

Original Research Article

REINVESTIGATING THE EXPORT-LED GROWTH EVIDENCE IN MALAYSIA: BOUND TEST APPROACH

Abstract

This paper re-investigates the evidence of Export-Led-Growth Hypothesis by using recent time series techniques known as Bound test or also known as ARDL approach. The data used in this paper is annually data range from 1980 to 2011. By modifying the standard Cobb-Douglas production function, we found out that export play significant role in contributing growth to the Malaysia's economy. Besides, labor and capital are also importance for the development of the nation. We recommend few policies based on the result gain from this paper.

Keywords: Economic Growth, Real Exports, Export-Led Growth Hypothesis, Bound test

1.0 INTRODUCTION

The Export Led Growth Hypothesis (ELGH) postulates that export expansion is one of the main determinants of growth. It holds that the overall growth of countries can be generated not only by increasing the amounts of labor and capital within the economy, but also by expanding exports. According to its advocates, exports can perform as an "engine of growth" (Emilio.J, 2001).

Export led growth hypothesis is among the interesting studies conducted by many researchers previously especially in developing countries where it yield different results.

In Malaysia, Khalafalla and Webb (2001) examine the relationships between exports and economic growth in Malaysia using quaterly data from 1965:Q1until 1996:Q4. They studied relationship for three different periods which are full sample period, the import substitution period (1965:Q1 until 1980:Q4) and export promotion period (1981:Q1 until 1996:Q4). By using cointegration and Granger causality test, they found that ELGH was valid for both full sample and import substitution period (Zulkarnain Yusop et. al., 2005). In another studies, Reinhardt N. (2000) and Mahadevan R. (2007) have similar opinio with orthodox school that supports export led growth hypotheses in Malaysia. Zulkornain et. al in 2005 applied a more comprehensive sample period (1960-2001) and bound testing approach in examining the relationship between growth and exports. It is found that cointegration relationship exist between exports and economic growth in long run which is accordance to Ghatak and Price (1997). The results of ARDL indicates exports and labour force have positive impact on economic growth while imports, exchange rate and the proxy of the financial crisis, have negative influence on growth.

Vohra (2001) find that exports have a positive and significant impact on economic growth by using data from 1973-1993 of India, Pakistan, Philipphines, Malaysia and Thailand. The

results indicates it is important to pursue liberal and free market policy in Malaysia, Philipines and Thailand. Meanwhile India and Pakistan need to avoid employing restrictive and regulatory policies measures.

In the other study, Nasim and Turkhan Ali (2004) reinvestigates export led growth by using cointegration and multivariate granger causality in Pakistan. The results obtained indicates there is unidirectional causality running from exports to output growth. There is no significant causality running from import and export growth. Meanwhile Ullah et. al. (2009) using 1970 – 2008 data, found unidirectional causality between economic growth, exports and imports. In detail, the granger causality results shows GDP does not granger cause Export and Capital Formation while it granger cause real Imports.

In Fiji and Papua New Guinea, Narayan et. al.(2007), applied Bound Test for cointegration to examine evidence for long run relationship between GDP, export and imports. By using granger causality test, exports and imports does granger cause GDP in Fiji while in Papua New Guinea, exports and GDP granger cause Imports. Results of Fiji implies that there is evidence of export led growth in the long run, while for Papua New Guinea, there is evidence for export led growth in the short run.

While in Germany, Stephen Romer (2002), Reiner Franke (2005) and Michael C. Burda (2008) found that the validity of export led growth hypothesis is found especially in manufacturing sector that where innnovation creates Germany Competitive economy in the world eventough there is increase in wage cost.

In South Korea, Samuel Seongsep Kim (2003) and Vitor Trindade (2005) found a strong evidence of ELGH in high value added industries. Lim et. al. (2010) applied Breitung rank test in their analysis between GDP growth and export on Singapore, South Korea and Hong Kong. It is found that Singapore results on cointegration is not supported by Johansen Test, but evidence does exist when Rank Test is used. While for South Korea, there is long run relationship between variables and its fit in both linear and nonlinear form. Whereas for Hongkong, cointegration relationship does not found either linerly or nonlinearly.

