Export Analysis of Major Commodities in Malaysia

N A Ismail¹, B A Talib², A Mokhtar³
¹Faculty of Plantation and Agrotechnology, Universiti Teknologi MARA, Cawangan Melaka, Kampus Jasin, 77300 Merlimau, Melaka, Malaysia
²,³Faculty of Economics and Management, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia

Corresponding author’s e-mail address: amalina1520@melaka.uitm.edu.my

Abstract. This study aims to investigate the factors associated with the commodity export demand and to explore and quantify the contribution of the commodity export to economic growth. The technique of (VECM) Vector Error Correction is applied to estimate the export and economic growth model. It tests whether there has been a long-run relationship between commodity export volume and exogenous variables such as own price, substitute price, exchange rate, world population and industrial production index. The results indicated that there is a long run relationship among variables. The result suggests that exchange rate have a negative impact to the palm oil, rubber and tin where depreciation may reduce export of these commodities. The findings of the research also show that the commodities export has mixed effect on economic growth in Malaysia. Export of petroleum, palm oil and sawlog has a positive and significant relationship with economic growth in the long run while only petroleum and palm oil contributed to the economic growth in the short run. The evidence of impulse response function shows that exchange rate and FDI shock have a relatively higher significant impact on all exports of major commodities and economic growth respectively. This study implies that export of major commodities in Malaysia should be treated as an engine of growth. The effective management of exchange rate and export promotion policies can play a significant role in increasing commodity exports thus will improve Malaysia economic growth.

Keywords: Major Commodities, Export, Economic Growth, Vector Error Correction Model

1. Introduction
The export of major commodity in Malaysia plays one of the important roles to lead the domestic economy. However, an export commodity in Malaysia is caught in price instability and international interdependence. Moreover, the contribution of major commodity export earnings to total export revenue and GDP continues to decline. These issues are widely discussed by the industrial players and those directly and indirectly involved in the industries.

In the case of palm oil, it depends on the consumption pattern of the major markets; thus, any changes in consumption from these countries will affect the price of palm oil. During the first nine months of 2013, the average price of CPO had declined to RM 2332 per tonne. This was due to the reduction in external demand, unfavourable weather condition and increased production of oil and fats by major producing countries. These factors have led to the replacement of palm oil with other types of oil such as soybean, rapeseed and sunflower seed in the world market [1].

In addition, the rubber’s price was also subjected to the world’s market, and the surplus in supply has discouraged this industry for a long time. This sector’s return to investment is influenced by the
unremunerated price. Since the second half of 2012, Malaysia’s smallholders had reduced their tapping activities following to the drop in the natural rubber price. This had forced them to find other alternative sources of income [1]. In 2013, the export volume of rubber had contracted 4.1% due to the weakening in demand, particularly from China and the US. The lower export price which averaged at RM 6.87 per kg in 2013 resulted in the decline of rubber earnings to RM 3 billion [2].

Major commodity was also heavily influenced by the uncertainty of the world market. Several notorious issues had surfaced as a result of the diminishing value of ringgit against the currencies of the nation’s major partners. For example, when a price is quoted in US dollar, it would depend on the exchange rate. Therefore, if ringgit depreciates, the market price of commodity quoted in foreign currency would fall and encourage greater foreign demand for the commodity. However, according to [3] due to depreciation in Malaysia’s currency, the high demand for natural rubber will lead to an increase in its price in the long term.

In addition, the economic slowdown of certain developed countries, especially in Europe, North America and Japan significantly affect Malaysia’s economy. Malaysia’s commodities remained to be at the mercy of the world’s economy, and certain commodity exports are subject to this development.

Moreover, the country’s major commodities also face competition from other commodities. As for rubber, Malaysia has to compete with Thailand and Indonesia which are relatively lower cost producers. Additionally, in view that synthetic rubber is a substitute for natural rubber the manufacturers are more inclined to utilise the cheaper material to maintain their competitiveness [3]. The palm oil is also facing stiff competition not only from other countries but also from other types of edible oil such as soybean, rapeseed, sunflower and corn [4]. This situation is even more unfavourable during bumper harvest.

