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Export-led Growth Hypothesis in Malaysia: New Evidence Using Disaggregated Data of Exports

(Hipotesis Eksport Menerajui Pertumbuhan di Malaysia: Bukti Baharu Menggunakan Data Tahap Eksport Disagregat)

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ABSTRACT

Export has been considered as main contributor to economic growth in which also known as export-led growth (ELG) hypothesis. The purpose of this study is to identify the export-led growth nexus in Malaysia. Specifically, this study focuses on disaggregated level of exports such as export of goods and manufactured sectors. By using ARDL co-integration technique for data that covers from 1980 to 2015, the result discovers that exports have positive impact on economic growth, particularly at disaggregated levels of exports namely exports of goods and export of manufactured sectors. This further supports the validation of the export-led growth hypothesis, especially in small, open and dynamic economy like Malaysia. From policy point of view, Malaysia policy makers should give special focus to search for better catalyst of exports promotion strategy to continuously and effectively promote long-term economic growth.

Keywords: Exports; growth; export-led growth (ELG) hypothesis; ARDL; Malaysia

ABSTRAK

Eksport adalah dianggap sebagai penyumbang utama kepada pertumbuhan ekonomi yang mana dikenali juga sebagai hipotesis eksport menerajui pertumbuhan (ELG). Tujuan kajian ini adalah untuk mengkaji hubungan eksport menerajui pertumbuhan di Malaysia. Secara lebih spesifik, kajian ini memberi tumpuan terhadap tahap eksport disagregat seperti eksport barangan dan eksport barangan perkilangan. Dengan menggunakan teknik kointegrasi ARDL untuk data dari tahun 1980 hingga 2015, keputusan kajian mendapati bahawa eksport mempunyai impak positif terhadap pertumbuhan ekonomi, terutamanya pada tingkat eksport disagregat iaitu eksport barangan dan eksport barangan perkilangan. Ini menunjukkan kesahihan hipotesis eksport menerajui pertumbuhan, terutamanya dalam sesebuah ekonomi yang kecil, terbuka dan dinamik seperti Malaysia. Implikasi dasar daripada kajian ini menunjukkan bahawa pembuat dasar di Malaysia perlu memberi tumpuan khusus mencari pemangkin strategi promosi eksport yang lebih baik secara berterusan dan efektif bagi meningkatkan pertumbuhan ekonomi negara dalam jangka panjang.

Kata kunci: Eksport; pertumbuhan; hipotesis eksport menerajui pertumbuhan (ELG); ARDL; Malaysia

INTRODUCTION

Malaysia is a developing country that records a remarkable economic performance compared to other developing countries, especially in the Asia region. The expansion of Malaysian economy is supported by a continuous effort by the government through a prudent development policy. Notably, Malaysian economy is underlying by a resilient external sector, essentially exports that stands strong throughout the economic development process. According to Tang et al. (2015), the relationship between the exports and economic growth in which growth is generated by the expansion of exports sector so called the export-led growth (ELG) hypothesis. Consistent with the definition, countries which adopt an export-led economic development implement export-promotion strategy as a

mechanism to expand their export sector to further boost their economic growth (Allaro 2012). In other words, it is easily understood that the ELG hypothesis refers to an economic postulation that exports is assumed to be a key driving force of economic growth.

The export expansion process throughout the promotion strategies may benefit a country's economy in various perspectives, either directly or as a spillover from the strategy. A country which adopt the export-promotion strategy, (1) promote efficient allocation of resources that leads towards improvement in capacity utilization, (2) utilize the expansion of economies of scale, (3) create demand on labour and increase employment especially in focused sectors such as exports and manufacturing sectors, (4) cultivate sophistication in technology that leads towards greater productivity of labour and total factor productivity, (5) attract productive foreign direct investment in manufacturing sector and finally, (6) reflect a better current account balance towards a healthy economy (Medina-Smith 2001).This vast achievement in implementing the export-promotion strategy have attracted developing countries, like Malaysia to replicate the development strategy model.

In 1980s, Malaysia government has announced one of the most important economic reform programs, which consists of trade liberalizations program. In order to achieve this trade liberalization process, Malaysia has undergone various stages of trade regimes, which inspired Malaysia to shift its policy towards the adoption of export-promotion strategy in late-1970s and further followed in 1985 to the present (Baharumshah & Rashid 1999)[1]. Since the adoption of the export-promotion strategy, export sectors has taken a lead in contributing to the Malaysian economic progress as illustrated in Figure 1. This shows that exports flow and GDP have moved parallelly throughout the sample study. It is also clearly exhibits that exports leads the trend of GDP, with exports acts as main engine of growth.

This demonstrates a sustainable performance of Malaysian economic development, which is driven by a vibrant exports sector as presented in Table 1. The exports sector at aggregated level has recorded a growth of 7.4 percent per annum during 1961–2015 and constitutes a share of more than 100 percent of GDP during year 2000s. In particular, the implementation of the export-promotion strategy has also promoted the disaggregated sectors of export such as manufacturing sector which overtook the contribution of traditional industries that were mainly related to primary commodity sectors such as agriculture and mining, especially in the upstream which are low value-added (Hassan & Murtala 2016). At the peak of high economic growth during the 1990s, the manufacturing sector accounted for over 80 percent of GDP, as displayed in Table 1.

In line with the apprehension, this study generally addresses specific interest in observing the performance of exports towards contributing to Malaysian economic growth that spanning over several main economics events: (1) 1980 – 2015 the development years of the foreign exchange market and financial opening of the country; (2) 1997 – 1998 the financial crisis; (3) 2008 – 2009 the recent global economic crisis and the instability in global commodity prices such as food and oil prices. Several number of studies found the existence of a steady-state long-run relationship between exports and economic growth in Malaysia which confirms the validity of ELG hypothesis (Ahmad 1993; Akter & Bulbul 2017; Al-Yousif 1999; Haseeb et al. 2014; Hashim & Mansur 2014; Ismail et al. 2014; Jimenez & Razmi 2013; Palley 2003; Ridzuan et al. 2014, 2016; Thaker et al. 2013; Thangavelu & Rajaguru 2004). This shows that Malaysian exports flows lead to hasten its economics progress. Nonetheless, there are also findings which exhibited that ELG hypothesis is not valid (Albiman & Suleiman 2016; Hassan & Murtala 2016), implying that exports does not lead to enhance Malaysian economic