Meanwhile a study done by Khawaja and Hiranya (2005) by using Bangladesh quaterly data of from the priod of 1976 until 2003, found a positive long run equilibrium relationships exist between exports and industrial production but there is no evidence of short run causality relationship exist between these two variables.

In China, M. Dutta (2005) found that the engine of growth in China is based on import-led growth but not export led growth. The finding is supported by Tang (2006) where the study shows no long run and short run causality between export expansion and economic growth in China. Where as it is found that economic growth does Granger-cause imports in the short run.

Based on previous findings that has been discussed, different methodology, selection of variables and period of time undertaken with different countries had yield different results of research. Due to this situation, there is a need to reinvestigate export led growth hypothesis (ELGH) in Malaysia and we will adopted Bound testing approach not only for estimating the short run and long run relationship between exports and economic growth but also to explore the relationship between Labor, Capital, exchange rate and import on economic growth for Malaysia from the period of 1980 to 2011 comprising of 32 years.

2.0 THE STANDARD PRODUCTION FUNCTION MODEL

Based on standard Cobb Douglas production function which consist of labor (L) and capital (CP), we introduce new variables such as export (X), import (M), and exchange rate (EXR) as one of the determining variables for output growth (GDP) for Malaysia. In this paper, gross domestic product is represented by the production function as below:-

$$GDP_{it} = f(CP_{it}, L_{it}, X_{it}, M_{it}, EXR_{it}) \text{ ----- (1)}$$

where at period t and country i , GDP refer to gross domestic product, L is labor, CP is capital, E is export, M is import and EXR is exchange rate between Malaysia and US end of period.

To test the stationarity of each variable, we use the log form of the variables. Log transformation can reduce the problem of heteroscedasticity because it compresses the scale in which the variables are measured, thereby reducing a tenfold difference between two values to twofold difference (Gujarati, 1995). The new model will be as follow:-

$$\ln GDP = \alpha_0 + \beta_1 \ln X_{it} + \beta_2 \ln M_{it} + \beta_3 \ln CP_{it} + \beta_4 \ln EXR_{it} + \beta_5 \ln L_{it} + v_{it} + u_{it} \text{ ----- (2)}$$

where $\ln GDP$ is log form for gross domestic product, $\ln X$ is log form for export, $\ln M$ is log form for import, $\ln CP$ is the log for capital and $\ln EXR$ is log form for exchange rates.

Finally, we transform the model into Bound testing approach.

The use of the bounds technique is based on three validations. First, Pesaran *et al.* (2001) advocated the use of the ARDL model for the estimation of level relationships because the model suggests that once the order of the ARDL has been recognised, the relationship can be estimated by OLS. Second, the bounds test allows a mixture of $I(1)$ and $I(0)$ variables as regressors, that is, the order of integration of appropriate variables may not necessarily be the same. Therefore, the ARDL technique has the advantage of not requiring a specific identification of the order of the underlying data. Third, this technique is suitable for small or finite sample size (Pesaran *et al.*, 2001).

Following Pesaran *et al.* (2001), we assemble the vector autoregression (VAR) of order p , denoted VAR (p), for the following model of growth function:

$$Z_t = \mu + \sum_{i=1}^p \beta_i z_{t-i} + \varepsilon_t$$

where z_t is the vector of both x_t and y_t , where y_t is the dependent variable defined as economic growth (GDP), x_t is the vector matrix which represents a set of explanatory variables i.e., FDI, GDI and EXP and t is a time or trend variable. According to Pesaran *et al.* (2001), y_t must be $I(1)$ variable, but the regressor x_t can be either $I(0)$ or $I(1)$. We further developed a vector error correction model (VECM) as follows:

$$\Delta z_t = \mu + \alpha t + \lambda z_{t-1} + \sum_{i=1}^{p-i} \gamma_t \Delta y_{t-i} + \sum_{i=1}^{p-1} \gamma_t \Delta x_{t-i} + \varepsilon_t$$

where Δ is the first-difference operator. The long-run multiplier matrix λ as:

$$\lambda = \begin{bmatrix} \lambda_{YY} & \lambda_{YX} \\ \lambda_{XY} & \lambda_{XX} \end{bmatrix}$$

