Sectoral Responses, Macroeconomic Impact and Household Welfare: GST Policy for Malaysia Economy

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ABSTRACT

Goods and services tax (GST) has been a controversial topic in Malaysia when it was first implemented. This study examines the impact of the GST on the Malaysian economy from three major perspectives. First, it investigates the consequent changes in sectoral responses, including output and prices for 15 main sectors. Second, the study presents the results of GST impact on seven macroeconomic variables, namely, consumption, investment, government revenue, government expenditure, export, import, and gross domestic product. Third, the results of household welfare are discussed. A computable general equilibrium model is utilized to simulate GST impact on the Malaysian economy, and a simple comparative static model is performed. The results prove that the higher the GST rate, the higher is the impact on each sector. The sectors most affected by GST are communication and ICT, and the electricity and gas sectors. By contrast, agriculture, forestry and logging, and the petroleum and natural gas sectors are the least affected. Consumption and investment receive the largest negative effect, whereas government revenue and expenditure show the largest positive effect. The study likewise finds that by lowering GST rate, the welfare loss was minimized and the higher-income groups were affected more than the lower-income groups.

Keywords: Computable General Equilibrium. Goods and services tax. Malaysia.

INTRODUCTION

After the announcement of the GST implementation was made in the 2014 budget, the research on this subject became very prominent. The Royal Malaysian Customs Department noted that of the Association of South-East Asian Nations (ASEAN) member countries, only Myanmar and Brunei do not implement GST. Malaysia implemented Sales and Services Tax (SST) from the 1970s up to March 2015 before it was replaced by GST. Observing and evaluating other studies are important to the current work to identify some of the issues, problems, and implications experienced by other. Research on the subject is necessary for policymakers in Malaysia to obtain beneficial information and minimize the expected negative impact that may occur.

The motivations for considering the implementation of GST were to (1) broaden the country's revenue base, and (2) overcome the inherent weaknesses in the SST system, which has a limited scope (The Performance Management and Delivery Unit, 2012, p. 279; Saira, Zariyawati, & Yoke-May, 2010; Singh, 2014; Tan, 2012). Imposing GST would, at least, be a relevant reform because the revenues would be spent by the government, especially to solve some of the budget deficit problems facing by Malaysia. Another reason for implementing GST was to address the estimated 30 percent shadow economy in Malaysia. Informal workers,

such as part-time workers and roadside vendors, can contribute to the widened tax base. The shadow economy represents considerable potential revenue for the government because they would have registered their businesses (Faizulnudin, 2012; Siti Halimah, 2014; Tan, 2012; Wan, 2013). In this manner, GST was introduced not only to raise revenues but also to improve the efficiency of the tax system.

Studies on the impact of GST on the Malaysian economy are limited because this tax reform is new to the country. The government and some independent institutions conducted studies and conferences to explain the rationale of GST and its implementation in Malaysia; however, those studies were not published. Those studies were conducted by the Ministry of Finance and the Royal Malaysian Customs Department. The Malaysian government's study only reported on the impact of GST on tax incidence, businesses, GDP, price level, foreign direct investment, export, and revenue of the tourism sector (Faizulnudin, 2012; Tan, 2012; Tholasy, 2012). With the exception of the government's study, studies relating to the Malaysian GST are scarce. For instance, most studies focused on exploring the level of awareness among consumers and producers with respect to the implementation of GST (Mohd Rizal and Mohd Adha, 2011; Saira et al., 2010; Amanuddin et al., 2014). One study was also related to the concept and mechanism of GST (Nor Hafizah and Azleen, 2013). In addition, GST impact studies were performed by Lau et al. (2013), but only one study has been conducted on the incidence of GST in Malaysia (Lim and Ooi, 2013). This study attempts to address overall impact of the GST on economic consequences such as the effect on output and prices, consumption, investment, government revenue, government expenditure, export, import, gross domestic product and household welfare. In short, this study aim to provide answer to the question on the impact of goods and services tax (GST) on the Malaysian economy.

According to Economic Planning Unit (2013), Malaysia had a persistent fiscal deficit from 1988 to 2013, with an average of 2.93 percent of GDP. The 2013 deficit was the highest in Asia after Japan at 9.3 percent and India at 7.1 percent (International Monetary Fund, 2014). Consequently, in July 2013, the Fitch Ratings lowered its perspective on Malaysia from strong to negative. They cited public finances as the country's key record fatigue (Bond and Hughes, 2013).

In 2013, the inflation rate in Malaysia was 3.0 percent, which was lower than the rate in Indonesia at 8.5 percent and in Laos at 7.0 percent (Tan, 2012). However, in 2014, the inflation rate increased to 3.4 percent. The increment was largely related to the increase in fuel prices in the second half of 2014 (Tholasy, 2012). Accordingly, in 2013, Malaysia experienced a slower economic growth of 4.7 percent compared with that of other countries in the ASEAN region. Indonesia and the Philippines grew at 5.8 and 7.2 percent, respectively. Therefore, Malaysia is clearly in need of economic reforms to achieve strong economic fundamentals, raise the level of its economy, and ensure long-term sustainable economic growth. The most suitable reform to promote growth is by implementing changes to the taxation structure, such as by implementing GST.

Gordon and Nielsen (1997) indicated that the dependency on direct taxes would be traded off by any increase in the indirect tax. The reasons behind this outcome are as follows: (i) Indirect taxes are most recommended because they offer a wider aim. Governments could improve their objective of collecting additional revenue from indirect taxes because they cover the entire population, unlike direct taxes, which merely concentrate on fixed income earners. (ii) The switch to indirect taxes could widen the base and minimize the burden on employment. This result is especially vital for countries facing an aging population (Bond and Hughes, 2013). In fact, direct taxes contributed 56.4 percent to Malaysia's tax revenue in 2012 compared to indirect taxes, which was only 17.2 percent. The global trend and pattern over the last few decades were to reform and transform all the tax structures into a wider and more comprehensive tax base.

In 2012 and 2013, an average of 1.75 million people paid their income taxes from among the 11.4 million total labor force in Malaysia (Lee, 2012). This figure represents 15.8 percent of the total labor force in Malaysia who are qualified as taxpayers. However, the number is small because about 50 percent of the labor force in Malaysia earn a monthly income below RM3,000 (Department of Statistics, 2012a). A study by the

Inland Revenue Board (IRB) of Malaysia (2013) revealed that people who earn a monthly income of less than RM3,000 do not have to pay income tax, therefore they are considered to be in the lower-income bracket[1]. Although the lower-income group is not required to pay income tax, they contribute to the tax revenue through SST, which was estimated at about RM71 per month (Tholasy, 2012). Therefore, if GST is implemented, they will pay almost the same amount of tax as the SST they pay for. The belief is that the imposition of GST will have different effects on different income groups. To date, studies conducted on the impact of GST on household welfare are few. GST impact studies were performed by Lau et al. (2013), but only one study has been conducted on the incidence of GST in Malaysia (Lim and Ooi, 2013).

