

IS THE EXPORT-LED GROWTH HYPOTHESIS VALID FOR MALAYSIA?

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Abstrak

Hipotesis export-led growth (ELGH) mengandaikan pertumbuhan eksport adalah salah satu penentu utama bagi pertumbuhan ekonomi. Tujuan kertas ini adalah untuk mengkaji kesahihan ELGH bagi Malaysia dengan menggunakan ujian cointegration dan ujian Granger Causality. Ujian cointegration digunakan untuk menguji perhubungan equilibrium jangka masa panjang, manakala ujian Granger Causality digunakan untuk menentu arah perhubungan jangka pendek dan jangka panjang. Pembolehubah yang digunakan dalam kajian ini adalah data tahunan bagi Keluaran Dalam Negeri Kasar pada harga malar, Eksport pada harga malar, Import pada harga malar dan kadar pertukaran mata wang untuk tempoh 1970 – 2011. Ujian cointegration membuktikan dalam jangka panjang eksport dan import pada harga malar mempunyai hubungan secara positif dengan pertumbuhan ekonomi, manakala kadar pertukaran mata wang berhubung secara negatif. Berdasarkan ujian Granger Causality, semua pembolehubah Granger cause dengan pertumbuhan ekonomi adalah signifikan pada paras 5 peratus dalam jangka pendek kecuali kadar pertukaran mata wang. Anggaran bagi error correction term adalah signifikan pada paras 5 peratus. Ini menunjukkan bahawa hipotesis eksport mempengaruhi pertumbuhan ekonomi adalah sah untuk jangka masa panjang. Ini menunjukkan bukti yang kukuh dalam menyokong ELGH bagi ekonomi Malaysia untuk jangka masa pendek dan panjang.

Kata kunci: Hipotesis eksport mempengaruhi pertumbuhan, Model VAR, Ujian cointegration, Ujian Granger Causality

Abstract

The export-led growth hypothesis (ELGH) postulates that export growth is one of the key determinants of economic growth. This paper aims to study the validity of ELGH for Malaysia through cointegration test and Granger Causality test. Cointegration test was used to examine long-run equilibrium relationship, while Granger Causality test was applied to determine the direction of relationship in the short-run and long-run. The variables used in this study were annual real Gross Domestic Product, real Exports, real Imports and exchange rate for the period 1970 to 2011. Cointegration test results proved that in the long-run real exports and imports have positive relationship with economic growth, while exchange rate showed negative impact on the economic growth. From the Granger Causality test, all the variables Granger cause economic growth is significant at 5 per cent level in the short-run, except exchange rate. The estimated error correction term is statistically significant at 5 per cent level of significance. There is evidence that the hypothesis of export-led growth is valid in the

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long-run. Thus, this provides strong evidence to support the ELGH in the Malaysian economy in both short-run and long-run.

Keywords: Export-led growth hypothesis, VAR model, Cointegration test, Granger Causality test