Lastly, the contribution of major commodities to the country’s export earnings and the gross domestic product was also declining. In 2014, the sector’s contribution went down to only 10.2 per cent, signifying the growing importance of manufactured products as opposed to the commodity-based [5]. Moreover, weak global demand and excess supply of palm oil, rubber and petroleum also contributed to the decline. Although in 2010 the major commodities’ export earnings share to GDP increased to 11.7 per cent due to firmed prices and favourable external demand, the sector’s share declined from 16.7 per cent in 2010 to 13.4 per cent in 2014 due to economic factors.

The general objective of this study is to analyse the exports and their contribution towards GDP growth. The study focuses on these major commodities due to their importance to GDP, total employment and foreign exchange earnings.

2. Methodology

2.1 Sources of Data
The data used for this study covers from the year 1980 to 2014 were gathered from the Economic Report of Ministry of Finance Malaysia (MIF), Department of Statistic Malaysia (DOS), Malaysia Palm Oil Board (MPOB), Ministry of International Financial Statistics (IMF). Mineral Yearbook of US Geological Survey, Rubber Statistical Bulletin of International Rubber Study Group, United States Census Bureau and Federal Reserve Economic Data.

2.2 Export Demand Model
Theoretically, the number of exports demanded the given commodity be expected to be influenced by the price of exports, weighted average of the export prices of the country’s trading partner and weighted average of the real income of the country’s trading partner [6]. A new model has been developed based on previous research made by [7, 8, 9, 10, 11]. The export demand equation was shown below:

\[ \log Q_{XD} = \beta_0 + \beta_1 \log P_{Xt} + \beta_2 \log P_{St} + \beta_3 \log E_{Xt} + \beta_4 \log WP_t + \beta_5 \log IP_t + e \]  
(1)

where,

**Dependent variable:** \( \log Q_{XD} \): Quantity export demanded (‘000 tons)
Independent variable: \( \text{LOGXP} \): Price of export commodity (RM/ tons), \( \text{LOGPS} \): Real price of substitute (US$/ tons), \( \text{LOGX} \): Exchange rate (RM/ US$), \( \text{LOGWP} \): World population (million), \( \text{LOGIPI} \): Industrial production index (2012=100)

Initially, if the variables confirm the existence of cointegration, then the VECM is estimated. In this study, the VECM model is as follows:

\[
\Delta \text{LOGQXD}_t = \alpha_0 + \sum_{i=1}^{k} \alpha_{0i} \Delta \text{LOGQXD}_{t-i} + \sum_{i=1}^{k} \alpha_{1i} \Delta \text{LOGPX}_{t-i} + \sum_{i=1}^{k} \alpha_{2i} \Delta \text{LOGPS}_{t-i} + \sum_{i=1}^{k} \alpha_{3i} \Delta \text{LOGIPI}_{t-i} + \lambda_1 (\text{LOGQXD} - \text{LOGPX} - \text{LOGP} - \text{LOGEX} - \text{LOGWP} - \text{LOGIPI})_{t-1} + u_{it}
\]

where \( k \) is the number of lag, \( \Delta \) LOG represents the change in natural logarithm, \( \alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5 \) are the parameters of the independent variables, \( \lambda_1 (\text{LOGQXD} - \text{LOGPX} - \text{LOGP} - \text{LOGEX} - \text{LOGWP} - \text{LOGIPI}) \) \((t-1)\) known as error correction term and \( u_{it} \) is the stochastic error term. The optimum lags length \( k \) is chosen based on the minimum values of Akaike information criteria (AIC) and Schwarz information criteria (BIC).

2.3 Economic Growth Model

The economic growth function is assumed to depend on the export earnings of major commodities. A new model has been developed based on previous research made by [12, 13, 14]. The economic growth equation was shown below:

\[
\text{LOGRGDP}_t = \beta_0 + \beta_1 \text{LOGXEP}_t + \beta_2 \text{LOGXEO}_{t} + \beta_3 \text{LOGXER}_t + \beta_4 \text{XES}_t + \\
\beta_5 \text{XET}_t + \beta_6 \text{LOGFDI}_t + \beta_7 \text{LOGTL}_t + \beta_8 \text{WRGDP}_t + e
\]

where,

Dependent variable: \( \text{LOGRGDP} \): GDP growth Malaysia (%), Independent variable: \( \text{LOGXEP} \): Export earning of petroleum (RM million), \( \text{LOGXEO} \): Export earning of palm oil (RM million), \( \text{LOGXER} \): Export earning of natural rubber (RM million), \( \text{LOGXES} \): Export earning of sawlog (RM million), \( \text{LOGXET} \): Export earning of tin (RM million), Control variable: \( \text{LOGFDI} \): Foreign Direct Investment, \( \text{LOGTL} \): Total Labour Force, \( \text{LOGWRGDP} \): World GDP growth (%)