Given the shortage of literature on GST and its impact on Malaysia, filling this gap is an urgent concern. This study tries to address all the issues mentioned above. Therefore, this study sets out to determine and analyse the impact of GST in Malaysia on the following three major issues. The specific questions can be demonstrated as follows: (i) What are the sectoral responses to GST?; (ii) What are the responses of macroeconomic variables to the implementation of GST?; and (iii) What is the impact of GST on households welfare?.

The next section of the paper discusses the data and model specification. Section 3 reports the findings and discussion. Finally, Section 4 presents the conclusions and policy implications.

DATA AND MODEL SPECIFICATION

Description of the Empirical Model

The empirical approach used in this study is a CGE model developed by Robinson et al. (1990) that has been used to analyze the impact of trade policy. The model comprises a set of nonlinear equations to be satisfied simultaneously with different orders of degrees. The production is assumed to have constant returns to scale, which means the increment of production will use the same cost amount. The model is static and can be applied to a small open economy.

The basic assumptions of the CGE model are roughly based on standard microeconomic assumptions. Data should be consistent with the equilibrium conditions, such as demands should be equal to supplies, which mean that all production must be consumed, and the profits are zero with revenues equal to costs. In addition, factor markets must be the same as the factor endowment. The factors of production, labor and capital, are assumed to be getting similar average wage or rental income, irrespective of sectors. There are no different skills among labor because all have similar skill levels.

The model used two factor inputs, labor and capital, and four agents in the economy: households, firms, governments, and the rest of the world. It includes three types of households classified according to income level: higher income, middle income, and lower income. Each household has a choice for different consumption goods. Firms are categorized into 15 sectors, which produce a certain number of products. From 124 groups of industries in the 2010 Malaysian Input-Output table, this study condensed it to 15 sectors.

Consumers try to maximize their utility while producers attempt to maximize profit, subject to budget allocation, production technology, and cost constraints. The market demand and supply achieve equilibrium with flexible price adjustments. The market is assumed to be a small open economy that does not have any impact on the rest of the world.

Optimizing the behaviors of the consumers, producers, and the government is simulated, and all transactions in the circular flow of income are captured. Producers minimize the costs subject to a production function by applying constant elasticity of substitution (CES) in the function. It shows that all local products used domestically and imported goods are imperfectly substituted. In CGE literature, this is known as the

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[1] Author justification based on households per capita income in Malaysia (Department of Statistics, 2012b).

"Armington assumption." Another assumption is the constant elasticity of transformation (CET). It represents the total sectoral output, which is supplied to the export and domestic markets.

Production. In this model, the economy consists of 15 production sectors, and the commodities produced are consumed by households and the government. Composite goods produced in each sector can be transformed into exported goods or commodities sold in a domestic market. Each production activity is assumed to combine the primary factors, labor and capital, in a constant return to scale using the Cobb-Douglas production function to produce the final product. Total production of domestic output X_i is given as follows:

$$X_i = AK_i^{\beta} L_i^{1-\beta} \ldots\ldots\ldots\ldots..Equation\ 1$$

Prices. The price system in the model is rich, mainly due to the assumed quality differences among commodities of different origins and destinations, including imports, exports, and domestic outputs used domestically. Market demand and supply achieve equilibrium with flexible price adjustments. Therefore, import price is exogenously taken in the model. Based on Robinson, Yu´nez-Naude, Hinojosa-Ojeda, Lewis, and Devarajan (1999), the domestic prices of imports (PM_i) are determined by world prices of import (pwm), exchange rate (EXR), and import tariff (t^m).

$$PM_i = pwm_i\ (1 + t_i^m)EXR \ldots\ldots\ldots\ldots..Equation\ 2$$

On the export side, the country's export demand function is downward sloping, so the world prices of export (*pwe)* are endogenous. Equation 7 shows that domestic prices of exports (PE_i) are determined by world prices of export (*pwe)*, exchange rate (*EXR*), and export subsidy (*t^e*).

$$PE_i = pwe_i\ (1 + t_i^e)EXR \ldots\ldots\ldots\ldots..Equation\ 3$$

Price of Composite Goods for Commodities Q. Q represents the constant elasticity of substitution (CES) aggregation of sectoral imports (M) and domestic goods supplied to the domestic market (D). The price of composite goods for commodities Q can be derived as in Equation 4.

$$PQ_i = \frac{PD_i.D_i + PM_i.M_i}{Q_i} \ldots\ldots\ldots\ldots..Equation\ 4$$

where $PQ_{i,}$ PD_i, and PM_i denote the price of composite goods for commodities Q, the price of domestic output, and the price of imported product for sector *i,* respectively; while Q_i, D_i, are M_i are the quantities produced by them.

Price of Composite Goods for Commodities X. X is total sectoral output, which is a constant elasticity of transformation (CET) aggregation of goods supplied to the export market (E) and goods sold to the domestic market (*D*). The price of the composite goods for commodities *X* can be derived as in Equation 5.

$$PX_i = \frac{PD_i.D_i + PE_i.E_i}{X_i} \ldots\ldots\ldots\ldots..Equation\ 5$$

where PX_i, PD_i, and PE_i denote the price of composite goods for commodities X, the price of domestic output, and the price exported product for sector i, respectively; while X_i, D_i, and E_i are the quantities produced by them.

Aggregate Price Index is defined in the GDP deflator as nominal GDP ($GDPVA$) divided by real GDP ($RGDP$).

$$PINDEX = \frac{GDPVA}{RGDP} \ldots\ldots\ldots\ldots\ldots..Equation\ 6$$

The GDP deflator is an index that provides the numeraire price level against all relative prices in the model. The CGE model's core can only determine relative price, therefore the numeraire is necessary.

Household expenditure functions are derived from a linear expenditure system (LES) demand function. It is determined using fixed expenditure shares as described in Equation 7.

$$QH_{ch} = \frac{\beta_{ch} \cdot (1 - mps_h) \cdot (1 - ty_h) \cdot YH_h}{PQ_c} \ldots\ldots\ldots\ldots..Equation\ 7$$

Where QH_{ch} is a household consumption; PQ_c is a price of composite goods; β_{ch} is expenditure shares; and mps_h, yh_h, and ty_h denote household savings rate, income, and income tax rate, respectively.

