index in Malaysia, such as the Wholesale Price Index (WPI) and Consumer Price Index (CPI) was at 9 percent and 4.9 percent, respectively, from 2000 to 2012 (World Bank, 2014). Compared to these numbers, the price impact of 5 percent to 6 percent are considered significant and; hence, mitigating measures such as phasing out subsidies to highly impacted subsectors are increasingly important. However, this study excludes the final demand sector such as households. Therefore, other approaches – including macroeconomic study or Computable General Equilibrium study – are suggested so as to further examine the impact on the household sector, too.

This study splits the electricity and transport fuel sectors proportional to their share in the 2010 Malaysian Energy Balance Table. As a result, there are differences in the price impact between a scenario where electricity and transport fuel are considered as two separate sectors and a scenario where they are combined as one sector. This study proves that separating the above-mentioned sectors provides a more precise estimate of the price impact following a removal in energy subsidies. However, the energy consumption in the industry and commercial sectors is not broken down by sector here. More precise analysis is recommended once detailed and official data on the industry subsectors (such as energy data and base data from the I-O table) are available.

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Appendices (Part I)

Appendix 1-A. 2010 Malaysian Input-Output Table

ABSORPTION MATRIX OF DOMESTIC PRODUCTION AT BASIC PRICES, 2010 (RM'000)	Agriculture, Fishery and Forestry	Crude Oil and Natural Gas	Mining and Quarrying	Food, Beverage, and Tobacco	Textile	Wood and Wood Product	Paper	Gasoline and Transport Diesel	Other Petroleum Products	Chemicals	Non Metal and Mineral
Agriculture, Fishery and Forestry	8,258,792.74	3,657.09	1,167.76	61,408,605.95	98,106.74	7,002,303.96	2,656,361.91	3,590.72	5,386.08	1,811,651.82	17,193.15
Crude Oil and Natural Gas	3,049.71	881,148.03	178.21	844,087.06	167.62	446.23	261.27	21,089,228.03	31,633,842.04	1,704,021.56	1,801.41
Mining and Quarrying	44,478.85	32,584.61	39,263.74	77,187.85	3,868.15	2,390.08	29,233.58	5,316.79	7,975.19	546,953.94	3,317,319.21
Food, Beverage, and Tobacco	4,361,917.71	42,383.86	17,903.63	50,206,843.04	69,760.53	25,093.55	36,197.26	33,214.63	49,821.94	4,716,416.36	31,947.04
Textile	9,100.57	3,060.79	7,225.35	53,940.36	1,465,479.58	37,476.95	265,258.09	816.51	1,224.76	364,531.45	22,791.17
Wood and Wood Product	216,072.39	664.66	4,902.00	7,288.23	3,834.95	2,150,525.31	1,888,575.74	209.38	314.07	326,624.95	27,033.57
Paper	5,509.54	2,671.09	4,056.87	278,516.27	36,280.19	63,199.60	3,181,853.91	1,467.07	2,200.60	262,968.71	99,658.14
Gasoline and Transport Diesel	2,641,099.95	1,336,753.98	154,043.16	347,893.27	41,959.22	87,253.83	111,412.54	-	-	2,825,115.81	899,017.90
Other Petroleum Products	1,912,520.65	967,994.26	111,548.49	251,922.71	30,384.26	63,183.80	80,678.05	-	677,180.15	2,045,773.52	651,012.96
Chemicals	4,310,640.68	984,425.82	194,166.81	1,587,574.44	940,891.35	415,214.06	1,351,602.10	195,739.38	293,609.07	34,576,008.63	627,061.04
Non Metal and Mineral	164,426.90	31,113.75	9,874.47	248,539.89	6,440.44	45,537.96	111,564.45	910.39	1,365.58	488,774.00	3,720,976.92
Iron and Steel Products	2,678.60	153,054.25	5,874.87	17,327.01	7,847.04	11,199.08	344,088.51	348.75	523.12	122,796.11	404,157.94
Non-Metallis and Non-Ferrous Metals	4,940.23	72,710.86	17,976.11	76,312.29	7,410.20	13,923.57	44,479.92	250.31	375.47	64,870.05	17,925.86
Metal Product	144,882.14	871,626.42	19,258.44	968,414.78	33,335.65	14,718.18	287,429.68	7,656.56	11,484.84	414,318.53	549,582.03
Industrial Machinery	129,996.73	65,773.70	133,539.30	11,473.69	97,149.90	182,818.42	6,337.89	459.34	689.01	47,477.30	13,730.57
Electrical Machinery	12,248.79	30,266.40	628.17	28,248.00	11,209.39	2,569.56	8,895.49	503.47	755.20	30,145.55	14,782.78
Precise Machinery	35,310.43	30,762.73	9,413.47	95,038.07	44,645.58	10,767.02	33,561.67	3,323.62	4,985.44	110,870.06	21,987.60
Transport Machinery	541,117.68	57,779.08	3,352.52	42,765.49	14,386.09	4,114.39	33,950.44	1,434.60	2,151.90	34,592.29	14,422.97
Other Machinery	60,315.19	80,860.53	1,267.15	315,021.24	283,033.38	23,149.10	87,657.84	6,966.85	10,450.27	200,428.62	47,548.70
Electricity	602,260.92	16,138.56	33,749.11	413,034.69	178,034.95	175,283.72	228,026.28	41,299.27	61,948.90	938,122.06	435,683.16
Gas	-	24,207.84	50,623.67	619,552.03	267,052.43	262,925.58	342,039.42	61,948.90	92,923.35	1,407,183.09	653,524.74
Water	413,757.81	14,405.93	8,084.54	599,785.00	49,120.15	23,996.89	77,534.66	11,167.67	16,751.51	1,400,047.96	363,997.59
Construction	846,149.91	818,294.05	6,009.72	618,328.36	28,976.09	81,016.49	124,159.38	33,079.25	49,618.87	376,588.42	175,342.92
Wholesale & Retail Trade and Motor Vehicle	4,248,778.70	1,127,917.96	282,962.68	17,357,081.11	708,267.65	1,469,435.32	1,954,557.91	1,181,044.11	1,771,566.16	10,538,697.89	1,560,260.72
Hotel and Restaurants	234,263.07	3,993.48	5,907.08	42,607.95	11,316.93	13,136.13	32,671.77	1,292.41	1,938.62	82,568.62	20,935.47
Transport and Communications	2,059,709.45	1,106,860.79	277,481.12	3,061,616.03	439,417.23	1,033,062.56	884,652.32	293,346.49	440,019.73	2,736,834.48	1,207,656.13
Finance and Insurance	5,917,361.87	1,251,823.94	135,493.33	3,855,455.12	335,569.47	512,545.79	646,916.15	341,508.22	512,262.33	2,025,788.43	505,448.04
Real Estate and Ownership of Dwellings	103,573.83	-	-	226,264.87	85,960.16	76,428.92	126,961.00	4,571.45	6,857.17	314,200.12	104,229.06
Busineess and Private Services	957,202.11	395,375.55	200,017.55	743,526.69	174,733.19	188,016.10	330,292.46	73,123.78	109,685.66	1,167,618.46	340,465.47
Government Services	1,738.02	11.82	6.22	4,967.91	762.60	1,349.41	1,120.43	41.48	62.22	3,572.96	1,067.07
total intermediate input (Xj)	**38,243,895.17**	**10,408,321.83**	**1,735,975.53**	**144,409,219.37**	**5,475,401.10**	**13,993,081.54**	**15,308,332.10**	**23,393,859.41**	**35,767,969.26**	**71,685,561.72**	**15,868,561.30**
total output (Xi)	**126,650,738**	**98,121,543**	**9,427,737**	**186,021,953**	**13,515,738**	**19,107,354**	**30,333,086**	**40,952,644**	**62,614,418**	**131,783,487**	**25,172,829**
Business and Private Services											

Appendix 1-A. 2010 Malaysian Input-Output Table *(continued)*

ABSORPTION MATRIX OF DOMESTIC PRODUCTION AT BASIC PRICES, 2010 (RM'000)	Iron and Steel Products	Basic Precious and Non-ferrous Metals	Metal Product	Industrial Machinery	Electrical Machinery	Precise Machinery	Transport Machinery	Other Machinery	Electricity	Gas	Water
Agriculture, Fishery and Forestry	11,257.36	6,055.50	17,084.24	29,358.00	53,296.91	163,342.41	1,301,530.35	76,093.34	3,073.54	2,135.85	2,305.83
Crude Oil and Natural Gas	300.13	157.48	181.72	515.27	181.22	453.91	102.29	30.26	959.81	666.99	97.39
Mining and Quarrying	197,874.11	210,277.16	180,171.79	120,476.16	48,232.22	41,129.17	86,165.38	395,241.83	347,030.84	241,157.02	345.81
Food, Beverage, and Tobacco	11,557.64	9,141.55	39,645.83	18,479.79	51,757.95	83,730.57	27,562.18	19,503.31	6,078.30	4,223.90	7,637.74
Textile	12,751.37	5,201.72	19,443.43	19,263.83	35,551.15	126,610.08	161,055.43	28,753.59	463.97	322.42	344.38
Wood and Wood Product	839.39	530.61	44,772.25	21,533.05	464,292.53	289,835.02	114,279.72	24,203.46	512.96	356.46	243.81
Paper	11,128.38	17,221.22	43,996.54	25,389.14	62,500.00	209,575.28	71,910.00	42,275.17	756.85	525.95	657.36
Gasoline and Transport Diesel	197,009.47	43,424.63	77,982.18	18,551.99	55,808.30	154,622.00	52,788.59	16,596.37	827,353.97	574,940.90	84,031.36
Other Petroleum Products	142,662.03	31,445.42	56,469.86	13,434.20	40,412.90	111,967.65	38,226.22	12,018.06	599,118.40	416,336.51	60,850.29
Chemicals	221,091.73	168,371.33	744,383.99	500,958.00	1,168,855.08	3,425,299.88	1,638,873.88	617,046.00	34,448.47	23,938.76	498,728.13
Non-metal and Mineral	1,601,568.96	40,619.26	132,474.14	77,910.60	180,664.43	2,342,496.12	234,617.38	9,342.22	703.85	489.12	591.98
Iron and Steel Products	5,763,331.27	311,264.86	3,057,671.72	1,488,422.10	434,156.17	1,557,012.77	2,473,301.97	185,712.52	1,509.62	1,049.06	185,179.14
Basic Precious and Non-ferrous Metals	1,028,025.11	732,439.46	326,041.42	236,794.16	409,521.86	220,881.45	642,713.46	120,312.69	72,741.87	50,549.43	649.83
Metal Product	586,854.76	801,273.09	2,003,582.41	1,212,156.55	1,331,914.13	1,165,286.96	1,276,373.96	108,918.62	29,007.23	20,157.56	50,709.94
Industrial Machinery	14,044.50	263,301.05	245,303.64	537,084.00	696,648.79	298,259.87	461,793.19	133,701.88	100,920.52	70,131.21	17,455.21
Electrical Machinery	6,449.98	61,529.61	44,737.65	42,441.35	515,714.58	863,871.96	261,519.62	5,541.63	905.08	628.95	1,389.64
Precise Machinery	11,996.12	8,484.82	28,487.13	31,216.29	746,364.02	2,458,234.79	178,206.66	180,685.40	37,164.14	25,825.93	16,227.55
Transport Machinery	5,844.49	8,454.55	34,353.80	121,540.87	113,081.52	55,310.71	6,834,741.17	13,322.91	5,038.24	3,501.15	1,350.58
Other Machinery	12,249.94	7,041.50	52,177.69	45,780.47	62,890.10	426,124.51	137,479.44	1,446,870.35	129.73	90.15	102.29
Electricity	369,355.58	124,518.89	175,472.37	88,162.51	242,012.00	660,414.94	157,653.07	34,539.93	259,297.09	-	288,991.19
Gas	554,033.37	186,778.34	263,208.55	132,243.76	363,018.00	990,622.41	236,479.61	51,809.89	4,433,980.27	492,664.47	433,486.78
Water	51,169.34	137,035.51	215,406.36	24,234.82	55,850.00	147,284.98	75,593.48	14,382.73	98,783.27	68,646.00	651,213.33
Construction	66,634.48	22,179.25	77,867.62	80,272.79	253,336.34	1,897,410.20	104,592.95	22,869.95	3,083.12	2,142.51	16,243.63
Wholesale & Retail Trade and Motor Vehicle	1,745,402.82	756,255.40	1,464,076.44	967,550.83	2,893,774.13	8,374,216.21	3,190,764.39	535,815.41	464,909.05	323,072.39	220,401.76
Hotel and Restaurants	46,562.93	7,317.02	34,847.09	19,489.59	24,747.18	63,026.49	28,787.07	5,569.57	5,657.19	3,931.27	2,406.52
Transport and Communications	718,318.08	378,775.63	662,163.03	356,515.02	1,584,740.07	3,602,454.66	615,563.78	149,511.01	214,305.93	148,924.46	244,085.64
Finance and Insurance	568,089.75	390,513.97	659,834.93	346,232.81	1,072,386.56	3,373,556.93	465,888.03	105,152.28	629,462.51	437,423.10	289,447.66
Real Estate and Ownership of Dwellings	41,138.64	25,102.22	126,112.61	65,554.18	75,707.05	372,909.32	113,299.68	27,377.00	-	-	-
Business and Private Services	147,946.37	97,267.66	354,300.39	264,599.22	381,122.44	1,853,778.17	533,701.91	93,212.22	895,427.16	622,246.00	403,588.64
Government Services	362.61	312.68	1,164.13	964.63	2,111.59	6,834.58	2,063.12	242.46	29.32	20.38	49.45
Total Intermediate Input (Xj)	**14,145,850.71**	**4,852,291.36**	**11,183,414.95**	**6,907,125.99**	**13,420,649.22**	**35,336,554.02**	**21,517,627.95**	**4,476,652.07**	**9,072,852.31**	**3,536,097.91**	**3,478,812.85**
Total Output (Xi)	**28,435,677**	**15,951,886**	**25,982,731**	**21,087,737**	**56,366,457**	**184,287,942**	**50,145,044**	**13,374,360**	**26,072,024**	**10,161,438**	**11,085,158**

Appendix 1-A. 2010 Malaysian Input-Output Table *(continued)*

ABSORPTION MATRIX OF DOMESTIC PRODUCTION AT BASIC PRICES, 2010 (RM'000)	Construction	Wholesale & Retail Trade and Motor Vehicle	Hotel and Restaurants	Transport and Communications	Finance and Insurance	Real Estate and Ownership of Dwellings	Business and Private Services	Government Services	Total Intermediate Output (Xi)
Agriculture, Fishery and Forestry	56,827.95	3,020,550.17	2,621,709.93	102,908.92	69,813.04	194,941.09	34,247.17	562,332.32	89,595,681.84
Crude Oil and Natural Gas	1,521.95	6,704.02	343.35	9,471.37	136.85	41.11	314.88	393.11	56,180,804.28
Mining and Quarrying	2,318,819.48	5,205.27	2,570.87	3,977.38	1,040.55	1,085.01	2,340.57	11,325.88	8,321,038.49
Food, Beverage, and Tobacco	25,075.11	5,816,361.52	8,627,686.51	42,141.92	20,014.68	22,854.03	247,698.64	845,580.96	75,518,231.69
Textile	13,620.04	441,777.52	63,777.11	40,148.41	17,883.42	12,863.06	10,841.71	219,045.46	3,460,623.71
Wood and Wood Product	3,647,228.54	348,982.17	809.91	6,529.04	6,118.12	7,181.82	8,726.20	45,964.90	9,658,985.22
Paper	36,490.95	3,614,628.13	23,472.21	1,566,714.64	2,477,334.25	118,383.78	800,646.56	1,192,091.95	14,254,080.33
Gasoline and Transport Diesel	1,316,908.42	4,981,258.41	296,814.97	6,181,389.56	118,563.97	36,243.31	272,598.00	311,084.22	24,062,520.27
Other Petroleum Products	953,623.34	3,607,118.16	214,934.97	4,476,178.65	85,856.67	26,245.16	197,398.55	225,267.88	18,101,763.79
Chemicals	998,774.15	4,807,755.45	25,418.00	1,210,407.65	64,392.88	130,923.83	364,456.82	4,070,929.79	66,191,987.19
Non-metal and Mineral	11,164,062.95	295,721.56	1,239.67	63,216.21	4,527.68	19,806.37	6,558.77	63,281.52	21,069,417.52
Iron and Steel Products	7,183,701.03	269,364.63	1,272.96	7,033.78	5,541.51	4,042.67	16,915.68	32,866.82	24,049,245.55
Basic Precious and Non-ferrous Metals	1,173,420.35	25,911.98	10,811.19	3,224.38	1,734.60	1,078.37	6,046.89	11,067.76	5,395,141.16
Metal Product	1,210,740.25	396,588.76	4,280.06	941,777.82	10,406.18	7,781.27	27,616.42	336,115.72	14,844,248.95
Industrial Machinery	479,319.75	184,605.08	427,800.98	195,351.32	4,449.59	5,866.55	58,535.93	82,397.39	4,966,416.32
Electrical Machinery	368,204.01	350,160.78	1,769.40	253,060.99	12,486.11	2,584.61	79,335.65	109,893.72	3,122,478.10
Precise Machinery	71,408.32	385,178.47	20,436.67	368,738.39	80,006.14	29,520.64	251,745.78	828,859.92	6,159,452.87
Transport Machinery	48,821.75	4,618,053.91	4,865.85	1,203,677.33	15,072.22	12,367.92	195,725.00	665,909.19	14,711,100.60
Other Machinery	56,891.09	1,398,051.17	27,705.12	1,450,417.84	166,009.56	21,067.32	1,074,322.71	910,291.73	8,412,391.58
Electricity	119,658.28	92,468.43	2,199,105.50	1,117,394.21	2,870,244.34	198,322.23	949,736.31	2,339,459.40	15,410,387.88
Gas	179,487.42	934.02	22,213.19	11,286.81	28,992.37	2,003.25	9,593.30	23,630.90	12,198,447.75
Water	135,597.07	899,262.62	414,678.75	227,744.76	148,886.48	20,764.99	70,693.07	841,669.90	7,277,547.16
Construction	6,533,345.76	53,060.17	274,306.90	1,624,067.91	471,625.31	1,013,958.93	428,584.16	4,500,041.22	20,603,186.63
Wholesale & Retail Trade and Motor Vehicle	5,455,653.88	7,268,472.23	1,981,608.21	3,862,697.94	771,245.02	149,084.79	826,223.61	812,789.53	84,264,584.26
Hotel and Restaurants	105,727.35	1,839,251.37	3,041,075.95	969,978.14	3,739,669.86	76,911.44	215,424.57	1,523,157.78	12,204,169.89
Transport and Communications	976,439.22	5,137,566.81	1,777,158.98	41,081,103.02	7,578,276.75	733,627.17	4,163,304.17	6,320,891.67	89,984,381.43
Finance and Insurance	1,152,371.16	6,748,864.42	567,836.86	11,155,656.25	43,643,431.60	4,661,970.53	2,609,684.61	3,178,470.74	98,096,447.37
Real Estate and Ownership of Dwellings	971,586.09	2,123,865.36	138,514.11	1,817,695.07	1,536,287.49	4,615,808.51	576,996.35	5,365,134.35	19,042,134.60
Business and Private Services	678,291.52	3,502,146.15	775,383.19	3,129,379.04	1,820,915.20	744,800.90	8,727,544.89	2,380,108.87	32,085,816.94
Government Services	8,373.12	20,255.28	1,686.94	16,020.40	1,224,473.93	39,627.86	72,121.12	1,574,967.18	2,986,380.91
Total Intermediate Input (Xj)	**47,441,990.30**	**62,260,124.05**	**23,571,288.31**	**83,139,389.15**	**66,995,436.37**	**12,911,758.52**	**22,305,978.12**	**39,385,021.79**	**862,229,094.28**
Total Output (Xi)	**91,361,903**	**199,971,866**	**47,680,539**	**165,050,536**	**145,527,523**	**38,145,463**	**64,201,474**	**135,579,295**	**2,074,170,581.69**

Source: Authors.