Initially, if the variables confirm the existence of cointegration, then the VECM is estimated. In this study, the VECM model is as follows:

\[
\Delta \text{LOGRDP}_t = \theta_0 + \sum_{i=1}^{k} \theta_{0i} \Delta \text{LOGRDP}_{t-i} + \sum_{i=1}^{k} \theta_{2i} \Delta \text{LOGXEP}_{t-i} + \sum_{i=1}^{k} \theta_{3i} \Delta \text{LOGXEO}_{t-i} + \sum_{i=1}^{k} \theta_{1i} \Delta \text{LOGXER}_{t-i} + \sum_{i=1}^{k} \theta_{4i} \Delta \text{LOGXES}_{t-i} + \sum_{i=1}^{k} \theta_{5i} \Delta \text{LOGXET}_{t-i} + \sum_{i=1}^{k} \theta_{6i} \Delta \text{LOGWRGDP}_{t-i} + \lambda_1 (\text{LOGRGDP} - \\
\theta - \text{LOGXEP} - \text{LOGXEO} - \text{LOGXER} - \text{LOGXES} - \text{LOGXET} - \text{LOGFDI} - \text{LOGTL} - \text{LOGWRGDP})_{t-1} + u_{it}
\]

where \( k \) is the number of lag, \( \Delta \) LOG represents the change in natural logarithm, \( \theta_1, \theta_2, \theta_3, \theta_4, \theta_5, \theta_6, \theta_7, \theta_8, \theta_9 \) are parameters of the independent variables, \( \lambda_1 (\text{LOGRGDP-O-LOGXEP-LOGXEO-LOGXER-LOGXES-LOGXET-LOGFDI-LOGTL-LOGWRGDP})_{t-1} \) known as error correction term, and \( u_{it} \) is the stochastic error term. The optimum lengths lag \( (k) \) is chosen based on the minimum values of Akaike information criteria (AIC) and Schwarz information criteria (BIC).

2.4 Empirical Analysis

From Table 1, the unit root testing of first difference data shows that all research variables have an ADF probability value either 5% or 1% significant level. This means that all research variables have stationary on the first difference so that the variables can be said to be integrated into degrees 1 or I (1). Thus, there exists the possibility that they share a long-run equilibrium relationship.

The choice of optimal lags for the VECM system is selected based on Akaike information criterion (AIC) and Schwarz information criterion (BIC) which is 1 for the model; petroleum, rubber, sawlog,
tin, economic growth and 2 for palm oil model. Diagnostic statistics reveal that the residual is generally well behaved and in particular free from autocorrelation and heteroskedasticity problem.

Table 1. Unit Root Test

| Variables   | Augmented Dickey-Fuller (t=1980-2014) | Variables   | Augmented Dickey-Fuller (t=1980-2014) |
|-------------|---------------------------------------|-------------|---------------------------------------|
|             | Level       | First Difference | Level       | First Difference |
| LOGQXDPO    | -3.8573*** | 9.4473***        | LOGRGDP    | -4.3013        |
| LOGXPOP     | -2.1362    | 5.4115***        | LOGXEP     | 1.9114         |
| LOGPOS      | -2.0368    | 4.1325***        | LOGXEP     | 3.8667**       |
| LOGQXDR     | -2.618     | 6.0465***        | LOGXER     | 2.659          |
| LOGRP       | -1.7703    | 3.0038**         | LOGXES     | 3.6616**       |
| LOGSRP      | -3.7634**  | 5.9782***        | LOGXET     | 0.7336         |
| LOGQXDS     | 3.6616**   | 5.8350***        | LOGFEDI    | -2.9536       |
| LOGSP       | 2.1512     | 2.9984**         | LOGTL      | -1.6258       |
| LOGSPW      | 1.4942     | 6.5148***        | LOGWRGD    | -5.8538       |
| LOGQXDT     | 2.7049     | 5.7450***        | LOGXP      | -1.017546     |
| LOGTP       | 1.9557     | 3.0049**         | LOGPP      | 3.4433        |
| LOGAP       | 5.1181***  | 3.9173**         | LOGLNGP    | 1.2525        |
| LOGEX       | 1.7855     | 6.3008***        | LOGEX      | 1.7721        |
| LOGWP       | 1.9341     | 5.7664***        | LOGWP      | 1.6337        |
| LOGIPI      | 1.7388     | 4.5072***        | LOGIPI     | 1.5101        |