Household savings is derived from the marginal propensity to save (mps) out of the after-tax income as in Equation 8. mps and the company savings rate ($csav$) are computed from the 2010 Malaysia SAM. The corporate savings formula is shown in Equation 9.

$$HHSAV = \sum_h YH_h \cdot \left(1 - \tau_h^h\right) \cdot mps_h \ldots\ldots\ldots\ldots..Equation\ 8$$

$$CORSAV = YCOMP \cdot (1 - ctax) \cdot csav \ldots\ldots\ldots\ldots.Equation\ 9$$

$$SAVINGS = HHSAV + CORSAV + GOVSAV + FSAV \cdot CUREXR \ldots\ldots\ldots\ldots.Equation\ 10$$

The total savings ($SAVINGS$) is derived from equation 8 and 9. Equation10 is the sum of household savings ($HHSAV$), corporate savings ($CORSAV$), government savings ($GOVSAV$), and foreign savings ($FSAV \cdot CUREXR$).

Government revenue (GR) is drawn from two sources, direct taxes and indirect taxes. The function is shown in Equation 11.

$$GR = hhtax + cortax + pettax + tariff + gsttax + exptax \ldots\ldots\ldots\ldots.Equation\ 11$$

Direct taxes consist of three types of taxes collected by the government, namely, household income tax ($hhtax$), corporate tax ($cortax$), and petroleum tax ($pettax$), while indirect taxes include tariff ($tariff$), goods and services taxes ($gsttax$), and export tax ($exptax$). We assume excise duties do not significantly

contribute to government revenue because it contributed to the lower portion of total indirect tax revenue. In this model, total government spending equals government revenue (GR) from different types of taxation.

For the *composite commodity markets,* product market equilibrium is defined in Equation 12, which states that the sectoral supply of composite commodities must equal demand.

$$Q_i = INTM_i + CD_i + GD_i + CD_i + ID_i + STK_i \ldots\ldots\ldots\ldots..Equation\ 12$$

The sectoral prices and quantities are equilibrating variables. Although there is an equivalent sectoral market-clearing condition for output sold in the domestic market (D), it is redundant because it is implicit in the clearing of composite goods markets (Q_i) and the assumption of a constant ratio of imports to domestic goods applies across all categories of demand (Robinson et al., 1999).

Factor market equilibrium is given by Equation 13. In the equilibrium, total factor supply equals demand.

$$\sum_i FDSC_{if} = FS_f \ldots\ldots\ldots\ldots..Equation\ 13$$

The supplies of labor and capital are mobile in the long run. In this model, capital stocks are exogenously fixed to reflect its rigidities in short-run allocation. In the long-run closure, mobility in all factors is assumed.

Current account balance. The current account balance (expressed in terms of foreign currency) indicates the country's expenditure to the rest of the world and must be equal to the country's income in foreign currency. This means spending for imports and factor income outflows must equal to income from exports and factor income inflows (foreign saving, $FSAV$). For the basic version of the model, $FSAV$ is fixed and the real exchange rate (EXR) plays the role of balancing variable in the current account, as in Equation 14.

$$pwm_{im}.M_{im} = pwe_{ie}.E_{ie} + FSAV \quad \ldots\ldots..Equation\ 14$$

Government budget balance. Government savings are expressed as total government receipts less the purchases of goods and services and the interest payments ($INTERS$) for the government's debt.

$$GOVSAV = GR - \sum_i PQ_i.GD_i - EXR.INTERS_{br} - INTERS_{comp} + GOVTRN \ldots\ldots\ldots\ldots..Equation\ 15$$

In *savings-investment balance,* out of the four savings' variables, only government savings is endogenously determined.

$$SAVING = INVEST \ldots\ldots\ldots\ldots..Equation\ 16$$

The model is savings-driven, in which the aggregate investment is determined by aggregate savings. This is commonly referred to as the neoclassical closure in CGE literature.

Sources of Data Collection

Data are obtained from various sources, such as Malaysian Input-Output Table for 2010, Malaysian HIS for 2012, HES for 2009, Bank Negara Statistics for 2010, Balance of Payment for 2010, Labor Force Survey for 2010, and National Accounts for 2010. The data were combined to form a consistent benchmark dataset. The 2010 input-output table consists of 124 x 124 activities - commodities. From 124 industries listed in the table, the economy is aggregated into 15 sectors. The sectors and their range of component are shown in Table 1.

Table 1: Aggregated Sectors in the Model

No	Aggregated Sectors	Categorized Sectors
1	Agriculture, Forestry and Logging	1-12
2	Crude Oil, Natural Gas and Mining	13-16
3	Food and Beverage	17-29
4	Textile and Leather	30-35
5	Petroleum Refinery	44
6	Chemical and Rubber	45-55
7	Cement, Glass and Ceramic	56-59
8	Iron, Steel and Metal	60-64
9	Wood, Machinery and Other Manufacturing	36-43 & 65-85
10	Electricity and Gas	86
11	Wholesale, Accommodation and Restaurants	87-95
12	Transportation and Operation Services	96-101
13	Communication and ICT	102-106
14	Banking, Financial and Insurance	107-110
15	Education, Health and Other Services	111-124

Source: Author's aggregation

Social Accounting Matrix

It is widely used as base data for calibration. Although the Economic Planning Unit (EPU) constructed the 2005 SAM for the Malaysian economy, the database was not officially published. Therefore, the author used an alternative database, the 2010 input-output table, to construct the SAM. In the SAM construction, the 2010 input-output table is employed and the data are compiled from many sources as needed. However, given that the data of the input-output table are insufficient for the construction, other data are required, such as national accounts, government accounts, household income and expenditure, and balance of payment.

To construct the SAM, other data such as value added, labor, and capital income should be calculated as well. Value added is the total value added from each sector of the economy. It is calculated based on the 2010 input-output data. Labor income is calculated from the total compensation of employees in the input-output table. Capital income is generated from operating surplus in the same source of input-output table. Table 2 reports the data for value added, labor, and capital income.