Appendix 1-B. 2010 Malaysian Energy Balance Tables

Unit: KTOE

	1. Coal	2. Coal Products	3. Crude Oil, NGL and Condensate	4. Petroleum Products	5. Gas	6. Hydro	7. Geothermal, Solar, etc.	8. Others	9. Electricity	Total
1. Indigenous Production	1,511	-	34,653	-	46,628	547	0	58	-	83,399
2. Imports	13,073	-	8,115	10,359	6,971	-	-	-	-	38,519
3. Exports	-62	-	-17,258	-8,429	-26,668	-	-	-	-1	-52,418
4. International Marine Bunkers	-	-	-	-59	-	-	-	-	-	-59
5. International Aviation Bunkers	-	-	-	-	-	-	-	-	-	-
6. Stock Changes	79	-	-337	441	-	-	-	-	-	182
7. Total Primary Energy Supply	14,601	-	25,173	2,312	26,932	547	0	58	-1	69,622
8. Transfers	-	-	-2,491	2,299	-	-	-	-	-	-192
9. Total Transformation Sector	-12,951	-	-22,710	21,572	-17,805	-547	0	-58	10,292	-22,208
9.1 Main Activity Producer	-12,951	-	-	-540	-12,553	-547	-	-58	9,905	-16,745
9.2 Autoproducers	-	-	-	-	-1,025	-	0	-	387	-638
9.3 Gas Processing	-	-	-	905	-4,227	-	-	-	-	-3,322
9.4 Refineries	-	-	-22,710	21,207	-	-	-	-	-	-1,503
9.5 Coal Transformation	-	-	-	-	-	-	-	-	-	-
9.6 Petrochemical Industry	-	-	-	-	-	-	-	-	-	-
9.7 Biofuel Processing	-	-	-	-	-	-	-	-	-	-
9.8 Charcoal Processing	-	-	-	-	-	-	-	-	-	-
9.9 Non-specified Transformation	-	-	-	-	-	-	-	-	-	-
10. Loss & Own Use	-	-	-	-1,682	-1,431	-	-	-	-796	-3,909
11. Discrepancy	176	-	28	-97	-1,480	-	-	-	-502	-1,874
12. Total Final Energy Consumptions	1,826	-	-	24,403	6,217	-	-	-	8,993	41,439
13. Industry Sector	1,826	-	-	4,833	5,935	-	-	-	3,994	16,588
13.1 Iron and Steel	-	-	-	-	-	-	-	-	-	-
13.2 Chemical (incl. Petro-Chemical)	-	-	-	-	-	-	-	-	-	-
13.3 Non Ferrous Metals	-	-	-	-	-	-	-	-	-	-
13.4 Non Metallic Mineral Products	1,826	-	-	-	-	-	-	-	-	1,826
13.5 Transportation Equipment	-	-	-	-	-	-	-	-	-	-
13.6 Machinery	-	-	-	-	-	-	-	-	-	-
13.7 Mining and Quarrying	-	-	-	-	-	-	-	-	-	-
13.8 Food, Beverages and Tobacco	-	-	-	-	-	-	-	-	-	-
13.9 Pulp, Paper and Printing	-	-	-	-	-	-	-	-	-	-
13.10 Wood and Wood Products	-	-	-	-	-	-	-	-	-	-
13.11 Construction	-	-	-	-	-	-	-	-	-	-
13.12 Textiles and Leather	-	-	-	-	-	-	-	-	-	-
13.13 Non-specified Industry	-	-	-	4,833	5,935	-	-	-	3,994	14,762
14. Transport Sector	-	-	-	16,562	245	-	-	-	18	16,826
14.1 Domestic Air Transport	-	-	-	-	-	-	-	-	-	-
14.2 Road	-	-	-	9,476	245	-	-	-	-	9,721
14.3 Rail	-	-	-	-	-	-	-	-	18	18
14.4 Inland Waterways	-	-	-	-	-	-	-	-	-	-
14.5 Pipeline Transport	-	-	-	-	-	-	-	-	-	-
14.6 Non-specified Transport	-	-	-	7,086	-	-	-	-	-	7,086
15. Other Sector	-	-	-	3,008	36	-	-	-	4,981	8,025
15.1 Residential & Commercial	-	-	-	1,958	36	-	-	-	4,957	6,951
15.1.1 Commerce and Public Services	-	-	-	1,246	30	-	-	-	3,020	4,296
15.1.2 Residential	-	-	-	712	6	-	-	-	1,937	2,655
15.2 Agriculture	-	-	-	1,050	-	-	-	-	24	1,074
15.3 Fishing	-	-	-	-	-	-	-	-	-	-
15.4 Non-specified Others	-	-	-	-	-	-	-	-	-	-
16. of which Non-Energy Use except APEC Non-OECD members before 2003	-	-	-	657	1,651	-	-	-	-	2,307
17. Electricity Output in GWh	49,401	-	1,659	-	61,342	6,361	-	911	-	119,674

Source: APEC (2010).

Appendix 1-C. A = Xij/Xj Matrix Excluding Electricity Sector

ABSORPTION MATRIX OF DOMESTIC PRODUCTION AT BASIC PRICES, 2010 (RM'000)	Agriculture, Fishery and Forestry	Crude Oil and Natural Gas	Mining and Quarrying	Food, Beverage, and Tobacco	Textile	Wood and Wood Product	Paper	Gasoline and Transport Diesel	Other Petroleum Products	Chemicals	Non-metal and Mineral	Iron and Steel Products	Basic Precious and Non-ferrous Metals	Metal Product
Agriculture, Fishery and Forestry	0.07	0.00	0.00	0.33	0.01	0.37	0.09	0.00	0.00	0.01	0.00	0.00	0.00	0.00
Crude Oil and Natural Gas	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.51	0.51	0.01	0.00	0.00	0.00	0.00
Mining and Quarrying	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.01	0.01	0.01
Food, Beverage, and Tobacco	0.03	0.00	0.00	0.27	0.01	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00
Textile	0.00	0.00	0.00	0.00	0.11	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Wood and Wood Product	0.00	0.00	0.00	0.00	0.00	0.11	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paper	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gasoline and Transport Diesel	0.02	0.01	0.02	0.00	0.00	0.00	0.00	-	-	0.02	0.04	0.01	0.00	0.00
Other Petroleum Products	0.02	0.01	0.01	0.00	0.00	0.00	0.00	-	0.01	0.02	0.03	0.01	0.00	0.00
Chemicals	0.03	0.01	0.02	0.01	0.07	0.02	0.04	0.00	0.00	0.26	0.02	0.01	0.01	0.03
Non-metal and Mineral	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.06	0.00	0.01
Iron and Steel Products	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.20	0.02	0.12
Basic Precious and Non-ferrous Metals	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.05	0.01
Metal Product	0.00	0.01	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.02	0.05	0.08
Industrial Machinery	0.00	0.00	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.01
Electrical Machinery	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Precise Machinery	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Transport Machinery	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Machinery	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas	-	0.00	0.01	0.00	0.02	0.01	0.01	0.00	0.00	0.01	0.03	0.02	0.01	0.01
Water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.01
Construction	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Wholesale & Retail Trade and Motor Vehicle	0.03	0.01	0.03	0.09	0.05	0.08	0.06	0.03	0.03	0.08	0.06	0.06	0.05	0.06
Hotel and Restaurants	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Transport and Communications	0.02	0.01	0.03	0.02	0.03	0.05	0.03	0.01	0.01	0.02	0.05	0.03	0.02	0.03
Finance and Insurance	0.05	0.01	0.01	0.02	0.02	0.03	0.02	0.01	0.01	0.02	0.02	0.02	0.02	0.03
Real Estate and Ownership of Dwellings	0.00	-	-	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Business and Private Services	0.01	0.00	0.02	0.00	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.01
Government Services	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix 1-C. A = Xij/Xj Matrix Excluding Electricity Sector (*continued*)

ABSORPTION MATRIX OF DOMESTIC PRODUCTION AT BASIC PRICES, 2010 (RM'000)	Industrial Machinery	Electrical Machinery	Precise Machinery	Transport Machinery	Other Machinery	Gas	Water	Construction	Wholesale & Retail Trade and Motor Vehicle	Hotels and Restaurants	Transport and Communications	Finance and Insurance	Real Estate and Ownership of Dwellings	Business and Private Services	Government Services
Agriculture, Fishery and Forestry	0.00	0.00	0.00	0.03	0.01	0.00	0.00	0.00	0.02	0.05	0.00	0.00	0.01	0.00	0.00
Crude Oil and Natural Gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mining and Quarrying	0.01	0.00	0.00	0.00	0.03	0.02	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Food, Beverage, and Tobacco	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.18	0.00	0.00	0.00	0.00	0.01
Textile	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Wood and Wood Product	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paper	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.02	0.00	0.01	0.01
Gasoline and Transport Diesel	0.00	0.00	0.00	0.00	0.00	0.06	0.01	0.01	0.02	0.01	0.04	0.00	0.00	0.00	0.00
Other Petroleum Products	0.00	0.00	0.00	0.00	0.00	0.04	0.01	0.01	0.02	0.00	0.03	0.00	0.00	0.00	0.00
Chemicals	0.02	0.02	0.02	0.03	0.05	0.00	0.04	0.01	0.02	0.00	0.01	0.00	0.00	0.01	0.03
Non-metal and Mineral	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Iron and Steel Products	0.07	0.01	0.01	0.05	0.01	0.00	0.02	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Basic Precious and Non-ferrous Metals	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Metal Product	0.06	0.02	0.01	0.03	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00
Industrial Machinery	0.03	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Electrical Machinery	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Precise Machinery	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Transport Machinery	0.01	0.00	0.00	0.14	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.00
Other Machinery	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.02	0.01
Gas	0.01	0.01	0.01	0.00	0.00	0.05	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water	0.00	0.00	0.00	0.00	0.00	0.01	0.06	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01
Construction	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.07	0.00	0.01	0.01	0.00	0.03	0.01	0.03
Wholesale & Retail Trade and Motor Vehicle	0.05	0.05	0.05	0.06	0.04	0.03	0.02	0.06	0.04	0.04	0.02	0.01	0.00	0.01	0.01
Hotel and Restaurants	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.06	0.01	0.03	0.00	0.00	0.01
Transport and Communications	0.02	0.03	0.02	0.01	0.01	0.01	0.02	0.01	0.03	0.04	0.25	0.05	0.02	0.06	0.05
Finance and Insurance	0.02	0.02	0.02	0.01	0.01	0.04	0.03	0.01	0.03	0.01	0.07	0.30	0.12	0.04	0.02
Real Estate and Ownership of Dwellings	0.00	0.00	0.00	0.00	0.00	-	-	0.01	0.01	0.00	0.01	0.01	0.12	0.01	0.04
Business and Private Services	0.01	0.01	0.01	0.01	0.01	0.06	0.04	0.01	0.02	0.02	0.02	0.01	0.02	0.14	0.02
Government Services	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01

Source: Authors.

Appendix 1-D. *B = I-A*

ABSORPTION MATRIX OF DOMESTIC PRODUCTION AT BASIC PRICES, 2010 (RM'000)	Agriculture, Fishery and Forestry	Crude Oil and Natural Gas	Mining and Quarrying	Food, Beverage, and Tobacco	Textile	Wood and Wood Product	Paper	Gasoline and Transport Diesel	Other Petroleum Products	Chemicals	Non-metal and Mineral	Iron and Steel Products	Basic Precious and Non-ferrous Metals
Agriculture, Fishery and Forestry	0.93	0.00	0.00	-0.33	-0.01	-0.37	-0.09	0.00	0.00	-0.01	0.00	0.00	0.00
Crude Oil and Natural Gas	0.00	0.99	0.00	0.00	0.00	0.00	0.00	-0.51	-0.51	-0.01	0.00	0.00	0.00
Mining and Quarrying	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.13	-0.01	-0.01
Food, Beverage, and Tobacco	-0.03	0.00	0.00	0.73	-0.01	0.00	0.00	0.00	0.00	-0.04	0.00	0.00	0.00
Textile	0.00	0.00	0.00	0.00	0.89	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
Wood and Wood Product	0.00	0.00	0.00	0.00	0.00	0.89	-0.06	0.00	0.00	0.00	0.00	0.00	0.00
Paper	0.00	0.00	0.00	0.00	0.00	0.00	0.90	0.00	0.00	0.00	0.00	0.00	0.00
Gasoline and Transport Diesel	-0.02	-0.01	-0.02	0.00	0.00	0.00	0.00	1.00	0.00	-0.02	-0.04	-0.01	0.00
Other Petroleum Products	-0.02	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00	0.99	-0.02	-0.03	-0.01	0.00
Chemicals	-0.03	-0.01	-0.02	-0.01	-0.07	-0.02	-0.04	0.00	0.00	0.74	-0.02	-0.01	-0.01
Non-metal and Mineral	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.85	-0.06	0.00
Iron and Steel Products	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	0.00	0.00	0.00	-0.02	0.80	-0.02
Basic Precious and Non-ferrous Metals	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.04	0.95
Metal Product	0.00	-0.01	0.00	-0.01	0.00	0.00	-0.01	0.00	0.00	0.00	-0.02	-0.02	-0.05
Industrial Machinery	0.00	0.00	-0.01	0.00	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	-0.02
Electrical Machinery	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Precise Machinery	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Transport Machinery	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Machinery	0.00	0.00	0.00	0.00	-0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas	0.00	0.00	-0.01	0.00	-0.02	-0.01	-0.01	0.00	0.00	-0.01	-0.03	-0.02	-0.01
Water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	-0.01	0.00	-0.01
Construction	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	0.00	0.00
Wholesale & Retail Trade and Motor Vehicle	-0.03	-0.01	-0.03	-0.09	-0.05	-0.08	-0.06	-0.03	-0.03	-0.08	-0.06	-0.06	-0.05
Hotels and Restaurants	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Transport and Communications	-0.02	-0.01	-0.03	-0.02	-0.03	-0.05	-0.03	-0.01	-0.01	-0.02	-0.05	-0.03	-0.02
Finance and Insurance	-0.05	-0.01	-0.01	-0.02	-0.02	-0.03	-0.02	-0.01	-0.01	-0.02	-0.02	-0.02	-0.02
Real Estate and Ownership of Dwellings	0.00	0.00	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Business and Private Services	-0.01	0.00	-0.02	0.00	-0.01	-0.01	-0.01	0.00	0.00	-0.01	-0.01	-0.01	-0.01
Government Services	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix 1-D. *B = I-A* (*continued*)

ABSORPTION MATRIX OF DOMESTIC PRODUCTION AT BASIC PRICES, 2010 (RM'000)	Metal Product	Industrial Machinery	Electrical Machinery	Precise Machinery	Transport Machinery	Other Machinery	Gas	Water	Construction	Wholesale & Retail Trade and Motor Vehicle	Hotels and Restaurants	Transport and Communications	Finance and Insurance	Real Estate and Ownership of Dwellings	Business and Private Services	Government Services
Agriculture, Fishery and Forestry	0.00	0.00	0.00	0.00	-0.03	-0.01	0.00	0.00	0.00	-0.02	-0.05	0.00	0.00	-0.01	0.00	0.00
Crude Oil and Natural Gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mining and Quarrying	-0.01	-0.01	0.00	0.00	0.00	-0.03	-0.02	0.00	-0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Food, Beverage, and Tobacco	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.03	-0.18	0.00	0.00	0.00	0.00	-0.01
Textile	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Wood and Wood Product	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	-0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paper	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.02	0.00	-0.01	-0.02	0.00	-0.01	-0.01
Gasoline and Transport Diesel	0.00	0.00	0.00	0.00	0.00	0.00	-0.06	-0.01	-0.01	-0.02	-0.01	-0.04	0.00	0.00	0.00	0.00
Other Petroleum Products	0.00	0.00	0.00	0.00	0.00	0.00	-0.04	-0.01	-0.01	-0.02	0.00	-0.03	0.00	0.00	0.00	0.00
Chemicals	-0.03	-0.02	-0.02	-0.02	-0.03	-0.05	0.00	-0.04	-0.01	-0.02	0.00	-0.01	0.00	0.00	-0.01	-0.03
Non-metal and Mineral	-0.01	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	-0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Iron and Steel Products	-0.12	-0.07	-0.01	-0.01	-0.05	-0.01	0.00	-0.02	-0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Basic Precious and Non-ferrous Metals	-0.01	-0.01	-0.01	0.00	-0.01	-0.01	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Metal Product	0.92	-0.06	-0.02	-0.01	-0.03	-0.01	0.00	0.00	-0.01	0.00	0.00	-0.01	0.00	0.00	0.00	0.00
Industrial Machinery	-0.01	0.97	-0.01	0.00	-0.01	-0.01	-0.01	0.00	-0.01	0.00	-0.01	0.00	0.00	0.00	0.00	0.00
Electrical Machinery	0.00	0.00	0.99	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Precise Machinery	0.00	0.00	-0.01	0.99	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
Transport Machinery	0.00	-0.01	0.00	0.00	0.86	0.00	0.00	0.00	0.00	-0.02	0.00	-0.01	0.00	0.00	0.00	0.00
Other Machinery	0.00	0.00	0.00	0.00	0.00	0.89	0.00	0.00	0.00	-0.01	0.00	-0.01	0.00	0.00	-0.02	-0.01
Gas	-0.01	-0.01	-0.01	-0.01	0.00	0.00	0.95	-0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water	-0.01	0.00	0.00	0.00	0.00	0.00	-0.01	0.94	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	-0.01
Construction	0.00	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.93	0.00	-0.01	-0.01	0.00	-0.03	-0.01	-0.03
Wholesale & Retail Trade and Motor Vehicle	-0.06	-0.05	-0.05	-0.05	-0.06	-0.04	-0.03	-0.02	-0.06	0.96	-0.04	-0.02	-0.01	0.00	-0.01	-0.01
Hotels and Restaurants	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	0.94	-0.01	-0.03	0.00	0.00	-0.01
Transport and Communications	-0.03	-0.02	-0.03	-0.02	-0.01	-0.01	-0.01	-0.02	-0.01	-0.03	-0.04	0.75	-0.05	-0.02	-0.06	-0.05
Finance and Insurance	-0.03	-0.02	-0.02	-0.02	-0.01	-0.01	-0.04	-0.03	-0.01	-0.03	-0.01	-0.07	0.70	-0.12	-0.04	-0.02
Real Estate and Ownership of Dwellings	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	-0.01	0.00	-0.01	-0.01	0.88	-0.01	-0.04
Business and Private Services	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.06	-0.04	-0.01	-0.02	-0.02	-0.02	-0.01	-0.02	0.86	-0.02
Government Services	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	0.00	0.00	0.99

Source: Authors.

Appendix 1-E. $C = (I-A)^{-1}$

ABSORPTION MATRIX OF DOMESTIC PRODUCTION AT BASIC PRICES, 2010 (RM'000)	Agriculture, Fishery and Forestry	Crude Oil and Natural Gas	Mining and Quarrying	Food, Beverage, and Tobacco	Textile	Wood and Wood Product	Paper	Gasoline and Transport Diesel	Other Petroleum Products	Chemicals	Non-metal and Mineral	Iron and Steel Products	Basic Precious and Non-ferrous Metals
Agriculture, Fishery and Forestry	1.09	0.00	0.00	0.50	0.02	0.46	0.15	0.00	0.00	0.05	0.01	0.01	0.01
Crude Oil and Natural Gas	0.03	1.02	0.02	0.03	0.01	0.02	0.02	0.53	0.52	0.05	0.05	0.02	0.01
Mining and Quarrying	0.00	0.00	1.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.16	0.02	0.02
Food, Beverage, and Tobacco	0.06	0.00	0.01	1.40	0.02	0.03	0.02	0.00	0.00	0.08	0.01	0.01	0.01
Textile	0.00	0.00	0.00	0.00	1.12	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Wood and Wood Product	0.00	0.00	0.00	0.00	0.00	1.13	0.08	0.00	0.00	0.01	0.00	0.00	0.00
Paper	0.00	0.00	0.00	0.01	0.01	0.01	1.12	0.00	0.00	0.01	0.01	0.01	0.00
Gasoline and Transport Diesel	0.03	0.02	0.02	0.02	0.01	0.03	0.02	1.01	0.01	0.04	0.06	0.02	0.01
Other Petroleum Products	0.02	0.01	0.02	0.02	0.01	0.02	0.01	0.01	1.02	0.03	0.04	0.01	0.01
Chemicals	0.06	0.02	0.03	0.05	0.12	0.06	0.09	0.02	0.02	1.37	0.06	0.03	0.02
Non-metal and Mineral	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.00	0.00	0.01	1.18	0.09	0.01
Iron and Steel Products	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.03	1.26	0.04
Basic Precious and Non-ferrous Metals	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	1.05
Metal Product	0.00	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.03	0.03	0.06
Industrial Machinery	0.00	0.00	0.02	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.02
Electrical Machinery	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Precise Machinery	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Transport Machinery	0.01	0.00	0.00	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Other Machinery	0.00	0.00	0.00	0.01	0.03	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00
Gas	0.00	0.00	0.01	0.01	0.03	0.02	0.02	0.00	0.00	0.02	0.04	0.03	0.02
Water	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.00	0.02	0.02	0.01	0.01
Construction	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00
Wholesale & Retail Trade and Motor Vehicle	0.05	0.02	0.04	0.17	0.08	0.13	0.11	0.04	0.04	0.13	0.10	0.10	0.07
Hotels and Restaurants	0.01	0.00	0.00	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.00
Transport and Communications	0.04	0.02	0.05	0.06	0.07	0.11	0.07	0.02	0.02	0.06	0.10	0.06	0.05
Finance and Insurance	0.09	0.02	0.03	0.10	0.06	0.10	0.07	0.03	0.03	0.06	0.07	0.06	0.05
Real Estate and Ownership of Dwellings	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.01	0.00
Business and Private Services	0.01	0.01	0.03	0.02	0.03	0.03	0.02	0.01	0.01	0.02	0.03	0.02	0.01
Government Services	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix 1-E. $C = (I-A)^{-1}$ (*continued*)

ABSORPTION MATRIX OF DOMESTIC PRODUCTION AT BASIC PRICES, 2010 (RM'000)	Metal Product	Industrial Machinery	Electrical Machinery	Precise Machinery	Transport Machinery	Other Machinery	Gas	Water	Construction	Wholesale & Retail Trade and Motor Vehicle	Hotels and Restaurants	Transport and Communications	Finance and Insurance	Real Estate and Ownership of Dwellings	Business and Private Services	Government Services
Agriculture, Fishery and Forestry	0.01	0.01	0.01	0.01	0.04	0.02	0.00	0.01	0.03	0.04	0.16	0.01	0.01	0.01	0.01	0.02
Crude Oil and Natural Gas	0.01	0.01	0.01	0.01	0.01	0.01	0.06	0.02	0.03	0.03	0.02	0.05	0.01	0.00	0.01	0.01
Mining and Quarrying	0.01	0.01	0.00	0.00	0.01	0.03	0.03	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Food, Beverage, and Tobacco	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.05	0.28	0.01	0.01	0.01	0.01	0.02
Textile	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Wood and Wood Product	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paper	0.01	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.02	0.01	0.02	0.03	0.01	0.02	0.01
Gasoline and Transport Diesel	0.01	0.01	0.01	0.01	0.01	0.01	0.06	0.02	0.03	0.03	0.02	0.05	0.01	0.01	0.01	0.01
Other Petroleum Products	0.01	0.01	0.01	0.00	0.01	0.01	0.05	0.01	0.02	0.02	0.01	0.04	0.01	0.00	0.01	0.01
Chemicals	0.05	0.04	0.04	0.03	0.06	0.08	0.01	0.07	0.03	0.04	0.02	0.02	0.01	0.01	0.02	0.05
Non-metal and Mineral	0.02	0.01	0.01	0.02	0.01	0.00	0.00	0.00	0.16	0.00	0.00	0.00	0.00	0.01	0.00	0.01
Iron and Steel Products	0.16	0.10	0.02	0.01	0.08	0.02	0.00	0.02	0.12	0.01	0.00	0.01	0.00	0.00	0.00	0.01
Basic Precious and Non-ferrous Metals	0.02	0.02	0.01	0.00	0.02	0.01	0.01	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Metal Product	1.09	0.07	0.03	0.01	0.04	0.01	0.00	0.01	0.03	0.01	0.00	0.01	0.00	0.00	0.00	0.01
Industrial Machinery	0.01	1.03	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Electrical Machinery	0.00	0.00	1.01	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Precise Machinery	0.00	0.00	0.01	1.01	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
Transport Machinery	0.00	0.01	0.00	0.00	1.16	0.00	0.00	0.00	0.00	0.03	0.00	0.01	0.00	0.00	0.01	0.01
Other Machinery	0.00	0.00	0.00	0.00	0.01	1.12	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.02	0.01
Gas	0.02	0.01	0.01	0.01	0.01	0.01	1.05	0.05	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water	0.01	0.00	0.00	0.00	0.00	0.00	0.01	1.06	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.01
Construction	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	1.08	0.00	0.01	0.02	0.01	0.03	0.01	0.04
Wholesale & Retail Trade and Motor Vehicle	0.09	0.07	0.07	0.06	0.10	0.06	0.05	0.04	0.10	1.06	0.09	0.05	0.02	0.01	0.03	0.02
Hotels and Restaurants	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	1.07	0.01	0.04	0.01	0.01	0.01
Transport and Communications	0.06	0.04	0.05	0.04	0.04	0.03	0.04	0.05	0.05	0.05	0.08	1.35	0.11	0.05	0.11	0.08
Finance and Insurance	0.06	0.04	0.04	0.04	0.04	0.03	0.08	0.06	0.05	0.07	0.05	0.14	1.45	0.21	0.09	0.06
Real Estate and Ownership of Dwellings	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.02	0.01	0.02	0.02	1.14	0.02	0.05
Business and Private Services	0.03	0.02	0.01	0.02	0.02	0.02	0.08	0.05	0.02	0.03	0.03	0.04	0.03	0.03	1.16	0.03
Government Services	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	1.01

Source: Authors.

