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Abstract

Most of previous researches have only focused on the effect of export expansion on economic growth while ignoring the potential of import in developing economic growth. This study makes an attempt to examine the relationship between trade and economic growth in Malaysia with emphasis on both the role of exports and imports. This study treats exports and imports separately to allow for the possibility that their influence toward economic growth is asymmetric and adopts recent advances in time series modeling. This study used Granger causality test and impulse response functions to examine whether growth in trade stimulates economic growth. It is important to examine the linkage between trade and economic growth for Malaysia in order to provide evidence whether rapid economic growth in the region is driven by trade or whether there is reciprocal impact between growth and trade. The results tend to suggest that the singular focus of past studies on exports as engine of growth may be misleading. The results confirm the bidirectional long run relationships between the economic growth and exports, economic growth and imports and exports and imports. From a policy point of view, investigating the causal links between trade and economic growth generates important implications for the development strategies of developing countries. If exports drive economic growth, policy should promote exports, and likewise for imports.

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I. Introduction

The relationship between trade and economic growth has received increasing attention from academics and policymakers. Although several studies have demonstrated the theoretical economic relationships between trade and economic growth, disagreements still persists regarding the causal direction and magnitude of effects. Most studies on the effect of trade openness on economic growth have primarily focused on the role of exports and mostly ignored the contribution of imports. However, some recent studies have shown that the causal link between exports and economic growth may be spurious and misleading without controlling for imports. Imports can be very important factor to economic growth since significant export growth is usually associated with rapid import growth.

This study makes an attempt to investigate the causal relationship between trade and economic growth in Malaysia. Many empirical studies have sought to test the validity of the export-led growth (ELG) hypothesis, growth-led export (GLE) hypothesis, import-led growth (ILG) hypothesis and growth-led import (GLI) hypothesis. However, the empirical evidence based on those studies is mixed and often contradictory. The differences in the measures of exports, imports and economic growth used, the sampling period and methodologies adopted explain the mixed results.

This study makes contributions to the literature in several ways. First, this study extends the traditional neoclassical growth model by estimating for both exports and imports on economic growth. Real exports and imports are included as two of the endogenous variables. Second, this study adopts recent advances in time series modeling by specifying causal models based on vector error correction models. The result suggests that the singular focus of past studies on exports as engine of growth may be misleading. The results confirm the bidirectional long run relationships between the economic growth and exports, economic growth and imports and exports and imports.

This study is organized as follows. Section II and Section III provides a brief theoretical and empirical overview of the trade and economic growth relationship. Section IV discusses the data and methodology used in the study. Section V presents the empirical results and Section VI contains the conclusions with policy implications.

II. Theoretical Framework

The relationship between exports and economic growth has been attributed to the potential positive externalities derived from exposure to foreign market. Exports can be viewed as an engine of growth in three ways. First, export expansion can be a catalyst for output growth directly as a component of aggregate output where an increase in foreign demand for domestic exportable products can cause an overall growth in output via an increase in employment and income in the exportable sector. Second, growth in exports can affect economic growth indirectly through various routes such as efficient resource allocation, greater capacity utilization, exploitation of economies of scale and stimulation of technological improvement due to foreign market competition. Export growth allows firms to take advantage of economies of scale that are external to firms in the non export sector but internal to the overall economy. Third, expanded exports can provide foreign exchange that allows for increasing levels of imports of intermediate goods that in turn raises capital formation thus stimulate output growth.

Besides that, expanded imports have the potential to play a complementary role in stimulating overall economic performance. It is plausible to assume that the effect of imports on economic growth may be different from exports. This study supports the assumption by treat exports and imports separately for the possibility that their influence toward economic growth is asymmetric. The transfer of technology from developed to developing countries through imports may serve as an important source of economic growth. Imports can be a channel for long run economic growth because it provides domestic firms access to foreign technology and knowledge. According to Mazumdar (2001), imports drive economic growth (import-led-growth (ILG)), consistent with the endogenous-growth literature. Foreign R&D knowledge could be an important source of productivity growth as cutting-edge technologies

are usually bundled with imported intermediate goods such as computers, precision machines and equipments. Thus, foreign imports are sources of technology-intensive intermediate factors of production. Therefore, imports can be treats as a medium of technology transfer which play more significant role on economic growth than exports.

In addition, imports can affect the productivity growth through its effect on domestic innovation through import competition. An increase in import penetration will exposes the domestic firms to foreign competition. Although the impact of import penetration may differ across domestic industries, imports are important to productivity growth because the domestic producers will respond to the technological competitive pressure from foreign competition.