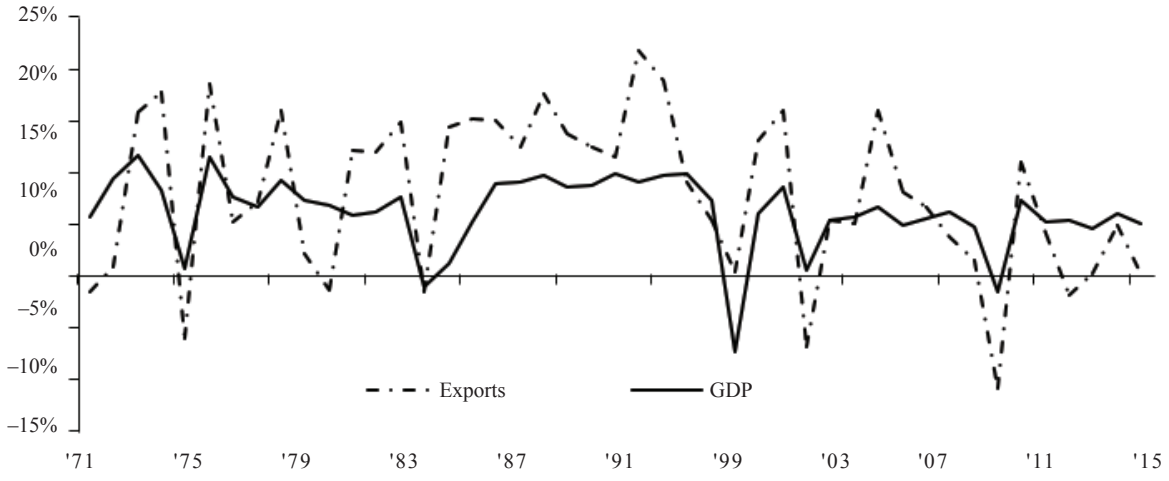

FIGURE 1. Performance of GDP and Exports of Goods and Services, 1971-2015, Growth (%)
Source: Department of Statistics Malaysia

growth. In this regard, the relationship between exports and economics progress poses a number of questions and challenges to policymakers and researchers, specifically on how to measure the effect of export on Malaysian economic growth.

However, the observation of the contribution of export sectors over GDP as presented in Table 1, indicates an increasing trend in which export sectors such as agricultural and industry sectors play a vital role in influencing the exports performance and thereby economic growth. It has been argued that industrialization is attributed to the effective export-oriented strategy that catalyst the success of the policy. This highlights the significance of manufacturing sector in enhancing exports sector contribution in economic progress (Hassan & Murtala 2016). This draw special attention to the importance of diverting form from the conventional approach of quantifying the growth effect of exports to specifically focusing in disaggregated level of exports, which may lead to more important findings. However, to the best of the author's knowledge, up to now, no studies have empirically scrutinized the impact of disaggreggted level of exports on economic growth, especially for the case of small-open-dynamic economies like Malaysia.

Given the limitations of empirical studies on area of ELG hypothesis based on disaggregated level of exports, especially for comparatively small stock of evidence in the region of ASEAN countries, this study seems to be timely to bridge the gap by empirically inspecting the effects of exports on the progress of Malaysian economic growth. The purpose of this study extends the previous studies in numerous aspects. Firstly, while existing study merely focuses on the role of aggregated level of exports on economic growth, this study leads to endeavour by employing disaggregated level of exports data such as exports of goods and exports of manufacturing sectors in conducting the analysis of ELG hypothesis in Malaysia. Secondly, empirical research on ELG hypothesis in Malaysia is limited in nature. In particular, studies that focuses on the effect of disaggregated level of exports on Malaysian economic growth also seemed to be non-existent. Hence, conducting this research with the concern of disaggregated level of exports data may provide further validity on the ELG hypothesis. In addition, one of the benefits of undertaking single country study is the ability to incorporate the special character of particular country. Such study evades the assumption of similarities among countries in terms of social, geography, economic level and politically (Sun et al. 2002). Thirdly, the study period spans over 1980 - 2015. The dataset is sufficiently large, which considers to be more comprehensive and enable to draw robust conclusions. Hence, the findings obtained in this study will bring new dimensions to the set of economics literature in which the estimation process is carried out by incorporating the macroeconomic fundamentals in the form of economic theories and econometric perspectives.

The rest of the paper is structured as follows: The next section reviews some of the relevant past literature. This is followed by the explanation of the model specification, econometric formulation and co-integration analysis. Then, the empirical results obtained from the

TABLE 1. GDP by Expenditure and Production, 1960–2015, % growth

	1960	1970	1980	1990	2000	2010	2015	1961-2015
GDP	n.a.	6.0	7.4	9.0	8.9	7.0	5.0	6.3
By Expenditure								
Consumption	*n.a.*	4.3	12.1	7.9	6.1	5.9	5.7	
	67.0	73.1	69.6	65.6	53.9	60.7	67.2	5.9
Investment	n.a.	28.1	24.7	27.1	26.4	11.0	3.6	
	15.7	20.1	30.5	33.0	25.3	22.4	26.1	7.9
Exports of G&S	*n.a.*	5.0	3.2	17.8	16.1	10.4	0.3	
	64.5	45.8	57.7	74.5	119.8	86.9	70.6	7.4
Imports of G&S	*n.a.*	17.1	20.5	26.3	24.4	15.5	0.8	
	49.0	41.3	55.3	72.4	100.6	71.0	62.9	7.4
By Production								1970–2015
Agriculture	*n.a.*	1.4[2]	1.3	–1.7	6.1	14.4	1.3	
	43.7	32.6	23.0	15.2	8.6	10.1	8.5	2.9
Industry	*n.a.*	8.8	3.6	8.4	10.7	4.9	5.3	
	24.7	30.3	41.8	42.2	48.3	40.5	39.1	5.5
Services	*n.a.*	6.7	23.5	18.5	7.5	5.3	5.5	
	40.9	35.2	18.0	42.6	43.1	49.4	52.4	9.7

Source: World Bank's World Development Indicator Database
Note: Figures in italics are share to GDP (%). G&S represents of goods and services.

econometric analysis are discussed. The final section concludes with the findings and policy implications.