Appendix 1-F. *D = [(I-A)-1]'*

ABSORPTION MATRIX OF DOMESTIC PRODUCTION AT BASIC PRICES, 2010 (RM'000)	Agriculture, Fishery and Forestry	Crude Oil and Natural Gas	Mining and Quarrying	Food, Beverage, and Tobacco	Textile	Wood and Wood Product	Paper	Gasoline and Transport Diesel	Other Petroleum Products	Chemicals	Non-metal and Mineral	Iron and Steel Products	Basic Precious and Non-ferrous Metals	Metal Product
Agriculture, Fishery and Forestry	1.09	0.03	0.00	0.06	0.00	0.00	0.00	0.03	0.02	0.06	0.00	0.00	0.00	0.00
Crude Oil and Natural Gas	0.00	1.02	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.02	0.00	0.00	0.00	0.01
Mining and Quarrying	0.00	0.02	1.01	0.01	0.00	0.00	0.00	0.02	0.02	0.03	0.00	0.00	0.00	0.00
Food, Beverage, and Tobacco	0.50	0.03	0.00	1.40	0.00	0.00	0.01	0.02	0.02	0.05	0.01	0.00	0.00	0.01
Textile	0.02	0.01	0.00	0.02	1.12	0.00	0.01	0.01	0.01	0.12	0.00	0.00	0.00	0.01
Wood and Wood Product	0.46	0.02	0.00	0.03	0.00	1.13	0.01	0.03	0.02	0.06	0.01	0.01	0.00	0.00
Paper	0.15	0.02	0.00	0.02	0.01	0.08	1.12	0.02	0.01	0.09	0.01	0.02	0.00	0.01
Gasoline and Transport Diesel	0.00	0.53	0.00	0.00	0.00	0.00	0.00	1.01	0.01	0.02	0.00	0.00	0.00	0.01
Other Petroleum Products	0.00	0.52	0.00	0.00	0.00	0.00	0.00	0.01	1.02	0.02	0.00	0.00	0.00	0.01
Chemicals	0.05	0.05	0.01	0.08	0.00	0.01	0.01	0.04	0.03	1.37	0.01	0.00	0.00	0.01
Non-metal and Mineral	0.01	0.05	0.16	0.01	0.00	0.00	0.01	0.06	0.04	0.06	1.18	0.03	0.00	0.03
Iron and Steel Products	0.01	0.02	0.02	0.01	0.00	0.00	0.01	0.02	0.01	0.03	0.09	1.26	0.05	0.03
Basic Precious and Non-ferrous Metals	0.01	0.01	0.02	0.01	0.00	0.00	0.00	0.01	0.01	0.02	0.01	0.04	1.05	0.06
Metal Product	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.01	0.05	0.02	0.16	0.02	1.09
Industrial Machinery	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.01	0.04	0.01	0.10	0.02	0.07
Electrical Machinery	0.01	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.04	0.01	0.02	0.01	0.03
Precise Machinery	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.03	0.02	0.01	0.00	0.01
Transport Machinery	0.04	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.01	0.06	0.01	0.08	0.02	0.04
Other Machinery	0.02	0.01	0.03	0.01	0.00	0.00	0.01	0.01	0.01	0.08	0.00	0.02	0.01	0.01
Gas	0.00	0.06	0.03	0.00	0.00	0.00	0.00	0.06	0.05	0.01	0.00	0.00	0.01	0.00
Water	0.01	0.02	0.00	0.01	0.00	0.00	0.00	0.02	0.01	0.07	0.00	0.02	0.00	0.01
Construction	0.03	0.03	0.05	0.01	0.00	0.05	0.01	0.03	0.02	0.03	0.16	0.12	0.02	0.03
Wholesale & Retail Trade and Motor Vehicle	0.04	0.03	0.00	0.05	0.00	0.00	0.02	0.03	0.02	0.04	0.00	0.01	0.00	0.01
Hotels and Restaurants	0.16	0.02	0.00	0.28	0.00	0.00	0.01	0.02	0.01	0.02	0.00	0.00	0.00	0.00
Transport and Communications	0.01	0.05	0.00	0.01	0.00	0.00	0.02	0.05	0.04	0.02	0.00	0.01	0.00	0.01
Finance and Insurance	0.01	0.01	0.00	0.01	0.00	0.00	0.03	0.01	0.01	0.01	0.00	0.00	0.00	0.00
Real Estate and Ownership of Dwellings	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.00
Business and Private Services	0.01	0.01	0.00	0.01	0.00	0.00	0.02	0.01	0.01	0.02	0.00	0.00	0.00	0.00
Government Services	0.02	0.01	0.00	0.02	0.00	0.00	0.01	0.01	0.01	0.05	0.01	0.01	0.00	0.01

Appendix 1-F. *D = [(I-A)-1]'* (*continued*)

ABSORPTION MATRIX OF DOMESTIC PRODUCTION AT BASIC PRICES, 2010 (RM'000)	Industrial Machinery	Electrical Machinery	Precise Machinery	Transport Machinery	Other Machinery	Gas	Water	Construction	Wholesale & Retail Trade and Motor Vehicle	Hotels and Restaurants	Transport and Communications	Finance and Insurance	Real Estate and Ownership of Dwellings	Business and Private Services	Government Services
Agriculture, Fishery and Forestry	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.01	0.05	0.01	0.04	0.09	0.00	0.01	0.00
Crude Oil and Natural Gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.02	0.02	0.00	0.01	0.00
Mining and Quarrying	0.02	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.04	0.00	0.05	0.03	0.00	0.03	0.00
Food, Beverage, and Tobacco	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.17	0.01	0.06	0.10	0.01	0.02	0.00
Textile	0.01	0.00	0.00	0.00	0.03	0.03	0.01	0.01	0.08	0.00	0.07	0.06	0.01	0.03	0.00
Wood and Wood Product	0.01	0.00	0.00	0.01	0.00	0.02	0.01	0.01	0.13	0.01	0.11	0.10	0.01	0.03	0.00
Paper	0.00	0.00	0.00	0.01	0.01	0.02	0.01	0.01	0.11	0.01	0.07	0.07	0.01	0.02	0.00
Gasoline and Transport Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.04	0.00	0.02	0.03	0.00	0.01	0.00
Other Petroleum Products	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.04	0.00	0.02	0.03	0.00	0.01	0.00
Chemicals	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.01	0.13	0.00	0.06	0.06	0.01	0.02	0.00
Non-metal and Mineral	0.00	0.00	0.00	0.00	0.01	0.04	0.02	0.01	0.10	0.00	0.10	0.07	0.01	0.03	0.00
Iron and Steel Products	0.00	0.00	0.00	0.00	0.00	0.03	0.01	0.01	0.10	0.01	0.06	0.06	0.01	0.02	0.00
Basic Precious and Non-ferrous Metals	0.02	0.00	0.00	0.00	0.00	0.02	0.01	0.00	0.07	0.00	0.05	0.05	0.00	0.01	0.00
Metal Product	0.01	0.00	0.00	0.00	0.00	0.02	0.01	0.01	0.09	0.01	0.06	0.06	0.01	0.03	0.00
Industrial Machinery	1.03	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.07	0.00	0.04	0.04	0.01	0.02	0.00
Electrical Machinery	0.01	1.01	0.01	0.00	0.00	0.01	0.00	0.01	0.07	0.00	0.05	0.04	0.00	0.01	0.00
Precise Machinery	0.00	0.01	1.01	0.00	0.00	0.01	0.00	0.01	0.06	0.00	0.04	0.04	0.00	0.02	0.00
Transport Machinery	0.01	0.01	0.01	1.16	0.01	0.01	0.00	0.00	0.10	0.00	0.04	0.04	0.01	0.02	0.00
Other Machinery	0.01	0.00	0.02	0.00	1.12	0.01	0.00	0.00	0.06	0.00	0.03	0.03	0.00	0.02	0.00
Gas	0.01	0.00	0.00	0.00	0.00	1.05	0.01	0.00	0.05	0.00	0.04	0.08	0.00	0.08	0.00
Water	0.00	0.00	0.00	0.00	0.00	0.05	1.06	0.00	0.04	0.00	0.05	0.06	0.00	0.05	0.00
Construction	0.01	0.01	0.00	0.00	0.00	0.01	0.01	1.08	0.10	0.00	0.05	0.05	0.02	0.02	0.00
Wholesale & Retail Trade and Motor Vehicle	0.00	0.00	0.00	0.03	0.01	0.00	0.01	0.00	1.06	0.01	0.05	0.07	0.02	0.03	0.00
Hotels and Restaurants	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.09	1.07	0.08	0.05	0.01	0.03	0.00
Transport and Communications	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.02	0.05	0.01	1.35	0.14	0.02	0.04	0.00
Finance and Insurance	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.04	0.11	1.45	0.02	0.03	0.01
Real Estate and Ownership of Dwellings	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.01	0.01	0.05	0.21	1.14	0.03	0.00
Business and Private Services	0.00	0.00	0.01	0.01	0.02	0.00	0.00	0.01	0.03	0.01	0.11	0.09	0.02	1.16	0.00
Government Services	0.00	0.00	0.01	0.01	0.01	0.00	0.01	0.04	0.02	0.01	0.08	0.06	0.05	0.03	1.01

Source: Authors.

Appendix 1-G. ICV: Input Coefficient of Electricity Sector

Sectors	S vector
Agriculture, Fishery and Forestry	0.00
Crude Oil and Natural Gas	0.00
Mining and Quarrying	0.00
Food, Beverage, and Tobacco	0.00
Textile	0.01
Wood and Wood Product	0.01
Paper	0.01
Gasoline and Transport Diesel	0.00
Other Petroleum Products	0.00
Chemicals	0.01
Non-metal and Mineral	0.02
Iron and Steel Products	0.01
Basic Precious and Non-ferrous Metals	0.01
Metal Product	0.01
Industrial Machinery	0.00
Electrical Machinery	0.00
Precise Machinery	0.00
Transport Machinery	0.00
Other Machinery	0.00
Gas	-
Water	0.03
Construction	0.00
Wholesale & Retail Trade and Motor Vehicle	0.00
Hotel and Restaurants	0.05
Transport and Communications	0.01
Finance and Insurance	0.02
Real Estate and Ownership of Dwellings	0.01
Business and Private Services	0.01
Government Services	0.02

Source: Authors.

Appendix 1-H. $A = X_{ij}/X_j$ Matrix Excluding Gasoline and Transport Diesel Sector

ABSORPTION MATRIX OF DOMESTIC PRODUCTION AT BASIC PRICES, 2010 (RM'000)	Agriculture, Fishery and Forestry	Crude Oil and Natural Gas	Mining and Quarrying	Food, Beverage, and Tobacco	Textile	Wood and Wood Product	Paper	Other Petroleum Products	Chemicals	Non-metal and Mineral	Iron and Steel Products	Basic Precious and Non-ferrous Metals	Metal Product
Agriculture, Fishery and Forestry	0.07	0.00	0.00	0.33	0.01	0.37	0.09	0.00	0.01	0.00	0.00	0.00	0.00
Crude Oil and Natural Gas	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.51	0.01	0.00	0.00	0.00	0.00
Mining and Quarrying	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.01	0.01	0.01
Food, Beverage, and Tobacco	0.03	0.00	0.00	0.27	0.01	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00
Textile	0.00	0.00	0.00	0.00	0.11	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Wood and Wood Product	0.00	0.00	0.00	0.00	0.00	0.11	0.06	0.00	0.00	0.00	0.00	0.00	0.00
Paper	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00
Other Petroleum Products	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.02	0.03	0.01	0.00	0.00
Chemicals	0.03	0.01	0.02	0.01	0.07	0.02	0.04	0.00	0.26	0.02	0.01	0.01	0.03
Non-metal and Mineral	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.06	0.00	0.01
Iron and Steel Products	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.02	0.20	0.02	0.12
Basic Precious and Non-ferrous Metals	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.05	0.01
Metal Product	0.00	0.01	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.02	0.02	0.05	0.08
Industrial Machinery	0.00	0.00	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.02	0.01
Electrical Machinery	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Precise Machinery	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Transport Machinery	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Machinery	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Electricity	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.01	0.02	0.01	0.01	0.01
Gas	-	0.00	0.01	0.00	0.02	0.01	0.01	0.00	0.01	0.03	0.02	0.01	0.01
Water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.01
Construction	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Wholesale & Retail Trade and Motor Vehicle	0.03	0.01	0.03	0.09	0.05	0.08	0.06	0.03	0.08	0.06	0.06	0.05	0.06
Hotels and Restaurants	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Transport and Communications	0.02	0.01	0.03	0.02	0.03	0.05	0.03	0.01	0.02	0.05	0.03	0.02	0.03
Finance and Insurance	0.05	0.01	0.01	0.02	0.02	0.03	0.02	0.01	0.02	0.02	0.02	0.02	0.03
Real Estate and Ownership of Dwellings	0.00	-	-	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Business and Private Services	0.01	0.00	0.02	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01
Government Services	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix 1-H. $A = X_{ij}/X_j$ Matrix Excluding Gasoline and Transport Diesel Sector (*continued*)

ABSORPTION MATRIX OF DOMESTIC PRODUCTION AT BASIC PRICES, 2010 (RM'000)	Industrial Machinery	Electrical Machinery	Precise Machinery	Transport Machinery	Other Machinery	Electricity	Gas	Water	Construction	Wholesale & Retail Trade and Motor Vehicle	Hotel and Restaurants	Transport and Communications	Finance and Insurance	Real Estate and Ownership of Dwellings	Business and Private Services	Government Services
Agriculture, Fishery and Forestry	0.00	0.00	0.00	0.03	0.01	0.00	0.00	0.00	0.00	0.02	0.05	0.00	0.00	0.01	0.00	0.00
Crude Oil and Natural Gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mining and Quarrying	0.01	0.00	0.00	0.00	0.03	0.01	0.02	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Food, Beverage, and Tobacco	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.18	0.00	0.00	0.00	0.00	0.01
Textile	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Wood and Wood Product	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paper	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.02	0.00	0.01	0.01
Other Petroleum Products	0.00	0.00	0.00	0.00	0.00	0.02	0.04	0.01	0.01	0.02	0.00	0.03	0.00	0.00	0.00	0.00
Chemicals	0.02	0.02	0.02	0.03	0.05	0.00	0.00	0.04	0.01	0.02	0.00	0.01	0.00	0.00	0.01	0.03
Non-metal and Mineral	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Iron and Steel Products	0.07	0.01	0.01	0.05	0.01	0.00	0.00	0.02	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Basic Precious and Non-ferrous Metals	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Metal Product	0.06	0.02	0.01	0.03	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00
Industrial Machinery	0.03	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Electrical Machinery	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Precise Machinery	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Transport Machinery	0.01	0.00	0.00	0.14	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.00
Other Machinery	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.02	0.01
Electricity	0.00	0.00	0.00	0.00	0.00	0.01	-	0.03	0.00	0.00	0.05	0.01	0.02	0.01	0.01	0.02
Gas	0.01	0.01	0.01	0.00	0.00	0.17	0.05	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.06	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01
Construction	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.01	0.01	0.00	0.03	0.01	0.03
Wholesale & Retail Trade and Motor Vehicle	0.05	0.05	0.05	0.06	0.04	0.02	0.03	0.02	0.06	0.04	0.04	0.02	0.01	0.00	0.01	0.01
Hotels and Restaurants	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.06	0.01	0.03	0.00	0.00	0.01
Transport and Communications	0.02	0.03	0.02	0.01	0.01	0.01	0.01	0.02	0.01	0.03	0.04	0.25	0.05	0.02	0.06	0.05
Finance and Insurance	0.02	0.02	0.02	0.01	0.01	0.02	0.04	0.03	0.01	0.03	0.01	0.07	0.30	0.12	0.04	0.02
Real Estate and Ownership of Dwellings	0.00	0.00	0.00	0.00	0.00	-	-	-	0.01	0.01	0.00	0.01	0.01	0.12	0.01	0.04
Business and Private Services	0.01	0.01	0.01	0.01	0.01	0.03	0.06	0.04	0.01	0.02	0.02	0.02	0.01	0.02	0.14	0.02
Government Services	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01

Source: Authors.

Appendix 1-I. *B = I-A*

ABSORPTION MATRIX OF DOMESTIC PRODUCTION AT BASIC PRICES, 2010 (RM'000)	Agriculture, Fishery and Forestry	Crude Oil and Natural Gas	Mining and Quarrying	Food, Beverage, and Tobacco	Textile	Wood and Wood Product	Paper	Other Petroleum Products	Chemicals	Non-metal and Mineral	Iron and Steel Products	Basic Precious and Non-ferrous Metals	Metal Product
Agriculture, Fishery and Forestry	0.93	0.00	0.00	-0.33	-0.01	-0.37	-0.09	0.00	-0.01	0.00	0.00	0.00	0.00
Crude Oil and Natural Gas	0.00	0.99	0.00	0.00	0.00	0.00	0.00	-0.51	-0.01	0.00	0.00	0.00	0.00
Mining and Quarrying	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.13	-0.01	-0.01	-0.01
Food, Beverage, and Tobacco	-0.03	0.00	0.00	0.73	-0.01	0.00	0.00	0.00	-0.04	0.00	0.00	0.00	0.00
Textile	0.00	0.00	0.00	0.00	0.89	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
Wood and Wood Product	0.00	0.00	0.00	0.00	0.00	0.89	-0.06	0.00	0.00	0.00	0.00	0.00	0.00
Paper	0.00	0.00	0.00	0.00	0.00	0.00	0.90	0.00	0.00	0.00	0.00	0.00	0.00
Other Petroleum Products	-0.02	-0.01	-0.01	0.00	0.00	0.00	0.00	0.99	-0.02	-0.03	-0.01	0.00	0.00
Chemicals	-0.03	-0.01	-0.02	-0.01	-0.07	-0.02	-0.04	0.00	0.74	-0.02	-0.01	-0.01	-0.03
Non-metal and Mineral	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.85	-0.06	0.00	-0.01
Iron and Steel Products	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	0.00	0.00	-0.02	0.80	-0.02	-0.12
Basic Precious and Non-ferrous Metals	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.04	0.95	-0.01
Metal Product	0.00	-0.01	0.00	-0.01	0.00	0.00	-0.01	0.00	0.00	-0.02	-0.02	-0.05	0.92
Industrial Machinery	0.00	0.00	-0.01	0.00	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00	-0.02	-0.01
Electrical Machinery	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Precise Machinery	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Transport Machinery	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Machinery	0.00	0.00	0.00	0.00	-0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Electricity	0.00	0.00	0.00	0.00	-0.01	-0.01	-0.01	0.00	-0.01	-0.02	-0.01	-0.01	-0.01
Gas	0.00	0.00	-0.01	0.00	-0.02	-0.01	-0.01	0.00	-0.01	-0.03	-0.02	-0.01	-0.01
Water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	-0.01	0.00	-0.01	-0.01
Construction	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	0.00	0.00	0.00
Wholesale & Retail Trade and Motor Vehicle	-0.03	-0.01	-0.03	-0.09	-0.05	-0.08	-0.06	-0.03	-0.08	-0.06	-0.06	-0.05	-0.06
Hotels and Restaurants	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Transport and Communications	-0.02	-0.01	-0.03	-0.02	-0.03	-0.05	-0.03	-0.01	-0.02	-0.05	-0.03	-0.02	-0.03
Finance and Insurance	-0.05	-0.01	-0.01	-0.02	-0.02	-0.03	-0.02	-0.01	-0.02	-0.02	-0.02	-0.02	-0.03
Real Estate and Ownership of Dwellings	0.00	0.00	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Business and Private Services	-0.01	0.00	-0.02	0.00	-0.01	-0.01	-0.01	0.00	-0.01	-0.01	-0.01	-0.01	-0.01
Government Services	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix 1-I. *B = I-A* (*continued*)