III. Empirical Framework

Since trade theory does not provide a definitive guidance on the causal relationship between trade and economic growth, the debate is usually informed by inferences based on empirical analyses. The empirical literature on export, import and economic growth nexus are distinguished between two stands in the methodological point of view. The first stand uses the cross-country approach in order to test the economic theory about export and economic growth nexus by using rank correlation approach and OLS method. However, results from ordinary least squares regression and simple correlation approach have limitation as the correlations may be spurious because they failed to account for the data's dynamic time series properties such as unit root and cointegration testing. These studies support for a positive relationship between export and economic growth (McNab and Moore, 1998). Most of these cross-sectional studies found a significant and positive relationship between export performance and national output growth. The results can only shows the correlation between export growth and GDP growth but could not provide information on the direction of causality. The issue of causality is dynamic in nature and is best examined using a dynamic times series modeling framework.

The second stand uses the times series technique. In the beginning of the time series literature on export, import and growth nexus, the researchers have widely used Granger

(1969) causality method. According to Awokuse (2006), there has been an increase in country specific studies focusing on the relationship between export performance and economic growth which used time series modeling technique. Bahmani and Alse (1993) found bidirectional relationship between export and real GDP in the case of nine developing countries. Ahmad and Harnhirun (1995) employed cointegration and error correction modeling approach in case of five Asean. They found bidirectional causal relationship between export and economic growth. The empirical evidence from these studies of the ELG hypothesis has been mixed. While several studies have supported the existence of a long run relationship between exports and economic growth, some studies have rejected the ELG hypothesis. For example, Xu (1996) used bivariate Granger causality tests and error correction models to examine relationship between export and economic growth. As a result, his finding supports the ELG hypothesis in Columbia but not in Argentina.

In the recent time, many researchers have used the cointegration methods like vector-error correction method, modified granger causality test and ARDL approach to investigate the relationship between export, import and economic growth. Ramos (2001) analyzes the relationship between export, import and GDP growth for Portugal by using multivariate Johansen's procedure and found bidirectional relationship between GDP and export, GDP and import and no link between import and export. The volumes of empirical evidence on the export-led growth (ELG) hypothesis have shown that there is a notable link between growth in export and gross domestic product (GDP). However, the direction of causality is still in controversies. While some researchers found the evidence to support ELG hypothesis, others researcher found evidence in support of the alternative growth-led exports (GLE) hypothesis or in several cases the empirical evidence indicated a bidirectional causal relationships (Giles and Williams, 2000).

According to Riezman et al. (1996), the standard methods of detecting ELG using Granger causality tests may give misleading results if imports are not included in the system being analyzed. Tangavelu and Rajaguru (2004) found that imports are more relevant compared to exports for Asian economies. Mahadevan and Suardi (2008) found no relation between economic growth and trade for Korea but found support for ILG hypothesis for Japan. Awokuse (2007) test the link between export, import and GDP by using granger causality approach. His findings provide support for import-led growth (ILG) in case of

Poland. These findings are supported by using variance decomposition and and impulse response functions. Zambe (2010) examines the relationship between export, import, exchange rate and GDP growth for the Cote d'Ivoire. By utilizing the bound testing ARDL approach for cointegration, the findings are bidirectional link between export and GDP growth, there by the ELG is confirmed. Hye and Boubaker (2011) had tested the ELG and ILG hypothesis in case of Tunisia and they suggest that ELG and ILG are valid.

IV. Data and Methodology

The study uses quarterly time series data from 2005 to 2014 (2005 Q1:2014 Q3) covering in Malaysia and the data have taken from the database of Datastream. The data of gross domestic product (GDP), export of goods and services, import of goods and services and exchange rate are measured in Malaysian Ringgit. The GDP measures the economic growth in Malaysia while trade is measured by the export and import of goods and services in Malaysia. The exchange rate is measured in Malaysian Ringgits to 1 US $. For econometric estimation, all series are transformed into natural logarithm form. The trade led growth equation is specifies as follows:

$$LG = \beta_0 + \beta_1 LE + \beta_2 LI + \beta_3 LX + \varepsilon$$

where

LG : logarithm of gross domestic product (GDP)

LE : logarithm of export of goods and services

LI : logarithm of import of goods and services

LX : logarithm of exchange rate

ε : error term

This study employs a time series technique, in particular, cointegration, error correction modelling and variance decomposition in order to find empirical evidence of the nature of relations between trade and economic growth. This method is favoured over the traditional regression method for the following reasons. Firstly, regression techniques make assumption about long run theoretical relationship among the variables and assume which variables are leader and follower. However, the time series techniques test the long run theoretical relationship among the variables and test the Granger-causality between variables.

Secondly, most finance variables are non-stationary. This means that performing ordinary regression on the variables will render the results misleading, as statistical tests like t-ratios and F statistics are not statistically valid when applied to non-stationary variables. Performing regressions on the differenced form of these variables will solve one problem but when variables are regressed in their differenced form, the long term trend is effectively removed. Thus, the differenced regression variables only capture short term, cyclical or seasonal effects. In other words, the regression in differenced forms is not really testing the long term or theoretical relationships.

Thirdly, in traditional regression, the endogeneity and exogeneity of variables is pre-determined by the researcher, usually on the basis of prevailing or a priori theories. However, in cointegration techniques, the data will determine which variables are in fact endogenous and exogenous. In other words, with regression, causality is presumed, whereas in cointegration, it is empirically proven with the data.

