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Shadow Economy and Selected Macroeconomic Variables Affecting Economic Growth in Malaysia

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ABSTRACT

This study examines the effects of the shadow economy (SE) and selected macroeconomic variables of the agriculture expenditure (AGRE), foreign direct investment (FDI), tax burden (TB) and tourism (TOR) on the economic growth (EG) in Malaysia over the study period of 1970 to 2020. The auto-regressive distributed lag (ARDL) bounds testing approach is applied to clarify the long-run cointegrating relationship between the EG and its fundamental variables. Simultaneously, the error correction model (ECM) is estimated for the short-run dynamics model in tandem with the long run estimation. Results showed that the effects of the long - and short-run relationships on the EG in Malaysia were verified. From the long-term estimate' results, AGRE, FDI, TOR and SE positively affect the EG in Malaysia. Their increases have led to a rise in the EG. The TB had a negative influence on the EG. The result may help Malaysian policymakers in revising their current policies to strengthen their macroeconomic indicators, which may attract the Malaysian economy with a higher EG status in the future.

INTRODUCTION

Economists have been agreed that economic growth (EG) is one of the most significant macroeconomic goals that a country should achieve and sustain (Haque, 2019). This growth outlines the economic outcome of the total performance of a country over a specific time. Although the EG has several defini-

tions in the literature, it can be defined precisely as the rise in the production of economic goods and services by the nation over a certain period, which may vary from one time to another (Anidiobu et al., 2018). It can be adjusted for inflation to provide an accurate measurement of the real economic activity (Akinsola & Odhiambo, 2017).

The continuation of a true EG may help a government to obtain several economic aspects for citizens, such as a growing social income, improving social life quality, reducing the unemployment level, and providing excellent public services (Ullah & Rauf, 2013). Therefore, the EG is regarded as a concern of the economic policy for all countries worldwide that can be reflected in their Gross Domestic Product (GDP) variations (Chetthamrongchai, et al., 2020). Countries are continuously seeking a vast GDP to achieve sustainable growth (Nworji et al., 2012). As mentioned, every country has its EG rates, which may vary compared to another country over time (Ibrahim, 2015). The unsustainable and low EG rates in developing countries are a big challenge for governments over a long period (Chughtai et al., 2015). Studies on the issue of EG stated that the main reasons for unsustainable and varied growth might include high inflation, augmented external debt, volatility of currency exchange rate, higher consumption but lower savings, fragile governance and ineffective policies, trade deficit, more expenditures than income, shortages of energy and water, instability of political condition, etc. (Anidiobu et al., 2018; Chughtai et al., 2015). This conclusion comes in tandem with other studies that support the feedback of unsustainable growth that may be attributed to former factors (See, for example, studies of Akinsola & Odhiambo, 2017; Alam et al., 2017; and Hertel & Liu, 2019).

Studies have also identified that the EG of a country could be determined by the behaviour of macroeconomics factors that can participate in the official GDP and choose the positioning trend of a country's economy (Chetthamrongchai et al., 2020). The GDP measures the level of economic production within a country's borders, and the growth of a country's GDP is closely related to improving the living standards of a certain country (Chowdhury et al., 2019).

Concerning the existing literature, some issues have been raised. First, studies have been conducted in numerous countries with different socio-economic conditions. Some preliminary results devoted to EG in Malaysia were concentrated mostly on the effects of macroeconomic variables of domestic investment, inflation, trade openness, interest rate, exchange rate, unemployment rate and many other significant factors. However, none of those studies accounted for the considerable effects of the critical factors, such as the agriculture expenditure (AGRE) or asymmetric effect of the tax burden (TB) or the existing shadow economy (SE) in shaping the EG as other sectors. Second, for a country-level analysis, this study's analysis covers a sufficient number (51) of annual observations for the country to produce a piece of full information and reasonable inferences on the Malaysian EG performance for the long term. Lastly, this study will be matched in line with time-series data analysis. Thus, the recent technique of the autoregressive distributed lag (ARDL) approach in investigating the cointegrating long-term association between the EG and its explanatory variables is considered to overcome the limitations of existing literature that employed the traditional regression analysis, which may end with spurious inferences.