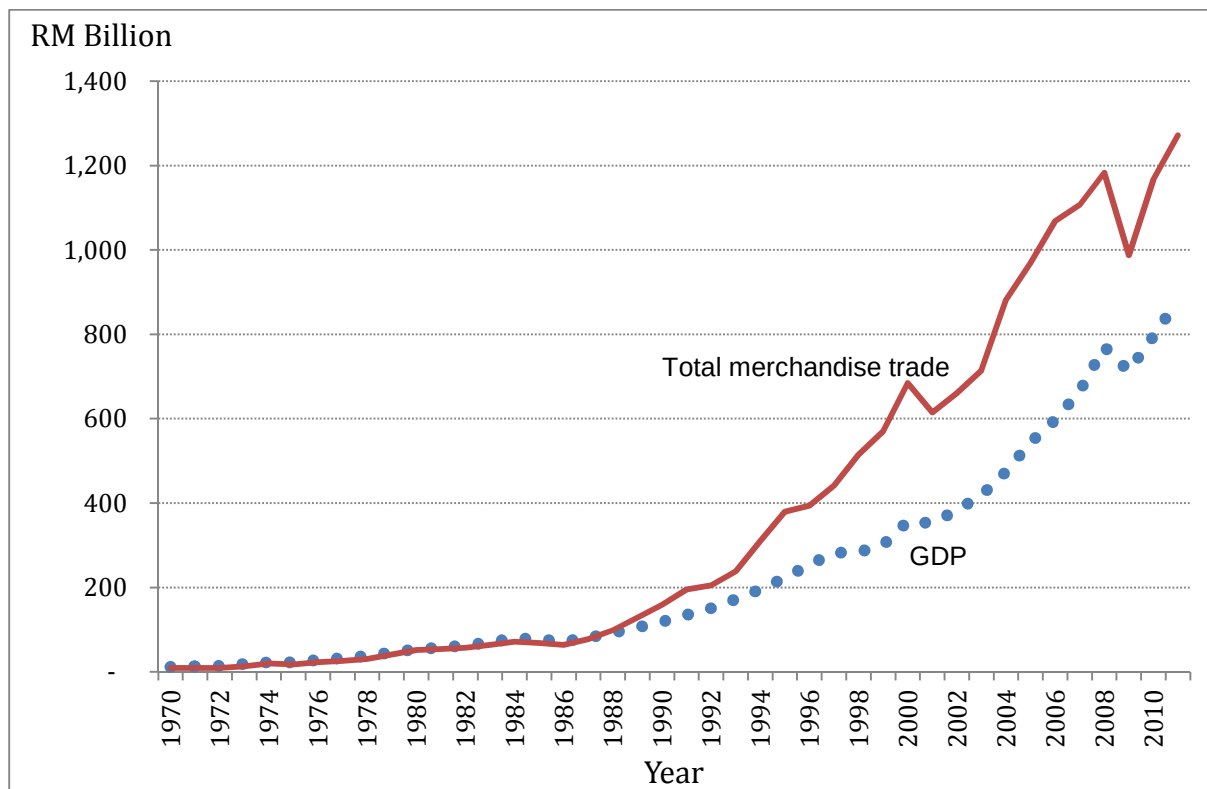
Introduction

Export-led growth hypothesis (ELGH) reflects the relationship between exports and economic growth, in particular, output growth is driven by exports. The ELGH implies that an increase in exports would lead to an increase in economic growth. One of the most debated issues in recent years is the question of whether strong economic performance is export-led or growth-driven. This question has important implications for policy formulations in determining the appropriate growth and development strategies and policies. The cointegration and Granger Causality test (Granger, 1969) were used for this study.

In 1968, Malaysia introduced the Investment Incentives Act and this Act of Parliament earmarked a new approach towards export-oriented strategy (Rokiah, 1997). Over the decades, Malaysia economy has undergone massive structural changes, from a country relying considerably on its natural resources vis-à-vis agricultural produce to a very much diversified economy. In 1978, primary commodities which consist of agricultural produce, tin and petroleum & gas contributed 77.0 per cent of total exports while the manufacturing sector contributed 21.0 per cent. By 1987, the contribution of primary commodities decreased to 47.0 per cent whereas the manufacturing exports increased to 45.0 per cent. In 2002, the contribution of the manufacturing sector surged to 73.0 per cent and the primary commodities accounted for 10.0 per cent of the total exports.

Malaysia is an open economy which is dependent on external trade to achieve its economic growth (Yusoff, 2005). External trade has been a catalyst in the development of the economy contributing significantly to the Gross Domestic Product (GDP). In 1971, the total merchandise trade to GDP stood at 73.0 per cent. It increased to 187.0 per cent in 2000 and recorded 142.0 per cent in 2009 (Liang *et al*, 2011). The total merchandise trade moved in tandem with GDP during the period under study as illustrated in Chart 1. Exports have played a substantial role in promoting economic growth (Ghatak *et al*, 1997) – by earning foreign exchange and achieving economies of scale. The direction of exports remained the same for the past two decades where the United States, Singapore and Japan were the main destinations.