Note: *** 1%, **5%, *10% level of significance

2.5 Multivariate Cointegration Tests

Given the common integrational properties of the export demand, the next stage in the analysis is to test for the presence of the cointegration the five separate models of the major export commodities and also one economic growth model. In this analysis, we employed the Johansen and Juselius (JJ) procedure of testing multiple cointegrating vectors. The JJ procedure is established on a unified framework of estimating and testing cointegrating relations within the VECM formulations. Next appropriate statistic is provided to test a hypothesis for the number of cointegrating vectors and also test any restrictions upon the coefficients of the vector. Table 2 provides the results from the cointegration test. Both the maximum eigenvalue and trace statistics indicate there exist at most a single cointegrating vector for the entire sample period since the null of $r = 0$ can be rejected at the 5% significant level. Given in the result is the presence of at least one cointegrating vector within each of the models.

Table 2. Johansen Cointegration Test Statistic

| $H_0$ | Petroleum | Palm Oil | Rubber |
|-------|-----------|----------|--------|
|       | Trace     | Max      | Trace  | Max   | Trace | Max   |
| $r = 0$ | 123.87*** | 58.52*** | 139.91*** | 67.64*** | 164.45*** | 84.69*** |
| $r = 1$ | 65.35     | 22.64    | 72.28* | 28.09 | 79.76* | 39.20*** |
| $r = 2$ | 42.71     | 16.67    | 44.19  | 18.27 | 40.6  | 17.45*** |
| $r = 3$ | 26.04     | 14.49    | 26.92  | 13.49 | 23.11 | 14.65 |
| $r = 4$ | 11.55     | 9.33     | 12.44  | 7.58  | 8.46  | 7.19 |
|        | Sawlog    | Max      | Trace  | Max   | Trace | Max   |
| $r = 0$ | 101.28*   | 48.07*** | 112.88*** | 54.19*** | 227.15** | 66.06*** |
| $r = 1$ | 53.21     | 19.12**** | 58.69 | 33.52*** | 161.08** | 46.35 |
Coefficient estimates and significance levels associated with the tests of zero loading restrictions appear in Table 3 for each export demand model. Based on petroleum export (LOGXDPO) result, in the long run, variables such exchange (LOGEX), world population (LOGWP) and industrial production index (LOGIPI) are not statistically significant. The significant exchange rate as one of the determinants of the foreign demand of petroleum is consistent with theory; if the Malaysia ringgit depreciates then it will raise the competitiveness of the domestic commodities thus encourages export [15]. However, the coefficient of the world population does not meet the expected sign. This is also in line with the research of to [16] as the populace of a country moves to urban area their energy consumption in the transportation sector will be reduced, thus will give impact to the energy export demand.

Meanwhile, the price of palm oil (LOGPOP) is not a significant factor which determines the world demand market for Malaysia’s palm oil market (LOGXDPO) but the exchange rate (LOGEX), price of soybean (LOGPOS) and industrial production index (LOGIPI) could explain the variation in palm oil export demand where they are significant at 1 per cent level. The result is parallel with the studies done by [8] that confirms the belief that soybean oil was indeed a substitute for palm oil. According to [17], the significant negative impact of exchange rate to palm oil export can be seen during the financial crisis 1997, whereas the consumer change in food preference and agriculture commodities which serve as an intermediate good only account a small percentage of the household expenditure which generally remained unchanged. Contrary with the theory, the world population has a negative relationship with quantity demand of palm oil export. This could be related to the decreased of palm oil consumption as a biofuel in the UK due to the policy changes such as Renewable Energy Directive (RED) and Greenhouse Gas Emission Target [28].