ABSORPTION MATRIX OF DOMESTIC PRODUCTION AT BASIC PRICES, 2010 (RM'000)	Industrial Machinery	Electrical Machinery	Precise Machinery	Transport Machinery	Other Machinery	Electricity	Gas	Water	Construction	Wholesale & Retail Trade and Motor Vehicle	Hotels and Restaurants	Transport and Communications	Finance and Insurance	Real Estate and Ownership of Dwellings	Business and Private Services	Government Services
Agriculture, Fishery and Forestry	0.00	0.00	0.00	-0.03	-0.01	0.00	0.00	0.00	0.00	-0.02	-0.05	0.00	0.00	-0.01	0.00	0.00
Crude Oil and Natural Gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mining and Quarrying	-0.01	0.00	0.00	0.00	-0.03	-0.01	-0.02	0.00	-0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Food, Beverage, and Tobacco	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.03	-0.18	0.00	0.00	0.00	0.00	-0.01
Textile	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Wood and Wood Product	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	-0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paper	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.02	0.00	-0.01	-0.02	0.00	-0.01	-0.01
Other Petroleum Products	0.00	0.00	0.00	0.00	0.00	-0.02	-0.04	-0.01	-0.01	-0.02	0.00	-0.03	0.00	0.00	0.00	0.00
Chemicals	-0.02	-0.02	-0.02	-0.03	-0.05	0.00	0.00	-0.04	-0.01	-0.02	0.00	-0.01	0.00	0.00	-0.01	-0.03
Non-metal and Mineral	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	-0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Iron and Steel Products	-0.07	-0.01	-0.01	-0.05	-0.01	0.00	0.00	-0.02	-0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Basic Precious and Non-ferrous Metals	-0.01	-0.01	0.00	-0.01	-0.01	0.00	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Metal Product	-0.06	-0.02	-0.01	-0.03	-0.01	0.00	0.00	0.00	-0.01	0.00	0.00	-0.01	0.00	0.00	0.00	0.00
Industrial Machinery	0.97	-0.01	0.00	-0.01	-0.01	0.00	-0.01	0.00	-0.01	0.00	-0.01	0.00	0.00	0.00	0.00	0.00
Electrical Machinery	0.00	0.99	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Precise Machinery	0.00	-0.01	0.99	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
Transport Machinery	-0.01	0.00	0.00	0.86	0.00	0.00	0.00	0.00	0.00	-0.02	0.00	-0.01	0.00	0.00	0.00	0.00
Other Machinery	0.00	0.00	0.00	0.00	0.89	0.00	0.00	0.00	0.00	-0.01	0.00	-0.01	0.00	0.00	-0.02	-0.01
Electricity	0.00	0.00	0.00	0.00	0.00	0.99	0.00	-0.03	0.00	0.00	-0.05	-0.01	-0.02	-0.01	-0.01	-0.02
Gas	-0.01	-0.01	-0.01	0.00	0.00	-0.17	0.95	-0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	0.94	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	-0.01
Construction	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.93	0.00	-0.01	-0.01	0.00	-0.03	-0.01	-0.03
Wholesale & Retail Trade and Motor Vehicle	-0.05	-0.05	-0.05	-0.06	-0.04	-0.02	-0.03	-0.02	-0.06	0.96	-0.04	-0.02	-0.01	0.00	-0.01	-0.01
Hotels and Restaurants	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	0.94	-0.01	-0.03	0.00	0.00	-0.01
Transport and Communications	-0.02	-0.03	-0.02	-0.01	-0.01	-0.01	-0.01	-0.02	-0.01	-0.03	-0.04	0.75	-0.05	-0.02	-0.06	-0.05
Finance and Insurance	-0.02	-0.02	-0.02	-0.01	-0.01	-0.02	-0.04	-0.03	-0.01	-0.03	-0.01	-0.07	0.70	-0.12	-0.04	-0.02
Real Estate and Ownership of Dwellings	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	-0.01	0.00	-0.01	-0.01	0.88	-0.01	-0.04
Business and Private Services	-0.01	-0.01	-0.01	-0.01	-0.01	-0.03	-0.06	-0.04	-0.01	-0.02	-0.02	-0.02	-0.01	-0.02	0.86	-0.02
Government Services	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	0.00	0.00	0.99

Source: Authors.

Appendix 1-J. $C = (I-A)^{-1}$

ABSORPTION MATRIX OF DOMESTIC PRODUCTION AT BASIC PRICES, 2010 (RM'000)	Agriculture, Fishery and Forestry	Crude Oil and Natural Gas	Mining and Quarrying	Food, Beverage, and Tobacco	Textile	Wood and Wood Product	Paper	Other Petroleum Products	Chemicals	Non-metal and Mineral	Iron and Steel Products	Basic Precious and Non-ferrous Metals
Agriculture, Fishery and Forestry	1.09	0.00	0.00	0.50	0.02	0.46	0.15	0.00	0.05	0.01	0.01	0.01
Crude Oil and Natural Gas	0.01	1.02	0.01	0.02	0.01	0.01	0.01	0.52	0.03	0.02	0.01	0.00
Mining and Quarrying	0.00	0.00	1.01	0.00	0.00	0.00	0.00	0.00	0.01	0.16	0.02	0.02
Food, Beverage, and Tobacco	0.06	0.00	0.01	1.40	0.02	0.03	0.02	0.00	0.08	0.01	0.01	0.01
Textile	0.00	0.00	0.00	0.00	1.12	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Wood and Wood Product	0.00	0.00	0.00	0.00	0.00	1.13	0.08	0.00	0.01	0.00	0.00	0.00
Paper	0.00	0.00	0.00	0.01	0.01	0.01	1.12	0.00	0.01	0.01	0.01	0.00
Other Petroleum Products	0.02	0.01	0.02	0.02	0.01	0.02	0.01	1.02	0.03	0.04	0.02	0.01
Chemicals	0.06	0.02	0.03	0.05	0.11	0.06	0.09	0.02	1.37	0.05	0.03	0.02
Non-metal and Mineral	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.00	0.01	1.18	0.09	0.01
Iron and Steel Products	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.03	1.26	0.04
Basic Precious and Non-ferrous Metals	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	1.05
Metal Product	0.00	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.03	0.03	0.06
Industrial Machinery	0.00	0.00	0.02	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.02
Electrical Machinery	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Precise Machinery	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Transport Machinery	0.01	0.00	0.00	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00
Other Machinery	0.00	0.00	0.00	0.01	0.03	0.00	0.01	0.00	0.00	0.01	0.00	0.00
Electricity	0.01	0.00	0.01	0.01	0.02	0.02	0.01	0.00	0.01	0.03	0.02	0.01
Gas	0.00	0.00	0.01	0.01	0.03	0.02	0.02	0.00	0.02	0.04	0.03	0.02
Water	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.02	0.02	0.01	0.01
Construction	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00
Wholesale & Retail Trade and Motor Vehicle	0.05	0.02	0.04	0.17	0.08	0.12	0.10	0.04	0.13	0.10	0.10	0.07
Hotels and Restaurants	0.01	0.00	0.00	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.00
Transport and Communications	0.04	0.02	0.05	0.06	0.07	0.11	0.07	0.02	0.06	0.10	0.06	0.05
Finance and Insurance	0.09	0.02	0.03	0.10	0.06	0.10	0.07	0.03	0.06	0.07	0.06	0.05
Real Estate and Ownership of Dwellings	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00
Business and Private Services	0.02	0.01	0.03	0.02	0.03	0.03	0.03	0.01	0.02	0.03	0.02	0.02
Government Services	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix 1-J. $C = (I-A)^{-1}$ (*continued*)

ABSORPTION MATRIX OF DOMESTIC PRODUCTION AT BASIC PRICES, 2010 (RM'000)	Metal Product	Industrial Machinery	Electrical Machinery	Precise Machinery	Transport Machinery	Other Machinery	Electricity	Gas	Water	Construction	Wholesale & Retail Trade and Motor Vehicle	Hotels and Restaurants	Transport and Communications	Finance and Insurance	Real Estate and Ownership of Dwellings	Business and Private Services	Government Services
Agriculture, Fishery and Forestry	0.01	0.01	0.01	0.01	0.04	0.01	0.00	0.00	0.01	0.03	0.04	0.16	0.01	0.01	0.01	0.01	0.02
Crude Oil and Natural Gas	0.01	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.01	0.01	0.01	0.01	0.02	0.00	0.00	0.00	0.00
Mining and Quarrying	0.01	0.01	0.00	0.00	0.01	0.04	0.02	0.03	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Food, Beverage, and Tobacco	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.05	0.28	0.01	0.01	0.01	0.01	0.02
Textile	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Wood and Wood Product	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paper	0.01	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.02	0.01	0.02	0.03	0.01	0.02	0.01
Other Petroleum Products	0.01	0.01	0.01	0.00	0.01	0.01	0.03	0.05	0.01	0.02	0.02	0.01	0.04	0.01	0.00	0.01	0.01
Chemicals	0.05	0.04	0.04	0.03	0.06	0.08	0.01	0.01	0.07	0.03	0.04	0.02	0.02	0.01	0.01	0.02	0.05
Non-metal and Mineral	0.02	0.01	0.01	0.02	0.01	0.00	0.00	0.00	0.00	0.16	0.00	0.00	0.00	0.00	0.01	0.00	0.01
Iron and Steel Products	0.16	0.10	0.02	0.01	0.08	0.02	0.00	0.00	0.02	0.12	0.01	0.00	0.01	0.00	0.00	0.00	0.01
Basic Precious and Non-ferrous Metals	0.02	0.02	0.01	0.00	0.02	0.01	0.00	0.01	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Metal Product	1.09	0.07	0.03	0.01	0.04	0.01	0.00	0.00	0.01	0.03	0.00	0.00	0.01	0.00	0.00	0.00	0.01
Industrial Machinery	0.01	1.03	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Electrical Machinery	0.00	0.00	1.01	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Precise Machinery	0.00	0.00	0.01	1.01	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
Transport Machinery	0.00	0.01	0.00	0.00	1.16	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.01	0.00	0.00	0.01	0.01
Other Machinery	0.00	0.00	0.00	0.00	0.01	1.12	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.02	0.01
Electricity	0.01	0.01	0.01	0.01	0.01	0.01	1.01	0.00	0.03	0.01	0.00	0.05	0.01	0.03	0.01	0.02	0.02
Gas	0.02	0.01	0.01	0.01	0.01	0.01	0.18	1.05	0.05	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.01
Water	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	1.06	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.01
Construction	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	1.08	0.00	0.01	0.02	0.01	0.03	0.01	0.04
Wholesale & Retail Trade and Motor Vehicle	0.09	0.07	0.07	0.06	0.10	0.06	0.03	0.04	0.04	0.10	1.06	0.09	0.05	0.02	0.01	0.03	0.02
Hotels and Restaurants	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	1.07	0.01	0.04	0.01	0.01	0.01
Transport and Communications	0.06	0.04	0.05	0.04	0.04	0.03	0.03	0.04	0.05	0.05	0.05	0.08	1.35	0.11	0.05	0.11	0.08
Finance and Insurance	0.06	0.04	0.04	0.04	0.04	0.03	0.06	0.08	0.06	0.05	0.07	0.06	0.14	1.45	0.21	0.09	0.06
Real Estate and Ownership of Dwellings	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.02	0.02	0.01	0.02	0.02	1.14	0.02	0.05
Business and Private Services	0.03	0.02	0.01	0.02	0.02	0.02	0.06	0.08	0.05	0.02	0.03	0.03	0.04	0.03	0.03	1.16	0.03
Government Services	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	1.01

Source: Authors.

Appendix 1-K. *D = [(I-A)-1]'*

ABSORPTION MATRIX OF DOMESTIC PRODUCTION AT BASIC PRICES, 2010 (RM'000)	Agriculture, Fishery and Forestry	Crude Oil and Natural Gas	Mining and Quarrying	Food, Beverage, and Tobacco	Textile	Wood and Wood Product	Paper	Other Petroleum Products	Chemicals	Non-metal and Mineral	Iron and Steel Products	Basic Precious and Non-ferrous Metals	Metal Product
Agriculture, Fishery and Forestry	1.09	0.01	0.00	0.06	0.00	0.00	0.00	0.02	0.06	0.00	0.00	0.00	0.00
Crude Oil and Natural Gas	0.00	1.02	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.01
Mining and Quarrying	0.00	0.01	1.01	0.01	0.00	0.00	0.00	0.02	0.03	0.00	0.00	0.00	0.00
Food, Beverage, and Tobacco	0.50	0.02	0.00	1.40	0.00	0.00	0.01	0.02	0.05	0.01	0.00	0.00	0.01
Textile	0.02	0.01	0.00	0.02	1.12	0.00	0.01	0.01	0.11	0.00	0.00	0.00	0.01
Wood and Wood Product	0.46	0.01	0.00	0.03	0.00	1.13	0.01	0.02	0.06	0.01	0.01	0.00	0.00
Paper	0.15	0.01	0.00	0.02	0.01	0.08	1.12	0.01	0.09	0.01	0.02	0.00	0.01
Other Petroleum Products	0.00	0.52	0.00	0.00	0.00	0.00	0.00	1.02	0.02	0.00	0.00	0.00	0.01
Chemicals	0.05	0.03	0.01	0.08	0.00	0.01	0.01	0.03	1.37	0.01	0.00	0.00	0.01
Non-metal and Mineral	0.01	0.02	0.16	0.01	0.00	0.00	0.01	0.04	0.05	1.18	0.03	0.00	0.03
Iron and Steel Products	0.01	0.01	0.02	0.01	0.00	0.00	0.01	0.02	0.03	0.09	1.26	0.05	0.03
Basic Precious and Non-ferrous Metals	0.01	0.00	0.02	0.01	0.00	0.00	0.00	0.01	0.02	0.01	0.04	1.05	0.06
Metal Product	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.05	0.02	0.16	0.02	1.09
Industrial Machinery	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.04	0.01	0.10	0.02	0.07
Electrical Machinery	0.01	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.04	0.01	0.02	0.01	0.03
Precise Machinery	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.03	0.02	0.01	0.00	0.01
Transport Machinery	0.04	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.06	0.01	0.08	0.02	0.04
Other Machinery	0.01	0.00	0.04	0.01	0.00	0.00	0.01	0.01	0.08	0.00	0.02	0.01	0.01
Electricity	0.00	0.02	0.02	0.00	0.00	0.00	0.00	0.03	0.01	0.00	0.00	0.00	0.00
Gas	0.00	0.02	0.03	0.00	0.00	0.00	0.00	0.05	0.01	0.00	0.00	0.01	0.00
Water	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.01	0.07	0.00	0.02	0.00	0.01
Construction	0.03	0.01	0.05	0.01	0.00	0.05	0.01	0.02	0.03	0.16	0.12	0.02	0.03
Wholesale & Retail Trade and Motor Vehicle	0.04	0.01	0.00	0.05	0.00	0.00	0.02	0.02	0.04	0.00	0.01	0.00	0.00
Hotels and Restaurants	0.16	0.01	0.00	0.28	0.00	0.00	0.01	0.01	0.02	0.00	0.00	0.00	0.00
Transport and Communications	0.01	0.02	0.00	0.01	0.00	0.00	0.02	0.04	0.02	0.00	0.01	0.00	0.01
Finance and Insurance	0.01	0.00	0.00	0.01	0.00	0.00	0.03	0.01	0.01	0.00	0.00	0.00	0.00
Real Estate and Ownership of Dwellings	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.01	0.01	0.00	0.00	0.00
Business and Private Services	0.01	0.00	0.00	0.01	0.00	0.00	0.02	0.01	0.02	0.00	0.00	0.00	0.00
Government Services	0.02	0.00	0.00	0.02	0.00	0.00	0.01	0.01	0.05	0.01	0.01	0.00	0.01

Appendix 1-K. *D = [(I-A)-1]'* (*continued*)

ABSORPTION MATRIX OF DOMESTIC PRODUCTION AT BASIC PRICES, 2010 (RM'000)	Industrial Machinery	Electrical Machinery	Precise Machinery	Transport Machinery	Other Machinery	Electricity	Gas	Water	Construction	Wholesale & Retail Trade and Motor Vehicle	Hotels and Restaurants	Transport and Communications	Finance and Insurance	Real Estate and Ownership of Dwellings	Business and Private Services	Government Services
Agriculture, Fishery and Forestry	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.05	0.01	0.04	0.09	0.00	0.02	0.00
Crude Oil and Natural Gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.02	0.02	0.00	0.01	0.00
Mining and Quarrying	0.02	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.04	0.00	0.05	0.03	0.00	0.03	0.00
Food, Beverage, and Tobacco	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.17	0.01	0.06	0.10	0.01	0.02	0.00
Textile	0.01	0.00	0.00	0.00	0.03	0.02	0.03	0.01	0.01	0.08	0.00	0.07	0.06	0.01	0.03	0.00
Wood and Wood Product	0.01	0.00	0.00	0.01	0.00	0.02	0.02	0.01	0.01	0.12	0.01	0.11	0.10	0.01	0.03	0.00
Paper	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.01	0.01	0.10	0.01	0.07	0.07	0.01	0.03	0.00
Other Petroleum Products	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.04	0.00	0.02	0.03	0.00	0.01	0.00
Chemicals	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.02	0.01	0.13	0.00	0.06	0.06	0.01	0.02	0.00
Non-metal and Mineral	0.00	0.00	0.00	0.00	0.01	0.03	0.04	0.02	0.01	0.10	0.00	0.10	0.07	0.01	0.03	0.00
Iron and Steel Products	0.00	0.00	0.00	0.00	0.00	0.02	0.03	0.01	0.01	0.10	0.01	0.06	0.06	0.01	0.02	0.00
Basic Precious and Non-ferrous Metals	0.02	0.00	0.00	0.00	0.00	0.01	0.02	0.01	0.00	0.07	0.00	0.05	0.05	0.00	0.02	0.00
Metal Product	0.01	0.00	0.00	0.00	0.00	0.01	0.02	0.01	0.01	0.09	0.01	0.06	0.06	0.01	0.03	0.00
Industrial Machinery	1.03	0.00	0.00	0.01	0.00	0.01	0.01	0.00	0.01	0.07	0.00	0.04	0.04	0.01	0.02	0.00
Electrical Machinery	0.01	1.01	0.01	0.00	0.00	0.01	0.01	0.00	0.01	0.07	0.00	0.05	0.04	0.00	0.01	0.00
Precise Machinery	0.00	0.01	1.01	0.00	0.00	0.01	0.01	0.00	0.01	0.06	0.00	0.04	0.04	0.00	0.02	0.00
Transport Machinery	0.01	0.01	0.01	1.16	0.01	0.01	0.01	0.00	0.00	0.10	0.00	0.04	0.04	0.01	0.02	0.00
Other Machinery	0.01	0.00	0.02	0.00	1.12	0.01	0.01	0.00	0.00	0.06	0.00	0.03	0.03	0.00	0.02	0.00
Electricity	0.01	0.00	0.00	0.00	0.00	1.01	0.18	0.01	0.00	0.03	0.00	0.03	0.06	0.00	0.06	0.00
Gas	0.01	0.00	0.00	0.00	0.00	0.00	1.05	0.01	0.00	0.04	0.00	0.04	0.08	0.00	0.08	0.00
Water	0.00	0.00	0.00	0.00	0.00	0.03	0.05	1.06	0.00	0.04	0.00	0.05	0.06	0.00	0.05	0.00
Construction	0.01	0.01	0.00	0.00	0.00	0.01	0.01	0.01	1.08	0.10	0.00	0.05	0.05	0.02	0.02	0.00
Wholesale & Retail Trade and Motor Vehicle	0.00	0.00	0.00	0.03	0.01	0.00	0.00	0.01	0.00	1.06	0.01	0.05	0.07	0.02	0.03	0.00
Hotels and Restaurants	0.01	0.00	0.00	0.00	0.00	0.05	0.01	0.01	0.01	0.09	1.07	0.08	0.06	0.01	0.03	0.00
Transport and Communications	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.02	0.05	0.01	1.35	0.14	0.02	0.04	0.00
Finance and Insurance	0.00	0.00	0.00	0.00	0.00	0.03	0.01	0.00	0.01	0.02	0.04	0.11	1.45	0.02	0.03	0.01
Real Estate and Ownership of Dwellings	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.03	0.01	0.01	0.05	0.21	1.14	0.03	0.00
Business and Private Services	0.00	0.00	0.01	0.01	0.02	0.02	0.00	0.00	0.01	0.03	0.01	0.11	0.09	0.02	1.16	0.00
Government Services	0.00	0.00	0.01	0.01	0.01	0.02	0.01	0.01	0.04	0.02	0.01	0.08	0.06	0.05	0.03	1.01

Source: Authors.

Appendix 1-L. ICV: Input Coefficient of Gasoline and Transport Diesel Sector

Sectors	S vector
Agriculture, Fishery and Forestry	0.02
Crude Oil and Natural Gas	0.01
Mining and Quarrying	0.02
Food, Beverage, and Tobacco	0.00
Textile	0.00
Wood and Wood Product	0.00
Paper	0.00
Other Petroleum Products	-
Chemicals	0.02
Non-metal and Mineral	0.04
Iron and Steel Products	0.01
Basic Precious and Non-ferrous Metals	0.00
Metal Product	0.00
Industrial Machinery	0.00
Electrical Machinery	0.00
Precise Machinery	0.00
Transport Machinery	0.00
Other Machinery	0.00
Electricity	0.03
Gas	0.06
Water	0.01
Construction	0.01
Wholesale & Retail Trade and Motor Vehicle	0.02
Hotels and Restaurants	0.01
Transport and Communications	0.04
Finance and Insurance	0.00
Real Estate and Ownership of Dwellings	0.00
Business and Private Services	0.00
Government Services	0.00

Source: Authors.