Malaysia is highly dependent on trade for growth (Hasan and Talib, 2011). The study showed that the dependency to external trade demand is very strong and become a key factor to induce economic growth. Almost two third of the growth (value added) was geared by external demand compared to one third of domestic final demand inducement. As a result, the Malaysian economy can be considered to be sensitive to external shocks.

Chart 1: GDP and the total merchandise trade of Malaysia, 1970 – 2011

Source: Department of Statistics, Malaysia

Malaysia's total merchandise trade has been increasing steadily from RM9.5 billion in 1970 to RM684.7 billion in 2000 and RM1.07 trillion in 2006. Malaysia continued to record strong trade position with total merchandise trade exceeding RM1.0 trillion in 2007 (RM1.1 trillion) and 2008 (RM1.2 trillion). In tandem with total merchandise trade, Malaysia's GDP has been growing gradually from 1970 to 2008. In 1970, Malaysia's GDP was RM11.8 billion and increased to RM770.0 billion in 2008. However, total merchandise trade and GDP in 2009 dropped to RM988.2 billion and RM712.9 billion respectively which was caused by the financial crisis. The crisis was triggered by United States sub-prime mortgage crisis (Ghazali and Lajuni, 2010). In 2010 and 2011, the total merchandise trade exceeded RM1.0 trillion again which were RM1.2 trillion and RM1.3 trillion respectively whereas the GDP was RM795.0 billion in 2010 and increased to RM880.1 billion in 2011.

Literature review

Choong *et al.* (2003) found that ELGH was valid in the Malaysian economy in both short-run and long-run. Their study focused on economic growth, imports, exports, imports of consumption goods, capital formation, labour force and exchange rate.

Since the mid-1980s, Malaysia's economy has been growing very rapidly with a widely held view that such growth is export-led (Al-Yousif, 1999). He also examined the validity of the ELGH for the case of Malaysia by considering a multivariate analysis, including variables such as the exchange rate, labour and capital. Al-Yousif found that in the

short-run, the economic growth in Malaysia was driven by exports (export-led growth). In the long-run, economic growth was internally generated.

Siddique *et al.* (1999) studied the relationship between economic growth, total exports and manufactured exports in Malaysia using cointegration and Granger Causality test. The results of Granger Causality did not produce any evidence to support the ELGH in Malaysia for both total exports and manufactured exports. However, evidence of a one-way Granger Causality running from economic growth to manufactured exports was found.

Khalafalla and Webb (2000) used VAR analysis to study the relationship between exports and economic growth for the period of 1965 until 1996. The study was carried out for the whole period and for two sub-periods i.e. 1965 until 1980 and 1981 until 1996. The reason for dividing the period was that in 1981, the industrialisation policy was launched by the government. The result confirmed that the ELG hypothesis was valid for the full period as well as for the 1965-1980 sub-periods. However, the test on the sub-period 1981-1996 proved that growth caused exports had a reverse relationship.

Pazim (2009) tested the validity of the export-led growth hypothesis in the BIMP-EAGA countries (i.e. Indonesia, Malaysia and the Philippines) using panel data analysis. The panel cointegration test indicated that there was no cointegrating relationship between exports and development for these countries. As a conclusion, exports could not be seen as the “engine” of growth in these countries. In other words, empirical findings did not provide sufficient evidence to support the export-led hypothesis in the area.

In his study, Tuan Lonik (2008) attempted to analyse the export-led growth hypothesis in Malaysia for the period 1978 until 2002. The analysis used the autoregression distributed lag (ARDL) cointegrating procedure that was first developed by Pesaran *et al.* (1996). He found that the hypothesis is valid in the case of Malaysia for the period under study.