Variables such as synthetic rubber price (LOGSRP), exchange rate (LOGEX), world population (LOGWP) and industrial production index (LOGIPI) are significantly influenced rubber export in the long run (LOGXDR). Even though, the signs of the coefficient estimates on world population are positive as expected but negative for other variable. Support the findings that natural rubber and synthetic rubber have a complementary relationship [18]. As the currency of country depreciated, the rubber export volume will decrease due to the theory in demand of the agriculture product such rubber is inelastic [19]. Where it was found out that industrial production index and quantity demand for rubber export has a negative relationship because, as the import of rubber from Sri Lanka increased, India had reduced importing rubber from Malaysia [20].

Besides that, in the case of sawlog, all variables such sawlog price (LOGSP), exchange rate (LOGEX), world population (LOGWP) and industrial production index (LOGIPI) are theoretically significant in determining quantity demand of sawlog export (LOGDXT) except for sawwood price (LOGSWP). Based on argued that the sawlog price and export demand of sawlog are expected to inversely related ceteris paribus [7, 11]. Related found a positive relationship between exchange rate and sawlog export in Malaysia [21]. According to [22], population growth is one of the main factors that influence the demand for forestry product.

In addition, for tin, the price of tin, aluminum price and world population has the strong positive response to the export demand of tin and negative response of exchange rate to the world demand for tin. The studies which has done support this finding that exchange rate and tin has a negative relationship with quantity demand for tin export [7, 23].

Table 3. Summarised from Result of VEC for Export Demand Model

| Variables | Petroleum | Palm Oil | Rubber | Sawlog | Tin |
|-----------|-----------|----------|--------|--------|-----|
| LOGPP     | -0.07     | /        | /      | /      | /   |
Due to the unstable price of rubber and tin and also the closure of several mines in 1992, the employment added product and generated RM 47.9 billion total value added to the Malaysia economy [25]. Malaysia is one of the oil exporting countries that heavily depends on oil and gas as the source of GDP growth. According to [26], since 1985, Malaysia had reduced its dependence on rubber, and tin export to diversifying its source of income as fall in the export earning caused by declined in rubber and tin export price give negative impact to the overall Malaysian economy. Besides that, sawlog was one of the value-added product and generated RM 47.9 billion total value added to the Malaysia economy [26].

The control variable world economic growth (LOGWRGDP) has a positive significant whereas FDI (LOGFDI) and total labour force (LOGTL) has negative significant to Malaysia’s economic growth. Due to the unstable price of rubber and tin and also the closure of several mines in 1992, the employment opportunities were affected, thus give a negative impact to the Malaysia economy [25]. The finding that FDI has a negative relationship with GDP growth [27].

VECM conveniently combines the long run behaviour of the variables and their short run relations and thus can better reflect their relationships among variables. Table 4 shows the matrix coefficients of five different model. As can be seen, the resulting support for the export demand of commodity and the contribution of commodity export to economic growth in Malaysia as a short run process whereby all the independent variables shock has contributed to short-run shocks do not last then one year. Based on petroleum result, only exchange rate lag 1 is positively significant whereas variables at lag 1 such exchange rate, world population and industrial production index are significant in the short run. However, world population has a negative relationship while others two variables have a positive relationship with the quantity demanded of petroleum export. For the case of palm oil, variables such exchange rate at lag 1 and world population at lag 1 and lag 2 respectively have significant negative relationship with quantity demand of palm oil export. For the case of rubber, the results show that the world population and industrial production index in the previous year influencing quantity demand of rubber export in the short run. Besides that, only lagged coefficient of sawlog price is negatively significant with the quantity demand of sawlog export in the short run. In addition, for tin, the lagged coefficient of the exchange rate, world population and industrial production index are significant in the short run. Based on Table 5, the positive coefficient of one-year lag of petroleum and rubber is significantly different from zero. This means that in the more earnings from this, both type of commodity will lead to higher economic growth in the short term.

| Variable | Coefficient | T-Value | P-Value |
|----------|-------------|---------|---------|
| LOGLNLP  | 0.05        |         |         |
| LOGEX    | 1.17***     | -6.2*** | 0.68*** |
| LOGWP    | -0.68***    | -1.61***| 0.04*** |
| LOGIPI   | -1.2***     | 4.67*** | 29.82***|
| LOGPOP   | /           | -0.42   | /       |
| LOGPOS   | /           | /       | /       |
| LOGRP    | /           | 0.07    | /       |
| LOGSRP   | /           | 0.09*   | /       |
| LOGSP    | /           | /       | /       |
| LOGSWP   | /           | /       | /       |
| LOGTP    | /           | /       | /       |
| LOGAP    | /           | /       | /       |