Table 2: Value Added, Labor, and Capital Income (RM Million)

Sectors	Value Added	Labor Income	Capital Income
Agricultural, Forestry, and Logging	37041.040	13908.680	61992.630
Crude Oil, Natural Gas, and Mining	12079.540	4906.893	81471.460
Food Processing	141006.900	6934.224	15896.730
Textiles and Leather Industries	5504.906	1319.901	3265.925
Petroleum Refinery	59555.370	2871.626	20006.490
Chemicals and Rubber Processing	72633.590	6592.928	16361.290
Cement, Lime and Plaster, Clay and Ceramic	15633.950	1591.650	3223.042
Iron and Steel Products	29735.550	3830.037	8849.907
Manufacturing	111699.500	29211.610	64166.630
Electricity and Gas	53914.180	17908.500	25007.470
Wholesale and Retail Trade	95320.100	41951.820	92081.410
Land, Water, Air, and Other Transport Services	37403.250	6659.984	17663.750
Communication	43965.570	7414.071	24294.620
Financial Institution and Insurance	57676.720	22261.650	37798.190
Other Services	89058.940	92973.740	62527.250

Source: Author's Calculation

Government consumption, investment, export, and import by sector are generated based on the 2010 input-output table. Government consumption, export, and import are accounted directly from the corresponding input-output table data. However, the total investment by sector is estimated by adding up the gross fixed capital formation (GFCF) and the change in inventories. Some of the investment value is negative because of the negative value of the inventory, which is greater than the GFCF. The results of these calculations are reported in Table 3.

Table 3: Government Consumption, Investment, Export, and Import (RM Million)

Sectors	Government Consumption	Investment	Export	Import
Agricultural, Forestry, and Logging	0.000	3856.866	16317.753	11033.420
Crude Oil, Natural Gas, and Mining	0.000	-399.722	41854.083	6295.654
Food Processing	0.000	4944.719	66533.872	19164.265
Textiles and Leather Industries	0.000	-1487.449	6211.250	3314.076
Petroleum Refinery	0.000	-112.496	43764.654	21943.129
Chemicals and Rubber Processing	0.000	3103.385	59825.300	36437.844
Cement, Lime and Plaster, Clay and Ceramic	0.000	125.400	3853.579	4626.087
Iron and Steel Products	0.000	2894.359	23775.737	26620.026
Manufacturing	0.000	18608.817	276037.889	165475.133
Electricity and Gas	0.000	55756.664	6878.653	20564.515
Wholesale and Retail Trade	0.000	13436.553	53903.153	32755.546
Land, Water, Air, and Other Transport Services	0.000	1028.627	21897.481	13574.613
Communication	0.000	-1.502	10444.482	9692.982
Financial Institution and Insurance	0.000	0.000	8757.985	3495.675
Other Services	101379.562	7702.997	15579.784	25156.134

Source: Author's Calculation

Data on savings, companies, and government transfer are also gathered. Data on household savings are obtained as a residual of total receipts minus consumption and taxes. Table 4 reports the data on households, firms, and government savings. Furthermore, transfer from companies to households mainly serves as a link between factor income accruing to capital and institutions. Therefore, it has been estimated from total companies transfer to households. The shares of companies and government transfers to household income are calculated based on the income shares of 65, 25, and 10 percent of higher-, middle-, and lower-income groups, respectively. Details can be referred to Table 6. Therefore, the data on savings, companies, and government transfer are adopted in the 2010 SAM to obtain consistent data in the SAM. Table 4 shows the results of these estimations.

Table 0: Calculation of Dataset for Households, Firms, and Government (RM Million)

Agents		Savings	Company Transfer	Government Transfer
Household	Higher	2937.918	109232.700	8499.135
	Middle	1129.968	42012.580	3268.898
	Low	451.987	16805.030	1307.559
Firm		117171.500	-	-
Government		9683.846	-	-

Source: Author's Calculation

On the basis of the corresponding data calculated above, all the data are combined to form a consistent benchmark dataset included in a SAM.

Calibration of Parameters

Calibration is performed to estimate the related coefficient parameters or benchmark data if data are lacking in order to standardize the parameters used in the calibration technique. The accurate estimation of the model parameters is crucial to ensure consistent results. Other than endogenous and exogenous variables in the equations, there are also parameters that are treated as constants. Many parameters, such as tax rates, are estimated using only the information contained in the benchmark data. These parameters cannot be calculated from SAM data. For some parameters, such as elasticity of substitution, they can either be estimated using benchmark data or gathered directly from previous empirical studies.

The exponents of Armington and CET functions used in this model are based on the elasticities of Armington and CET functions employed by Al-Amin et al. (2008). The elasticities of substitution for the Armington function (σ_i^c) and the CET function (σ_i^t) are reported in Table 5.

Table 5: Elasticities for the Armington and CET Functions

Sectors	σ_i^c	σ_i^t
Agricultural, Forestry, and Logging	0.9	0.6
Crude Oil, Natural Gas, and Mining	0.9	0.9
Food Processing	1.2	1.2
Textiles and Leather Industries	0.7	0.7
Petroleum Refinery	0.6	0.6
Chemicals and Rubber Processing	0.7	0.7

Cement, Lime and Plaster, Clay and Ceramic	0.7	0.7
Iron and Steel Products	0.7	0.7
Manufacturing	0.7	0.5
Electricity and Gas	0.9	0.5
Wholesale and Retail Trade	0.5	0.5
Land, Water, Air, and Other Transport Services	0.5	0.5
Communication	0.5	0.5
Financial Institution and Insurance	0.7	0.5
Other Services	0.5	0.5

Source: Al-Amin (2008)

The remaining parameter (i.e., share parameter of a CES production function) is estimated using a combination of data. Specifically, all the shift and share parameters for the CES and CET functions are calculated using the benchmark values. The calibration procedure assumes that the economy is in equilibrium. This assumption is established by a benchmark dataset that represents equilibrium for an economy so that the model is solved from equilibrium data for its parameter values (Shoven and Whalley, 1992).

The data on *household consumption* are disaggregated into three types of households, namely, higher-, middle-, and lower-income groups. The shares of each group are based on the consumption shares of 48, 36, and 16 percent, comprising the higher-, middle-, and lower-income groups, respectively. Details are presented in Table 6.

Table 6: Range of the Three Income Groups

Income Group	Range of Income (RM)	Consumption Share (%)
Higher Income	Above 7,000	48
Middle Income	3,000–6,999	36
Lower Income	Below 3,000	16

Source: Author's definition

The definition of household income groups is based on the household income of the "top 20," "middle 40," and "bottom 40" of total households in Malaysia. The definition of household income level is also referred to in Table 1.5 in the Household Income Survey (HIS) 2012[2].