The diagonal elements of the matrix are unrestricted, so the selected series can be either I(0) or I(1). If $\lambda_{YY} = 0$, then Y is I(1). In contrast, if $\lambda_{YY} < 0$, then Y is I(0).

The VECM procedures described above are imperative in the testing of at most one cointegrating vector between dependent variable y_t and a set of regressors x_t . To derive model, we followed the postulations made by Pesaran *et al.* (2001) in Case III, that is, unrestricted intercepts and no trends. After imposing the restrictions $\lambda_{YY} = 0, \mu \neq 0$ and $\alpha = 0$, the GIE hypothesis function can be stated as the following unrestricted error correction model (UECM):

Final Model of Growth for Malaysia

$$\Delta \text{LnGDP}_t = \beta_0 + \beta_1 \text{LnGDP}_{t-1} + \beta_2 \text{LnX}_{t-1} + \beta_3 \text{LnM}_{t-1} + \beta_4 \text{LnCP}_{t-1} + \beta_5 \text{LnEXR}_{t-1} + \beta_6 \text{LnL}_{t-1} + \sum \beta_7 \text{LnGDP}_{t-1} + \sum \beta_8 \text{LnX}_{t-1} + \sum \beta_9 \text{LnM}_{t-1} + \sum \beta_{10} \text{LnCP}_{t-1} + \sum \beta_{11} \text{LnEXR}_{t-1} + \sum \beta_{11} \text{LnL}_{t-1} + u_t \text{-----}(3)$$

where Δ is the first-difference operator, u_t is a white-noise disturbance term and all variables are expressed in natural logarithms with the symbol of Ln. The above final model also can be viewed as an ARDL of order, (v s r q t w). The model indicates that economic growth in terms of real GDP per capita tends to be influenced and explained by its past values besides the other explanatory variables such as export, import, capital, exchange rate and labor.

The structural lags are determined by using minimum Akaike's information criteria (AIC). From the estimation of UECMs, the long-run elasticities are the coefficient of the one lagged explanatory variable (multiplied by a negative sign) divided by the coefficient of the one lagged dependent variable (Bardsen, 1989). After regression of Equation (3), the Wald test (*F*-statistic) was computed to differentiate the long-run relationship between the concerned variables. The Wald test can be carry out by imposing restrictions on the estimated long-run coefficients of economic growth, inequality, investment and public expenditure.

The null and alternative hypotheses are as follows:

$$H_0 = \beta_1 = \beta_2 = \beta_3 = 0 \text{ (no long-run relationship)}$$

Against the alternative hypothesis

$$H_0 \neq \beta_1 \neq \beta_2 \neq \beta_3 \neq 0 \text{ (a long-run relationship exists)}$$

The computed *F*-statistic value will be evaluated with the critical values tabulated in Table CI (iii) of Pesaran *et al.* (2001). According to these authors, the lower bound critical values

assumed that the explanatory variables x_t are integrated of order zero, or $I(0)$, while the upper bound critical values assumed that x_t are integrated of order one, or $I(1)$. Therefore, if the computed F -statistic is smaller than the lower bound value, then the null hypothesis is not rejected and we conclude that there is no long-run relationship between poverty and its determinants. Conversely, if the computed F -statistic is greater than the upper bound value, then agriculture expenditure and its determinants share a long-run level relationship. On the other hand, if the computed F -statistic falls between the lower and upper bound values, then the results are inconclusive.