V. Empirical Results

Table 1 shows the list of variables used in identifying the relationship between trade and economic growth in Malaysia. The variables consist of GDP, export, import and exchange rate. The variables are converted into natural logarithm to turn the series stationary in variance and first difference of logarithm series to turn the series stationary in mean.

Table 1. *List of variables under study*

Code	Description	Log level form	Log 1st difference form
GDP (G)	Gross domestic product	LG	DG
Export (E)	Export of goods and services	LE	DE
Import (I)	Import of goods and services	LI	DI
Exchange (X)	Exchange rate :Malaysian Ringgits to 1 US $	LX	DX

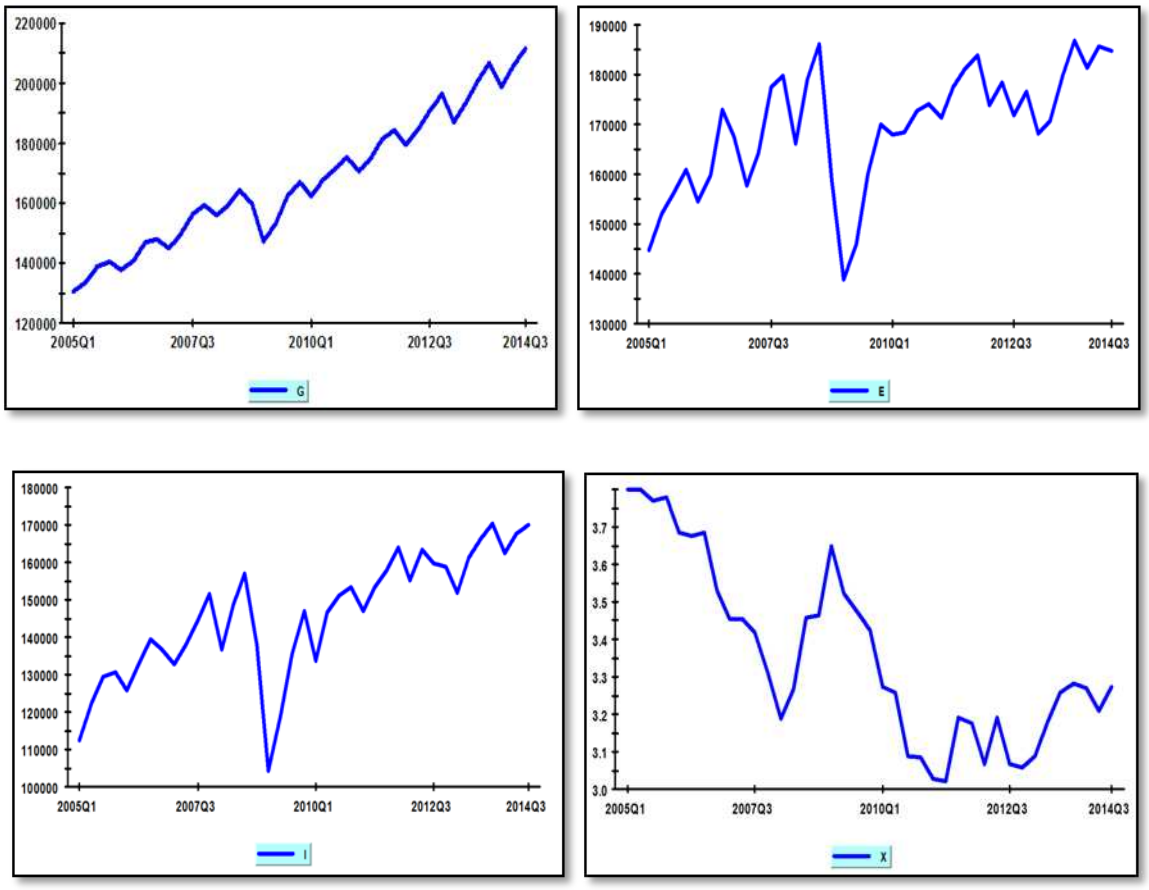

Figure 1. *Graphs based on raw data*

Figure 1 shows the graph of variables used in the study based on the raw data. From the graph, it shows no trend between GDP, export, import and exchange rate.

UNIT ROOT TEST

Unit root test analyze the stationary properties of the data. An important question to time series data is whether each variable is stationary in level forms or stationary after first differencing. Table 2 presents the results from Augmented Dickey-Fuller (ADF) unit root tests and Phillips-Perron (PP) unit root tests. The ADF regression order is based on the highest Schwarz Bayesian Criterion (SBC). The result suggests that all variables are non-stationary at the level form since t-statistic is lower than critical value, thus the null hypothesis of non-stationary is failed to be rejected, i.e. non-stationary is accepted. However, ADF and PP indicated different results for LG and LE. Log level form of GDP (LG) shows that GDP is non-stationary at ADF test but stationary at PP test. So, GDP is non-stationary at level form by using ADF test. Log level form of export (LE) shows that export is stationary at ADF test but non-stationary at PP test. So, export is non-stationary at level form by using PP test. However, at the first difference, the null hypothesis of non-stationary is rejected (t-Stat > C.V.), thus in the first differenced form the variables are stationary or I(1).