Data for Goods and Services Tax

This study assumes that all 15 sectors in the economy are taxable products. Although the government stipulated that basic goods and essential items are zero-rated from GST and that public transportation, healthcare, and education are exempt from GST, this study assumes all the products will be paid for by the GST. This assumption simplifies the analysis, which involves many industries and sectors. Some of the zero-rated and exempt items are not listed in the same sector as the author categorized. To avoid making a mistake in selecting and calculating the data, the author generalized all the sectors as taxable items for the GST imposed. Equations 17 to 21 derived the formula for calculating taxable output and the GST revenue, following Ignacio (2002).

$$Total\ output + Import = \ Supply - Export = \ Domestic\ Consumption - Exemption = Taxable\ Outpu \ldots \ldots Equation\ 17$$

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[2] Percentage distribution of households and income share by monthly income class, ethnic group, and strata in Malaysia in 2012.

$$Stocks\ outside\ GST\ base = \frac{Change\ in\ stocks}{Supply * Taxable\ Output}\ \ldots\ldots\ldots Equation\ 18$$

$$Taxable\ Base\ less\ Inventories = Taxable\ Output - Stocks\ outside\ GST\ base$$
$$\ldots\ldots\ldots Equation\ 19$$

$$Taxable\ Supply = Taxable\ Base\ less\ Inventories - Marginal\ Firms$$
$$\ldots\ldots\ldots Equation\ 20$$

$$GST\ revenue = \frac{Taxable\ Supply}{1.04} * 0.04 \ldots\ldots\ldots Equation\ 21$$

The GST revenue figures for the 15 sectors are calculated based on the formula taken from Equations 17 to 21. In the beginning, the author removed the effect of tax from the base data. In this case, the effect of SST is deducted from domestic consumption. Hence, the GST effect is added to the amount of taxable output. For Equation 21, to calculate the GST revenue, the GST rate of 4 percent is levied on the taxable supply for each sector. For instance, the GST rate is assumed to be imposed at 4 percent (using Simulation 1 in this study). Therefore, the taxable supply must be divided by 1.04 and multiplied by 0.04 to obtain the amount of GST revenue for each sector.

For data analysis, the General Algebraic Modeling System (GAMS) software is used as main instrument to analyze the objectives of the study. The present study examines the impact of GST on the Malaysian economy on the basis of three simulations: Simulation 1, Simulation 2, and Simulation 3, imposed at 4, 6, and 8 percent by GST rate, respectively.

Findings and Discussions

This section will discuss the findings based on the three objective in this paper. For first objective, the impact of GST would be seen through the sectoral production and prices. *Sectoral production* measures in terms of growth value of the production. It is reported in term of percentage as the base year is 2010. The resulting impact of GST on production is presented in Figure 1.
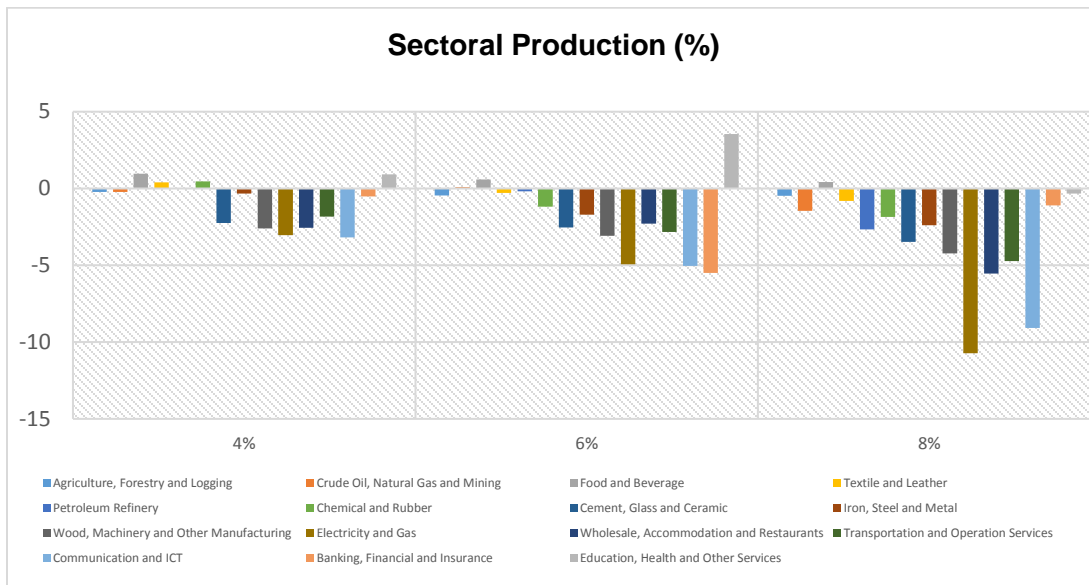
Figure 1: Sectoral Production (%)

Source: Simulation Result Calculated from Original Model of Various Data

Figure 1 presents the changes of sectoral production in terms of the three simulations. For Simulation 1, when GST was fixed at 4 percent, only five sectors, namely, food and beverage; textile and leather; petroleum refinery; chemical and rubber; and education, health, and other services, were positively related to the imposition of GST. This result contradicts consumption tax theory, which states that when tax is levied, the cost of production will increase. As a result, the supply curve will shift leftward and the quantity of supply will decline. The analysis suggests that at 4 percent GST rate, these five sectors can absorb the hike in production cost. By contrast, the remaining 10 sectors were negatively affected by GST. The most affected sector was communication and ICT at a rate of 3.18 percent. This sector is heavily dependent on technologies and innovations. Its products are costly as input, and other resources used are not cheap. Therefore, the 4 percent GST rate reduced the communication and ICT production.

The largest negative effect of the GST was in banking, financial, and insurance at 5.5 percent. Production in this sector is in high demand, and the sector supports value-added activities in the financial market. GST is charged on transaction fees, annual credit card fees, and general insurance. The huge drop in production of the banking, financial, and insurance sector was an indirect GST effect. The 2014 Economic Report found that the performance of the life insurance business was considerably slower than before. The total loan applications contracted were at 1.9 percent, while the approved loans were reduced to 2.4 percent in 2014 (Ministry of Finance, 2014a, p. 70). This outcome was partly due to the macro-prudential measures taken to control household debt. According to consumption tax theory, the imposition of indirect tax will cause the producer to reduce supply. As a result, price will increase. This will, in turn, lead to an increase in household debt whenever people want to hold more money to purchase as many real goods or services as they used to prior to tax imposition.