Note: *** 1%, **5%, *10% level of significance

Given the presence of cointegration among the variables, it would be interesting how these five major commodities export will give impact to the economic growth in the long run. For the case of tin, the lagged coefficient of one-year lag exchange rate is positively significant whereas variables at lag 1 such tin price, world population and industrial production index are significant in the short run. However, world population has a negative relationship while others two variables have a positive relationship with the quantity demanded of petroleum export. For the case of palm oil, variables such exchange rate at lag 1 and world population at lag 1 and lag 2 respectively have significant negative relationship with quantity demand of palm oil export. For the case of rubber, the results show that the world population and industrial production index in the previous year influencing quantity demand of rubber export in the short run. Besides that, only lagged coefficient of sawlog price is negatively significant with the quantity demand of sawlog export in the short run. In addition, for tin, the lagged coefficient of the exchange rate, world population and industrial production index are significant in the short run. Based on Table 5, the positive coefficient of one-year lag of petroleum and rubber is significantly different from zero. This means that in the more earnings from this, both type of commodity will lead to higher economic growth in the short term.
Table 4. Matrix of Short-Run Coefficient for Export Demand

|        | ∆LOGXDPO | ∆LOGXDP | ∆LOGXDR | ∆LOGXSD | ∆LOGQXDT |
|--------|----------|---------|---------|---------|-----------|
| ECT    | -0.25    | -0.43   | -0.74   | -0.06   | -0.69     |
| ∆LOGXDP(1) | -0.32 |         |         |         |           |
| ∆LOGXDP(-2) | -0.11 |         |         |         |           |
| ∆LOGPOP(1)   | 0.05  |         |         |         |           |
| ∆LOGPOP(-2)   | 0.2   |         |         |         |           |
| ∆LOGPOS(1)    | 0.32  |         |         |         |           |
| ∆LOGPOS(-2)   | 0.35  |         |         |         |           |
| ∆LOGEX(-1)   | -1.14* | 0.69**  | -0.23   | 0.08    | -1.31***  |
| ∆LOGEX(-2)   | -0.34  |         |         |         |           |
| ∆LOGWPC(-2)  | -1.04* | 0.29*   | 0.73**  | -0.09   | 0.42**    |
| ∆LOGIPIC(-1) | 0.35  | 0.20    | -0.01***| -1.26   | -3.72**   |
| ∆LOGIPIC(-2) | 0.04  |         |         |         |           |
| ∆LOGDOPC(-1) | /     | 0.14    |         |         |           |
| ∆LOGPP(-1)   | /      | 0.11    |         |         |           |
| ∆LOGLNGP(-1) | /     | 0.14    |         |         |           |
| ∆LOGXDR(-1)  | /      | /       | -0.14***| /       |           |
| ∆LOGRP(-1)   | /      | /       | -0.02   | /       |           |
| ∆LOGSRP(-1)  | /      | /       | 0.01    | /       |           |
| ∆LOGXS(-1)   | /      | /       |         | 0.16*   | /         |
| ∆LOGSPC(-1)  | /      | /       |         | 1.06    | /         |
| ∆LOGSWP(-1)  | /      | /       |         | 0.08    | /         |
| ∆LOGDXT(-1)  | /      | /       |         |         | 0.42*     |
| ∆LOGTPC(-1)  | /      | /       |         | -0.32   | /         |
| ∆LOGAP(-1)   | /      | /       |         |         | -0.08     |

Note: *** 1%, **5%, *10% level of significance

Table 5. Matrix of Short Run Coefficient for Economic Growth

|        | ∆LOGRGDP(-1) | ∆LOGXEP(-1) | ∆LOGXEO(-1) | ∆LOGXER(-1) |
|--------|--------------|--------------|--------------|--------------|
| Coefficient | -0.812 | -0.1473 | 0.514** | 0.941 | 0.604*** |

|        | ∆LOGXES(-1) | ∆LOGXET(-1) | ∆LOGFDI(-1) | ∆LOGTL(-1) | ∆LOGWRGD(-1) |
|--------|--------------|--------------|-------------|------------|--------------|
| Coefficient | 0.271 | -0.584 | -0.429 | -0.31 | -0.018 |