Table 2. *Results of Unit Root Tests*

LOG LEVEL FORM				
Variable	**ADF**	**PP**	**Stationarity**	
	t-stat	**t-stat**	**ADF**	**PP**
LG	-1.747	-3.7686	Non-stationary	Stationary
LE	-4.2372	-3.0318	Stationary	Non-stationary
LI	-3.4195	-3.4909	Non-stationary	Non-stationary
LX	-1.956	-1.1481	Non-stationary	Non-stationary
CV	**-3.5514**	**-3.5313**		

FIRST DIFFERENCE FORM				
Variable	**ADF**	**PP**	**Stationarity**	
	t-stat	**t-stat**	**ADF**	**PP**
DG	-3.9176	-8.9649	Stationary	Stationary
DE	-6.7188	-7.2853	Stationary	Stationary
DI	-3.9913	-8.9155	Stationary	Stationary
DX	-3.4701	-5.9201	Stationary	Stationary
CV	**-2.9558**	**-2.9422**		

VAR ORDER

Table 3. *Lag order identification*

Order	AIC	SBC	p-value	CV
1	270.0665	254.8029	[0.082]	5%

It is important to choose appropriate lag length because if the number of lag is too small, it will invalidate the tests and if the number of lag is too large, it may result a loss of power. The choice of lag length of 1 is based on 5% significance level as shown in Table 3 above.

COINTEGRATION TESTING

The determination of cointegrating vectors is based on the Maximal Eigenvalue and the Trace tests as shown in Table 4.

Table 4. *Maximal Eigenvalue and Trace test results*

Cointegration LR Test Based on Maximal Eigenvalue of the Stochastic Matrix				
Null	Alternative	Statistic	95% Critical Value	90% Critical Value
r = 0	r = 1	27.1901	27.42	24.99
r <= 1	r = 2	14.4855	21.12	19.02

Cointegration LR Test Based on Trace of the Stochastic Matrix				
Null	Alternative	Statistic	95% Critical Value	90% Critical Value
r = 0	r >= 1	45.9099	48.88	45.7
r <= 1	r >= 2	18.7199	31.54	28.78

Based on both Maximal Eigenvalue and Trace tests of cointegration, there is only one cointegrating vector among the variables, since null hypothesis of having no cointegration is rejected based on t-statistic > 90% C.V. These results imply that the relationship between GDP, export, import and exchange rate are not spurious. Each variable contains information

for the prediction of other variable. However, cointegration cannot tell the direction of Granger-causality as to which variable is exogenous and which variable is endogenous, for which the Vector Error Correction Modeling technique (VECM) will be applied.

LONG-RUN STRUCTURAL MODELLING (LRSM)

Table 5. *Exact Identification and over identification results*

Variable	**Data**	**Panel A**	**Panel B**
		A1=1	A1=1;A4=0
LG	Coefficient	1.0000	1.0000
	S.E	(NONE)	(NONE)
LE	Coefficient	3.1955	3.1202
	S.E	(0.91014)	(0.84037)
	t-statistic	3.511	3.7129
	Result	SIGNIFICANT	SIGNIFICANT
LI	Coefficient	-3.2573	-3.0881
	S.E	(0.68249)	(0.52112)
	t-statistic	4.7727	5.9259
	Result	SIGNIFICANT	SIGNIFICANT
LX	Coefficient	-0.20339	0.00
	S.E	(0.43514)	(NONE)
	t-statistic	0.4674	
	Result	INSIGNIFICANT	
LR test of restrictions		Panel A is accepted	CHSQ(1)=0.24669[0.619] p-value is more than 5%, hence - restriction is correct -Exchange rate is not significant

The Cointegration tests the long-term relationship between variable, while the LRSM tests long-term coefficients. LRSM endeavours to estimate theoretically meaningful long run relation by imposing on those long run relations and testing both exact identifying and over identifying restrictions based on the theories and information of the economies under review.

Export and import of goods and services have significant impact on GDP since the t-statistic is more than 2 but exchange rate is not significant in determining GDP. Testing over identification for exchange rate shows that the restriction is correct since the CHSQ(1) is more than 5% significance level.

VECTOR ERROR CORRECTION MODEL (VECM)

Table 6. *ECM(-1) results*

ecml (-1)	Coefficient	Standard error	T-ratio [Prob.]	S.L	Result
dLG	0.035586	0.063675	0.55887[0.58]	5%	Exogenous
dLE	0.017742	0.11316	0.15679[0.876]	5%	Exogenous
dLI	0.33266	0.14673	2.2672[0.029]	5%	Endogenous
dLX	-0.054966	0.05558	-0.98895[0.329]	5%	Exogenous

The vector error correction model (VECM) identifies the endogeneity and exogeneity of variables. The information on direction of Granger-causality can be particularly useful for policymakers. By knowing which variable is exogenous and endogenous, policymakers can have better information on the causality of the changes in economic growth. Typically, a policymaker would be interested to know which variable is the exogenous variable because then the policymaker would closely monitor the performance of that variable as it would give impact to other endogenous variables.