LITERATURE REVIEW

There are numerous dimensions of argument in the literature for the pursuit of an exports-led growth (ELG) hypothesis. As stressed above, ELG provides basis for the empirical studies on the relationship between exports and economic growth. Economies that implement exports expansion strategy could have experience benefit from better capacity utilization to meet up with international demand, exploitation of economies of scale that enhance the level of productivity, and resource allocation according to comparative advantage. Other aspects that may also attribute to the advantages of exports promotion include the technological advancement induced by exposure to international market competition pressure as well as the creation of more job opportunities throughout the labour-surplus economies (Baharumshah & Rashid 1999; Balassa 1978). Michalopoulos and Jay (1973), Michaely (1977), Heller and Porter (1978), Feder (1982) and Chow (1987) are among others that scrutinized the relationship between exports and economic growth, to mention but a few. In general, these cross-sectional studies led to the support of the ELG hypothesis regardless of the various proxies of growth (e.g. GNP, total factor productivity, scale economies and externalities). Others notable works by, Bahmani-Oskooee and Alse (1993), Liu et al. (1997), Afxentiou and Serletis (1992) and Sengupta and Espana (1994) provide positive evidence to further support the ELG hypothesis. For instance, Bahmani-Oskooee and Alse (1993) found that there exists a stable long-run relationship between export and economic growth.

In addition, studies on ELG nexus in Malaysia seem to be scarced and limited. Akter and Bulbul (2017), Haseeb et al. (2014), Hashim and Mansur (2014), Ismail et al. (2014), Ridzuan et al. (2014, 2016), Thaker et al. (2013), Thangavelu and Rajaguru (2004), Lai (2004), Palley (2003), Ibrahim (2002), Al-Yousif (1999), Islam (1998), Doraisami (1996) and Ahmad (1993), among others examined the ELG hypothesis for the case of Malaysia. They discovered that Malaysian exports lead to the eventual enhancement of economic progress and thereby further substantiating the export-led growth strategy. On the other hand, there is also findings that invalidate the ELG hypothesis (Albiman & Suleiman 2016; Hassan & Murtala 2016), implying that export sectors play no role to enhance Malaysian economic growth.

In the same vein, Jimenez and Razmi, (2013), Khalafalla and Webb (2001), Baharumshah and Rashid (1999) Ghatak et. al (1997) focused on trade relations with GDP using total, manufacturing and agricultural exports (or traditional sector of exports – nonfuel primary exports). They found that aggregate exports and manufactured exports contributed significantly to the existing exports and GDP relationship. Meanwhile, they found a significant negative relationship between traditional exports and GDP. This highlights the significance of manufacturing sector in enhancing exports sector contribution in economic progress (Hassan & Murtala 2016).

In short, empirical studies on exports-led growth hypothesis remain limited and no clear conclusion has emerged from all these studies. Arguably, studies that focus on disaggregated level of exports (i.e. export of goods and manufactured sectors) are more likely to validate the existence of the ELG hypothesis. However, as of now, there appear to be no definite empirical evidence to support the view that the ELG hypothesis via disaggregated level of exports. Such evidence is clearly the next logical step towards the evolution of the literature on ELG hypothesis.

RESEARCH METHODOLOGY

EMPIRICAL MODEL

The model employed in this study relies on the conventional ELG hypothesis, which adopted through the developments of the endogenous growth theory. Indeed, the benchmark specification employed in this study is broadly inspired by Ridzuan et al. (2014, 2016), Razmi (2007), Khalafalla and Webb (2001) and Baharumshah and Rashid (1999). Thus, the impact of exports on growth can be derived in a linear specification, which is expressed in three empirical models of export expansion as follows:

$$GDP_t = \alpha_0 + \alpha_1 GFCF_t + \alpha_2 ENR_t + \alpha_3 XGS_t + \alpha_4 REER_t + \varepsilon_t \quad (1)$$

$$GDP_t = \beta_0 + \beta_1 GFCF_t + \beta_2 ENR_t + \beta_3 XGS_t + \beta_4 REER_t + \varepsilon_t \quad (2)$$

$$GDP_t = \theta_0 + \theta_1 GFCF_t + \theta_2 ENR_t + \theta_3 XGS_t + \theta_4 REER_t + \varepsilon_t \quad (3)$$

where GDP is the gross domestic products, GFCF is the gross fixed capital formation, ENR is the secondary school enrolment, which is a proxy for human capital, three measurement of exports expansion are used; XGS is the exports of goods and services, XGD is the exports of goods, XMF is the exports of manufactured goods, REER is the real effective exchange rate, is the disturbance term and *t* refers to time period. All variables are in natural logarithm form. The advantage of a log transformation is that the slope α_i, β_i and θ_i measures the elasticity of the dependent variable with respect to independent variables (Gujarati 2004)heteroscedasticity, autocorrelation, model specification.

The sensitivity of the variables in the ELG model is measured through their parameters. *GFCF* which is a total of investment activities that accumulate spending through the production of goods may lead to boost the development of economics progress. This suggests that an increase in *GFCF* will further stimulate economic growth. As such *GFCF* is expected to be positive sign. Besides, ENR is considered as a complete stage of basic education that may reflect a steady foundation of lifelong learning, in which to provide a quality and skilled labour in inspiring economic progress (The World Bank 2018). Therefore, an improvement in secondary school enrolment reflects an increase in economic growth, implying ENR to be positive sign. In addition, XGS represents the expansion of export sectors in terms of aggregate (total exports of goods and services), while XGD and XMF represents the expansion of export sectors in terms of disaggregate exports (i.e. goods and manufacture sectors). All three hypothetically contributes to the economic activity. Hence, an increase in *XGS*, *XGD* and *XMF* may lead to a better growth, indicating to be expected a positive sign. Moreover, the *REER* measures the value of a Malaysian ringgit (MYR) against a basket of currencies of its main trading partners. An increase in REER reflects an appreciation in MYR, which deteriorates economic growth as exported items become more expensive relative to imports items. So, REER is expected to be negative sign.