Overall, the results show that, there is no consensus on the relationship between economic growth and the variables studied, suggesting further analysis is needed.

Methodology

Theoretical Model

The export-led growth hypothesis gives an insightful guide in choosing variables for this study on the determinants of Malaysian economic growth. Basically, our model is formulated based on the studies conducted by Riezman *et al.* (1996) and Al-Yousif (1999). The identified model is a four variable model, which hypothesises that economic output is a function of exports, imports and exchange rate.

Notably,

$$GDP_t : f(EXPORTS_t, IMPORTS_t, ER_t)$$

Where	GDP	= Real gross domestic product (in RM)
	EXPORTS	= Real merchandise exports (in RM)
	IMPORTS	= Real merchandise imports (in RM)
	ER	= Exchange rate (measured as RM/US\$)

The inclusion of imports and exchange rate in the model is based on the result of Riezman *et. al.* (1996), Henriques and Sadorsky (1996) and Al-Yousif (1999). Riezman *et. al.* (1996) argued that imports were crucial in testing this hypothesis to avoid producing a spurious causality result whereas Henriques and Sadorsky (1996) said the inclusion of exchange rate was to reflect the price competitiveness in the international markets. According to Al-Yousif (1999), exchange rate has a direct influence on economic performance via export channel.

Stationary and Order of Integration

In order to avoid spurious regression, we need to distinguish the stationary of the series. By doing so, we ensure the validity of the usual test statistics (t-statistics and F-statistics, and R^2). Stationary could be achieved by appropriate differencing and this appropriate number of differencing is called order of integration. The standard Augmented Dickey Fuller (ADF) [Dickey and Fuller 1979] and Phillips-Perron (PP) [Phillips and Perron 1988] unit root tests were used to test the stationary of the series.

Augmented Dickey Fuller (ADF) Test

$$\Delta y_t = \beta_1 + \beta_2 t + \beta_3 y_{t-1} + \sum_{i=1}^m \alpha_i \Delta y_{t-1} + \varepsilon_t \quad (1)$$

Where y_t = is our variable of interest = {GDP_t, EXPORTS_t, IMPORTS_t, ER_t}, Δ is the differencing operator, t is the time trend and ε is the white noise residual of zero mean and constant variance. $\{\beta_1, \beta_2, \beta_3, \alpha_1, \dots, \alpha_m\}$ is a set of parameters to be estimated. Both of the null and alternative hypotheses in unit root tests are:

$$H_0 : \delta=0 \text{ (} y_t \text{ is non stationary / a unit root process)}$$

$$H_A : \delta \neq 0 \text{ (} y_t \text{ is stationary)}$$

Cointegration Test

To perform cointegration test, this study utilised the Johansen and Juselius (1990) Multivariate Cointegration test, which involves three steps. First, determine the order of integration for each of the variables under observation. Second, estimate the cointegrating regression with vector autoregression (VAR) model. Finally, if the time series are cointegrated, then construct the error-correction modelling (ECM). To carry out the Johansen and Juselius test, we first formulate the VAR model:

$$y_t = \Gamma_1(L)y_{t-1} + \Gamma_2(L)y_{t-1} + \dots + \Gamma_p(L)y_{t-1} + \varepsilon_{t-p} \quad (2)$$

where $y_t = [\text{GDP}_t \text{ EXPORTS}_t \text{ IMPORTS}_t \text{ ER}_t]'$ is a column vector and $\Gamma_i(L)$ with $i = 1, \dots, p$ is a lag operator. ε is the white noise residual of zero mean and constant variance. In this study, Johansen test was used to assess the cointegration of the interest variables. For Johansen test there are two types of testing i.e. Trace Test and Maximal Eigenvalue Test.

Trace Test

$$^2_{trace} = -N \sum_{i=r+1}^M \ln[1 - (r_i^*)^2] \quad (3)$$

where N is the total number of observations, M is the number of variables and r_i^* is the i correlation between i -th pair of variables. t_{trace} has a chi-square distribution with $M - r$ degrees of freedom. Large values of t_{trace} give evidence against the hypothesis of r or fewer cointegration vectors.