The VECM output suggests that GDP, export and exchange rate are exogenous variables since p-value more than 5% significant level while import is endogenous variable since p-value is less than 5% significant level. The exogenous variables would receive market shocks and transmit the effects of those shocks to other variable. The coefficient of e_{t-1} tells us how long it will take to get back to long term equilibrium if that variable is shocked. The equation of ECM is given as follows:

$$ecm1 = 1.0000LG + 3.1202LE - 3.0881LI - 0.0000LX$$

VARIANCE DECOMPOSITIONS (VDCs)

Variance decompositions (VDCs) decompose the variance of forecast error of a particular variable into proportions attributable to shocks in each variable in the system including its own. The variable that is explained mostly by its own shocks is deemed to be the most exogenous. Although the error-correction model has identified the endogeneity or exogeneity of a variable, the generalized variance decomposition technique will assist in determining the relative degree of endogeneity or exogeneity of the variables.

The VDCs and IRF serve as tools for evaluating the dynamic interactions and strength of causal relations among variables in the system. There are two ways to identify the relative exogeneity of variables. There are generalized approach and orthogonalized approach. The generalized approach is preferred compared to the orthogonalized approach because the orthogonalized approach is sensitive to the order of the variables in a VAR system which determines the outcome of the results, whereas the generalized approach is invariant to the ordering of variables in the VAR and produce one unique result.

Table 7 shows the variance decomposition for generalized and orthogonalized approach. The ranking for generalized and orthogonalized approach indicated different result. In generalized approach, exchange rate is the first leader followed by GDP as second leader while import is the most endogenous variable. The ranking is consistent through the long-term period. It is important for decision makers to identify the relative exogeneity of variables because affecting on the most exogenous variable will have greater impact on other variables. Thus, knowing relative endogeneity or exogeneity will helps the policymakers to choose among variables those which will have due impact on others.

Table 7. *Generalized and Othogonalized Approaches*

GENERALIZED APPROACH						ORTHOGONOLIZED APPROACH					
Horizon	Variable	LG	LE	LI	LX	Horizon	Variable	LG	LE	LI	LX
	LG	40.36%	28.12%	31.23%	0.29%		LG	99.29%	0.10%	0.61%	0.00%
	LE	26.54%	40.22%	32.84%	0.40%		LE	65.96%	34.00%	0.05%	0.00%
4	LI	28.94%	36.78%	33.97%	0.32%	4	LI	75.16%	22.33%	2.51%	0.00%
quarters	LX	1.44%	1.07%	1.47%	96.02%	quarters	LX	1.47%	0.08%	0.43%	98.03%
	Exogeneity	40.36%	40.22%	33.97%	96.02%		*Exogeneity*	99.29%	34.00%	2.51%	98.03%
	Ranking	2	3	4	1		*Ranking*	1	3	4	2
	LG	40.35%	28.25%	31.10%	0.30%		LG	99.20%	0.12%	0.69%	0.00%
	LE	26.53%	40.27%	32.80%	0.40%		LE	65.83%	34.12%	0.05%	0.00%
8	LI	28.74%	37.54%	33.37%	0.35%	8	LI	74.40%	24.12%	1.48%	0.00%
quarters	LX	1.55%	1.09%	1.61%	95.75%	quarters	LX	1.57%	0.04%	0.39%	97.99%
	Exogeneity	40.35%	40.27%	33.37%	95.75%		*Exogeneity*	99.20%	34.12%	1.48%	97.99%
	Ranking	2	3	4	1		*Ranking*	1	3	4	2
	LG	40.34%	28.31%	31.05%	0.30%		LG	99.16%	0.12%	0.72%	0.00%
	LE	26.52%	40.29%	32.79%	0.40%		LE	65.79%	34.16%	0.05%	0.00%
12	LI	28.66%	37.84%	33.14%	0.36%	12	LI	74.10%	24.83%	1.07%	0.00%
quarters	LX	1.59%	1.09%	1.67%	95.65%	quarters	LX	1.62%	0.03%	0.37%	97.98%
	Exogeneity	40.34%	40.29%	33.14%	95.65%		*Exogeneity*	99.16%	34.16%	1.07%	97.98%
	Ranking	2	3	4	1		*Ranking*	1	3	4	2
	LG	40.34%	28.33%	31.03%	0.30%		LG	99.14%	0.12%	0.74%	0.00%
	LE	26.52%	40.30%	32.78%	0.40%		LE	65.76%	34.18%	0.06%	0.00%
16	LI	28.62%	38.01%	33.01%	0.37%	16	LI	73.94%	25.21%	0.85%	0.00%
quarters	LX	1.61%	1.10%	1.70%	95.59%	quarters	LX	1.64%	0.02%	0.37%	97.97%
	Exogeneity	40.34%	40.30%	33.01%	95.59%		*Exogeneity*	99.14%	34.18%	0.85%	97.97%
	Ranking	2	3	4	1		*Ranking*	1	3	4	2
	LG	40.34%	28.35%	31.01%	0.30%		LG	99.13%	0.13%	0.75%	0.00%
	LE	26.52%	40.30%	32.78%	0.40%		LE	65.75%	34.20%	0.06%	0.00%
20	LI	28.59%	38.11%	32.93%	0.37%	20	LI	73.84%	25.45%	0.71%	0.00%
quarters	LX	1.63%	1.10%	1.71%	95.56%	quarters	LX	1.65%	0.02%	0.36%	97.97%
	Exogeneity	40.34%	40.30%	32.93%	95.56%		*Exogeneity*	99.13%	34.20%	0.71%	97.97%
	Ranking	2	3	4	1		*Ranking*	1	3	4	2
24	LG	40.34%	28.36%	31.00%	0.30%	24	LG	99.12%	0.13%	0.76%	0.00%
quarters	LE	26.52%	40.31%	32.77%	0.40%	quarters	LE	65.74%	34.21%	0.06%	0.00%