ESTIMATION PROCEDURE: ARDL BOUNDS TESTING APPROACH

The autoregressive distributed lag (ARDL) bound test proposed by Pesaran et al. (2001) is utilized to test the ELG hypothesis. This ARDL technique has been widely applied in economics research circle as well as in determining the validity of the ELG hypothesis (Ahmad et al. 2010; Choong et al. 2005; Haseeb et al. 2014; Ismail et al. 2014; Naseem et al. 2010; Ridzuan et al. 2014, 2016, 2018). The technique requires each variables to be (1) stationary at level or integrated at $I(0)$, (2) stationary at first difference or integrated at $I(1)$ or (3) a combination of both integration properties (Pesaran et al. 2001). ARDL co-integration technique identifies co-integrating vectors for each variable in an analytical framework which means every variable is provided with a long-run relationship equation. Once co-integration is identified, the model of vectors is re-parameterized into ECM to produce the long-run and short-run coefficients (Pesaran et al. 2001). It is also well-known that the ARDL bounds test is applicable irrespective of whether the variables' stationarity properties is either purely $I(0)$ or $I(1)$, or mutually co-integrated. This allows to bypass the pre-testing of the integration order of all selected variables throughout the three the models. Besides, the issue of endogeneity is less of a problem. The ARDL model takes sufficient number of lags to capture the data generating process in general to specific modeling framework (Laurenceson & Chai 2003). According to the bounds test procedure, it is essential to model the above equation (1), (2) and (3) as a conditional ARDL as follows:

$$\begin{aligned}\Delta GDP_t = {} & \alpha_0 + \sum_{i=1}^{p}\alpha_1\Delta GDP_{t-i} + \sum_{i=0}^{q}\alpha_2\Delta GFCF_{t-i} \\ & + \sum_{i=0}^{r}\alpha_3\Delta ENR_{t-i} + \sum_{i=0}^{s}\alpha_4\Delta XGS_{t-i} \\ & + \sum_{i=0}^{t}\alpha_5\Delta REER_{t-i} + \alpha_6 GDP_{t-1} \\ & + \alpha_7 GFCF_{t-1} + \alpha_8 ENR_{t-1} + \alpha_9 XGS_{t-1} \\ & + \alpha_{10} REER_{t-1} + \varepsilon_t \end{aligned} \quad (4)$$

$$\begin{aligned}\Delta GDP_t = {} & \beta_0 + \sum_{i=1}^{p}\beta_1\Delta GDP_{t-i} + \sum_{i=0}^{q}\beta_2\Delta GFCF_{t-i} \\ & + \sum_{i=0}^{r}\beta_3\Delta ENR_{t-i} + \sum_{i=0}^{s}\beta_4\Delta XGD_{t-i} \\ & + \sum_{i=0}^{t}\beta_5\Delta REER_{t-i} + \beta_6 GDP_{t-1} \\ & + \beta_7 GFCF_{t-1} + \beta_8 ENR_{t-1} + \beta_9 XGD_{t-1} \\ & + \beta_{10} REER_{t-1} + \varepsilon_t \end{aligned} \quad (5)$$

$$\begin{aligned}\Delta GDP_t = {} & \theta_0 + \sum_{i=1}^{p}\theta_1\Delta GDP_{t-i} + \sum_{i=0}^{q}\theta_2\Delta GFCF_{t-i} \\ & + \sum_{i=0}^{r}\theta_3\Delta ENR_{t-i} + \sum_{i=0}^{s}\theta_4\Delta XMF_{t-i} \\ & + \sum_{i=0}^{t}\theta_5\Delta REER_{t-i} + \theta_6 GDP_{t-1} \\ & + \theta_7 GFCF_{t-1} + \theta_8 ENR_{t-1} + \theta_9 XMF_{t-1} \\ & + \theta_{10} REER_{t-1} + \varepsilon_t \end{aligned} \quad (6)$$

where Δ is first difference operator and ε_t is a white-noise disturbance error term. The first step in conducting the ARDL co-integration technique is to identify a long-run relationship between all variables using the bounds *F*-statistic test. The computation of *F*-statistics is conducted based on the Wald test (*F*-statistic) by imposing restrictions on the estimated long-run coefficients of one period lagged level of the variables equal to zero such that *Ho:* $\alpha_6 = \alpha_7 = \alpha_8 = \alpha_9 = \alpha_{10} = 0$, *Ho:* $\beta_6 = \beta_7 = \beta_8 = \beta_9 = \beta_{10} = 0$ and *Ho:* $\theta_6 = \theta_7 = \theta_8 = \theta_9 = \theta_{10} = 0$, The determination of long-run relationship is made by comparing the computed F-statistic value with the lower bound and upper bound critical values proposed by Narayan (2005), which is suitable for small number of observations ranges from 30 to 80, as opposed to the critical values table proposed by Pesaran et al. (2001) which recommended for a larger sample size. If the computed *F*-statistic is greater than the upper bound critical values, the H_0 is rejected, indicating a long-run relationship exists between variables within the empirical framework. Conversely, if the *F*-statistic is smaller than lower bound critical values, the H_0 is failed to be rejected, thus a long-run relationship does not exist. However, if the computed *F*-statistic is in-between the lower bound and the upper bound critical values, the result of the bound test is said to be inconclusive (Nkoro & Uko 2016)the means and variances are constant and not depending on time. However, most empirical researches have shown

that the constancy of the means and variances are not satisfied in analyzing time series variables. In the event of resolving this problem most cointegration techniques are wrongly applied, estimated, and interpreted. One of these techniques is the Autoregressive Distributed Lag (ARDL. Next, the system optimum autoregressive lag length is selected using minimum Schwartz Bayesian Criterion (SBC), as it is found to perform better than other information criteria in the case of small sample sizes. Once the long-run co-integration relationship has been ascertained, the long-run and short-run parameters of the co-integrating equation then estimated. The long-run co-integration relationship is estimated using the following specification:

$$GDP_t = \alpha_0 + \sum_{i=1}^{p}\alpha_1 GDP_{t-i} + \sum_{i=0}^{q}\alpha_2 GFCF_{t-i} + \sum_{i=0}^{r}\alpha_3 ENR_{t-i} + \sum_{i=0}^{s}\alpha_4 XGS_{t-i} + \sum_{i=0}^{t}\alpha_5 REER_{t-i} + \mu_t \quad (4)$$

$$GDP_t = \beta_0 + \sum_{i=1}^{p}\beta_1 GDP_{t-i} + \sum_{i=0}^{q}\beta_2 GFCF_{t-i} + \sum_{i=0}^{r}\beta_3 ENR_{t-i} + \sum_{i=0}^{s}\beta_4 XGD_{t-i} + \sum_{i=0}^{t}\beta_5 REER_{t-i} + \mu_t \quad (5)$$

$$GDP_t = \theta_0 + \sum_{i=1}^{p}\theta_1 GDP_{t-i} + \sum_{i=0}^{q}\theta_2 GFCF_{t-i} + \sum_{i=0}^{r}\theta_3 ENR_{t-i} + \sum_{i=0}^{s}\theta_4 XMF_{t-i} + \sum_{i=0}^{t}\theta_5 REER_{t-i} + \mu_t \quad (9)$$