Maximal Eigenvalue Test

The maximal eigenvalue test is to evaluate the null hypothesis $H_0: r = r_0$ against $H_A: r = r_0 + 1$.

$$^2_{max} = -T \ln(1 - \lambda_{r+1}) \quad (4)$$

In that test, the null hypothesis of r cointegrating vectors is tested against the alternative of $r+1$ cointegrating vectors.

Granger Causality Test

The model as described in equation 2 can be adapted for the Malaysian economy, particularly in examining the export-led growth hypothesis in the multivariate framework. Equation (2) can be explicitly expressed as follows, which include error-correction term (ECT):

$$\begin{aligned} \Delta \text{GDP}_t = & \alpha_0 + \sum_{i=1}^p \alpha_1 \Delta \text{GDP}_{t-1} + \sum_{i=1}^p \alpha_2 \Delta \text{EXPORTS}_{t-1} + \sum_{i=1}^p \alpha_3 \Delta \text{IMPORTS}_{t-1} \\ & + \sum_{i=1}^p \alpha_4 \Delta \text{ER}_{t-1} + \alpha_5 \text{ECT}_{t-1} + \varepsilon_t \end{aligned} \quad (5)$$

Where, ECT_{t-1} is the error-correction term derived from the long-run cointegrating relationship. Therefore, the estimated coefficient of ECT (α_5) measures the long-run equilibrium relationship while $\alpha_1, \alpha_2, \alpha_3, \dots, \alpha_5$ measure the short-run causal relation. The cointegration between two or more variables is already sufficient to indicate that the presence of causality at least in one direction (Granger 1988). The structure lag is

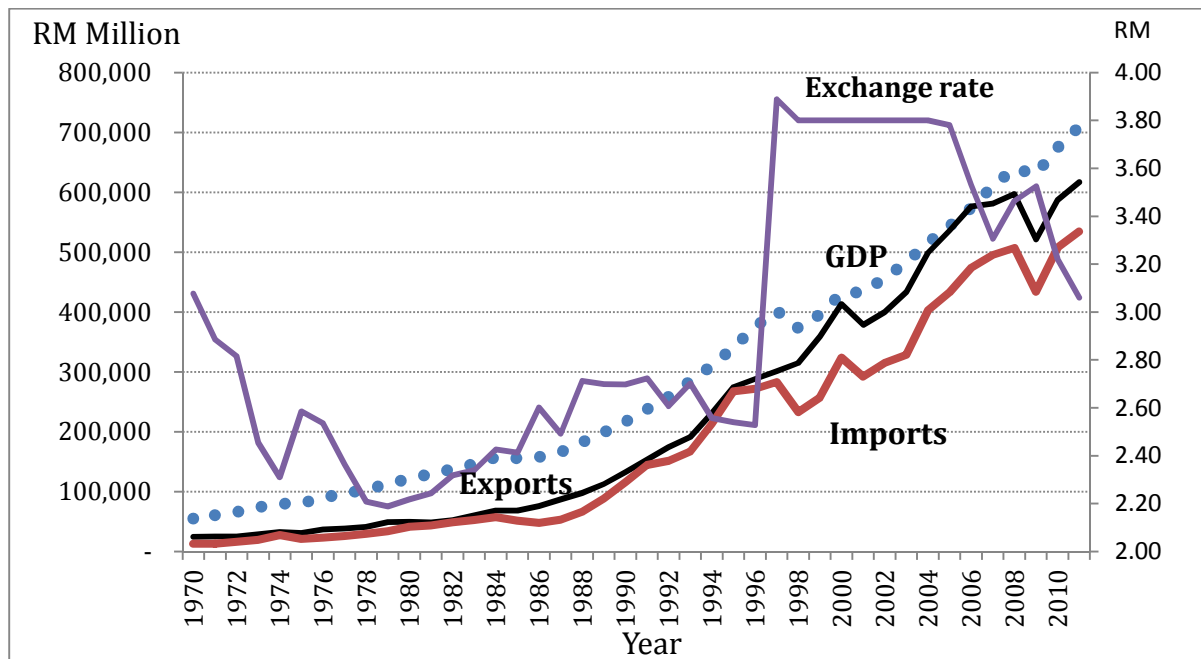
determined by using Akaike's minimum Final Prediction Error (FPE) criterion. The causality between predetermined and dependent variables can be examined by conducting Wald test, that is, by calculating the F-statistic based on the null hypothesis that a set of coefficients on the lagged values of independent variables are equal to zero. If the null hypothesis is accepted, then it can be concluded that the independent variables do not cause dependent variable.