Thus, this study explores the effects of foreign direct investment (FDI) and tourism (TOR) on the EG and accounts for different macroeconomic variables that were not previously considered to examine the EG in Malaysia, such as the AGRE, SE and TB for a long period as the current study, which covers the period from 1970 to 2020. This is because the performance of the EG status in Malaysia comes from the long-term performance of an official economy that could be affected by the existence of informal activities and long run variations of macroeconomic policies that affected the growth in the country.

The rest of this paper is structured as follows. Section 1 presents the empirical literature. Section 2 describes the methodology and data used. Section 3 discusses the results obtained from the analysis of data. Section 5 outlines the analysis's findings.

1. LITERATURE EMPIRICAL REVIEW

This section presents the empirical literature that has been conducted by different authors on the economic growth's issue in Malaysia. Many economists' scholars have adopted many macroeconomic

factors that affect EG. This section presents some of the most recent studies that have been conducted on the issue of EG in Malaysia. For example, Tang and Tan (2015) used the ARDL model and Granger causality testing techniques to evaluate the role of domestic direct investment, FDI and exports in the catalysts of EG in Malaysia for 1991Q1–2010Q2. The estimation results showed all three variables positively affected the EG. Specifically, domestic direct investment's growth effect was more stable in the long run than the two other determinants. Nevertheless, this study utilized aggregate data of FDI and ignored the fact that the FDI inflows will not efficiently induce EG. Thus, this study may suffer from aggregation bias, and therefore, its results may not be validated through the many benefits to policymakers. Because of these limitations, Tang and Tan (2018) extended their previous study to assess the contribution of FDI to Malaysia's EG for the period of 2008: Q1–2016: Q3. Their model employed the ARDL bound test because of the mixed-order integration (i.e., variables dealt with the stationary at the level and first difference). They used disaggregated FDI data where the FDI sources were gathered from six regions: North America, Central, South America, Northeast Asia, Southeast Asia, Oceania and Europe. The reported results showed that the EG, domestic investment, FDI, and exports were cointegrated. It also supported their past study that FDI is an essential catalyst for Malaysia's EG. Their research further revealed that the FDI inflows from Northeast Asia, Central and South America, and Oceania while Southeast Asia and North America had more remarkable contributions to Malaysia's EG. These studies only concentrated in one country, and thus, some concerns may arise on whether the results have general significance.

Yacoub and Lestari (2019) used the Engel-Granger causality method to determine the direct effect of FDI and trade on the EGs of the five ASEAN countries including Malaysia. They found that trade openness and FDI were positive and significantly affected the EG of Malaysia and others. Results showed the mentioned variables had a bidirectional effect run towards the Malaysia's EG. However, this result was contrary the results obtained by Rasiah et al. (2017), who found that no relationship run can be observed between FDI and trade openness in Malaysia's case. Their study's difference may be attributed to the political conditions and omitted variables. Vogiatzoglou and Nguyen (2016) studied the effect of FDI, imports and exports on the EG in the short- and long-run for the five ASEAN including Malaysia from 1980 to 2014. The authors analysed all possible causal relationships among variables using the VECM framework. Results indicated that FDI, imports and exports had a positive effect on the EG for both periods for the short- and long-run for Malaysia.

Ridzuan et al.(2016) reinvestigated the validity of the export-led growth (ELG) hypothesis in Four ASEAN countries including Malaysia and its relation to the common effective preferential tariff (CEPT) program. In their study, the analysis utilized the ARDL approach and covered the period of 1980–2011. The results show that export, labour, and capital positively affected EG, while imports and exchange rates harmed the growth. Ridzuan et al. (2016) also found that the ELG hypothesis of ASEAN-4 is supported in the long- and short-run. The structural break of the Asian financial crisis 1997–1998, global recession 2007–2008 and the exchange rate were considered in their study and negatively affected the growth in Malaysia. The negative sign indicates that every 1% increase in the Asian financial crisis will reduce Malaysia's GDP by 0.05%.