	LI	28.57%	38.18%	32.88%	0.37%		LI	73.77%	25.61%	0.62%	0.00%
	LX	1.64%	1.10%	1.73%	95.54%		LX	1.66%	0.02%	0.36%	97.97%
	Exogeneity	40.34%	40.31%	32.88%	95.54%		*Exogeneity*	99.12%	34.21%	0.62%	97.97%
	Ranking	2	3	4	1		*Ranking*	1	3	4	2
	LG	40.34%	28.37%	30.99%	0.30%		LG	99.11%	0.13%	0.76%	0.00%
	LE	26.51%	40.31%	32.77%	0.40%		LE	65.73%	34.22%	0.06%	0.00%
28	LI	28.56%	38.23%	32.84%	0.38%	28	LI	73.72%	25.73%	0.55%	0.00%
quarters	LX	1.64%	1.10%	1.74%	95.52%	quarters	LX	1.67%	0.01%	0.35%	97.96%
	Exogeneity	40.34%	40.31%	32.84%	95.52%		*Exogeneity*	99.11%	34.22%	0.55%	97.96%
	Ranking	2	3	4	1		*Ranking*	1	3	4	2
	LG	40.34%	28.38%	30.99%	0.30%		LG	99.11%	0.13%	0.76%	0.00%
	LE	26.51%	40.31%	32.77%	0.40%		LE	65.72%	34.22%	0.06%	0.00%
32	LI	28.55%	38.27%	32.81%	0.38%	32	LI	73.68%	25.82%	0.50%	0.00%
quarters	LX	1.65%	1.10%	1.74%	95.51%	quarters	LX	1.67%	0.01%	0.35%	97.96%
	Exogeneity	40.34%	40.31%	32.81%	95.51%		*Exogeneity*	99.11%	34.22%	0.50%	97.96%
	Ranking	2	3	4	1		*Ranking*	1	3	4	2
	LG	40.34%	28.38%	30.98%	0.30%		LG	99.10%	0.13%	0.77%	0.00%
	LE	26.51%	40.32%	32.77%	0.40%		LE	65.72%	34.23%	0.06%	0.00%
36	LI	28.54%	38.30%	32.78%	0.38%	36	LI	73.65%	25.89%	0.46%	0.00%
quarters	LX	1.65%	1.10%	1.75%	95.50%	quarters	LX	1.68%	0.01%	0.35%	97.96%
	Exogeneity	40.34%	40.32%	32.78%	95.50%		*Exogeneity*	99.10%	34.23%	0.46%	97.96%
	Ranking	2	3	4	1		*Ranking*	1	3	4	2
	LG	40.34%	28.39%	30.98%	0.30%		LG	99.10%	0.13%	0.77%	0.00%
	LE	26.51%	40.32%	32.77%	0.40%		LE	65.71%	34.23%	0.06%	0.00%
40	LI	28.53%	38.32%	32.76%	0.38%	40	LI	73.63%	25.95%	0.43%	0.00%
quarters	LX	1.65%	1.10%	1.75%	95.49%	quarters	LX	1.68%	0.01%	0.35%	97.96%
	Exogeneity	40.34%	40.32%	32.76%	95.49%		*Exogeneity*	99.10%	34.23%	0.43%	97.96%
	Ranking	2	3	4	1		*Ranking*	1	3	4	2
	LG	40.34%	28.39%	30.97%	0.30%		LG	99.10%	0.13%	0.77%	0.00%
	LE	26.51%	40.32%	32.77%	0.40%		LE	65.71%	34.23%	0.06%	0.00%
44	LI	28.53%	38.34%	32.75%	0.38%	44	LI	73.61%	25.99%	0.40%	0.00%
quarters	LX	1.66%	1.10%	1.76%	95.48%	quarters	LX	1.68%	0.01%	0.35%	97.96%
	Exogeneity	40.34%	40.32%	32.75%	95.48%		*Exogeneity*	99.10%	34.23%	0.40%	97.96%
	Ranking	2	3	4	1		*Ranking*	1	3	4	2
	LG	40.34%	28.39%	30.97%	0.30%		LG	99.10%	0.13%	0.77%	0.00%
	LE	26.51%	40.32%	32.77%	0.40%		LE	65.71%	34.23%	0.06%	0.00%
48	LI	28.53%	38.36%	32.74%	0.38%	48	LI	73.59%	26.03%	0.38%	0.00%
quarters	LX	1.66%	1.10%	1.76%	95.48%	quarters	LX	1.69%	0.01%	0.35%	97.96%
	Exogeneity	40.34%	40.32%	32.74%	95.48%		*Exogeneity*	99.10%	34.23%	0.38%	97.96%