Note: *** 1%, **5%, *10% level of significance

2.6 Impulse Response Analysis

To fully appreciate the fully impacts that innovation in a variable of interest on remaining variables, we stimulate the generalised impulse- response functions using a level VAR specification. We opt for the generalised impulse response function developed by Pesaran and Shin to circumvent the results sensitivity to the variables alternative ordering in the traditional Cholesky decomposition. Figure 1 presents the plots of the impulse response function for five different model of major commodities export demand.
Figure 1 (a) Impulse Response Function Petroleum

Figure 2 (b) Impulse Response Function Palm Oil

Figure 3 (c) Impulse Response Function Rubber
Figure 4 (d) Impulse Response Function Sawlog

Figure 5 (e) Impulse Response Function Tin
Figure 1 (a) shows in general petroleum’s export demand significantly responded to all research variable shocks. The shocks increase in the following period until year 5, and after that it becomes stable. In contrast, there are positive shocks of the exchange rate to petroleum export in the first two years, but it continues to be negative fluctuated in the next eight years.

Figure 1 (b) shows that the quantity demanded of palm oil export responses positively to palm oil price, soybean price, exchange rate and it last for ten years. One standard deviation shock in palm oil export results in a negative response by industrial production index and world population after year 3.

Figure 1 (c) shows in the 2nd and 3rd-year exchange rate and industrial production index gives a positive response to rubber export and follows by fluctuating movement in the rest period while rubber price tends to be stable over the entire horizons. However, rubber export directly influenced negatively by synthetic rubber price and world population by one standard deviation.

Figure 1 (d) shows the positive impact of sawlog export itself, sawnwood price, sawlog price exchange rate and industrial production index by a standard deviation to sawlog export, but all variables tend to be stable after five years. However, the world population gives a negative response to sawlog export.

In figure (e) there seems to be the positive response of the tin export itself, aluminium price, tin price even though at first three years aluminium price responds negatively to tin export demand. For the case of exchange rate and industrial price index, their responses to the tin export are first positive and then turn negative after 2nd and 1st year respectively.

Figure (f) shows the response for petroleum export earning, palm oil export earning, rubber export earning, sawlog export earning, tin export demand towards Malaysia’s economic growth is shown up and down movement and tend to balance after 6th year. However, FDI, economic growth and total labour respond positively fluctuated and become stable after the 8th year.
3. Conclusion
In this study, we employed VECM method to investigate the factors that influenced export demand of Malaysia’s major commodities and to find out if these commodities export play any role in stimulating Malaysia’s national income. Our result suggests that a long-run equilibrium relationship has existed for all five major export commodities and the economic growth model. Exchange rate, world population, and industrial production index influenced all exports of major commodities. All of them are also significantly influenced by their substitutes except for petroleum while only sawlog is have affected by its own price. Besides, it is evidence that major commodities export earning act as a stimulus to GDP growth in the long term. The respond of its own commodities export and price are positive whereas for other response variable, there are positive and negative effects existed when then impulse is major commodities export. FDI and total labour force give a positive impact when then impulse is economic growth. Thus Malaysian government should intensify efforts on the export of major commodities to generate revenue and foreign exchange needed to economy further. The improvement of simultaneous trade liberation and human capital policy will ensure increased investment by both local and foreign investor.