Next, the model is re-parameterized into the error correction model (ECM). ECM is derived from ARDL model by utilizing simple linear transformation by integrating short-run adjustment with long-run equilibrium. ECM also produces an error correction term (ECT_{t-1}), which is derived from the error term from the co-integration models. ECT_{t-1} represents the speed of adjustment parameter or feedback effect that exhibits how fast of the disequilibrium is being adjusted. Rule of assessing this term is that a positive coefficient specifies divergence, otherwise specifies convergence. $ECT_{t-1} = 1$ indicates that 100 percent of the adjustment takes place in one period (in this case 1 year) or in other words, a full and instantaneous adjustment takes place in one period, while the $ECT_{t-1} = 0$ implies that there is no adjustment has taken place, in which means that any claim of the existence of a long-run relationship would be illogical (Nkoro & Uko 2016)the means and variances are constant and not depending on time. However, most empirical researches have shown that the constancy of the means and variances are not satisfied in analyzing time series variables. In the event of resolving this problem most cointegration techniques are wrongly applied, estimated, and interpreted. One of these techniques is the Autoregressive Distributed Lag (ARDL. Hence, the speed of adjustment of the imports demand model can be captured through the estimation of the error correction model as expressed below:

$$\Delta GDP_t = \alpha_0 + \sum_{i=1}^{p}\alpha_1 \Delta GDP_{t-i} + \sum_{i=0}^{q}\alpha_2 \Delta GFCF_{t-i} + \sum_{i=0}^{r}\alpha_3 \Delta ENR_{t-i} + \sum_{i=0}^{s}\alpha_4 \Delta XGS_{t-i} + \sum_{i=0}^{t}\alpha_5 \Delta REER_{t-i} + \alpha_6 ECT_{t-1} + \mu_t \quad (10)$$

$$\Delta GDP_t = \beta_0 + \sum_{i=1}^{p}\beta_1 \Delta GDP_{t-i} + \sum_{i=0}^{q}\beta_2 \Delta GFCF_{t-i} + \sum_{i=0}^{r}\beta_3 \Delta ENR_{t-i} + \sum_{i=0}^{s}\beta_4 \Delta XGD_{t-i} + \sum_{i=0}^{t}\beta_5 \Delta REER_{t-i} + \beta_6 ECT_{t-1} + \mu_t \quad (11)$$

$$\Delta GDP_t = \theta_0 + \sum_{i=1}^{p}\theta_1 \Delta GDP_{t-i} + \sum_{i=0}^{q}\theta_2 \Delta GFCF_{t-i} + \sum_{i=0}^{r}\theta_3 \Delta ENR_{t-i} + \sum_{i=0}^{s}\theta_4 \Delta XMF_{t-i} + \sum_{i=0}^{t}\theta_5 \Delta REER_{t-i} + \theta_6 ECT_{t-1} + \mu_t \quad (12)$$

SOURCES OF DATA

The analysis utilizes data with a time frame of 1980 to 2015. Given the specification in equation (1), (2) and (3), the dependent variable of this study is economic growth, which proxy by the GDP. The expansion of exports, being the independent and the interest variable of this study, are proxies by (a) exports of goods and services (G&S), (b) exports of goods (XGD) and (c) exports of manufactured goods (XMF). On the other hand, the other independent variables consist of physical capital, human capital, and exchange rate, in which are proxies by gross fixed capital formation, secondary school enrolment, and real effective exchange rate (REER, 2010 = 100) respectively. The data is collected from the World Development Indicator (WDI) database by the World Bank.

EMPIRICAL RESULTS

Prior to the analysis the long-run co-integration relationship of ELG hypothesis, the unit root test of Augmented Dickey Fuller (1981) (ADF) and Phillips Perron (1988) (PP) tests are conducted to ascertain the stationarity of the variables involved. As discussed in the earlier, one of the important pre-requisites in the estimation of the ARDL model is the variables have to exhibit integration at $I(0)$ or $I(1)$ or a combination of both integration properties. The null hypotheses for both tests are unit root is present or in other words, the variables are non-stationary and vice-versa for the alternative hypotheses. The results of the ADF and PP tests are reported in Table 2.

From the stationarity tests conducted, a combination of $I(0)$ and $I(1)$ are exhibited in this empirical framework. According to the results, GFCF, ENR, XGS, XGD and REER are stationary at first difference or integrated at order 1, $I(1)$. On the other hand, XMF is the only variable that is stationary at level or integrated at $I(0)$. Therefore, all variables passed the pre-requisite for ARDL modelling which requires the variables to be integrated of $I(0)$ or $I(1)$

TABLE 2. Results of Unit Root Test

	ADF		PP	
	With Constant	With Constant & Trend	With Constant	With Constant & Trend
	Level			
GFCF	–1.494	–2.825[c]	–1.475	–2.254
ENR	–1.035	–2.335	–1.049	–2.335
XGS	–2.636[c]	0.457	–2.430[c]	0.386
XGD	–2.106	–0.841	–2.168	–0.910
XMF	–4.089[a]	0.122	–3.739[a]	0.069
REER	–1.234	–1.700	–1.238	–1.983
	First Difference			
GFCF	–4.221[a]	–4.215[b]	–4.154[a]	–4.152[b]
ENR	–6.041[a]	–5.960[a]	–6.041[a]	–5.960[a]
XGS	–4.372[a]	–5.170[a]	–4.347[a]	–5.149[a]
XGD	–4.686[a]	–5.106[a]	–4.538[a]	–4.987[a]
XMF	–1.111	–5.018[a]	–3.678[a]	–4.998[a]
REER	–4.453[a]	–4.371[a]	–4.241[a]	–4.090[b]

Note: All values are *t*-statistics. The null hypothesis is that the series is non-stationary or contains a unit root. The rejection of null hypothesis for both ADF and PP tests are based on the MacKinnon one-sided *p*-values. [c, b] and [a] denote that a *t*-statistics is significant at the 10%, 5% and 1% level of significance, respectively.

or a mixture of both (Pesaran et al., 2001). An additional requirement that allows the employment of ARDL analysis is that none of the variables are integrated at *I*(2) (Nkoro & Uko 2016).