The main aim of this model is to verify the export led growth evidence for Malaysia by detecting the positive relationship between export and growth. Furthermore, the model will also test if labor and capital are positively associated with growth in the Malaysia while the import and the exchange rates are negatively correlated with the GDP.

2.1 Sources of Data

The data used in this research paper (GDP, X, M, CP, L and EXR) for Malaysia are collected from various sources such as International Financial Statistical Database from International Monetary Fund (IMF), World Development Indicators and Global Development Finance 2011 from World Bank and UNCTADSTAT database from United Nations Conference on Trade and Development (UNCTAD) that can be access freely from the internet. The sample data used is annual data starting from 1980 up to 2011 comprising 32 years. Data used for GDP is real GDP as a proxy of economic growth, total labor force for Labor (L), nominal export of goods and services for export (X). nominal import of goods and services for import (M), gross fixed capital formation for capital (CP) and national currency per US dollar (end of period) for exchange rate (EXR).

3.0 RESULT AND ANALYSIS

The analysis begins with testing the unit root of every variable for Malaysia. Unit root test such as Dickey-Fuller/augmented Dickey-Fuller (ADF) and the Phillip Perron (PP) test are done to determine the order of integration of the variables. The stationary of the data is run by using Eview7 because it is more users friendly. Table 1 represent the result from the unit root test tested for all variables in the model. Based on DF and ADF, we found out that all variables are stationary at $I(0)$ at level for both no trend and with trend except for Malaysia' labor force (L) where it is stationary at $I(1)$ at level with trend with 10% significant level. At first differences, all variables are found to be stationary at $I(1)$ and mostly significant at 1% level except for the import (M) which significant at only 5% level.. Unit root test is once again tested by more powerful test known as Philipp Perron test (PP). The result show that labor (L) is still stationary at level with trend while other variables show similar result from DF/ADF unit root test. With the dependent variable, GDP is confirmed to be $I(1)$ at first difference while the independent variables shows a mix evidence of $I(0)$ and $I(1)$, therefore, the data meet the requirement to proceed by using Autoregressive Distributed Lags (ARDL) module as suggested by Pesaran (2001) and Narayan (2005).

Table 1: Unit Root Test

Country	DF/ADF Unit Root Test			
Malaysia	Level		First Difference	
	No Trend	With Trend	No Trend	With Trend
LnGDP	-0.904293 (0)	-1.548439 (0)	-6.367700 (0)***	-6.376687 (0)***
LnX	-0.929713 (0)	-0.710066 (0)	-4.669637 (0)***	-4.828945 (0)***
LnM	-0.978687 (0)	-0.950011 (0)	-4.068373 (0)***	-4.047703 (0)**
LnEXR	-1.696547 (0)	-1.736781 (0)	-5.939946 (0)***	-6.020444 (0)***
LnL	0.560866 (0)	-3.450126 (0)*	-4.714615 (0)***	-4.693916 (0)***
LnCP	-1.355367 (0)	-1.850775 (0)	-5.124857 (0)***	-5.051956 (0)***
Malaysia	PP Unit Root Test			
	No Trend	With Trend	No Trend	With Trend
LnGDP	-0.961932 (2)	-1.636923 (3)	-6.342420 (2)***	-6.355625 (2)***
LnX	-0.898216 (2)	-0.710066 (0)	-4.653093 (3)***	-4.830729 (6)***
LnM	-0.978687 (0)	-1.191492 (1)	-4.089000 (2)***	-4.065266 (2)**
LnEXR	-1.667539 (2)	-1.736781 (0)	-5.964379 (3)***	-6.097059 (4)***
LnL	0.503246 (2)	-3.524638 (4)*	-4.714615 (0)***	-4.650235 (1)***
LnCP	-1.355367 (0)	-1.945988 (1)	-5.121956 (2)***	-5.048539 (2)***
Note: (*),(**),(***) indicate significant at 1%,5% and 10% significant level respectively. DF and ADF is run by using Schwarz Info Criterion while PP is run by using Newey West Bandwidth.				