Source of Data

In this paper, the annual GDP, annual exports and annual imports data were obtained from the Department of Statistics Malaysia (DOSM) while annual exchange rate series were from Bank Negara Malaysia. For this study, appropriate prices were applied to get real export and import values. Chart 2 shows the trend of the GDP, exports, imports and exchange rate from 1970 to 2011.

All of the series were transformed into log form. Log transformation can reduce the problem such as heteroscedasticity because it compresses the scale in which the variables are measured, thereby reducing a tenfold difference between two values to a twofold difference (Gujarati 1995). Data analysis was done by using STATA.

Chart 2: GDP, exports, imports and exchange rate, 1970 – 2011



Source: Department of Statistics, Malaysia

Results and Interpretations

The ADF and PP test showed that data were stationary at first difference of each series; and the optimum lags obtained from STATA as proposed by Akaike's information criterion (AIC) was two.

Table 1 below presents results of the unit root test. Based on the result of Panel A, the unit root test are present in all the series in level. According to the ADF-test and PP-test, the null hypothesis was not rejected for the series at 5 per cent significant level. It implies that the data are not stationary.

However, by taking first differences I(1) for all the variables under study, the null hypothesis of non-stationary is easily rejected at 5 per cent significant level as shown in Table 1 (see Panel B). The data are stationary at first difference I(1).

Unit Root Test

Table 1: Results of the Unit Root Test ^a

Panel A: Level (Lag = 2)

Variable	ADF	PP	Decision
GDP	0.9798	0.9347	Do not Reject H_0
EXPORTS	0.8735	0.9164	Do not Reject H_0
IMPORTS	0.8223	0.7798	Do not Reject H_0
ER	0.6493	0.5769	Do not Reject H_0

Panel B: First Difference (Lag = 2)

Variable	ADF	PP	Decision
GDP	0.0039*	0.0000*	Reject H_0
EXPORTS	0.0076*	0.0000*	Reject H_0
IMPORTS	0.0006*	0.0000*	Reject H_0
ER	0.0007*	0.0000*	Reject H_0

Notes:

^a The null hypothesis is that the series is non-stationary, or contains a unit root test. The rejection of null hypothesis for both ADF and PP test are based on the McKinnon critical value.

* Indicate the rejection of the null hypothesis of non stationary at 5 per cent significant level. The lags lengths in both ADF and PP tests are selected based on the AIC criteria, which at lag two.

Test results for Cointegration

Results of the cointegration test are shown in Table 2. From the Johansen test, the trace test indicates that there are cointegration at $r=3$ at 5 per cent significant level.