References
[1] Ministry of Finance Malaysia [MOF] 2013 Economic Report 2013/2014: 28-80
[2] Ministry of Finance Malaysia [MOF] 2014 Economic Report 2014/2015: 3/1-3/45
[3] Lembaga Getah Malaysia [LGM] 2014 Natural Rubber Market Review Malaysia Rubber Digest
[4] Mahfoor H, Mad Nasir S, and Ismail I L 2001 Challenges of Agribusiness: a Case for Malaysia’s Agriculture Management towards Strengthening Agriculture Development and Trade (pp. 388-400) Thailand: Chiang Mai University
[5] Ministry of Finance Malaysia [MOF] 2015 Economic Report 2015/2015: 2/1-2/13
[6] Goldstein M and Khan M S 1978 The Supply and Demand for Exports: A Simultaneous Approach Review of Economics and Statistics 60 275-289
[7] Mohamed Yusoff and Ahmad Zubaidi Baharumshah 1993 The Effects of Real Exchange Rate on the Demand for Exports ASEAN Economic Bulletin 9(3) 338-347
[8] Basri Abdul Talib and Zaimah Darawi 2002 An Economic Analysis of the Malaysian Palm Oil Market Oil Palm Industry Economic Journal 2(1) 19-27
[9] Nourah A R A 2005 Modelling and Forecasting the Demand for Crude Oil in Asian Countries. 25th USAEE/ IAEE North American Conference: Fueling the Future: Prices, Productivity, Policies and Phroepheis (pp. 1-36)
[10] Ambiyah A 2011 Determinants of Palm Oil Export: Price and Income Elasticity Estimation. Trends in Agricultural Economics 4(2) 52-57
[11] Abdul Rahim A S, Mohd Shahwahid H O, Mad Nasir S, and Awang Noor A G 2013 Market and Welfare Economic Impacts of Sustainable Forest Management Policy on Timber Market in Sarawak, Malaysia Middle-East Journal of Scientific Research 13(8) 972-982
[12] Narayan S 2000 The Relationship between Commodity Prices and Output/Exports Working Paper 2000/07
[13] Diana Suziliana Maruzeki 2006 Sumbangan Eksport Komoditi Terpilih Kepada Pertumbuhan Ekonomi Malaysia TSm07 PE D5 Fakulti Ekonomi dan Pengurusan Universiti Kebangsaan Malaysia
[14] Ojo E J, Awe L T, and Olufemi O J 2014 Agricultural Export and Economic Growth in Nigeria: A Multivariate Johansen Cointegration Analysis International Journal of Arts and Commerce, 3(3) 89-98
[15] Keong C C, Zulkornain Y, and Sen V L K 2005 Export-Led Growth Hypothesis in Malaysia: An Investigation Using Bound Test Sunway Academic Journal 2 13-22
[16] Polimeni J M, Mayumi K, Giampetro M, and Alcott B 2008 The Jevons Paradox and the Myth of Resource Efficiency Improvements Earthscan
[17] Noor Zahirah Mohd Sidek, Mohammed Yusoff, Gairuzazmi Ghani, and Jarita Duasa 2011
Malaysia’s Palm Oil Exports: Does Exchange Rate Overvaluation and Undervaluation matter?  
African Journal of Business Management 5(27) 11219-11230

[18] Sakarindr P 1979 *An Econometric Study of Thai Rubber in the World Rubber Market* Iowa State University

[19] Tulasombat S, Bunchapattanasakda C, and Ratanakomu S 2015 The Effect of Exchange Rates on Agricultural Goods for Export: A Case of Thailand *Information Management and Business Review* 7(1) 1-11

[20] Berendson B S M 1978 *Regional Models of Trade and Development* Interprint Ltd

[21] Deivani K 2000 *The Impact of the Recent Currency Crisis on Malaysia Export* University of Malaya, Malaysia

[22] Kanabahita C 2001 *Forestry Outlook Studies in Africa (FOSA)* Uganda Forestry Department, Ministry of Water, Lands and Environment, Kampala–Uganda

[23] Bojanic A N and Caudill S B 1992 The Demand for Bolivian Tin *Atlantic Economic Journal* 20(4) 8

[24] Mohd Azfanizam Abdul Rashid 2015 *Oil and the Economy-Measuring the Relationship*

[25] Taylor R J 2007 Technical Progress and Economic Growth an Empirical Case Study of Malaysia *Edward Elgar Publishing Limited*

[26] Noor Aini Z, Nor Hazmira M, and Ismariah A 2014 Assessment of rubberwood value added in Malaysia’s wooden furniture industry *International Journal of Economics and Management* 8(1) 1-9

[27] Jamal O, Yaghoob J, and Tamat S 2014 Economic Growth, Foreign Direct Investment, Macroeconomic Conditions and Sustainability in Malaysia *Applied Econometrics and International Development* 14(1) 214-223

[28] DEFRA 2013 *UK Consumption of Sustainable Palm Oil*