Sectoral prices are measured in terms of the percentage changes of the price of domestic output. The percentage is calculated by a change from the base year in 2010. The effects of GST on sectoral prices are reported in Figure 2. All 15 sectors generally had an increase in sectoral prices after the GST was implemented in Malaysia. The sectoral prices are positively related to the GST. The increment in sectoral prices is supported by the study conducted by the Malaysian Ministry of Finance in 2013. The ministry's

finding shows that prices increased to around 1.8 percent with GST implementation on the basis of 944 items in the CPI basket (Faizulnudin, 2012).
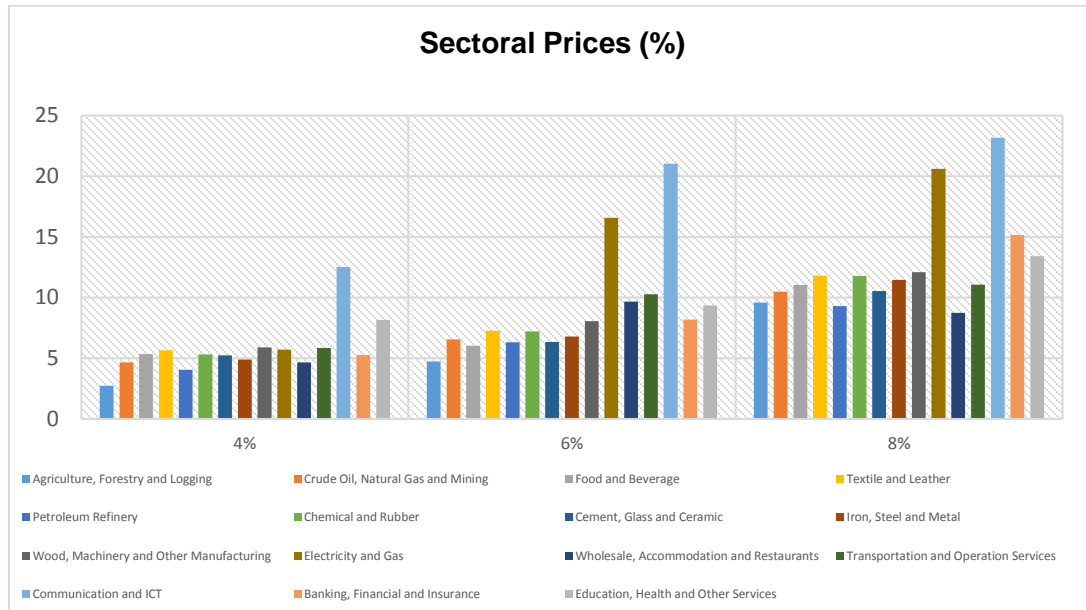

Figure 2: Sectoral Prices (%)

Source: Simulation Result Calculated from Original Model of Various Data

In short, sectoral price gradually increases as GST rate increases. Some sectors are affected less, while some are affected more. This finding is supported by Narayanan (1991); Narayan (2003); Pike et al. (2009); Smart and Bird (2009); Renata and Sabina (2010); and Christandl et al. (2011), all of whom stated that when tax is charged, the price of the product increases. The results also seem consistent with consumption tax theory. However, in one case, namely, wholesale, accommodation, and restaurants, as GST rate increased at 8 percent, the prices slightly declined. This finding is in line with Siti Halimah (2014) and Wan (2013), who stated that the introduction of GST at 6 percent resulted in increased prices for certain products and reduced prices in others.

For the second objective, we examine the impact of GST on macroeconomic variables. Figure 3 indicates the results of seven significant variables will be examined, namely, consumption, investment, government revenue, government expenditure, export, import, and GDP.
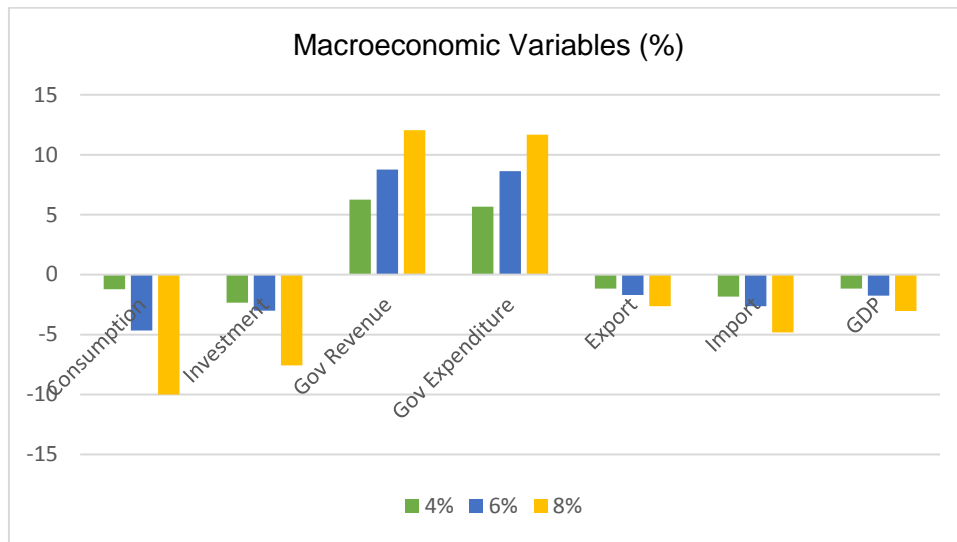
Figure 3: Macroeconomic Variables (%)

Source: Simulation Result Calculated from Original Model of Various Data

Figure 3 demonstrates the macroeconomic variables in three simulations. Two variables, government revenue and government expenditure, have a positive impact from all three simulations. Government expenditure trends show a similarity to revenue trends. However, expenditure was maintained at a lower rate than revenue. The trend of the impact increases from Simulation 1 to Simulation 3. However, the majority of other variables are adversely affected by GST imposition. In general, consumption was the most negatively affected followed by investment. The remaining three variables, namely, export, import, and GDP, were less affected by GST for all the cases.

The third objective is the impact of GST on household welfare. The households are divided into three groups: lower-, middle-, and higher-income groups. Equivalent variation is calculated for each household to indicate the welfare gains or losses affected by GST as shown in Figure 4.
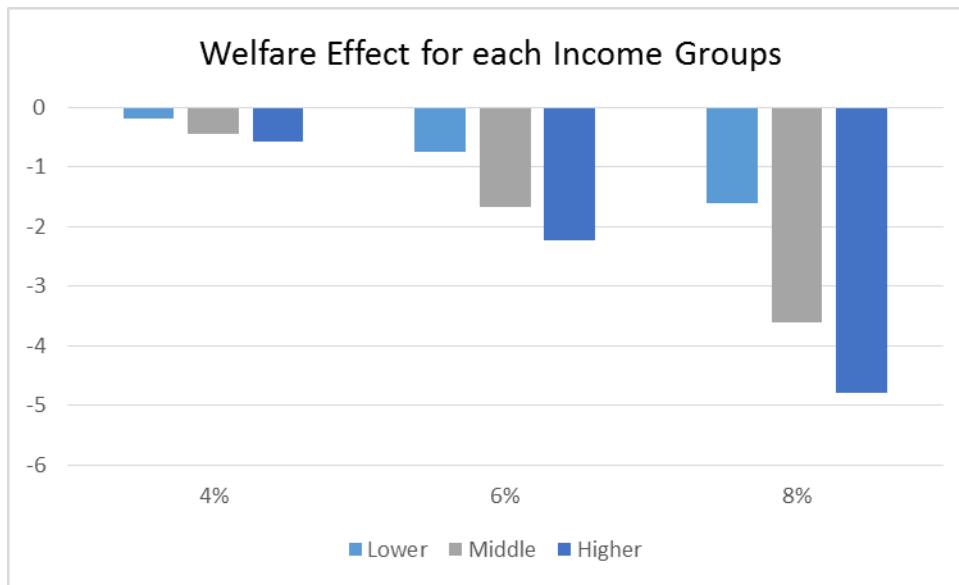
Figure 4: Percentages of Welfare Effect (%)