Part II

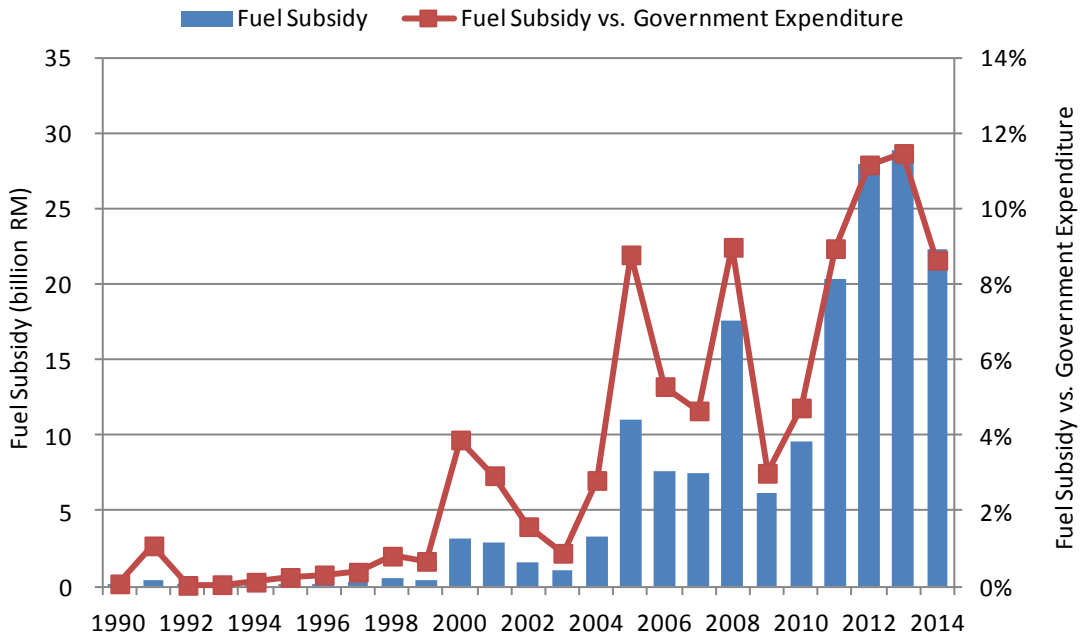
ECONOMIC IMPACT OF REMOVING ENERGY SUBSIDIES: A QUANTITATIVE ANALYSIS

2.1 Introduction

Energy is one of the main industrial sectors where prices are subsidised. The value of fossil fuel subsidies amounted to about US$500 billion globally in 2014, according to the International Energy Agency (IEA, 2015). While these subsidies can help low-income households use more energy, they could hinder the efficient use of such energy and weaken the competitiveness of alternative energy such as renewables. Many countries have worsening fiscal deficit due to the rapid increase in their domestic demand for fossil fuels.

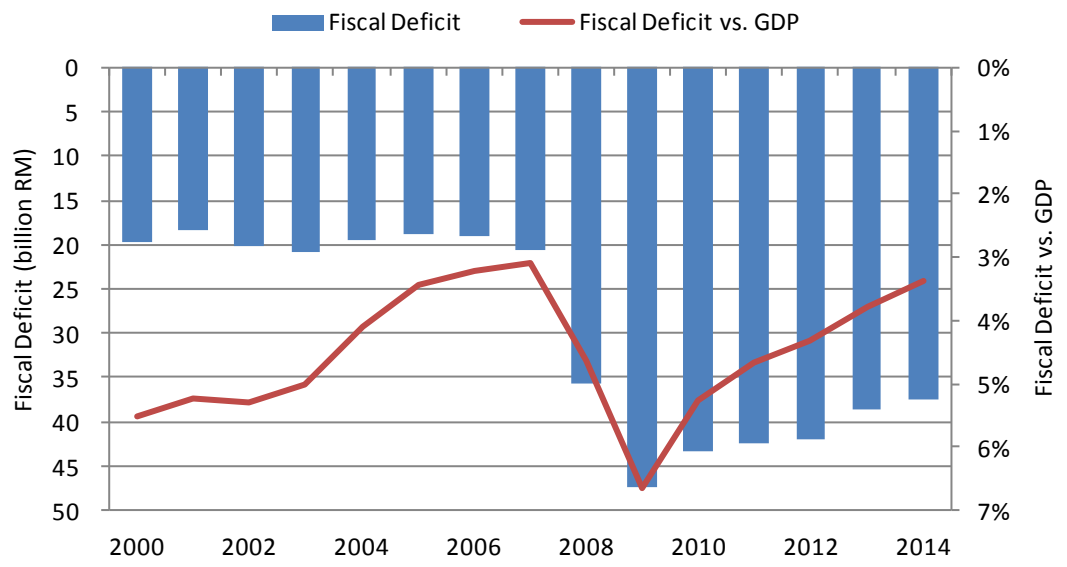
Malaysia, in particular, subsidises the natural gas of its power generation sector, mobility fuel of the road transport sector, and liquid petroleum gas for residential use. Figure 2.1 shows that petroleum subsidy alone amounted to over RM20 billion after 2010. Total fuel subsidies account for around 10 percent of total government expenditure. Direct fuel subsidies have increased significantly over the years, adding pressure on government finances. Malaysia's fiscal deficit of 4.5 percent of GDP was the second highest among Asia's 13 emerging economies in 2012, coming only after India (IISD, 2014). The government aims to reduce it to the national target of 3 percent by 2015 and 0 percent by 2020.

Figure 2.1. Fuel (Gasoline, Diesel, and Liquid Petroleum Gas) Subsidies from Government



Source: Hamid and Rashid (2012), and Maybank IB Research (2014).

Figure 2.2. Fiscal Deficit in Malaysia



Source: ADB (2015).

2.1.1 Objectives and Framework

Malaysia started its subsidy reform with a reduction in subsidies for fuel and sugar in 2010. Gasoline (RON97) and diesel oil prices gradually increased from RM2.05 and RM1.75 per litre in 2010, respectively, to around RM2.8 and RM2.2 per litre by 2014. On 1 December 2014, the government officially ended the subsidy for fuels and introduced the "managed float system." Nevertheless, the current gasoline and diesel oil prices are still much lower than the global average prices (GlobalPetrolPrices.com, 2015).

On electricity tariffs, the subsidy reform continues. The Special Industrial Tariff will be abolished by 2020 (Malaysia Government, 2015).

However, these policies could raise social problems. Removing subsidies means higher energy prices, which would affect the standard of living of low-income households. In the case of Indonesia, the rise in prices of petroleum products (gasoline, diesel oil, and kerosene) in 2000 led to violent demonstrations, including the burning of a gasoline station, student protests, abduction of two local-government employees, and strikes by public transport workers (IISD, 2010).

Policymakers should thus anticipate the possible economic impact of any price hikes so as to avoid a possible civil disturbance. For this purpose, this study measured the economic impact of removing energy subsidies using a Malaysian macroeconomic model. The resulting implications found by this study can be used by policymakers to set up appropriate action plans.

2.1.2 Report Structure

This report consists of five sections. Section 2 presents the overall structure of the economic model and methodology for this analysis. Section 3 shows economic impacts through three paths. The analysis of how removing energy subsidies impacts the economy is presented in Section 4. Lastly, Section 5 presents the policy implications based on this study's findings.

2.2 Methodology for Analysis

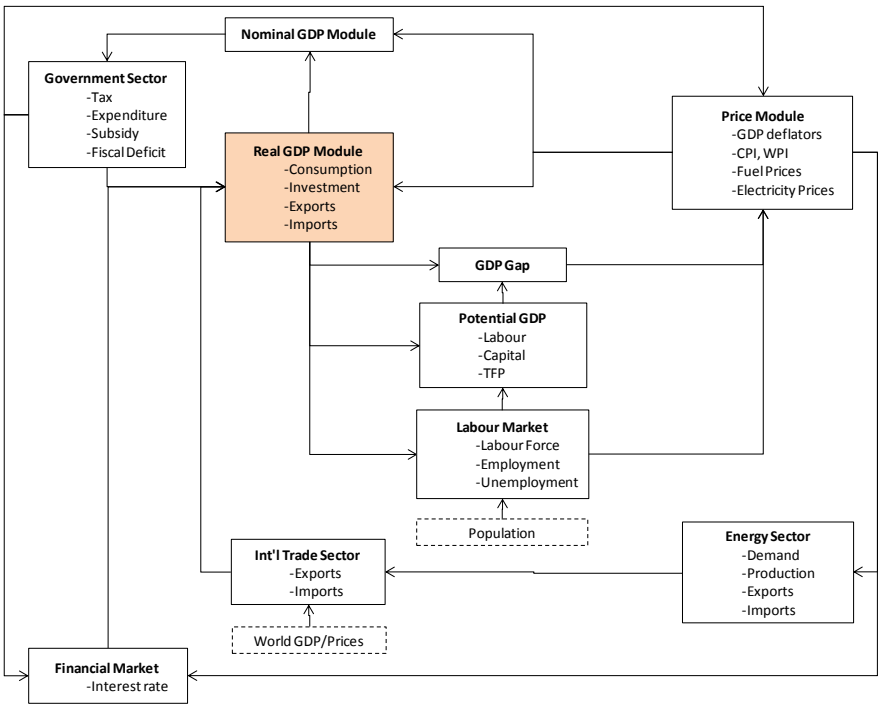
This study analyses the impacts of Malaysia's energy subsidy reform on the GDP, employment, and fiscal deficit. For this purpose, an econometric model was developed. This section presents the overall structure of the model and methodology for the quantitative analysis.

2.2.1 Macroeconomic Model

The developed econometric model is based on a Keynesian-type macroeconomic model (Figure 2.3). Real GDP, which describes the demand side composition such as consumption, investment, export and import, is central to the model. Price is one of the main modules in the analysis because higher energy prices brought about by subsidy removal can affect economic activities, such as private consumption.

The model looks at the government sector. Subsidy is an important component of government budget. It also covers the labour market as it measures the effects of subsidy reforms on employment.

Figure 2.3 Model Structure



Source: Authors.

This model also reviews the supply-side (potential) GDP, which is based on the growth account analysis. Higher/lower demand-side GDP leads to narrower/wider gap between supply-and demand-side GDP, which brings higher/lower general prices and eventually raises/reduces the GDP.

The model consists of 96 equations (96 endogenous variables) and 54 exogenous variables. Parameters for each equation were estimated by ordinary least square (OLS) regression. Estimation periods are between the 1990s and 2014, depending on data availability. Main sources are the 'Key Indicators for Asia and the Pacific' (ADB, 2015) for economic-related data and Malaysia Energy Information Hub (*Suruhanjaya Tenaga*) for energy-related data.

Table 2.1 shows the model's performance (final test) for the last 5 years. The Root Mean Squared Error for GDP, the main variable, is 2.1 percent, which is quite a good result. Other main variables also showed low Root Mean Squared Errors, which are at less than 5 percent.

Table 2.1. Final Test Performance (Root Mean Squared Error for 2010-2014)

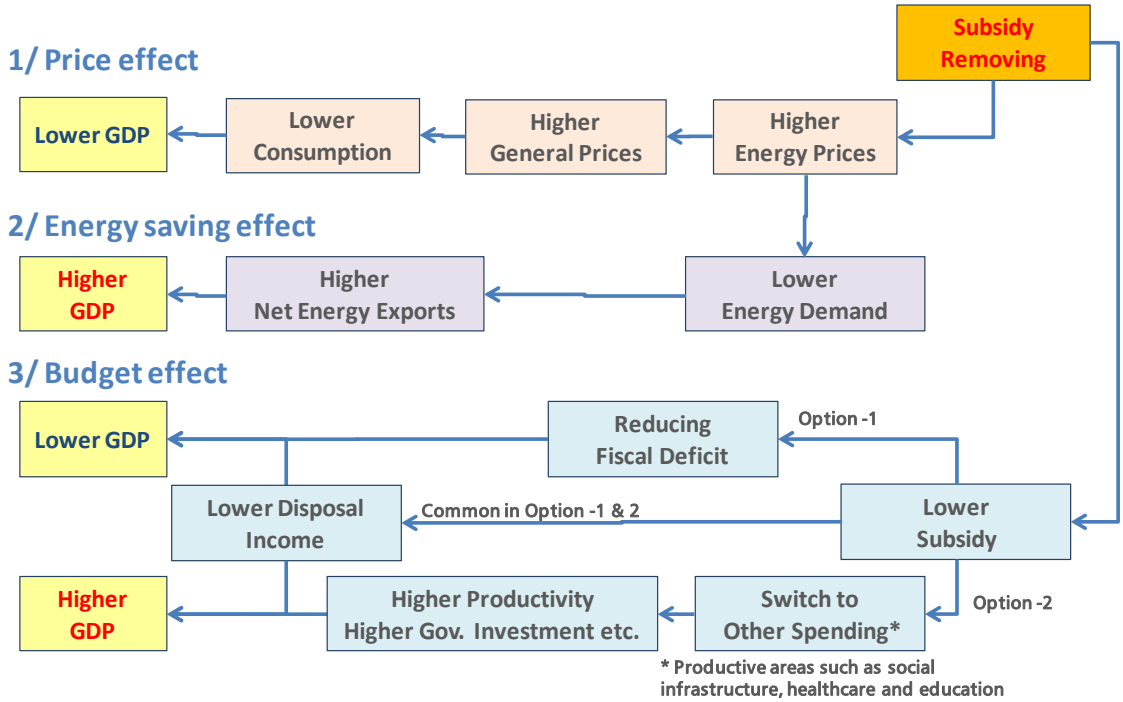
Real GDP	2.1%	Nominal GDP	1.7%
Real Private Consumption	0.5%	Nominal Private Consumption	1.3%
Real Private Investment	4.5%	Nominal Private Investment	4.5%
Real Exports	1.3%	Nominal Exports	1.8%
Real Imports	2.5%	Nominal Imports	2.6%
GDP Deflator	1.3%	Interest rate	4.8%
CPI	1.1%	WPI	1.9%
Government Expenditure*	0.0%	Government Revenue	1.0%
Employment	3.5%	Unemployment	7.7%

*exogenous variable
Source: As provided by this study's authors.

2.2.2 Three Paths Affecting the Economy

This study's model focuses on three paths where the economy (mainly GDP) will be affected once subsides are removed: the price effect, energy saving effect, and budget effect (Figure 2.4). Their effects on GDP vary. While the price effect will negatively affect GDP, the energy saving's effect will be positive. The budget effect depends on how the budget will be used. Total impact on GDP depends on how large each of their respective effect will be.

Figure 2.4. Three Effects of Subsidy Reform on GDP

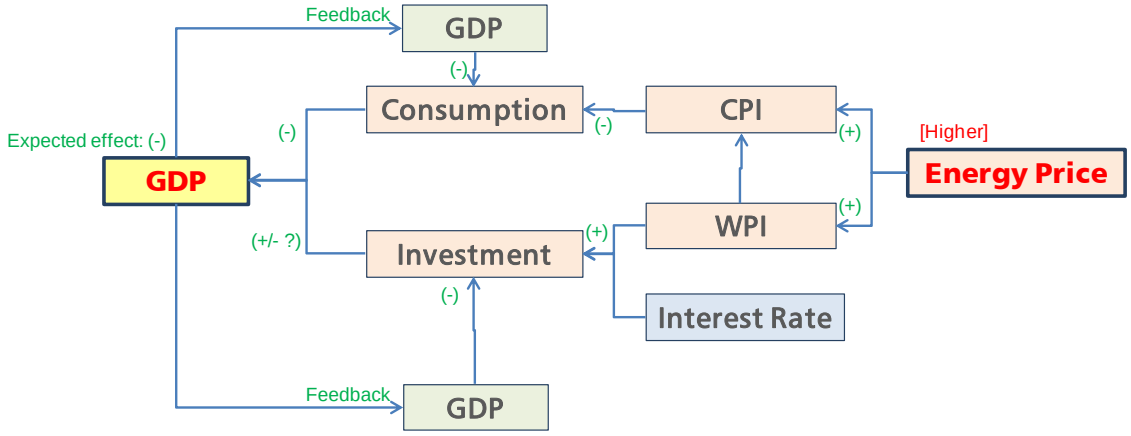


Source: As provided by this study's authors.

Price effect

Removing the subsidies can raise the prices of electricity, gasoline, and diesel oil. These higher energy prices then lead to higher general prices as reflected in the CPI and WPI. These can affect GDP negatively once consumption and exports lessen while imports increase. On the other hand, the effect on investment depends on which has the larger effect; the one from lower real interest rate (which comes from higher WPI) or another from lower GDP. However, the total price effect is expected to be negative.

Figure 2.5. Flow Chart on Price Effect



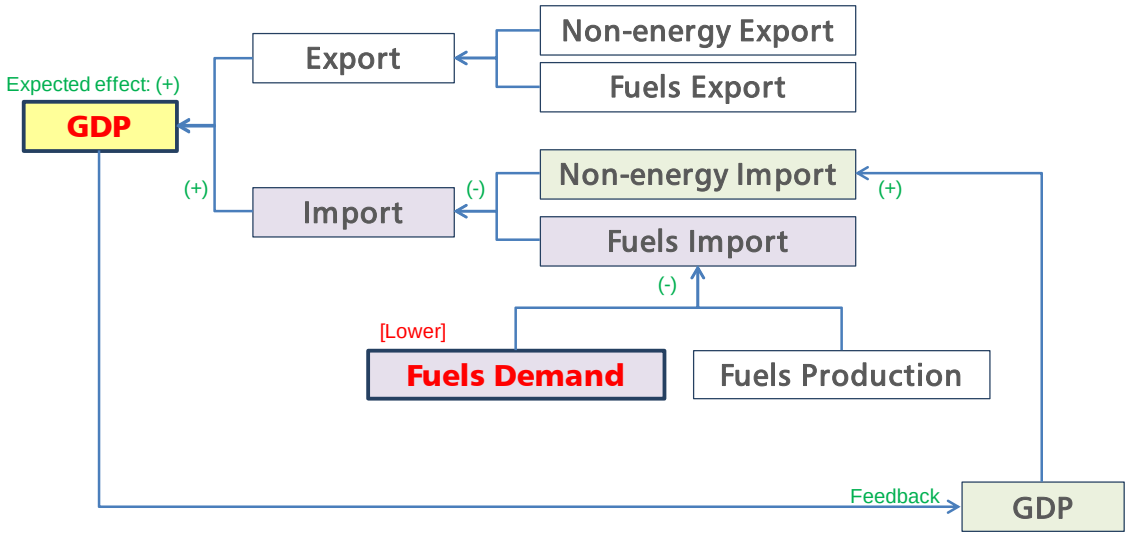
Source: As provided by this study's authors.

Energy saving effect

When energy prices increase after the removal of subsidies, energy demand goes down. A lower electricity demand then affects the demand for input fuel used for power generation. In this study, the affected input fuel is assumed to be natural gas only.

Lower gasoline and diesel oil demand directly affects the primary oil demand. They can affect GDP positively through lower imports or higher exports, with domestic fuel production assumed to remain unchanged.

Figure 2.6. Flow Chart on Energy Saving Effect



Source: Authors.

Budget effect

When subsidies are removed, the GDP is negatively affected as such reduces disposal income.

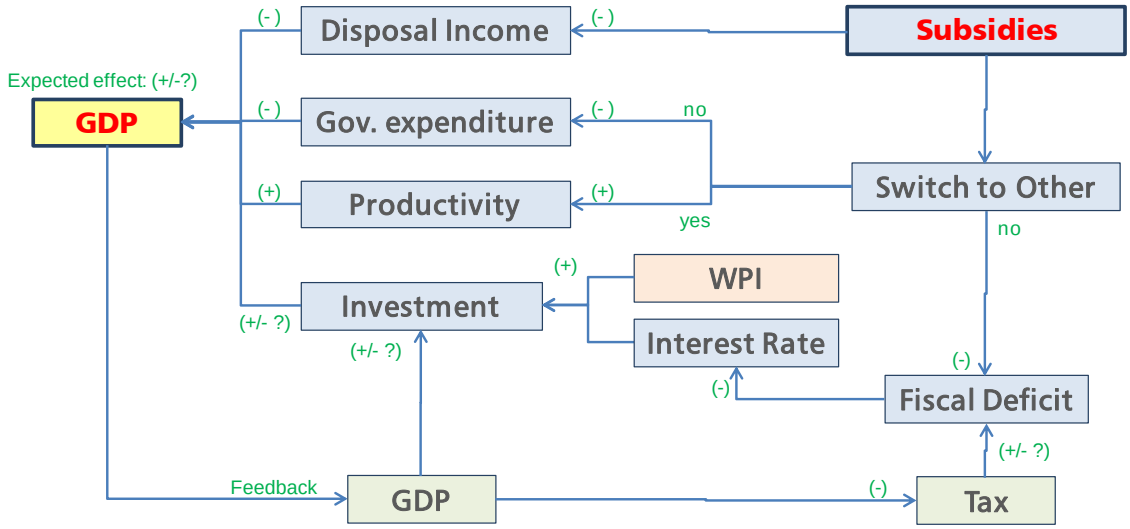
However, the total budget effect depends on how the Malaysian government will use the remaining budget from the unused subsidies. If the fund is saved to reduce the nation's fiscal deficit, the GDP will be negatively affected as such lowers government's spending.

On the other hand, an improvement in the fiscal deficit can lower interest rate, which then boosts investment. The positive effect from this recourse is expected to be too small, though, that it will hardly offset the negative budget effects.

The government has other ways to use the remaining budget initially allocated as energy subsidy. It can use the fund to invest in social infrastructure, or spend on healthcare and education, instead of using it to reduce the fiscal deficit. In this case, the budget effect will be positive since higher government consumption and investment will improve GDP directly (in national accounts) while the decrease in subsidies affects indirectly the GDP through private consumption and investment. Also, investment in infrastructure and expenditure for education can boost economic productivity in the short and long term.