	Ranking	2	3	4	1

	Ranking	1	3	4	2

IMPULSE RESPONSE FUNCTION (IRF)

IRFs essentially map out the dynamic response path of a variable owing to a one-period standard deviation shock to another variable. The impulse response functions (IRFs) essentially produce the same information as the VDCs, except that they can be presented in graphical form. An impulse response function is helpful in tracing the time path of the various shocks on the variables contained in the VAR system. It is normalized such that zero represents the steady state value of the response variable.

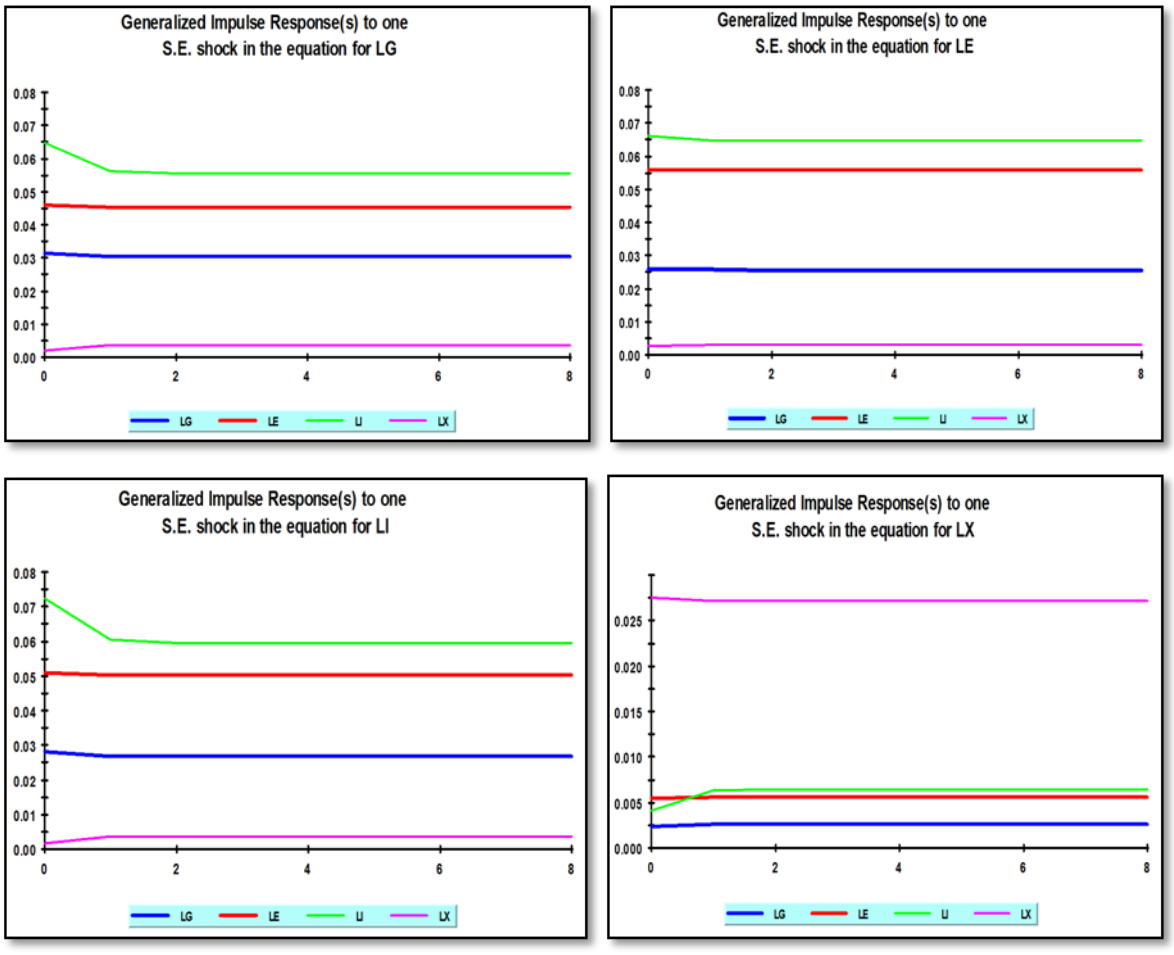

Figure 2. *Generalized Impulse Response to one S.E. shock in the equation for each variable*

From the Figure 2, it shows that changes in GDP influence import of goods and services and that disturbance last for two quarters. In contrast, there is little impact of GDP shock to export and exchange rate when it becomes stabilize within one quarter. Shock in

export has more impact on GDP as compared to import and exchange rate when it become normalize within two quarters but it takes one quarter to normalize for import and exchange rate.