Given that the variables comply with the stationarity requirement of the ARDL bound test approach, the analysis then proceeds with the examination of the ARDL *F*-statistic bound test to determine if a long-run relationship between the dependent and independent variables in each model exist. The result of this test will then determine whether ELG hypothesis is valid in the case of Malaysia. Results for the ARDL *F*-statistics bound test are displayed in Table 3.

The results are estimated by imposing a maximum of four lags on the model and using Schwartz-Bayesian Criterion (SBC) to select the optimum number of lags. Based on the result, the computed *F*-statistic are 10.52, 6.10 and 7.18 for Model *XGS*, Model *XGD* and Model *XMF*, respectively. *F*-statistics values for Model *XGS* and Model *XMF* exhibit greater than the upper bound critical value of 6.37 at 1% significance level while *F*-statistics value for Model *XGD* shows greater than the upper bound critical value of 4.63 at 5% significance level. Therefore, the null hypothesis that no co-integration or long-run relationship is rejected for all models. This indicates that a steady-state long-run relationship exists between GDP and the selected variables, particularly for the main interest variables of this research, which are XGS, XGD and XMF[2].

TABLE 3. Results of ARDL Bounds Test

	F-statistic	
Model XGS	10.52[a]	
Model XGD	6.10[b]	
Model XMF	7.18[a]	
Critical value bounds		
Significance level	Lower bound	Upper bound
10%	2.70	3.84
5%	3.28	4.63
1%	4.59	6.37

Notes: Critical value bounds are based on Case III: unrestricted intercept and no trend with $k = 4$ (Narayan, 2005). [a] and [b] denote that a *F*-statistics is significant at the 1% and 5% level of significance.

Results presented in Table 4 are the long-run coefficient estimates for all models, which are treated as elasticities since the variables are specified in logarithm form, as mentioned earlier. An appealing part of the results is that the interest variables of this analysis, namely XGS, XGD and XMF exhibit expected result in which a statistically significant and positive relationship with GDP is obtained. Results for XGS model indicates that a 1 percent increase in the exports of goods and services in the country leads to the promotion of economic growth by more than 0.85 percent. This signifies that the economy grows simultaneously as the aggregate exports in Malaysia increases. Most of the recent studies also

TABLE 4. Results of ARDL Long-Run Relationship

	Model XGS		Model XGD		Model XMF	
Variable	Coeff.	*t*-stats	Coeff.	*t*-stats	Coeff.	*t*-stats
GFCF	0.210	0.851	0.341[b]	2.481	0.263	1.105
ENR	2.458[a]	3.634	1.505[c]	3.352	2.421 [c]	4.766
XGS	0.859[b]	2.380				
XGD			0.347[c]	3.499		
XMF					0.472[a]	2.117
REER	2.556[b]	3.206	0.650[c]	3.428	2.496[b]	3.023

Note: [c], [b] and [a] denote that a *t*-statistics is significant at the 10%, 5% and 1% level of significance, respectively.

discovered that relationship between aggregate exports and economic growth complies to the ELG hypothesis (Akter & Bulbul 2017; Hashim & Mansur 2014; Ismail et al. 2014; Ridzuan et al. 2014, 2016; Thaker et al. 2013). The relationship between aggregate exports and economic growth in Malaysia can be explained such that, an increase in exports of G&S generates demand in Malaysia, particularly in terms of production of inputs and labours. This is supported by an established of supply chain under the export-oriented industries in Malaysia, whereby production input, are supplied to produce exports products. Therefore, higher demand in production input either local or import, due to increasing exports generates income to supplier firms. As for the labour, since not all industries in Malaysia are fully mechanized, thus there would be an increase in demand of labour for the expansion of production of export-oriented industries as well as supporting firm. Hence, utilization of labour, either blue-collar or white-collar, generates income for the people and stimulates income economic growth.

In addition, exports of goods (XGD) also demonstrate significant and positive effect on economic growth. This suggests that expansion of merchandise exports plays an important role as a technical driver for the expansion of aggregate export growth and hence stimulates economic growth. This result is also supported by most of the recent research using a similar variable (Haseeb et al. 2014; Lim & Ho 2013). Besides, exports of manufactured goods are also found to be positively significant on economic growth, reflecting the development of export-oriented industries to stimulate economic growth. This is supported by the fact that exports of manufactured goods holds an average of 77 percent of total exports of goods during the period of 2010 to 2015. According to Ghatak et al. (1997) manufactured goods of Malaysia appears to significantly contribute to the economic growth since the 1960s. This significance could be explained in the context of manufacturing industry, which involve Malaysia's industrial revolution since 70s, where the electric and electronic (E&E) global value chain leads as a key driver for exports of manufactured goods to further boost the economic growth. A similar result was also obtained from previous study (Ghatak et al. 1997). This indicates that the result strongly identifies that exports is still persistent in contributing to Malaysia's economy in recent years. The results is in an agreement with the hypothesis that Malaysia might possibly be considered as in the intermediate stage of development due to its conformity to the ELG hypothesis, as exports in countries in a higher stage of development do not possess a statistically significant relationship with economic growth (Subasat 2002).

Furthermore, exchange rate which reflects global price competitiveness appears to affect economic growth. Based on the results, REER produces a significant and positive relationship with GDP. However, this result is not isolated because most of the previous studies in ELG hypothesis, which uses exchange rate also produced the same contradictory result (Ridzuan et al. 2014, 2016; Slesman et al. 2017; Thaker et al. 2013). According to the result, a positive sign indicates that an appreciation of MYR against a basket of currencies will enhance economic growth. The growth in economy as a result of currency appreciation is on the grounds that many industries in Malaysia relies on imported input and hence, an appreciation of local currency would mean that the imported input is now relatively cheaper. This leads to a reduction in the cost of production for firms. Such situation is reflected by the fact that almost 85 percent of Malaysia's import by end-use consist of capital, intermediate and import for re-export goods. Therefore, it is evident that an appreciation of the local currency leads to the enhancement of economic growth in relation to production and investment for exports of manufactured goods.