Aziz and Azmi (2017) investigated the relationship between Malaysia's EG and factors, namely inflation, FDI and female labour force participation. The analysis covered 1982–2013 and used the ADF and OLS approaches. From the stationarity test analysis, the EG, inflation, FDI and female labour forces were also found to be stationary at levels. Results showed a positive effect on the growth by the factors of the FDI and female labour forces. However, FDI is the only variable that contributed significantly to Malaysia's growth, which may be attributed to the policy changes that affect the Malaysian investment environment during the study period. It may also be attributed to inadequate data for some variables affecting the regression estimation results, which may end with a lack of reliability, precision and convincing. The variable of inflation was also adversely correlated with the EG but was not a significant factor in Malaysia's EG, which may also be because of the policymakers' capacity to restrict inflation.

Rahman and Majidi (2017) examined the effects of oil price, FDI, exports and inflation on Malaysia's EG from 1976 to 2016 by utilizing the Phillip Peron and ADF unit root tests, Granger causality test and Johansen-Juselius of cointegration procedures. Their findings revealed the long-run effect on Malaysia's EG. Although oil prices, FDI and exports had significant implications for Malaysia's growth, no indication

that inflation has a causal relationship with the EG was observed. It was noted that the study ignored more significant variables that may explain and harm the Malaysian EG, such as the development of the financial and banking industry and the expansion of shadow economic activities, which made the results more biased.

Omar and Nor (2020) explored the impact of selected macroeconomic variables of the population, unemployment and export on the EG in Malaysia using quarterly data from 2006 to 2016. The analysis results of the Multiple Linear Regression (MLR) indicated that the population variable was significant and negatively related to EG, while exports positively affect the growth. This study also reported an insignificant relationship that the EG was not affected by unemployment. However, the results were ambiguous because they outlined different findings for the variable of export. The authors documented that export was negatively related to EG in the abstract, which was contrary to their explanation for data analysis and conclusion.

Based on the empirical literature presented and from a country-level analysis, none of these former studies considered the effects of the shadow economy, tax burden and agricultural expenditure on the EG in Malaysia as a separate study.

2. METHODOLOGY AND DATA

In this study, the actual time series econometrics form for the Malaysian economic growth is written as follows:

$$EG_{it} = \alpha_0 + \alpha_1 LogAGREX_{it} + \alpha_2 LogFDI_{it} + \alpha_3 LogSE_{it} + \alpha_4 LogTB_{it} + \alpha_5 LogTOR_{it} + \varepsilon_{it} \quad (1)$$

where EG is the economic growth in Malaysia at time *t*, which was measured by the real ggross domestic product (RGDP) as a dependent variable. AGRE represents the agriculture expenditure at time *t*, FDI is the foreign direct investment at time *t*, SE represents the shadow economy at time t, TB represents the tax burden at time t and TOR represents the contribution of the tourism sector, which is measured by the number of international tourists arrivals to the country at time *t*. ε_t is the white noise, a_0 is constant, and subscript *t* represents the time. As in the terms of time series data analysis, the traditional unit root test by Dickey and Fuller (1979) will be utilized. The bound test of the autoregressive distributive lag model (ARDL) introduced by Pesaran et al. (2001) is used for checking the cointegrating relationship between the EG in Malaysia and its determinants. Thus, the ARDL model is constructed based on the EG model in the form of the unrestricted error correction model (UECM) as follows:

$$\Delta EG_t = \beta_0 + \sum_{i=1}^{n} \beta_{1i} \Delta EG_{t-i} + \sum_{i=0}^{n} \beta_{2i} \Delta AGRE_{t-i} + \sum_{i=0}^{n} \beta_{3i} \Delta FDI_{t-i} + \sum_{i=0}^{n} \beta_{4i} \Delta SE_{t-i} + \sum_{i=0}^{n} \beta_{5i} \Delta TB_{t-i} + \sum_{i=0}^{n} \beta_{6i} \Delta TOR_{t-i} + \delta_7 EG_{t-1} + \delta_8 AGRE_{t-1} + \delta_9 FDI_{t-1} + \delta_{10} SE_{t-1} + \delta_{11} TB_{t-1} + \delta_{12} TOR_{t-1} + \varepsilon_t \quad (2)$$

where Δ stands for the first difference operator, *n* is the order of lagΔEG_t is changes in lagged Growth. β_0 is drift term and ε_t is an error term. All variables were included in their logarithmic forms, except for economic growth. The ARDL model is used to verify the existence of the long-term relationship along with the short-run estimates. Therefore, the short-run dynamics for error correction in the ARDL form are represented by the terms with the summation signs, while the long-run relation is represented by items accompanied by the δ parameter.

ARDL approach applies the Wald test (*F*-statistic) to determine whether the variables either are cointegrated. No cointegration was reported because the null hypothesis stated $H_0 = a_{EG} = a_{AGRE} = a_{FDI} = a_{SE} = a_{TB} = a_{TOR} = 0$ against its alternative that there is cointegra-

tion. In other words, rejection of the null hypothesis indicates that no long-run relationship exists between variables. Conversely, the alternative hypothesis is stated as H_1. At least one $a_x \neq 0$, where x = EG, AGRE, FDI, SE, TB and TOR indicate that the long-run relationship exists if a non-rejection for the null at least one of the independent variables is not equal to nil. The *F*-statistics determine the existence of a long-run relationship, whether to deny or accept H_0.

The null hypothesis H_0 of no cointegration between variables is rejected if the estimated F-statistic exceeds its upper bound critical value as tabulated in Narayan (2005), which concludes that the variables have a long-run cointegrating relationship. However, the H_0 will not be rejected if the estimated F-statistic is smaller than its upper critical value and concludes that the variables do not have long-run cointegration. When the *F*-statistic ranges within two boundaries, it implies the existence of an inconclusive result in the long-run relationship. Once the long-run cointegrated relationship is recognized (first stage), it is necessary to take the following second stage to capture an estimation of the dynamic short-run coefficients ECM of the proposed ARDL EG model. Thus, equation (2) in the ARDL form of the dynamic ECM can be stated as equation (3) as follows:

$$\Delta EG_t = \beta_0 + \sum_{i=1}^{n} \beta_1 \Delta EG_{t-i} + \sum_{i=0}^{n} \beta_2 \Delta AGRE_{t-i} + \sum_{i=0}^{n} \beta_3 \Delta FDI_{t-i} + \sum_{i=0}^{n} \beta_4 \Delta SE_{t-i} + \sum_{i=0}^{n} \beta_5 \Delta TB_{t-i} + \sum_{i=0}^{n} \beta_6 \Delta TOR_{t-i} + \lambda ECM_{t-1} + \nu_t \quad (3)$$

where λ denotes equilibrium velocity change (it ranges to the value of -1, implies the perfect and instantaneous convergence to the value of 0, which implies no convergence), and ECM_{t-1} refers to the error correction term with a one lagged period (ECT), which must be negative, less than one and significant to ensure that the dynamics converge to long-run equilibrium was estimated correctly. The analysis will be extended to the EG model to conduct various statistical diagnostic tests, while the stability procedure is applied using the cumulative sum of recursive residuals (CUSUM) and cumulative sum of recursive residuals squares (CUSUMSQ) as proposed by Brown et al. (1975). The data used are from 1970–2020 and gathered from the World Bank Data indicators except for the SE, which was gathered from Elgin and Oztunali (2012) and Schneider and Medina (2018).

3. EMPIRICAL RESULTS

All the analyzed results obtained from each test of the independent variables to the dependent variable are presented in more details in this section. The results are reported in the appendix.