Shock in import of goods and services have same impact for GDP, export and exchange rate which will normalize within one quarter. This result supports that import is weak or endogenous variable because it does not give strong impact to other variables. Exchange rate change has strong impact on import lasting for about two quarters, but slight influence on GDP and export which will normalize within one quarter. Exchange rate is the most leading variable by looking at the scale of the graphs and import is the most endogenous which is consistent with the findings from VECM and VDC steps.

The trade openness of a country will depends on the exchange rate of a country. The policymakers will make decision on the export and import of goods and services based on exchange rate because changes in exchange rate will give impact on GDP, import and export as exchange rate is the leader variable.

PERSISTENCE PROFILE (PP)

The persistence profile (PP) deals with effects of system-wide shock in the long run rather than of variable-specific shock as it is done in IRF.

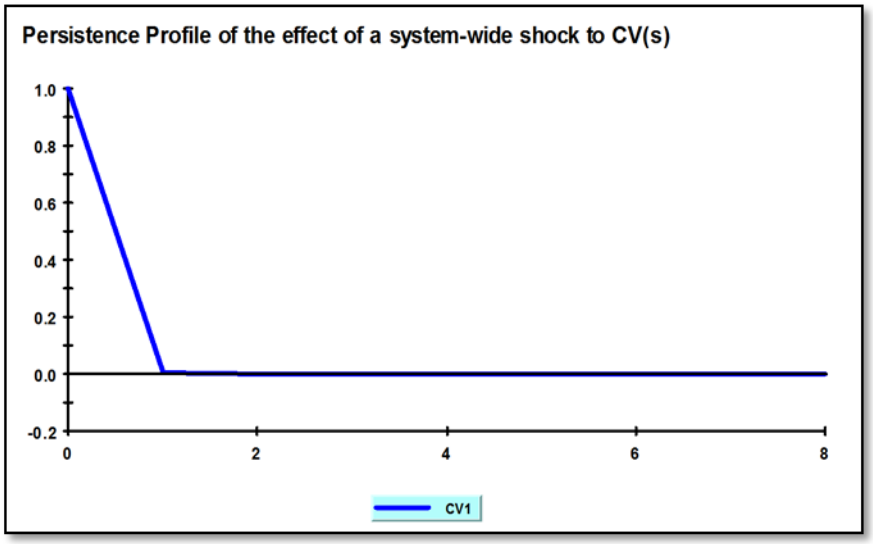

Figure 3. *Persistence profile (PP) of the effect of a system-wide shock to CV*

The results indicate that if the long-term convergence between the variables is disturbed by any shocks, it will take about two quarters to restore the equilibrium.

VI. Conclusions and Policy Implications

This study examines empirically the causal links between export, import, exchange rate and economic growth in Malaysia by conducting multivariate time series. Economic theory suggests that both the export and import sectors can contribute to economic growth. However, most of previous researches have only focused on the role of export sector while ignoring the potential growth contribution of the import sector. This study is concluded to three key findings on the basis of empirical evidence. First, there is bidirectional causal relationship exists between export and economic growth where export leads economic growth and economic growth leads export. This finding confirms the validity of ELG and GLE hypothesis. This finding is equal to the empirical findings of Mah (2005) in case of China.

Secondly, the bidirectional relationship between import and economic growth confirms the validity of ILG and GLI hypothesis. The present empirical result is equal with the earlier findings of Sato and Fukushige (2007) in case of North Korea. Thirdly, the result indicates the bidirectional long-run association between export and import. In summary, the findings from this study confirm that the exclusion of imports and the singular focus on the role of exports as the engine of growth may be misleading. However, the economic growth is the second leader compared to exchange rate which is the most exogenous. It means that, any shock in exchange rate will impact the export, import and economic growth.

The empirical findings are very helpful for trade policymakers. There are several policy implications of this finding in Malaysia and other developing countries. First, export promotion as a strategy for economic growth would only be partially effective if import restrictions are maintained. Second, import openness is very important to economic growth as it complements the role of exports by serving as a supply of intermediate production inputs needed in the export sector. Third, developing economies with limited technological

endowment could benefit from access to foreign technology and knowledge from developed countries via imports. Finally, it is recommended for the future empirical research focusing on the trade and foreign direct investment in stimulating economic growth. It may be useful to extend the analytical framework used in this study to other developing countries.

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