The government can also use the fund to subsidise other sectors, such as low-income households. However, this study's model cannot further delve into this option since there are not enough data to disaggregate the economic activities (such as disposal income and private consumption) between lower-income households and their higher-income counterparts.

Figure 2.7. Flow Chart on the Budget Effect



Source: Authors.

2.2.3 Methodology and Case Setting

To be able to measure the impact on Malaysia's macroeconomy, estimates are first done on the reference case, wherein it is assumed that the subsidy is still in effect. Next, other cases are considered under various assumptions.

The impact of a subsidy phaseout is measured per case and compared with the results of the reference case. Such effects are measured via three paths – price effect, energy saving effect, and budget effect – separately. In estimating the price and the energy saving effects, fiscal neutrality is assumed from the reference case. For the budget effect, two assumptions on how the government will use the unused subsidy budget are identified: (i) the government will use it to reduce the fiscal deficit; or (ii) the government will use the fund for other sectors – e.g. to invest in social infrastructure or to spend on education. The total impact through the three paths are then measured simultaneously.

Table 2.2 Cases in This Study

0/ Reference Case	
1/ Price effect	
2/ Energy saving effect	
3/ Budget effect	Reducing fiscal deficit
	Switching to other spending
4/ Total effect	Reducing fiscal deficit
	Switching to other spending

Source: As provided by this study's authors.

2.3 Impacts via Three Paths

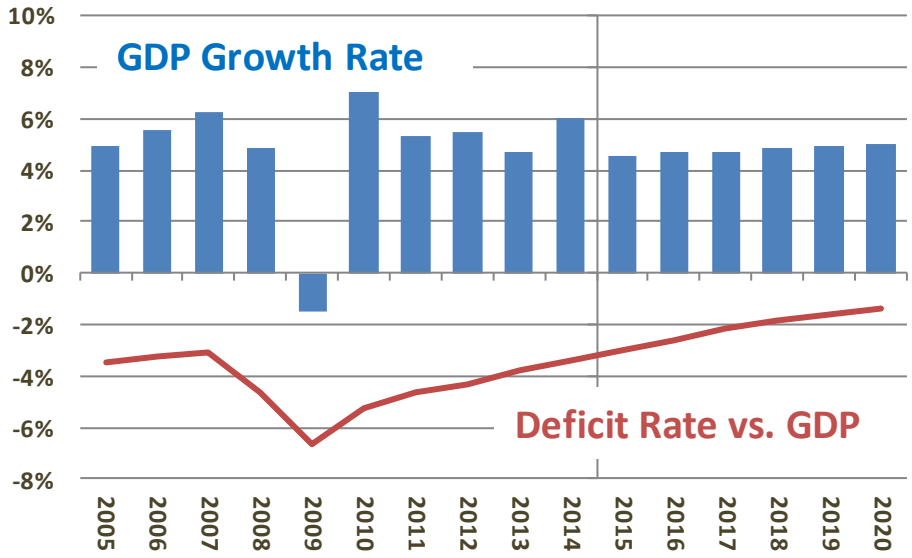
This section looks at how the removal of energy subsidies impacts the Malaysian macroeconomy. As mentioned in the previous section, the reference case is first presented before the impact of subsidy removal is measured per effect path. To evaluate the effect on the economy, this study focuses on main economic indices such as the GDP, CPI, employment, and fiscal deficit.

2.3.1 Reference Case

The reference case is used as a baseline for this study. It is assumed that the subsidy amount and energy prices remain unchanged from the 2014 level. The World Economic Outlook (IMF, 2015) is used as reference for assumptions on the global economic situation and international fossil fuel prices while World Population Prospects (UNDP, 2015) is referred to for data on population growth.

Although lower economic growth is expected in the coming years for Malaysia, the rate should still hover around 5.0 percent (Figure 2.8). Average inflation rate (CPI) will accelerate to 3 percent (from 2.5 percent in the last 5 years) mainly due to the implementation of the Goods and Services Tax (GST) in 2015. The labour market will improve with higher employment and lower unemployment rates. Although the subsidy remains in place, the nation's fiscal situation will improve. Fiscal deficit against GDP will decrease from 3.4 percent in 2014 to 1.4 percent in 2020, as compared with the national target of 0 percent (Table 2.3).

Figure 2.8. GDP Growth Rate and Fiscal Deficit Rate in Reference Case



Source: ADB (2015) and IEEJ estimation.

Table 2.3. Summary of Reference Case

		Actual		Forecast	CAGR (%)	
		2010	2014	2020	2010-2014	2014-2020
GDP	RM bil. (2010 price)	821	1,013	1,342	5.4	4.8
Private Consumption	RM bil. (2010 price)	395	525	724	7.4	5.5
Private Investment	RM bil. (2010 price)	108	200	299	16.7	6.9
Gov. Consumption	RM bil. (2010 price)	103	138	174	7.4	4.0
Gov. Investment	RM bil. (2010 price)	76	64	78	-4.3	3.3
Exports	RM bil. (2010 price)	714	771	896	1.9	2.6
Imports	RM bil. (2010 price)	583	676	830	3.8	3.5
CPI	Y2010=100	100	111	132	2.5	3.0
WPI	Y2010=100	100	109	123	2.2	2.0
Interest Rate	%	2.8	3.2	3.1	* 0.4	* -0.2
Gov.Revenue	RM bil.	160	221	334	8.4	7.2
Gov.Expenditure	RM bil.	203	258	358	6.2	5.6
Fiscal Deficit	RM bil.	-43	-37	-24	-3.6	-7.2
Fiscal Deficit Rate vs. GDP	%	-5.3	-3.4	-1.4	* 1.9	* 2.0
Employment	1000 person	11,900	13,532	15,579	3.3	2.4
Unemployment	1000 person	404	400	426	-0.3	1.1
Unemployment Rate	%	3.3	2.9	2.7	* -0.4	* -0.2

		Actual		Forecast	CAGR (%)	
		2010	2014	2020	2010-2014	2014-2020
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Unemployment Rate	%	3.3	2.9	2.7	* -0.4	* -0.2

Note: The figures with "*" are shown as changes (percentage points) for interest rate, fiscal deficit rate and unemployment rate.

Source: ADB (2015) and authors' estimation.

2.3.2 Economic Impacts through Three Paths

This section looks at the effect of subsidy removal on three paths: the price effect, energy saving effect, and the budget effect. In evaluating the overall impact on the economy, this study turns to main economic indices such as the GDP, CPI, employment, and fiscal deficit.

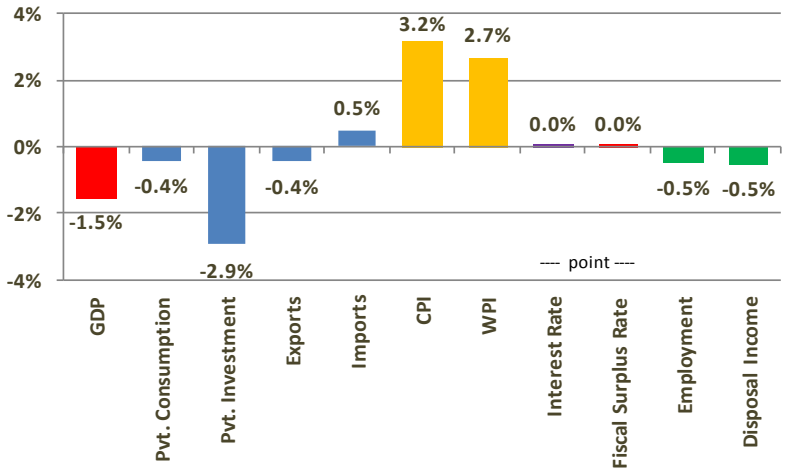
Price effect

A removal of subsidies means higher electricity, gasoline, and diesel oil prices. The energy price would increase by 22 percent to 30 percent, according to some sources in Malaysia. In this paper's analysis, electricity and fuel prices are assumed to increase by 25 percent starting 2016.

These higher energy prices bring up general prices by around 3 percent (CPI by 3.2 percent; WPI by 2.7 percent) by 2020 (Figure 2.9), compared with the reference case. Such affect GDP negatively by lowering consumption and exports, and increasing imports.

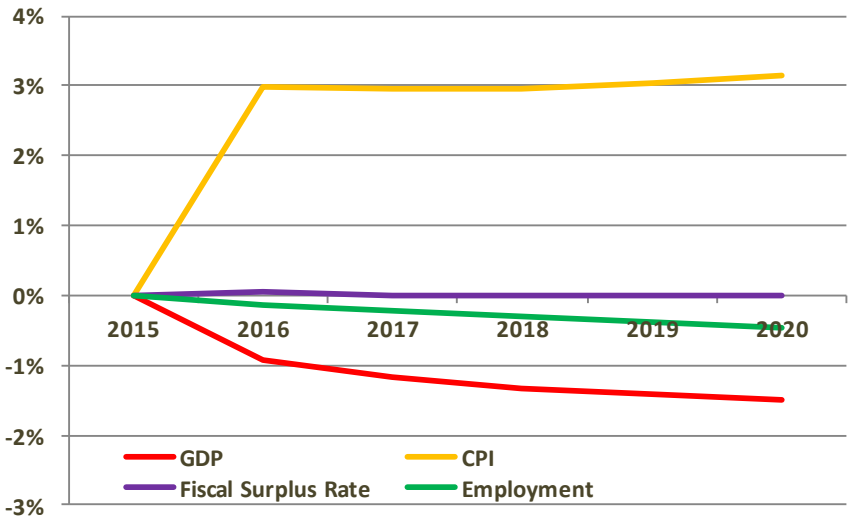
Any positive effect on investment from lower real interest rates is too small that it can hardly offset the slower GDP growth effect. The impact on the economy gradually spreads (Figure 2.10), where GDP is expected to taper by 1.5 percent in 2020. Employment drops by 0.5 percent. Since fiscal neutrality is assumed, fiscal deficit remains unchanged (but fiscal surplus rate against GDP improves slightly due to the higher nominal GDP).

Figure 2.9. Price Effect (vis-à-vis the Reference Case) in 2020



Note: Changes for interest rate and fiscal surplus rate are shown as percentage points.
Source: Estimates provided by this study's authors.

Figure 2.10. Price Effect (vis-à-vis the Reference Case), 2015-2020



Note: Changes for interest rate and fiscal surplus rate are shown as percentage points.
Source: Estimates provided by this study's authors.

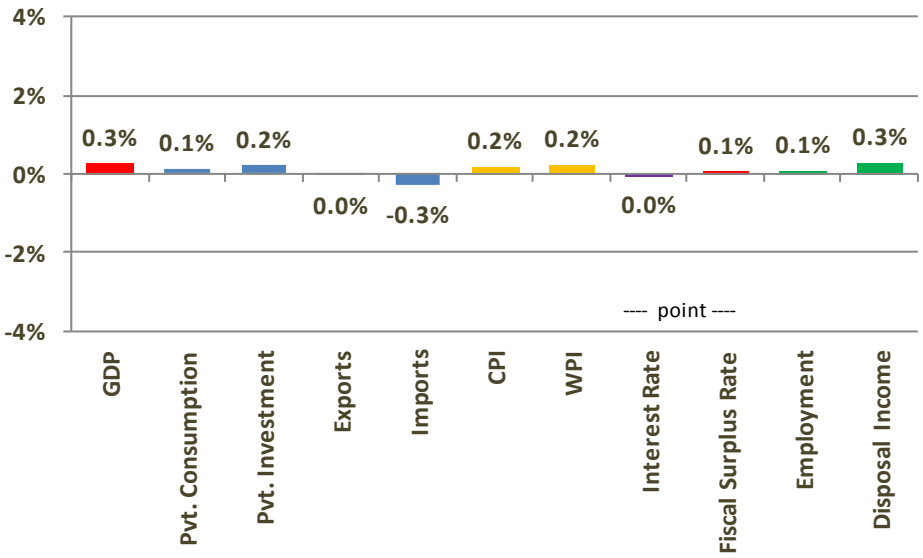
Energy saving effect

Once the subsidies are removed, the ensuing higher energy prices are expected to change the behaviours of energy consumers. That is, consumers would have lower energy demand. Assuming price elasticity is -0.1, energy demand would decrease by 2.5 percent.

In domestic primary demand basis, natural gas (Note: The study assumes that this is the only input fuel for power generation) would decrease by 2 percent due to the lower electricity demand. For primary oil, which includes other oil products, demand will decrease by 1.5 percent. In the analysis, it is assumed that half of this reduction in demand occurs in 2016 while the remainder happens in 2017 due to the ratchet effect and the lead time needed to change to more efficient appliances since higher energy price induces more efficient appliances.

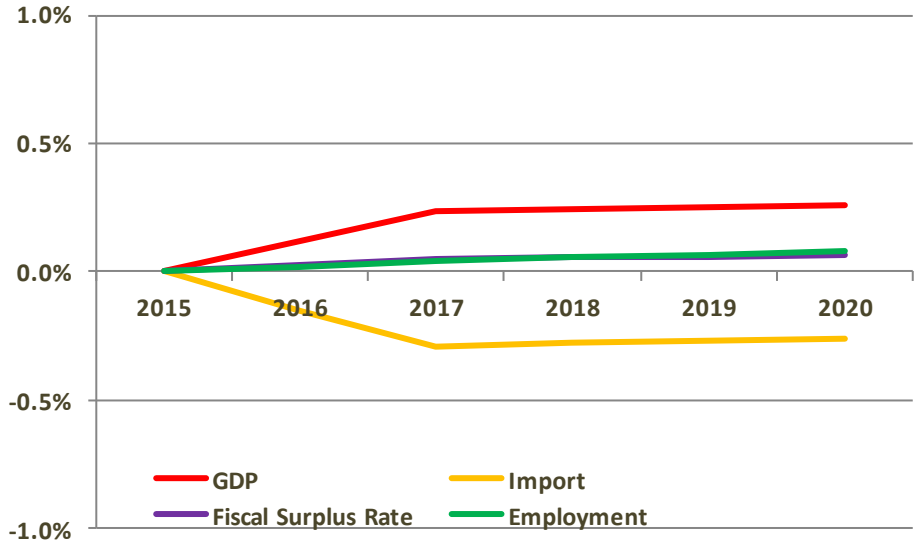
Lower fuel demand further leads to lower fuel imports, assuming the domestic fuel production remains unchanged. Total imports decrease by 0.3 percent in 2020 (Figure 2.11), compared with the reference case. Consequently, GDP is affected positively. The positive impact on GDP, however, is relatively small at 0.3 percent increase by 2020.

Figure 2.11. Energy Saving Effect (vis-à-vis the Reference Case) in 2020



Note: Changes for interest rate and fiscal surplus rate are shown as percentage points.
Source: Estimates provided by this study's authors.

Figure 2.12. Energy Saving Effect (vis-à-vis the Reference Case)



Note: Changes for interest rate and fiscal surplus rate are shown as percentage points.
Source: Estimated provided by this study's authors.

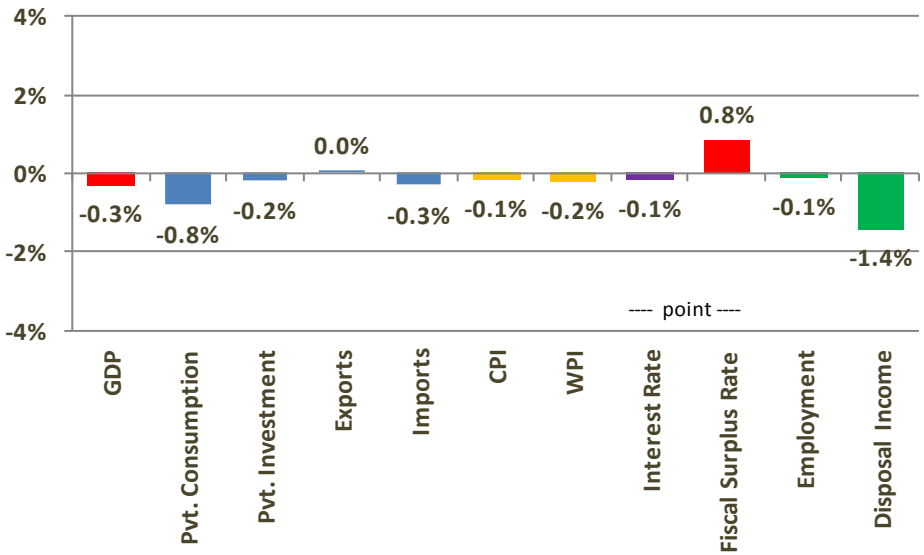
Budget effect

The subsidy value for the energy sector (gasoline and diesel oil for road transport sector) will decrease by RM15 billion when the reform in Malaysia is completed, according to KeTTHA, and this study's estimation. The budget effect depends on how the Malaysian government would use the unused subsidy budget once the subsidies are stopped.

To measure the effects by policy decisions, two extreme assumptions were made: (i) That the government will use the remaining subsidy budget to reduce fiscal deficit; and (ii) That the government will use the funds to spend on other sectors (e.g. investment in social infrastructure and expenditure for education). In this study's analysis, this subsidy reduction is assumed to take place in 2016.

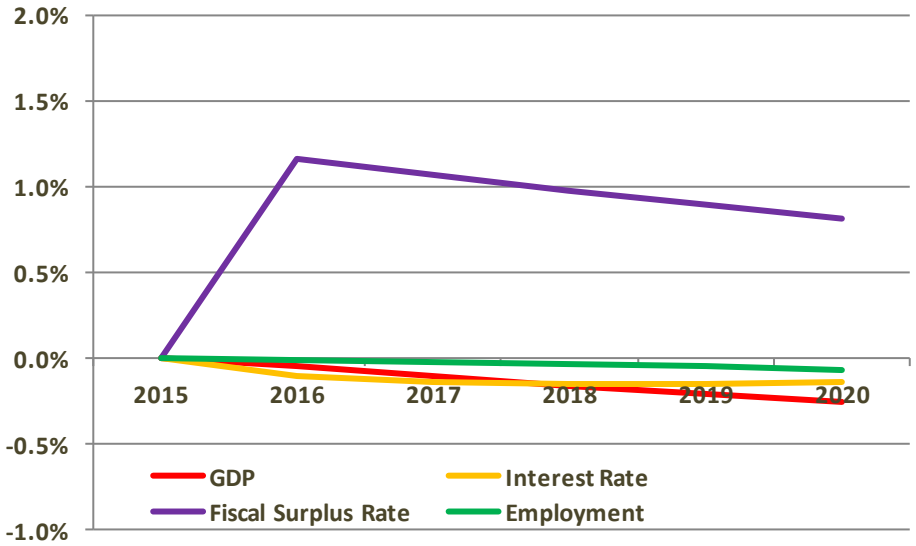
First, this study measured the impact if the government opt to use all of the subsidy amounts towards reducing fiscal deficit. In this case, removing the subsidies brings about 1.4 percent lower real private disposal income and 0.8 percent lower private consumption in 2020 (Figure 2.13), compared with the reference case. A lower consumption reduces GDP by 0.3 percent and employment by 0.1 percent. On the other hand, the fiscal deficit rate as a percentage GDP improves by 0.8 percentage point. Although this option can lower the interest rate (by 0.1 percentage point), the positive effect on investment is so small that it is overwhelmed by the slower GDP effect.

Figure 2.13. Budget Effect of Option to Reduce the Deficit (vis-a-vis the Reference Case), 2020



Note: Changes for interest rate and fiscal surplus rate are shown as percentage points.
Source: Estimates provided by this study's authors.

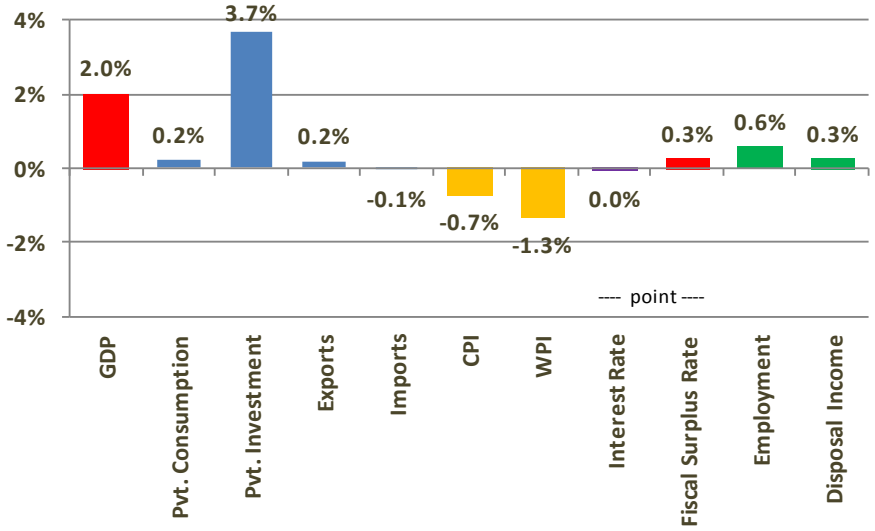
Figure 2.14. Budget Effect of Option to Reduce the Deficit (vis-à-vis the Reference Case), 2015-2020



Note: Changes for interest rate and fiscal surplus rate are shown as percentage points.
Source: Estimates provided by this study's authors.