The results also show that the *GFCF* and *ENR* appear to be significant and have a positive relationship with GDP as expected for all three models, XGS, XGD and XMF. This suggest that increases of *GFCF* which constitutes of the structure as well as machinery and equipment including transport and information and communication technology (ICT) equipment (Department of Statistics Malaysia 2016) may lead to better economic progress. Meanwhile, ENR which represents human capital confirms that a population which is well-equipped with knowledge and skills from the basic education will provide a quality and skilled labour to further accelerate the efficacy of the economic development process.

On the other hand, under the dynamic short-run relationship, the ECT is generally measured the speed of adjustment parameter or feedback effect that exhibits how fast the disequilibrium is being adjusted. As a rule of thumb, the ECT value is should be significant and range between –1.0 to 0.0. The results of the ECT values and the short-run coefficient for all three models are displayed in Table 5. The estimated error correction term, *ECTs* appear to be statistically significant and recorded –0.15, –0.52 and –0.28 for Model *XGS, XGD* and *XMF*, respectively. For instance, the Model *XGD* shows that the speed of adjustment towards a long-run equilibrium is 52.0% a year and takes approximately 1.9 years. This indicates that exports of goods require a shorter period to converge towards the economic equilibrium. While for the Model XGS, the speed of adjustment towards a long-run equilibrium is 15.1% a year and takes about 6.6 years, for full adjustment, implying that exports of goods take a longer time to achieve full convergence to long-run equilibrium as compared to the effect of exports of goods. It is therefore likely that the ECM values integrates the short-run adjustment back to the long-run equilibrium, validating the ELG hypothesis is co-integrated and the convergence to the long-run equilibrium is attainable.

TABLE 5. Results of ARDL Short-Run Relationship

	Model XGS		Model XGD		Model XMF	
Variable	Coeff.	*t*-stats	Coeff.	*t*-stats	Coeff.	*t*-stats
GFCF	0.152[c]	11.037	0.206[c]	10.701	0.158[c]	7.273
GFCF(–1)	0.088	1.353	0.114	1.242	0.088	1.044
GFCF(–2)	–0.143[a]	–2.007	–0.163[a]	–2.038	–0.170[a]	–2.055
GFCF(–3)	0.113[b]	3.179	0.112[a]	1.990	0.128[a]	2.140
ENR	0.151[a]	2.299	0.071	0.882	0.021	0.271
ENR(–1)	0.339[b]	3.376	0.075	0.582	0.084	0.781
ENR(–2)	–0.036	–0.351	–0.055	–0.327	–0.056	–0.368
ENR(–3)	–0.296[b]	–2.498	–0.267	–1.466	–0.432	–1.883
	XGS		XGD		XMF	
X~	0.378[c]	10.294	0.177[c]	8.581	0.264[b]	3.323
X~(–1)	0.106	1.425	–0.010	–0.194	0.108	1.825
X~(–2)	–0.141[b]	–2.469	–0.081	–1.080	–0.115	–1.583
X~(–3)	0.144[b]	3.011	0.042	0.767	0.087	1.128
REER	0.233[c]	4.252	0.088	1.362	0.461[c]	4.519
REER(–1)	0.089	1.554	–0.048	–0.400	0.049	0.840
REER(–2)	0.107[b]	2.567	0.176	1.312	–0.035	–0.494
REER(–3)	–0.277	–4.889	–0.278[b]	–3.415	–0.174[c]	–4.036
ECT	–0.151[b]	–2.295	–0.520[b]	–2.186	–0.280[c]	–4.320

Note: [c], [b] and [a] denotes that a *t*-statistics is significant at the 10%, 5% and 1% level of significance, respectively

In order to ascertain the robustness of the models, several diagnostic tests on residuals are adopted to check the reliability of the error correction model for all three models, which is determined through a battery of diagnostic tests such as Breusch-Godfrey serial correlation LM test, ARCH test, Jacque-Bera normality test and Ramsey RESET specification test. The diagnostic tests reveal that all models meet the desired econometric properties, which indicate residuals for all models are serially uncorrelated, homoscedastic variance, exhibit a correct functional form and normally distributed as illustrated in Table 6. Hence, the estimated ELG hypothesis for all three models are sufficient and can be used to construct the subsequent explanation on the behavior of Malaysian economic growth.

In addition, the CUSUM and CUSUMSQ stability test is performed. Figure 2 shows that the plots of CUSUM and CUSUMSQ statistics are well within the critical bounds implying that regressions are stable at the 5 percent significance level.

SUMMARY AND CONCLUSIONS

Concentrating on the disaggregated level of exports such as exports of goods and manufactured goods, this study investigated the export-led-growth (ELG) hypothesis, which is underlie by the impact of exports on economic growth. By employing time series data analysis for small, open and dynamic economy like Malaysia for the time period that covers from 1980 to 2015, three empirical models of export expansion is utilized, namely exports of goods and services, exports of goods and exports of manufactured goods. Based on the standard time series procedures of unit root testing and ARDL co-integration, the results show evidence of economic growth positively

TABLE 6. Diagnostic Test

Test	Model XGS	Model XGD	Model XMF
Serial correlation χ^2: Breusch-Godfrey LM	4.373 (0.067)	10.755 (0.11)	1.449 (0.307)
Heteroscedasticity χ^2: Breusch-Pagan-Godfrey	1.533 (0.273)	0.656 (0.799)	1.626 (0.243)
Functional form χ^2: Ramsey RESET	0.611 (0.561)	1.194 (0.271)	3.016 (0.109)
Normality χ^2: Jarque-Bera	0.224 (0.894)	1.505 (0.471)	0.752 (0.687)

Note: Values in parentheses are *p*-value.