3.1 Unit root and cointegration tests

To determine the existing stationarity for the selected variables, analysis performed the traditional ADF test proposed by Dickey and Fuller (1979). Table 1 presents the ADF unit root test results, a stationary test that shows the order of integration for the variables by using yearly data from 1970 to 2020 in Malaysia.

Table 1. ADF Test Results

Variables	*T-Statistics (At Level)*	*T-Statistics (At First Difference)*	*Integration Order*
EG	-2.30(2)	-9.05(2)**	I(1)
LAGRE	-2.75(2)	-6.84(2)**	I(1)
LFDI	-5.61(2)	-7.76(2)**	I(1)
LSE	-4.68(2)	-9.77(2)**	I(1)
LTB	-2.80(2)	-7.73(2)**	I(1)
LTOR	-1.37(2)	-8.21(2)**	I(1)

Notes: The lag order selected based on the AIC is the figures in parentheses. ** indicates significance at the 5% level. The test was conducted with intercept and trend.

Source: Calculation by Author

The test results for the level form and the first difference were conducted with only the intercept and the intercept with the trend. The selected optimal lag is shown in brackets next to each line of the test statistics. It can be observed that among all variables, EG, LAGRE, LFDI, LSE, TB and LTOR are not stationary at the level with the I(0) process, but they all are stationary after taking the first difference at the 5% significance level. These former variables are integrated at first order or I(1) process and confirmed that no variable was integrated at the second-order I(2). These findings imply that a stationary series will be given by a linear combination of variables, making it possible to cointegrate (Puatwoe & Piabuo, 2017).

For a cointegrating long run investigation, the comparison between the critical value and the F-statistic was performed. Table 2 shows the result of the bound test for cointegration. The estimated F-statistic of 7.75, which is greater than the upper bound value of the Narayan (2005) table (F > Upper Bound Value) of 4.27 at the 5% significance level. It implies that the null hypothesis of no cointegration is rejected at the 5% significance level and that selected macroeconomic variables and the EG are cointegrated. Hence, the long-run relationship between variables exist.

Table 2. ARDL Cointegration Test Results

Model EG=F(LAGRE, LFDI, LSE, LTB, LTOR)	*Calculated F-Statistic* 7.7**	
	K=5, N=45	
Bounds testing critical values: case III: unrestricted intercept and no trend	I(0)	I(1)
10%	2.458	3.647
5%	2.922	4.268
1%	4.030	5.598

Notes: ** corresponds to the significance level of 5%, while the number of explanatory variables is k. In Narayan (2005), the critical F-statistic boundaries are seen.

Source: *Calculation by Author*

3.2 Long-run, Short-run Estimates and Diagnostic tests

Table 3 of panel A in the Appendix shows the ARDL long-run coefficients of the shadow economy and the selected macroeconomic variables that affect the EG in Malaysia. The long-run elasticity of AGRE is relatively high, with a coefficient of 3.3, which indicates that a 1% increase in Malaysian AGRE will lead to a 33% increase in EG. For every 1% increase in FDI, the EG will increase by 12%. An increase of 1% SE will lead to an increase in EG by 13%, which may be attributed to the shadow economy providing good opportunities to individuals contributing the least to an official economy thereby using their income obtained for official consumption, which enhances the growth. A 1% increase in TB will lead to a 12.4% decrease in the EG. If the level of TOR increases by 1%, the EG will increase by 19.3%. From the estimated model, the result suggests that AGRE, FDI, SE and TOR positively influence Malaysia's EG. However, the TB affected the EG negatively. The AGRE and the rest of the variables have a relatively high leading role in shaping EG in Malaysia at the 5% significance level.