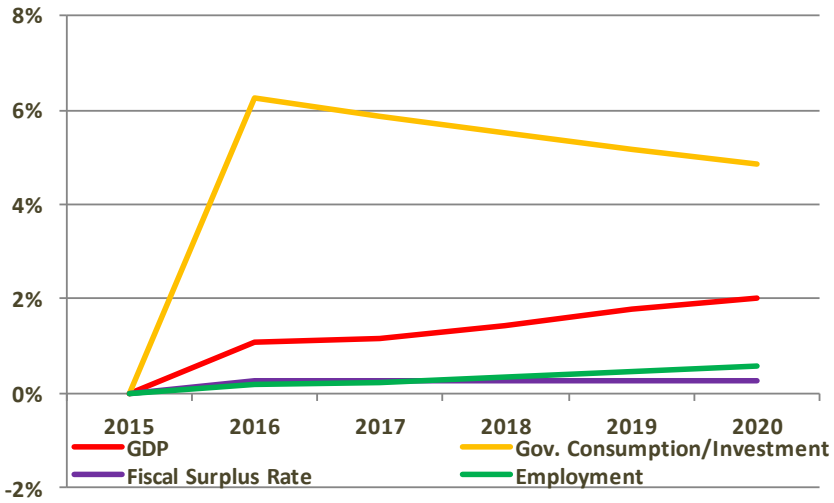
Next, this study measured the effect if the government uses all of the energy subsidy to spend on other sectors (i.e. invest in social infrastructure and spend on education). In this case, switching the subsidies to other expenditures leads to a higher GDP (by 2.0 percent in 2020), as shown in Figure 2.15. Employment also increases by 0.6 percent. However, disposal income increases by only 0.3 percent.

Figure 2.15. Budget Effect of Switching to Other Spending Items (vis-à-vis the Reference Case) in 2020



Note: Changes for interest rate and fiscal surplus rate are shown as percentage points.
Source: Estimates provided by this study's authors.

Figure 2.16. Budget Effect of Switching to Other Spending Items (vis-à-vis the Reference Case), 2015-2020



Note: Changes for interest rate and fiscal surplus rate are shown as percentage points.
Source: Estimates provided by this study's authors.

Subsidy is defined as income transfers to private sectors from the government, which is generally considered as a negative tax in the national accounts.

Removing the subsidy will indirectly affect private consumption. Per this study's model, removing the subsidy can lower the disposable income in the national accounts. In general, a RM1 decrease in income does not decrease private consumption by an equivalent value. Private consumption will decline by less – by RM0.5 only, for example – depending on the consumption propensity.

On the other hand, a RM1 increase in government consumption (or investment) directly drives up GDP by RM1. The direct positive effect of higher government consumption and investment on the GDP will overwhelm the indirect effect of lower private consumption.

2.4 Overall Economic Impact

Although removing the energy subsidies will lead to higher energy prices and reduce energy demand, such also allows the government to have policy options – for example, to reduce fiscal deficit or to switch it to other expenditure types. This section now shows the overall effect via the three identified paths under the assumption that the energy subsidy will end in 2016.

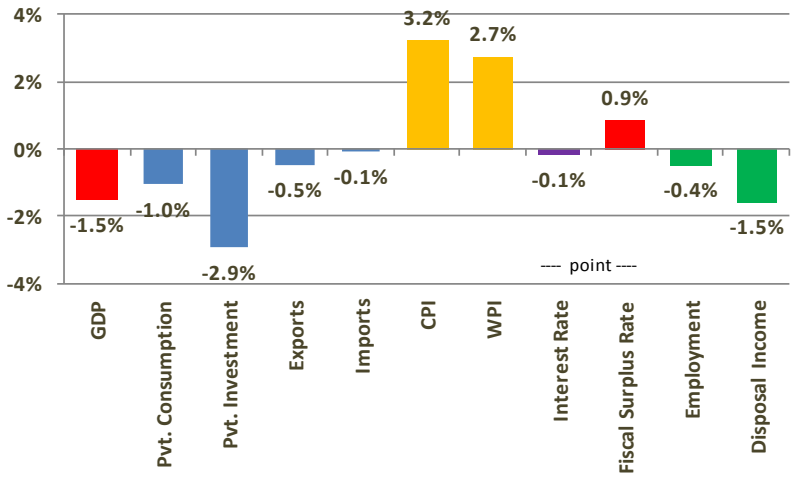
2.4.1 Total Effect Brought by Reduced Deficit

First, this study measures the impact on the Malaysian economy once the government removes the energy subsidies and reduces fiscal deficit. Findings show that the fiscal deficit as a percentage of GDP improves by 0.9 percentage points to 0.5 percent in 2020, while GDP

and employment are negatively affected by 1.5 percent and by 0.4 percent, respectively (Figure 2.17), compared with the reference case.

The negative price and budget effects overwhelm the positive energy saving effect. General prices increase by around 3 percent, while the Malaysian economy slows down. Improving the fiscal deficit, thus, leads to a lower interest rate (by 0.1 percentage point). Its positive effect on investment, however, is too small to compensate for the slower GDP effect.

Figure 2.17. Economic Impact of Removing Energy Subsidies, Reducing Deficit (vis-à-vis the Reference Case) in 2020

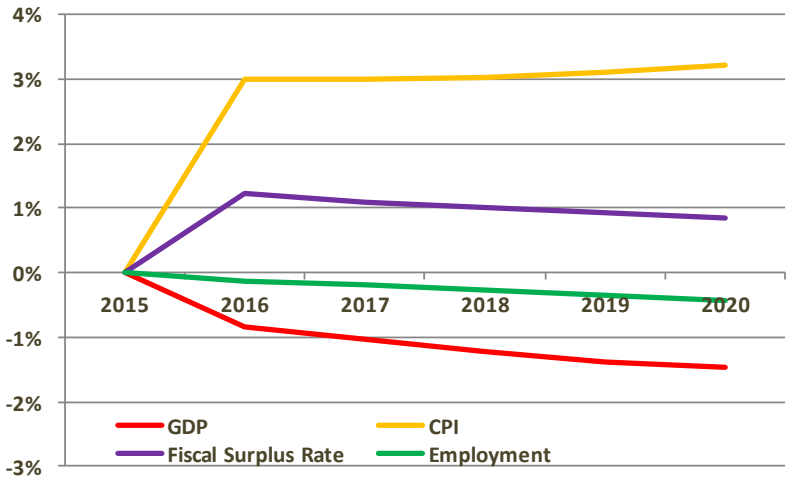


Note: Changes for interest rate and fiscal surplus rate are shown as percentage points.

Source: Estimated provided by this study's authors.

The negative impact on GDP gradually spreads (Figure 2.18) due to prevailing high prices. The improved fiscal deficit slows down after the first year (2016) because the lower GDP leads to lower tax revenue. The economic deterioration will last beyond 2020.

Figure 2.18. Economic Impact of Removing Energy Subsidies, Reducing Deficit (vis-à-vis the Reference Case), 2015-2020



Note: Changes for interest rate and fiscal surplus rate are shown as percentage points.
Source: Estimates provided by this study's authors.

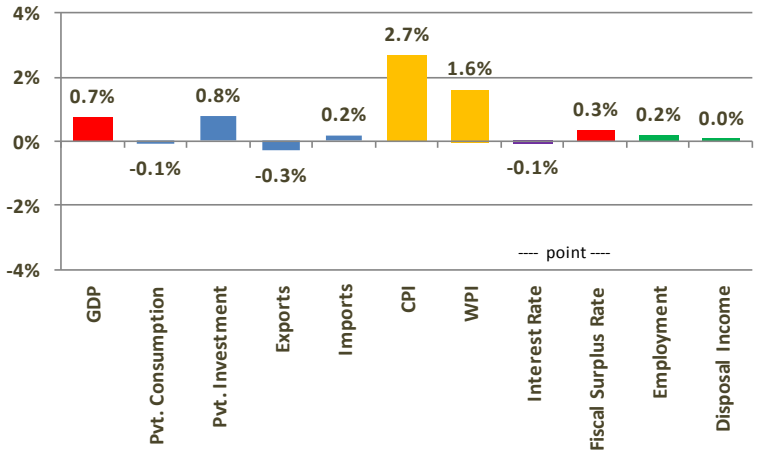
2.4.2 Total Effect Due to Shift to Other Forms of Spending

Next to be measured is the impact on the economy if the government removes the subsidies and reallocates the funds to other sectors (i.e. investment in social infrastructure and expenditure on education). In this case, the positive budget and energy saving effects are larger than the negative price effect.

Results show that GDP and employment increase by 0.7 percent and by 0.2 percent, respectively, in 2020. Consumer prices rise by 2.7 percent (Figure 2.19) – a rate that is lower than if the funds are to be used to reduce deficit – due to higher economic productivity. Fiscal deficit improves by 0.3 percentage points due to a higher tax revenue, thanks to the higher GDP.

The positive impact on GDP gradually increases (Figure 2.20). During the first year (2016), the negative impact of the price hike on consumption is relatively large. However, higher economic productivity through better infrastructure and education mitigates the price increase and eventually accelerates the GDP growth.

Figure 2.19. Economic Impact of Removing Energy Subsidies and Switching to Other Public Spending Items (vis-à-vis the Reference Case) in 2020

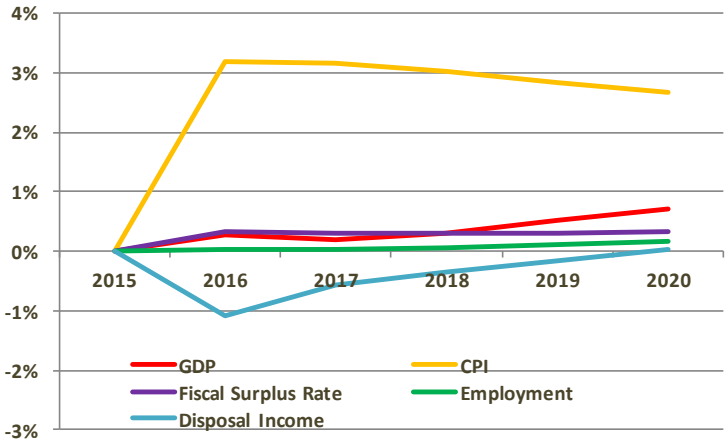


Note: Changes for interest rate and fiscal surplus rate are shown as percentage points.

Source: Estimates provided by this study's authors.

Note that the positive impact on the economy varies across sectors. The eliminated subsidies and higher prices can lead to lower real private disposable income despite the higher GDP. Such negative effect will extend until 2019 and then turn slightly positive by 2020. Thus, the lower disposable income may be viewed by the masses as a social issue for a couple of years after subsidies are removed.

Figure 2.20. Economic Impact of Removing Energy Subsidies and Switching to Other Public Spending Items (vis-à-vis the Reference Case), 2015-2020



Note: Changes for interest rate and fiscal surplus rate are shown as percentage points.

Source: Estimated provided by this study's authors.

This section has just shown the results of two policy options on the unused subsidy budget. The differences in the two results are quite significant. One lowers GDP (by -1.5 percent

compared with the reference case) but shows a fiscal deficit improvement (0.9 percentage points), while the other leads to higher GDP (by 0.7 percent) but with lesser improvement in the fiscal deficit (0.3 percentage point).

These two assumed policy options are on opposite ends of the spectrum. In reality, the government would more likely take a reasonable approach that is midway the two scenarios, allowing for a less extreme (i.e. milder) impact on the economy.

2.5 Conclusion and Implications

How the subsidy reform impacts the economy was measured here by using Malaysia's macroeconomic model. In assessing the overall effects, two policy options on how to use the subsidy budget were assumed. These are: (i) That the Malaysian government will use all of the subsidy budget to reduce its fiscal deficit; and (ii) That the government will use the budget to finance expenditures in other sectors (i.e. by investing in social infrastructure and spending on education). The results of this analysis showed significant differences.

The first assumed option shows lower GDP (-1.5 percent compared with the reference case) but leads to an improvement in the fiscal deficit numbers (0.9 percentage point). Meanwhile, the second options showed a higher GDP (by 0.7 percent) but with lesser improvement on the fiscal deficit (0.3 percentage point) (Table 5.1.1). Thus, the second option presents a better picture than the first one.

However, removing subsidies and higher prices results in lower real private disposable income despite the higher GDP. The negative effect will last for a couple of years after the subsidies are removed.

This study focused on how the economy can be affected through three paths – price effect, energy saving effect and budget effect – once energy subsidies are removed. Results show a negative price effect – i.e., higher general prices (around 3 percent) and lower GDP (-1.5 percent) in the next five years.

On the other hand, the positive energy saving effects are somehow small, improving the GDP by 0.3 percent only.

In the analysis of the budget effect, results showed that using the subsidy budget to reduce the fiscal deficit has a negative impact on Malaysia's economy since it lowers GDP by 0.3 percent although it will indeed improve the fiscal deficit by 0.8 percentage points in terms of the ratio against GDP. On the other hand, the option to reallocate the subsidies for other government forms of spending brings a positive impact on the economy (2.0 percent higher GDP).

Table 2.4. Economic Impact of Removing Energy Subsidies (vis-à-vis the Reference Case) in 2020

	Effect of Three Paths				Total Effect	
	Price Effect	Energy Saving Effect	Budget Effect		with Reducing Deficit	with Switching to Others
			with Reducing Deficit	with Switching to Others		
GDP	-1.5%	0.3%	-0.3%	2.0%	-1.5%	0.7%
Private Consumption	-0.4%	0.1%	-0.8%	0.2%	-1.0%	-0.1%
Private Investment	-2.9%	0.2%	-0.2%	3.7%	-2.9%	0.8%
Exports	-0.4%	0.0%	0.0%	0.2%	-0.5%	-0.3%
Imports	0.5%	-0.3%	-0.3%	-0.1%	-0.1%	0.2%
CPI	3.2%	0.2%	-0.1%	-0.7%	3.2%	2.7%
WPI	2.7%	0.2%	-0.2%	-1.3%	2.7%	1.6%
Interest Rate	* 0.0%	* -0.0%	* -0.1%	* -0.0%	* -0.1%	* -0.1%
Fiscal Surplus Rate vs. GDP	* 0.0%	* 0.1%	* 0.8%	* 0.3%	* 0.9%	* 0.3%
Employment	-0.5%	0.1%	-0.1%	0.6%	-0.4%	0.2%
Real Disposal Income	-0.5%	0.3%	-1.4%	0.3%	-1.5%	0.0%

Note: Changes for interest rate and fiscal surplus rate are shown as percentage points.
Source: Estimated provided by this study's authors.

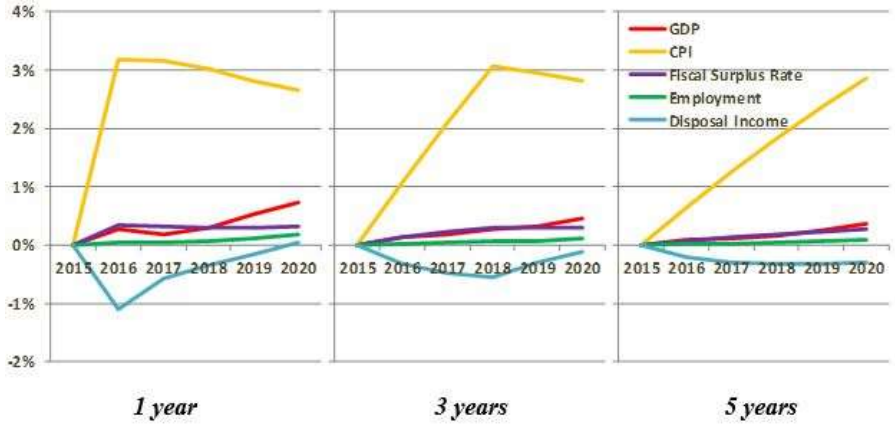
2.5.1 Implications

Subsidies can lead to economic inefficiencies, which results in misallocation of resources. Hence, removing them can make the economy more efficient and healthier. This study affirms this expectation by using a macroeconomic model and showing that an appropriate subsidy reform can accelerate economic growth and reduce fiscal deficit.

Both economic stability and fiscal reform are important issues to Malaysia's policymakers, as they have to strike a balance between the two. The fuel subsidy reform could improve energy efficiency and help the shift toward renewable energy, which can then strengthen Malaysia's energy security, mitigate climate change, and increase its net fuel exports. All these bring a positive impact on the economy.

Reallocating the use of the subsidies to other government expenditures can boost the economy, although it is important to consider which sectors it has to be allocated to. The budget should be used for economic growth, such as investing in social infrastructure, healthcare and education.

Figure 2.21. Economic Impact of Removing Energy Subsidies and Switching to Other Public Spending Items, by Time Period (vis-à-vis the Reference Case)



Note: Changes for interest rate and fiscal surplus rate are shown as percentage points.
Source: Estimated provided by this study's authors.

Note that the positive impact on the economy varies across sectors. Higher general prices result in lower real private disposable income despite the higher GDP. Such negative effect will last for a couple of years following the removal of subsidies, which may raise social problems. It is, thus, very important to mitigate the negative impact.

This study identified extreme cases/assumptions and looked at the impact at every time period (1 year, 3 years, and 5 years) after subsidies are removed. The negative impact on real disposable income varies across these cases.

The implications identified in this study can help policymakers set up appropriate action plans on how to deal with Malaysia's energy subsidies. It can take a reasonable approach towards how to use the funds freed up by the subsidy reforms across several years, enough to soften the expected impact on the economy.