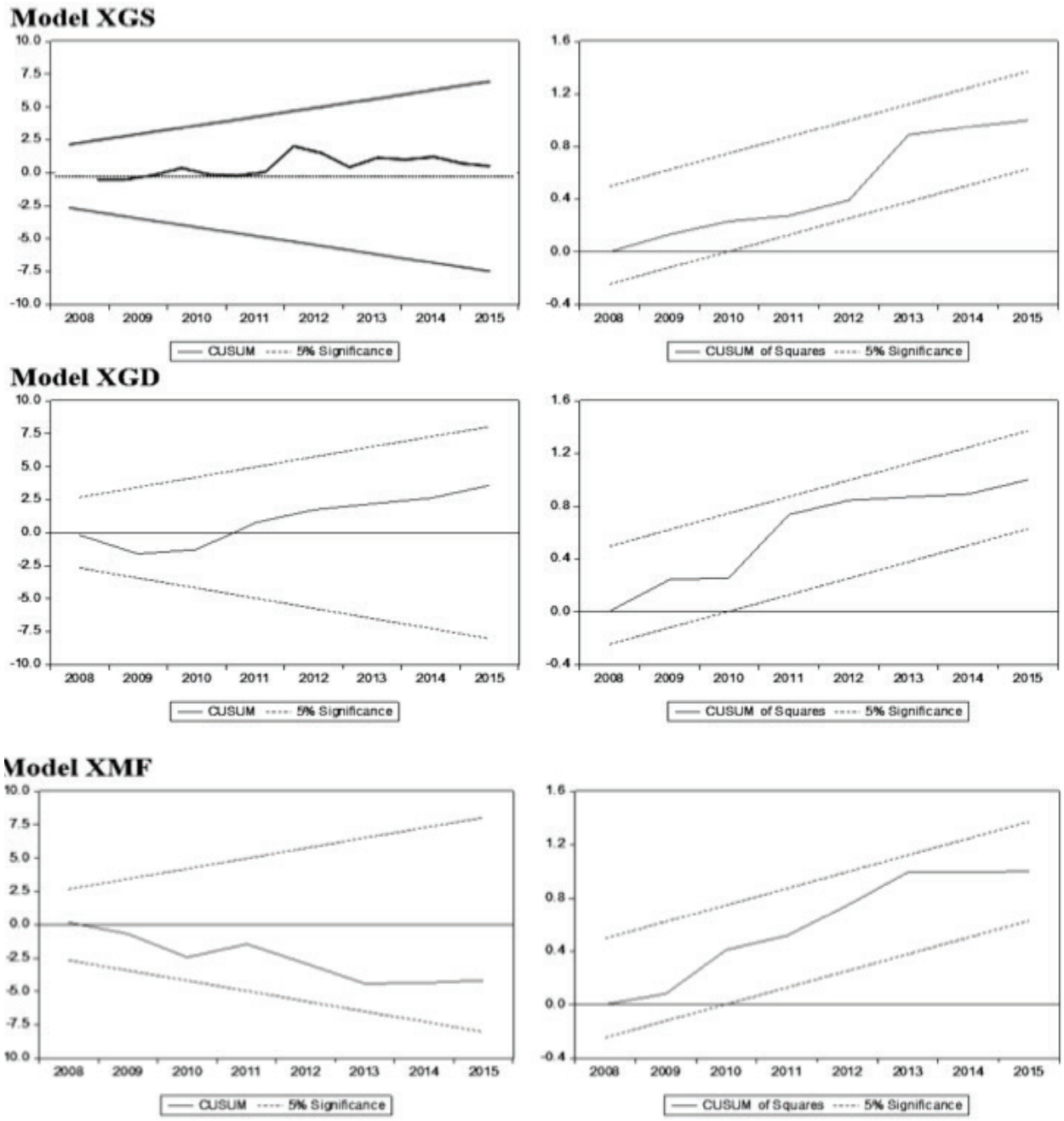

FIGURE 2. Plot of CUSUM and CUSUMSQ

influenced by the export sectors. This means that the expansion of exports, particularly at disaggregated level; exports of goods and exports of manufactured goods exhibit a steady-state long-run relationship with the economic growth.

This finding shows that export expansion strategy may play important role in contributing towards the development of the country's economic growth. This is line with the conventional wisdom that as an open economy that heavily engaged with international trade should further expand cross-border production activities in order to reinforce economic growth. However, due to the uncertainty of global economy and regionalism process, the export-led-growth may not hold as a result of the shirking demand in the international market. Besides, the fluctuation of the exchange rate coupled with episodes of economic crisis, may also adversely affect the performance exports of goods and manufactured goods.

In this respect, policy strategies that geared towards attracting export promotion should be taken with caution given the risk factors whereby excessive emphasize on export expansion strategy may lead to misjudgement by the government on other key factors which likewise could also contribute to the efficacy of growth progress. Hence, the formulation of policies should ensure the

sustainability of future success of Malaysia's export expansion strategy by taking into consideration the continuous efforts to penetrate into new sphere of international market and on the improvement in the quality of productivity via the research and development process. Hence, it is recommended that any growth effect of exports should be more comprehensive, whereby it should complement and not precede policies that are aimed at promoting better infrastructure and/or other macroeconomic policies, which may improve investor's confidence.

In spite of these key findings, some caveats are in order. Beyond the scope of this study, a more exhaustive analysis is to consider other variables that are typically seen as influencing growth. A future effort may also want to explore the specific channels through which exports to industrialized countries impact growth progress. It might also be interesting to further extend the analysis to inspect whether other developing countries behave differently than Malaysia. Future researchers may take this opportunity in order to address this issue.

NOTES

[1] Malaysia had practiced four major phases of industrialization, with import-substitution or export orientation dominating each phase alternatively between 1958 and 2000. The first phase is Import-Substitution I (IS-I) 1958 – 1970, the second phase is Export-Oriented I (EO-I) 1970 - 1980, the third phase is Import-Substitution II (IS-II) 1980 – 1985 and the fourth Export-Oriented 2 (EO2) strategy in 1985 to the present

[2] As a note, this study also conducted analysis on additional disaggregated variables such are (1) exports of services, (2) exports of agricultural goods and (3) exports of mining goods. This analysis also incorporated into the similar model and go through the ARDL bounds test procedure. However, the results are excluded as the results appeared to be no co-integration or an inconclusive decision, which suggested of non-existence of long-run co-integration relationship.

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