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207 Before we proceed with ARDL testing, we first test for the existence of long run relationship
 208 between the dependent variable and independent variables by using Microfit 4.1. Tables 2
 209 below illustrate the result of F-statistics for Malaysia by setting the lag order equal to 2. The
 210 critical value for both restricted intercept with no trend and restricted intercept with trend
 211 suggested by Narayan (2004) is also shown in the table 2. We used Narayan critical value
 212 table because our data comprised 32 years of observation and it is between the ranges of 30
 213 to 80 as suggested by this author. Based on the result below, the computed F-statistics is
 214 found to be significant at 1% level for Malaysia and larger than the critical value at I(1) for
 215 both restriction categories which are 5.691 (restricted intercept with no trend) and 6.211
 216 (restricted intercept and trend). This condition has proven the existence of long run
 217 relationship between the variables which indicating of a steady-state long run relationship
 218 among economic growth, exports, imports, labor capital, and real exchange rates. Therefore,
 219 the ECM version of the ARDL model is an efficient way in determining the long run
 220 relationship among the variables.

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Table 2: Detecting the Long Run Relationship

Malaysia					
F-Statistic	Significant Level	Bound Testing (restricted intercept and no trend)		Bound Testing (restricted intercept and trend)	
7.5178***		I (0)	I (1)	I (0)	I (1)
	1%	3.976	5.691	4.270	6.211
	5%	2.794	4.148	2.970	4.499
	10%	2.334	3.515	2.457	3.797
Lags=2, k=6 and n=30 (32-2). This bound test statistic based on Narayan 2004					

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224 After detecting the long run relationship for Malaysia, we estimate both short run and long
 225 run model from equation (3) and the maximum order of lag chosen are 2 as suggested by
 226 Pesaran and Shin (1999) and Narayan (2004). From this, the lag length that minimizes
 227 Schwarz Bayesian criterion is selected. The ARDL (2,0,0,0,1,1) model is used for Malaysia.
 228 Before we analyzed the result, it is important to check the robustness of the model by
 229 adopting several diagnostic tests such as Breusch-Godfrey serial correlation LM test, ARCH
 230 test, Jacque-Bera normality test and Ramsey RESET specification test. All the test reveal
 231 that the model has the desired econometric properties, namely, it has a correct functional
 232 form and the model's residuals are serially uncorrelated, normally distributed and
 233 homoscedastic given that the probability value of the t-test are all above than 10% significant
 234 value.

235 The estimated coefficients of the long run relationship between economic growth (GDP) and
 236 the independent variables significant at 1% level except for import (M) which significant at
 237 10% level only. The result showed that the export (X), capital (CP) and labor (LL) have a
 238 positive relationship with the GDP with estimated elasticities of 0.34, 0.13 and 1.09
 239 respectively. This shows that a 1% increase in export (X), capital (CP) and Labor (L) will
 240 result in 0.34 %,).13% and 1.09% increase in the country's GDP. The detection of positive
 241 relation between X and GDP confirm the idea of export led growth for Malaysia. As
 242 anticipated, imports (M) have a negative impact on GDP where an increase in import might
 243 lead to a decrease in international reserve of the country, thereby slowing down the
 244 economic growth or GDP. Over the sample period studied, a 1% increase in M will decrease
 245 the GDP by 0.13%. Next, beside M, exchange rate (EXR) is also found to have a negative
 246 relationship with the GDP and this finding was inconsistent with the previous studies that a
 247 positive relationship should be observed between exchange rate (domestic price of US
 248 currency, RM/USD) and economic growth or GDP. In order words, the depreciation of the
 249 exchange rate will slow down the economic growth. This finding might relate to the series of
 250 economic crisis that occur in Asia from the past 30 years such as Asian Financial Crisis in
 251 1997-1998 and Global Recession in 2008-2009. Previously, the devaluation policy perhaps
 252 can improve the competitiveness of the export (X) in international market in order to stimulate
 253 the economic performance. Somehow, this method also could potentially make a country
 254 worse off in more recent scenario.