Table 2: Results of the cointegration test**I. Johansen test for cointegration**

Max rank, r	LL	Eigen value	Trace value	5 per cent critical value
0	335.51		86.1770	47.21
1	355.30	0.62635	46.8000	29.68
2	366.58	0.43403	24.0312	15.41
3	374.22	0.31718	0.87702	3.76
4	378.60	0.19688		

II. Cointegrating equations

Following the output from STATA;

Equation	Parms	chi2	P>chi2
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_ce1	3	70.95214	0.0000
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Identification: beta is exactly identified

	Coefficients	Std Error	z	P> z
GDP	1			
EXPORTS	-0.4324	0.082	-5.29	0.000
IMPORTS	-0.0018	0.058	-0.03	0.000
ER	0.2162	0.0696	0.002	0.000
CONSTANT	-0.0033			

The STATA output indicates strong support for a cointegrating equation such that $GDP - 0.4324 \text{ EXPORTS} - 0.0018 \text{ IMPORTS} + 0.2162 \text{ EXCHANGE RATE} - 0.0033 = 0$ should be stationary series. The equation can be rewritten as follows:

$$GDP = 0.4324 \text{ EXPORTS} + 0.0018 \text{ IMPORTS} - 0.2162 \text{ ER} + 0.0033$$

Exports are positively correlated to economic growth with the estimated elasticity of 0.4324 (Table 2 Panel II). This finding is consistent with Choong *et al.* (2003). This shows that exports and imports have a positive impact on Malaysia's economic growth.

Causality Analysis – Standard Granger Causality Test

The dynamic short-run causality among the relevant variables is shown in Table 3. If the null hypothesis of no causality is rejected, then we can conclude that a relevant variable Granger-caused economic growth. From this test, we found that all the explanatory variables are statistically significant to Granger caused economic growth at a 5 per cent significant level except for exchange rate. The finding of this study is consistent with Al-Yousif (1999) that in the short-run, the economic growth in Malaysia was driven by exports (export-led growth). To sum up the findings of the short-run causality test, we can conclude that the hypothesis of export-led growth is valid in the Malaysian

economy. It appears that, there is a positive relationship and short-run causality running from exports to economic growth.

Table 3: Short-run Causality test (Granger Causality Wald Test)

Hypothesis	Chi-square	p-value	Decision at 5 per cent significant level
H_0 = Exports does not Granger cause GDP	4.7847	0.029	Reject H_0
H_0 = Imports does not Granger cause GDP	0.5724	0.044	Reject H_0
H_0 = Exchange rate does not Granger cause GDP	2.0778	0.149	Do not reject H_0
H_0 = ALL does not Granger cause GDP	8.6591	0.034	Reject H_0

Table 4: Results of VECM based on equation (5)

	Coefficient of ECT	t value
Equation GDP	-0.848	-3.29

Table 4 showed the result of VECM. The estimated error correction term has negative sign and is statistically significant at 5 per cent level of significance. There is evidence that the hypothesis of export-led growth is valid in long-run.

Conclusion

The result of the Cointegration test revealed that cointegrating vector exists in the model. The variables are linked together in the long-run with both exports and imports having positive impact on economic growth.

From the Granger Causality test, it was reported that all variables Granger cause economic growth in the short-run at 5 per cent significant level except for the exchange rate. The estimated error correction term is statistically significant at 5 per cent level of significance. It showed that the hypothesis of export-led growth is valid in long-run. From this study, we have strong evidence to support export-led growth hypothesis which is valid in the Malaysian economy in both the short-run and long-run.

This result is in contrast to India and China where the export-led growth hypothesis are not valid. For the case of India, Mishra (2009) found that the export-led growth hypothesis was rejected. For China, Tang (2006) study showed no short-run and long-run causality between export expansion and economic growth on the basis of Granger causality test.

The limitation of this study is that only GDP, exports, imports and exchange rate were used whereby there are other factors that can influence economic growth. For future study, it is suggested that more variables should be used for instance Gross Fixed

Capital Formation (GFCF), labour force, imports of consumption goods and manufactured exports besides only the four variables mentioned.

Being an open economy, Malaysia depends on foreign trade and which means that the economic performance is sensitive to the changes in the global environment. From a policy perspective, since the ELGH is found to be valid for Malaysia in short-run and long-run, there should be appropriate measures to boost exports through the formulation of relevant macroeconomic policies.

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