Source: Simulation Result Calculated from Original Model of Various Data

Figure 4 shows that the changes in percentages of welfare loss continuously increased for all income groups from all simulations. The lower the GST rate, the less the welfare loss, while the higher the GST rate, the greater the welfare loss. The decline in household welfare has been proven in the second objective – which shown GST imposition negatively affected private consumption. The increase in GST rate decreased consumption expenditure. Hence, household welfare decreased when the consumption declined. In 2015, the cost of living slightly increased, which might have been the effect of the first year of GST introduction. This outcome is also due to inflation, which averaged at 4 percent in 2015. The escalating cost of living and staggered nominal wages have explicitly affected income inequality in Malaysia.

Furthermore, higher-income groups were more affected by GST than lower-income groups. Thus, GST is somehow a type of progressive tax. Progressive tax in the case of Malaysia is based on three factors. The first is government intervention in controlling the price of some necessity goods. The second is the direct cash-assistance package, such as the Bantuan Rakyat 1 Malaysia (BRIM), which helps reduce the cost of living for lower-income and some middle-income groups. However, BRIM only provides temporary relief and is not ideal for the long-term. The third is the increased spending of the middle- and higher-income groups, thus leading to more taxes being paid. Overall, the GST implementation decreased the households' welfare in Malaysia.

CONCLUSIONS AND POLICY IMPLICATIONS

This paper examines the impact of GST on the Malaysian economy. The CGE model is utilized to simulate the GST impact. For the first objective, GST negatively affected the sectoral production yet positively affected sectoral prices for the entire economic sector. GST reduced sectoral production while leading to an increase in sectoral prices. Generally, the higher the GST rate introduced, the greater the impact on each

sector. The effect can be observed in ascending order, with the highest impact of GST occurring in Simulation 3, followed by Simulation 2, and finally Simulation 1.

The sectors most affected by GST were communication and ICT and electricity and gas. These two sectors are important for any emerging economy. GST may affect the growth of technology, which is the basis of a knowledge-based economy and industrial revolution. On the contrary, the least affected sectors were agriculture, forestry, and logging and petroleum and natural gas. Both sectors are included in primary sectors, which are the backbone for the country's economic prosperity and development. Therefore, the minimal effect of GST on these sectors is a good indication for policy makers to compose a good plan for the country. Authorities can easily realize which sector the GST will contribute more revenue to and when the sector will achieve their objective.

For the second objective, most of the factors were adversely affected by GST. GST is inversely related to consumption, investment, export, import, and GDP, and the most affected was consumption. Households adjusted their spending when GST was first implemented. The rise in prices normally caused households to spend less for the product, in line with theory of consumer behavior. However, government revenues and expenditures were positively related. GST implementation broadened the sources of revenue. For example, the number of registered companies has increased. The country was also benefitted when the hike in government collection compensated for the fall in other economic variables. Furthermore, the government would utilize GST revenue to increase expenditure by operating and developing expenditure for the welfare of the public and to spur the economy. The least affected factors were exports and imports. For the first few months of GST implementation, both export and import contracted to some extent. In addition, a total reduction in imported goods was due to the fall in purchasing power shown by the decline in consumption expenditure.

Third, the rise in GST rates likewise led to a rise in welfare losses. When GST rate is high, households pay more and the loss is greater compared to a low GST rate. Hence, GST in Malaysia is progressive, which is good for both the government and the public because the government can collect more money from high-income earners. The collected revenue can be invested for the benefit of the public, which can increase their welfare especially for lower-income groups.

The results of this study provide some insightful information to the authorities. The introduction of GST not only aimed to increase revenue but to improve the efficiency of the tax system as well. GST has succeeded in broadening the country's revenue base and tax compliance because the number of registered companies has increased. The businesses which were considered under the shadow economy have now contributed to the tax collection.

The increase in government revenue can be one of the vibrant advantages for the country. It could counterbalance the adverse effects from GST. With the budget surpluses, money may be invested to promote export-oriented industries, particularly for E&E products. The authorities may also use the money to stimulate import-substitution industries, especially in the manufacturing sector. Therefore, GST may induce money to come in to the country, and the country will not be greatly affected from the global changes and the depreciation of the ringgit.

With a high GST collection, the government can improve the national education and health sectors, both of which are primary indicators of economic development. Enhancing the quality for both sectors and providing fundamental need and public amenities will provide a better future for the society. Similarly, the authorities will be able to facilitate them to ensure stability, environmental care, security, and energy challenges. This effect, in turn, will improve the welfare of society and help achieve fiscal sustainability and economy growth.

The government could also impose an appropriate tax rate to the society. GST would be a useful complement to the economy when it is charged at a minimum rate. Primarily, a charge of at least 6 percent is a reasonable initial rate. If the rate is high or fluctuates, the impact on the economy will worsen. In addition, the lower the GST rate is imposed in the economy, the lower the welfare. Therefore, the recommendation is to have GST

imposed at a lower rate, which should remain unchanged for at least five years. For example, the Singaporean government has gained public acceptance and stability in its revenue collection after keeping its rate constant at 3 percent for almost nine years.

Policymakers should pursue policies promoting price stability in conjunction with tax reform. GST has affected household consumption through inflationary pressures. If the government can restrict inflation to a certain extent, it could support the lower- and middle-income earners. As inflation decreases, relative income increases. Subsequently, their consumption ability will increase, which in turn would benefit them and promote the economy. At the same time, the richest groups will also increase their demand and they will pay for more taxes as their spending increases. Accordingly, this outcome will support the national economy and increase the GDP in general.

Importantly, the economy will grow if the government spends the revenues wisely. Governments at all levels should be aware of the consequences for households in facing such policy shifts. The expenditure must be targeted to the necessities without any discrimination, particularly to the poor. Prudent and productive use of the revenue may be redistributed in the best way to the right persons. The authorities should place GST revenue as a benchmark to measure government spending, so that it will manage its expenditure and reduce its deficit budget.