Table 3: Analysis of Short Run and Long Run Model

Short Run Coefficient		Long Run Coefficient	
Malaysia/ ARDL(2,0,0,0,1,1)			
Dependent variable: D(LGDP)	Coefficient (Standard Error)	Dependent variable: LGDP	Coefficient (Standard Error)
D(Constant)	-0.64306 (1.0181)	Constant	-0.76262 (1.2110)
ECT _{t-1}	-0.84322 (0.047232)***	LX	0.34807 (0.066015)***
D(LGDP) _{t-1}	-0.12745 (0.051142)**	LM	-0.13237 (0.076736)*
D(LX)	0.29350 (0.057129)***	LCP	0.13126 (0.036180)***
D(LM)	-0.11162 (0.064279)*	LEXR	-0.34060 (0.10899)***
D(LCP)	0.11068 (0.029362)***	LL	1.0930 (0.10899)***
D(LEXR)	-0.026350 (0.026293)		
D(LL)	0.049463 (0.12704)		
Diagnostic Checking			
Serial Correlation ^a			
0.0023598 (0.961)			
Functional Form ^b			
0.10640 (0.744)			
Normality ^c			
1.7273 (0.422)			
Heteroscedasticity			
1.8620 (0.172) ^d			

Note: Dependent variable is D(LGDP) or LGDP. (*),(**),(***) indicate significant at 1%,5% and 10% significant level respectively. ^a Langrange multiplier test of residual; ^bRamsey's RESET test using the square of the fitted values; ^cBased on a test of skwness and kurtosis of residuals; ^dBased on the regression of squared residuals on squared fitted values

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257 The dynamic short run causality among the variables tested are obtained by restricting the
258 coefficient of the variables with its lags equal to zero by using the Wald test. If the null
259 hypothesis of no causality is rejected, then we can concluded that a selected variables used
260 in this model (Granger) can caused the economic growth. From the test reveal in table 3, all
261 explanatory variables are statistically significant at 1%, 5% and 10% significant level except
262 for exchange rate (EXR) and labor (L). This mean that export (X), import (M) and capital (CP)
263 can granger caused the economic growth. Besides, the significant ECT suggest that more
264 than more than 0.84 of the disequilibrium caused by the previous shock will be corrected in
265 the current year and converges back to the long run equilibrium for the country. As a
266 summary, based on the findings of the short run causality test, we concluded that the
267 hypothesis of export-led growth is still valid in the Malaysian economy as there appeared to
268 be a positive relationship and short run causality running from the exports to growth. This
269 study is consistent with the previous studies done by Shah and Yusoff (1990) and Ghatak
270 and Price (1997).

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272 **4.0 CONCLUSION**

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274 This research paper indeed tries to reinvestigate the validity of export led growth hypothesis
275 for Malaysia. By adopting a more recent econometric technique known as Bound test, we
276 proposed our model to investigate the lead of trade and development theory to justify the
277 hypothesis of export led growth for Malaysia. This paper extend the study made by the
278 previous paper (Ghatak and Price, 1997) by including more relevant determinant variables
279 such as labor (L), capital (CP), exchange rate (EXR), import (M) and export (X). In summary,
280 the result show that X,L, and CP has positive impacts on economic growth while M, and EXR
281 has negative impact on growth. Moreover, we also found that the hypothesis of export led
282 growth in the Malaysian economy is supported in both short run and long run. As for policy
283 recommendation, since export (X) seem to be one of the major determinant for Malaysian
284 economy, the government should implement effective macroeconomic policies in stabilizing
285 its trade balance , liberalizing the country's trade and attracting export-oriented foreign direct
286 investment into the country. Besides, the government should ensure there is enough supply
287 of labor and capital in the market given that it would lead to a higher level of economic
288 growth. Last but not least, the government should monitor carefully its exchange rate policy
289 in order to maintain the health of the economy as any movement in the exchange rate may
290 produce undesirable impact towards the economy growth.

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