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Appendices

Appendix 2-A. Model's Equations

```
'----------REAL EXPENDITURE----------
GDP=CP+CG+IP+IG+JP+EXC-MC
YD=YD.N/CP.P
CP=136994.1+.104234*(YD)+1.23178*(W/CP.P)-152736.9*(CP.P/CP.P(1))+.857120*(CP(1))-
25260.1*(DUM09)
't-value   (4.43) (2.60) (.97) (-6.01) (16.19) (-5.60)
' OLS   (2003-2014)   R^2=.999   SD= 2,908.58   DW= 2.993
CG=CG.N/CG.P
IPG=IP+IG
IP=-70991.3+.184550*(CP+EXC-MC)+.121602*(R*K(1)/IP.P)-585.769*(INTLR-
DOT(IP.P))+.445014*(IP(1))-16404.6*(DUM06)-
16596.9*(DUM08)+31749.8*(DUM13+DUM12)
't-value   (-2.53) (1.67) (.64) (-1.09) (3.97) (-.88) (-.76) (2.05)
' OLS   (1998-2014)   R^2=.859   SD= 17,413.5   DW= 1.764
IG=IG.N/IG.P

'---EXPORT---
EXC=EXC_OIL+EXC_GAS+EXC_COAL+EXC_OTH
EXC_OIL=.000310+1.91005*(CREX)
'            (.23)        (23065629.25)
' OLS   (1997-2013)   R^2=1.   SD= .000955   DW= 2.937
CREX=-68231.7+82380.2*(WLD_GDP/WLD_GDP(1))-
71.0611*(POIL/WLD_GDP.P)+.245821*(CREX(1))-3662.81*(DUM11)
't-value   (-4.82) (5.77) (-4.28) (2.03) (-3.80)
' OLS   (2001-2012)   R^2=.924   SD= 794.2920   DW= 2.315
EXC_GAS=-.005335+1.38560*(NGEX)
'            (-3.00)     (24245504.64)
' OLS   (1997-2013)   R^2=1.   SD= .001118   DW= 2.881
NGEX=6417.10+.000567*(WLD_GDP)-
500.059*(PGAS/WLD_GDP.P)+9596.68*(DUM10+DUM11)+2035.15*(DUM07+DUM09)
't-value   (1.63) (4.56) (-1.80) (11.02) (2.08)
' OLS   (1997-2014)   R^2=.949   SD= 1,072.51   DW= 1.674
EXC_COAL=.0000006+.519352*(CLEX)
'            (1.20)      (157944053.61)
' OLS   (1997-2013)   R^2=1.   SD= .0000013   DW= 2.224
EXC_OTH=729043.8+.002264*(WLD_GDP)-
728033.4*(EXC.P_OTH/WLD_GDP.P/EXR)+69131.3*(DUM07+DUM08)-42854.6*(DUM10)-
11321.7*(DUM12)
't-value   (5.64) (.79) (-.82) (3.81) (-1.43) (-.43)
' OLS   (2004-2014)   R^2=.712   SD= 21,838.9   DW= 2.682

'---IMPORT---
MC=MC_OIL+MC_GAS+MC_COAL+MC_OTH
MC_OIL=.000116+1.91005*(CRIM)
'            (.35)        (43585537.21)
```

```
' OLS   (1997-2013)   R^2=1.   SD= .000475   DW= 1.112
MC_GAS=-.0000413+1.38560*(NGIM)
'           (-.33)      (58876493.20)
' OLS   (2003-2013)   R^2=1.   SD= .000188   DW= 1.933
MC_COAL=.0000066+.519352*(CLIM)
'           (.15)       (101485184.57)
' OLS   (1997-2013)   R^2=1.   SD= .0000950   DW= 2.479
MC_OTH=313482.8+.058238*(YD.N/MC.P_OTH)-
107734.9*(MC.P_OTH/MC.P_OTH(1))+.617294*(MC_OTH(1))-81071.2*(DUM01)-
25854.9*(DUM03)+66209.1*(DUM04)-57464.9*(DUM09+DUM10)
't-value   (2.29) (.91) (-.97) (4.17) (-2.81) (-.96) (2.57) (-2.68)
' OLS   (2000-2014)   R^2=.852   SD= 23,617.1   DW= 2.028

'----------PRICES & WAGE----------
GDP.P=GDP.N/GDP
CP.P=.005282+.009972*(CPI)
'         (.14)       (28.58)
' OLS   (2010-2014)   R^2=.995   SD= .002767   DW= 1.471
CPI=0.0288*CPI_ELEC+0.0877*CPI_GSL+(1-0.0288-0.0877)*CPI_OTH
CPI_ELEC=CPI_ELEC(1)*ELE_D.P/ELE_D.P(1)
CPI_GSL=CPI_GSL(1)*GASO.P/GASO.P(1)
ELE_D.P=ELE_D.P_TMP*ELE_D_CHANGE
GASO.P=GASO.P_TMP*GASO_CHANGE
CPI_OTH=(-17.7628+.098514*(WPI)+21.8927*(GDP_GAP)+.900299*(CPI_OTH(1))-
1.49693*(DUM07)-2.52259*(DUM10)-2.03720*(DUM12))*(1+GST.R)
't-value   (-.61) (1.47) (.75) (7.86) (-1.56) (-2.41) (-2.14)
' OLS   (2002-2014)   R^2=.989   SD= .844259   DW= 2.063

WPI=0.0613*WPI_ENE+(1-0.0613)*WPI_OTH
ELE_I.P=ELE_I.P_TMP*ELE_I_CHANGE
DIESEL.P=DIESEL.P_TMP*DIESL_CHANGE
WPI_ENE=WPI_ENE(1)*(ELE_I.P/860*8659+DIESEL.P/8365*8647)/(ELE_I.P(1)/860*8659+DIE
SEL.P(1)/8365*8647)
'8659 ktoe for Elec Demand and 8647 for Diesel in Industry+Transport+Commercial in 2013
'860 kcal/kWh, 8365 kcal/L
WPI_OTH=(-
47.3478+41.6939*(MC.P)+.019208*(WPI_ENE+WPI_ENE(1))+70.1746*(GDP_GAP)+.404212*
(WPI_OTH(1))-3.43639*(DUM09)+6.42719*(DUM08))*(1+GST.R)
't-value   (-.46) (1.42) (.18) (.65) (1.15) (-.53) (1.31)
' OLS   (2003-2014)   R^2=.935   SD= 2.96723   DW= 2.614

CG.P=.052216+.709236*(CP.P)+.249149*(CG.P(1))
'         (1.49)      (4.45)        (1.65)
' OLS   (2000-2014)   R^2=.978   SD= .022317   DW= 1.603
IG.P=IP.P
IP.P=-.030793+.007157*(WPI)+.294869*(IP.P(1))
'         (-.52)      (3.88)       (1.84)
' OLS   (2000-2014)   R^2=.96   SD= .030745   DW= 1.935
JP.P=-.654472+.021910*(WPI)+3.12836*(DUM08)
```

```
'          (-.72)      (2.14)        (4.62)
' OLS   (1997-2014)   R^2=.639   SD= .640773   DW= 2.372
INTLR=.088782+1.56274*(IP.P/IP.P(1))-9.25385*(DEFICIT.R)+.405036*(INTLR(1))-
1.15500*(DUM09)-.515240*(DUM10)
't-value   (.16) (2.92) (-1.63) (11.05) (-5.03) (-2.70)
' OLS   (1998-2014)   R^2=.938   SD= .175114   DW= 1.445
EXC.P_OIL=.0000000+.003979*(POIL*EXR)
'              (.32)        (39651697.61)
' OLS   (1997-2013)   R^2=1.   SD= .0000000   DW= 1.229
EXC.P_GAS=.0000000+.028618*(PGAS*EXR)
'              (.88)        (53246303.99)
' OLS   (1997-2013)   R^2=1.   SD= .0000000   DW= .899
EXC.P_COAL=.0000000+.003137*(PCOAL*EXR)
'              (-.23)      (49646683.04)
' OLS   (1997-2013)   R^2=.983   SD= .042778   DW= .873
EXC.P_OTH=.063427+.005808*(WPI)+.319809*(EXC.P_OTH(1))
'              (.98)        (3.70)        (1.59)
' OLS   (1999-2013)   R^2=.931   SD= .032100   DW= 2.095
EXC.P=EXC.N/EXC
MC.P_OIL=.0000000+.000524*(POILM)
'             (.26)        (61894900.60)
' OLS   (1997-2013)   R^2=1.   SD= .0000000   DW= 2.237
MC.P_GAS=.0000000+.000722*(PGASM)
'             (-.26)      (28054288.87)
' OLS   (2003-2013)   R^2=1.   SD= .0000000   DW= 1.791
MC.P_COAL=.0000000+.001925*(PCOALM)
'              (.65)        (50450906.99)
' OLS   (1997-2013)   R^2=1.   SD= .0000000   DW= 2.031
POILM=POIL*EXR*7.6
PGASM=PGAS*EXR*39.6526
PCOALM=PCOAL*EXR*1.6291952
MC.P=MC.N/MC

'----------GOVERNMENT EXPENDITURE----------
TAX=(3377.27+.144955*(GDP.N)-12933.1*(DUM10)+7478.02*(DUM12))*(1+GST.R)
'        (1.20)      (33.34)          (-2.83)          (1.58)
' OLS   (1998-2014)   R^2=.988   SD= 4,312.00   DW= 1.576
NON_TAX=-4369.22+.037996*(GDP.N)+.717986*(EXC.N_OIL)+14882.0*(DUM09)-
9944.38*(DUM05)+3507.26*(DUM13)-3602.97*(DUM08)
't-value   (-2.72) (7.10) (4.70) (5.45) (-3.41) (1.16) (-1.17)
' OLS   (1997-2014)   R^2=.979   SD= 2,551.99   DW= 2.516

GOV.REVN=TAX+NON_TAX
CG.N=CG.N_TEMP*(1-
GOV_SWITCH)+CG.N_TEMP*CG.P/CG.P_REF*GOV_SWITCH+SUB_CHANGE*CG_SWITCH*SU
B_CG_SHARE
IG.N=IG.N_TEMP*(1-
GOV_SWITCH)+IG.N_TEMP*IG.P/IG.P_REF*GOV_SWITCH+SUB_CHANGE*IG_SWITCH*(1-
SUB_CG_SHARE)
```

```
GOV.EXPD=CG.N+IG.N+SUBSIDY_TTL
SUBSIDY_TTL=SUBSIDY_FUEL+SUBSIDY_OTH-SUB_CHANGE
DEFICIT=GOV.REVN-GOV.EXPD
DEFICIT.R=DEFICIT/GDP.N
ICG.N_TEMP=CG.N_TEMP+IG.N_TEMP

'----------NOMINAL EXPENDITURE----------
GDP.N=CP.N+CG.N+IPG.N+JP.N+EXC.N-MC.N
YD.N=GDP.N-TAX+SUBSIDY_TTL

CP.N=CP*CP.P
IPG.N=IP.N+IG.N
IP.N=IP*IP.P
JP.N=JP*JP.P
EXC.N=EXC.N_OIL+EXC.N_GAS+EXC.N_COAL+EXC.N_OTH
EXC.N_OIL=EXC_OIL*EXC.P_OIL
EXC.N_GAS=EXC_GAS*EXC.P_GAS
EXC.N_COAL=EXC_COAL*EXC.P_COAL
EXC.N_OTH=EXC_OTH*EXC.P_OTH
MC.N=MC.N_OIL+MC.N_GAS+MC.N_COAL+MC.N_OTH
MC.N_OIL=MC_OIL*MC.P_OIL
MC.N_GAS=MC_GAS*MC.P_GAS
MC.N_COAL=MC_COAL*MC.P_COAL
MC.N_OTH=MC_OTH*MC.P_OTH

'----------LABOUR----------
LF=(.032649+.029867*(GDP/10^6)+.878526*(LF(1)/POP(1))-.002177*(DUM01))*POP
'           (.50)       (1.36)              (4.70)                (-.25)
' OLS   (1999-2014)   R^2=.87   SD= .007766   DW= 1.768

L=LF-U
U=LF*URATE/100
URATE=8.67037-7.79287*(GDP/GDP(1))+.807552*(URATE(1))+.164604*(DUM13)
'          (7.70)      (-7.55)               (5.43)              (1.84)
' OLS   (2009-2014)   R^2=.938   SD= .071709   DW= 2.218
W=-15045.3-
590.531*(URATE)+266.498*(CPI)+.561209*(W(1))+1890.45*(DUM08)+1405.07*(DUM12)
'     (-1.15)    (-.61)          (1.63)        (2.06)         (2.03)          (1.86)
' OLS   (2000-2014)   R^2=.989   SD= 638.9795   DW= 1.424

'----------GDP potential ----------
'LOG(GDP/L)=.891909+.608065*(LOG(K*0.9/L))+.013494*(TIME)+.055003*(DUM04+DUM05
+DUM06+DUM07+DUM08)
't-value   (.95) (3.10) (5.02) (6.74)
' OLS   (1998-2014)   R^2=.986   SD= .013709   DW= 1.279
'TFP_ACTUAL=EXP(LOG(GDP)-(.608065*LOG(K*0.9)+(1-.608065)*LOG(L)))
'LOG(GDP_PTL)=.891909+.608065*LOG(K)+(1-
.608065)*LOG(LF)+.013494*(TIME)+.055003*(DUM04+DUM05+DUM06+DUM07+DUM08)
GDP_PTL=EXP((.608065*LOG(K)+(1-.608065)*LOG(LF))+LOG(TFP_ACTUAL))
```

```
GDP_GAP=GDP/GDP_PTL

DOT(TFP_ACTUAL)=.208288+.024018*(DOT(IP(1)+IP(2)))+.026667*(DOT(IG(1)+IG(2)))+.1795
17*(DOT(CG_EDU(1)+CG_EDU(2)+CG_EDU(3)))+.125098*(DOT(TFP_ACTUAL(1)))+1.64641*(
DUM02+DUM03+DUM04)-7.05964*(DUM09)-1.53803*(DUM13)
't-value   (.30) (.61) (.60) (2.65) (1.54) (2.88) (-10.38) (-2.22)
' OLS   (2002-2014)   R^2=.926   SD= .582566   DW= 2.494
R=-.288791+.136564*(TFP_ACTUAL)+.186299*(R(1))-.021746*(DUM09)
'     (-4.55)     (4.85)                (1.09)         (-2.00)
' OLS   (2000-2014)   R^2=.943   SD= .007947   DW= 1.119
K=.0000000+.946106*(K(1))+IPG
'          (.00)        (792.82)
' ROLS  (2000-2014)   R^2=.999   SD= 8,356.45   DW= .749
CG.N_EDU_TMP=CG.N_TEMP*CG_EDU_SHARE
CG.N_EDU=CG.N_EDU_TMP+SUB_CHANGE*CG_SWITCH*SUB_CG_SHARE
CG_EDU=CG.N_EDU/CG.P
CG_EDU_STCK=CG_EDU+CG_EDU_STCK(1)

'----------ENERGY----------
CRIM=CRPD-CRPR+CREX+CRSD
NGIM=NGPD-NGPR+NGEX
CLIM=CLPD-CLPR+CLEX+CLSD
CRPD=CRPD_TMP*CRPD_CHANGE
NGPD=NGPD_TMP*NGPD_CHANGE
CLPD=CLPD_TMP*CLPD_CHANGE
```

Appendix 2-B. List of Variables

Variables	Contents	Unit	Data available	
CAP.EXPD	Govt Expenditure - Capital	million ringgit	1990	2014
CG	Real Govt Consumption	million ringgit	1990	2014
CG.N	Nominal Govt Consumption	million ringgit	1990	2014
CG.N_EDU	Govt. Expenditure Education and training	million ringgit	1990	2014
CG.N_EDU_TMP	CG.N_EDU	million ringgit	1990	2014
CG.N_TEMP	CG.N	million ringgit	1990	2014
CG.P	Deflator Govt Consumption	CY2010=1	1990	2014
CG.P_REF	CG.P	million ringgit	1990	2014
CG_EDU	CG.N_EDU/CG.P	million ringgit	1990	2014
CG_EDU_SHARE	CG.N_EDU/CG.N	%	1990	2014
CG_EDU_STCK	Stock Education	million ringgit	1990	2014
CG_EDU_TMP	CG_EDU	million ringgit	1990	2014
CG_SWITCH	1= subsidy switching to CG, 0= none		1990	2014
CLEX	Export Coal	ktoe	1990	2014
CLIM	Import Coal	ktoe	1990	2014
CLPD	Primary Demand Coal	ktoe	1990	2014
CLPD_CHANGE	Coal demand Change Rate	Reference=1	1990	2014
CLPD_TMP	CLPD	ktoe	1990	2014
CLPR	Production Coal	ktoe	1990	2014
CLSD	Statistics Difference Coal	ktoe	1990	2014
CP	Real Private Consumption	million ringgit	1990	2014
CP.N	Nominal Private Consumption	million ringgit	1990	2014
CP.P	Deflator Private Consumption	CY2010=1	1990	2014
CPI	Consumer Price Index	CY2010=100	1990	2014
CPI_ELEC	CPI Electricity	CY2010=101	1990	2014
CPI_GSL	CPI Gasoline	CY2010=102	1990	2014
CPI_OTH	CPI Others	CY2010=103	1990	2014
CREX	Export Oil	ktoe	1990	2014
CRIM	Import Oil	ktoe	1990	2014
CRPD	Primary Demand Oil	ktoe	1990	2014
CRPD_CHANGE	Oil demand Change Rate	Reference=1	1990	2014
CRPD_TMP	CRPD	ktoe	1990	2014
CRPR	Production Oil	ktoe	1990	2014
CRSD	Statistics Difference Oil	ktoe	1990	2014
CUR.EXPD	Govt Expenditure - Current	million ringgit	1990	2014
D.N	Consumption of fixed capital	million ringgit	1990	2014
DEFICIT	Fiscal Surplus/Deficit	million ringgit	1990	2014
DEFICIT.R	Fiscal Surplus/Deficit Rate vs GDP	ratio	1990	2014
DIESEL.P	Diesel Price	RM/Liter	1990	2014

Variables	Contents	Unit	Data available	
DIESEL.P_TMP	DISEL.P	RM/L	1990	2014
DIESL_CHANGE	Diesel price change rate	Reference=1	1990	2014
DUM00	Dummy 2000		1990	2014
DUM01	Dummy 2001		1990	2014
DUM02	Dummy 2002		1990	2014
DUM03	Dummy 2003		1990	2014
DUM04	Dummy 2004		1990	2014
DUM05	Dummy 2005		1990	2014
DUM06	Dummy 2006		1990	2014
DUM07	Dummy 2007		1990	2014
DUM08	Dummy 2008		1990	2014
DUM09	Dummy 2009		1990	2014
DUM10	Dummy 2010		1990	2014
DUM11	Dummy 2011		1990	2014
DUM12	Dummy 2012		1990	2014
DUM13	Dummy 2013		1990	2014
DUM14	Dummy 2014		1990	2014
DUM90	Dummy 1990		1990	2014
DUM91	Dummy 1991		1990	2014
DUM92	Dummy 1992		1990	2014
DUM93	Dummy 1993		1990	2014
DUM94	Dummy 1994		1990	2014
DUM95	Dummy 1995		1990	2014
DUM96	Dummy 1996		1990	2014
DUM97	Dummy 1997		1990	2014
DUM98	Dummy 1998		1990	2014
DUM99	Dummy 1999		1990	2014
ELE_D.P	Electricity Domestic Price	RM/kWh	1990	2014
ELE_D.P_TMP	ELE_D.P	RM/kWh	1990	2014
ELE_D_CHANGE	Electricity domestic price change rate	Reference=1	1990	2014
ELE_I.P	Electricity Industry Price	RM/kWh	1990	2014
ELE_I.P_TMP	ELE_I.P	RM/kWh	1990	2014
ELE_I_CHANGE	Electricity industry price change rate	Reference=1	1990	2014
EXC	Real Exports	million ringgit	1990	2014
EXC.N	Nominal Exports	million ringgit	1990	2014
EXC.N_COAL	Nominal Export - Coal	million ringgit	1990	2014
EXC.N_GAS	Nominal Export - Gas	million ringgit	1990	2014
EXC.N_OIL	Nominal Export - Oil	million ringgit	1990	2014
EXC.N_OTH	Nominal Export - Others	million ringgit	1990	2014
EXC.P	Deflator Exports	CY2010=1	1990	2014

Variables	Contents	Unit	Data available	
EXC.P_COAL	Deflator Export - Coal	CY2010=1	1990	2014
EXC.P_GAS	Deflator Export - Gas	CY2010=1	1990	2014
EXC.P_OIL	Deflator Export - Oil	CY2010=1	1990	2014
EXC.P_OTH	Deflator Export - Others	CY2010=1	1990	2014
EXC_COAL	Real Export - Coal	million ringgit	1990	2014
EXC_GAS	Real Export - Gas	million ringgit	1990	2014
EXC_OIL	Real Export - Oil	million ringgit	1990	2014
EXC_OTH	Real Export - Others	million ringgit	1990	2014
EXR	Foreign Exchange Rate	RM/USD	1990	2014
GASO.P	Gasoline Price	RM/Litre	1990	2014
GASO.P_TMP	GASO.P	RM/Litre	1990	2014
GASO_CHANGE	Gasoline price change rate	Reference=1	1990	2014
GDP	Real GDP	million ringgit	1990	2014
GDP.N	Nominal GDP	million ringgit	1990	2014
GDP.P	Deflator GDP	CY2010=1	1990	2014
GDP_GAP	GDP/GDP_PTL		1990	2014
GDP_PTL	EXP(.891909+.608065*LOG(K)+(1-.608065)*LOG(LF)	million ringgit	1990	2014
GOV.EXPD	Govt Expenditure	million ringgit	1990	2014
GOV.REVN	Govt Revenue	million ringgit	1990	2014
GOV.REVN_REF	Govt revenue in reference	mil. RM	1990	2014
GOV_SWITCH	1=fiscal neutrality from reference, 0=none		1990	2014
GST.R	GST rate	%	1990	2014
ICG.N_TEMP	IG.N+CG.N	million ringgit	1990	2014
IG	Real Govt Investment	million ringgit	1990	2014
IG.N	Nominal Govt Investment	million ringgit	1990	2014
IG.N_TEMP	IG.N	million ringgit	1990	2014
IG.P	Deflator Govt Investment	CY2010=1	1990	2014
IG.P_REF	IG.P	million ringgit	1990	2014
IG_SWITCH	1= subsidy switching to IG, 0= none		1990	2014
INTLR	Interest Rate	%	1990	2014
IP	Real Private Investment	million ringgit	1990	2014
IP.N	Nominal Private Investment	million ringgit	1990	2014
IP.P	Deflator Private Investment	CY2010=1	1990	2014
IPG	Real Investment	million ringgit	1990	2014
IPG.N	Nominal Investment	million ringgit	1990	2014
IPG.P	Deflator Investment	CY2010=1	1990	2014
JP	Real Inventory Investment	million ringgit	1990	2014
JP.N	Nominal Inventory Investment	million ringgit	1990	2014
JP.P	Deflator Inventory Investment	CY2010=1	1990	2014
K	Real Gross Capital Stock	million ringgit	1990	2014

Variables	Contents	Unit	Data available	
L	Employment	thousand	1990	2014
LF	Labour Force	thousand	1990	2014
LW.N	Compensation of employees	million RM	1990	2014
MC	Real Imports	million ringgit	1990	2014
MC.N	Nominal Imports	million ringgit	1990	2014
MC.N_COAL	Nominal Import - Coal	million ringgit	1990	2014
MC.N_GAS	Nominal Import - Gas	million ringgit	1990	2014
MC.N_OIL	Nominal Import - Oil	million ringgit	1990	2014
MC.N_OTH	Nominal Import - Others	million ringgit	1990	2014
MC.P	Deflator Imports	CY2010=1	1990	2014
MC.P_COAL	Deflator Import - Coal	CY2010=1	1990	2014
MC.P_GAS	Deflator Import - Gas	CY2010=1	1990	2014
MC.P_OIL	Deflator Import - Oil	CY2010=1	1990	2014
MC.P_OTH	Deflator Import - Others	CY2010=1	1990	2014
MC_COAL	Real Import - Coal	million ringgit	1990	2014
MC_GAS	Real Import - Gas	million ringgit	1990	2014
MC_OIL	Real Import - Oil	million ringgit	1990	2014
MC_OTH	Real Import - Others	million ringgit	1990	2014
NGEX	Export Gas	ktoe	1990	2014
NGIM	Import Gas	ktoe	1990	2014
NGPD	Primary Demand Gas	ktoe	1990	2014
NGPD_CHANGE	Gas demand Change Rate	Reference=1	1990	2014
NGPD_TMP	NGPD	ktoe	1990	2014
NGPR	Production Gas	ktoe	1990	2014
NGSD	Statistics Difference Gas	ktoe	1990	2014
NON_TAX	Govt Revenue - Non-Tax	million ringgit	1990	2014
PCOAL	International Coal Price	$/t	1990	2014
PCOALM	Import Coal Price	RM/toe	1990	2014
PGAS	International Gas Price	$/MMBTU	1990	2014
PGASM	Import Gas Price	RM/toe	1990	2014
POIL	International Oil Price	$/bbl	1990	2014
POILM	Import Oil Price	RM/toe	1990	2014
POP	Population	thousand	1990	2014
R	YC.N/K	%	1990	2014
SUB_CG_SHARE	subsidy switching share of CG	%	1990	2014
SUB_CHANGE	Subsidy Change from reference	million ringgit	1990	2014
SUBSIDY_FUEL	Subsidy for Fuel	million ringgit	1990	2014
SUBSIDY_OTH	Subsidy for Others	million ringgit	1990	2014
SUBSIDY_TTL	Subsidy Total	million ringgit	1990	2014
TAX	Govt Revenue - Tax	million ringgit	1990	2014

Variables	Contents	Unit	Data available	
TFP_ACTUAL	EXP(LOG(GDP)-(.608065*LOG(K*0.9)+(1-.608065)*L		1990	2014
TIME	Time Trend	1990=0	1990	2014
U	Unemployment	thousand	1990	2014
URATE	Unemployment Rate	%	1990	2014
W	LW.N/L*1000	ringgit	1990	2014
WLD_GDP	Real World GDP	Mil. US$	1990	2014
WLD_GDP.N	Nominal World GDP	Mil. US$	1990	2014
WLD_GDP.P	Deflator World GDP	2005=100	1990	2014
WPI	Wholesale Price Index	CY2010=100	1990	2014
WPI_ENE	WPI Energy	CY2010=100	1990	2014
WPI_OTH	WPI Others	CY2010=100	1990	2014
YC.N	Business income	million ringgit	1990	2014
YD	(GDP.N-TAX+SUBSIDY_TTL)/CP.P	million ringgit	1990	2014
YD.N	GDP.N-TAX+SUBSIDY_TTL	million ringgit	1990	2014