REFERENCES

Al-Amin, A. Q., Abdul Hamid, J. & Chamhuri, S., (2008). A Computable General Equilibrium Approach To Trade And Environmental Modelling In The Malaysian Economy. MPRA Paper 8772. University Library of Munich, Germany.

Amanuddin, S., Muhammad Ishfaq, M. R., Afifah, A. H., Nur Fatin, Z., & Nurul Farhana, M. F. (2014). Educators' Awareness and Acceptance Towards Goods and Services Tax (GST) Implementation in Malaysia: A Study in Bandar Muadzam Shah, Pahang. International Journal of Business, Economics and Law, 4(1).

Bond, T., & Hughes, C. (2013). A-level Economics Challenging Drill Solutions: Yellowreef Limited.

Christandl, F., Fetchenhauer, D., & Hoelzl, E. (2011). Price Perception and Confirmation Bias in the Context of a VAT Increase. Journal of Economic Psychology, 32(1), 131-141.

Department of Statistics. (2012a). Findings of the Household Income Survey (HIS) 2012. Kuala Lumpur: Jabatan Perangkaan Malaysia.

Department of Statistics. (2012b). Mean Monthly Household Income by Strata, Malaysia, 2009 & 2012. Findings of the Household Income Survey (HIS) 2012. Kuala Lumpur: Jabatan Perangkaan Malaysia.

Economic Planning Unit. (2013). Table 6 - Gini Coefficient by Ethnicity, Strata and State, Malaysia, 1970-2012. Retrieved from http://www.epu.gov.my/en/household-income-poverty.

Faizulnudin, H. (2012). Implikasi GST Kepada Pengguna. Paper Presented at the Persidangan GST 2012 'Cukai Barang & Perkhidmatan' Reformasi & Transformasi Cukai, Johor Bahru.

Ignacio, L. L. (2002). A General Equilibrium Analysis of Value-Added Tax Reforms in the Philippines. (Doctoral Dissertation, The George Washington University, Columbia).

International Monetary Fund. (2014). Asia and Pacific - Sustaining the Momentum: Vigilance and Reforms. Regional Economic Outlook. World Economic and Financial Surveys.

Gordon, R. H., & Nielsen, S. B. (1997). Tax Evasion in an Open Economy. Value-added vs. Income Taxation. Journal of Public Economics, 66(2), 173-197.

Lau, Z. Z., Tam, J., & Heng-Contaxis, J. (2013). The Introduction of Goods and Services Tax in Malaysia: A Policy Analysis CPPS Policy Paper Series (pp. 29).

Lee, W. L. (2012). Income Tax Cut Expected to Pave Way for GST. Retrieved from http://www.themalaysianinsider.com/malaysia/article/income-tax-cut-expected-to-pave-way-for-gst-say-experts/.

Lim, K.-H., & Ooi, P. Q. (2013, October). Implementing Goods and Services Tax in Malaysia. 1-51. Retrieved from http://www.penanginstitute.org/gst/.

Ministry of Finance. (2014a). Economic Report 2014/2015. Economic Performance and Prospects: Ministry of Finance Malaysia. Retreived from http://www.treasury.gov.my/

Mohd Rizal, P. & Mohd Adha, I. (2011). The Impact of Goods and Services Tax (GST) on Middle Income Earners in Malaysia. World Review of Business Research, 1(3), 192-206.

Narayan, P. K. (2003). The Macroeconomic Impact of the IMF Recommended VAT Policy for the Fiji Economy: Evidence from a CGE Model. Review of Urban & Regional Development Studies, 15(3), 226-236.

Narayanan, S. (1991). The Value Added Tax In Malaysia: The Rationale, Design & Issues (1st ed.). Malaysia: Institute of Strategic and International Studies (ISIS) Malaysia.

Nor Hafizah, A. M., & Azleen, I. (2013). Goods and Services Tax (GST): A New Tax Reform in Malaysia. International Journal of Economics Business and Management Studies, 2(1), 12-19.

Pike, R., Lewis, M., & Turner, D. (2009). Impact of VAT Reduction on the Consumer Price Indices. The Labour Gazette, 3(8), 17-21.

Renata, D., & Sabina, H. (2010). Impact of Value Added Tax on Tourism. International Business & Economics Research Journal (IBER), 9(10).

Robinson, S., Kilkenny, M., & Hanson, K. (1990). The USDA/ERS Computable General Equilibrium (CGE) Model of The United States. Staff Report-Economic Research Service, United States Department of Agriculture(AGES 9049).

Robinson, S., Yu´nez-Naude, A., Hinojosa-Ojeda, R. u., Lewis, J. D., & Devarajan, S. (1999). From Stylized To Applied Models: Building Multisector CGE Models for Policy Analysis. North American Journal of Economics and Finance 10 5–38.

Saira, K., Zariyawati, M. A., & Yoke-May, L. (2010). An Exploratory Study of Goods and Services Tax Awareness in Malaysia. Political Managements and Policies in Malaysia, 265-276.

Shoven, J. B., & Whalley, J. (1992). Applying General Equilibrium. Cambridge University Press.

Singh, V. (2014). Are Consumption Taxes Really More Efficient and Resilient? In S. Wong, S. Teoh & T. K. Ramnath (Eds.), The ISIS National Forum on Malaysia's Goods and Services Tax (GST): Possible Lessons from the United Kingdom and Singapore (Vol. PP 5054/11/2012 (031098), pp. 16). Kuala Lumpur: Institute of Strategic and International Studies, Malaysia.

Siti Halimah, I. (2014). The Malaysian GST Model. Paper presented at the International Seminar on GST at Sasana Kijang, Kuala Lumpur.

Smart, M., & Bird, R. M. (2009). The Economic Incidence of Replacing a Retail Sales Tax with a Value-Added Tax: Evidence from Canadian Experience. Canadian Public Policy, 35(1), 85-97.

Tan, S. K. (2012). Rasional Pelaksanaan GST. Paper presented at the Persidangan GST 2012 'Cukai Barang & Perkhidmatan' Reformasi & Transformasi Cukai, Johor Bahru.

The Performance Management and Delivery Unit (Pemandu) (2012). Economic Transformation Programme Annual Report 2012. Kuala Lumpur: Prime Minister's Department.

Tholasy, S. (2012). Masalah dan Kesan GST Ke Atas Ekonomi Negara. Paper presented at the Persidangan GST 2012 'Cukai Barang & Perkhidmatan' Reformasi & Transformasi Cukai, Johor Bahru.

Wan, L. W. (2013). Mekanisme Pelaksanaan GST. Paper presented at Pasca Bajet Negara, INTAN Kampus Utama Bukit Kiara, Kuala Lumpur.