Table 3. ARDL Long Run and Short Run Estimates

Panel A: ARDL (1,5,5,4,5,5) Long- Run Form Estimate								
Constant	LAGRE	LFDI		LSE	LTB	LTOR		
238.38	3.27(3.43)	1.20(2.29)		1.28(2.89)	-1.24(-2.81)	1.93(4.23)		
Panel B: ARDL (1,5,5,4,5,5) Error Correction Form Estimate								
		Lag Order						
Regressors	0	1	2	3	4	5		
ΔEG	-	-1.31(-5.98)						
ΔLAGRE		3.48(0.25)	-0.47(4.00)	-0.31(-1.97)	-0.24(-1.76)	-0.37(-2.80)		
ΔLFDI		0.54(4.48)	0.26(1.57)	0.39(3.86)	0.57(4.47)	058(4.51)		
ΔLSE		-0.59(-0.38)	-8.75(-4.54)	-4.26(-2.28)	3.07(2.02)	-0.59(-0.38)		
ΔLTB		0.16(1.02)	0.24(1.39)	0.12(0.80)	0.43(0.29)	-.40(-2.94)		
ΔLTOR		0.23(3.00)	-0.12(-1.51)	-0.47(-5.38)	-0.21(-2.00)	0.26(3.50)		
Panel C: Diagnostic Test								
ECM (-1)	$\chi^2_{SC}(3)$	$\chi^2_{ff}(5)$	$\chi^2_{H}(1)$	$\chi^2_{N}(5)$	Adj- R^2	CUSUM	CUSUMSQ	
-0.62(7.72)	9.72[0.06]	4.88[0.11]	3.18[0.08]	5.33[0.07]	0.78	Stable	Unstable	

Notes: As in panels A and B, the number in parentheses refers to the t-ratio value. χ^2_{SC} , χ^2_{ff} , χ^2_{H} and χ^2_{N} are Breush-Godfrey Serial Correlation Lagrange Multiplier Tests, Ramsey RESET Test, Heteroskedasticity Test and Normality Test, respectively, in Panel C. These statistics are distributed in the form of chi-square variables with parenthesized degrees of freedom, and in the brackets are the values of probability. At the 5% significance level, the chi-squared critical values with just one degree of freedom are 3.84, 7.82 with three degrees of freedom, and 11.07 with five degrees of freedom. To predict economic growth with a maximum lag of 5, the ARDL cointegration method is applied.

Source: Calculation by Author

Table 3 of panel B in the Appendix reports the short-run ECM results of the shadow economy and other selected macroeconomic variables in affecting the Malaysia's EG. The coefficient of one lag period of the AGRE variable does not affect the growth because it is statistically insignificant. The estimated coefficients from the second to the fifth lagged periods of the AGRE variable are statistically significant at the 5% level. However, they have a negative effect on growth. The variable coefficients of FDI from the first to fifth lagged periods have a positive effect on growth because the coefficients are statistically significant at the 5%. The coefficients from the second to the fourth lagged periods of the SE variable are statistically significant at the 5% significance level and have a different direction effect on the EG. In contrast, the TB coefficients for the second and fifth lagged periods have a different direction influence on the EG and are statistically significant at different significance levels (10% and 5%). The TOR coefficients over the five lagged periods have a positive and negative effect on the EG and are statistically significant at the 10% and the 5% levels.

The findings show that the first lagged period coefficient of the ECT is statistically significant at the 5% level and has its negative sign. The ECT coefficient reflects the speed of correction between the two periods (long- and short-term) towards the equilibrium of the EG and indicates that the current period should correct 62% of the previous period's disequilibrium. It confirms the idea that the selected independent variables and the EG move together or are cointegrated over time. The adjusted R-squared indicates that 78% of the Malaysian's EG variations are attributed to its independent variables. To check the validation of the estimated model, Table 3 of panel C in the Appendix show that the model is free from any statistical problems and was specified correctly.

3.3 Stability Test

Finally, to assess the robustness of the estimated model and evaluate the relationship of short and long-run stability between the shadow economy and other selected macroeconomic variables on the EG,

the structural stability test of the CUSUM and CUSUMSQ tests of Brown et al. (1975) are used. Figures 1 and 2 provide graphical representations of these two tests.

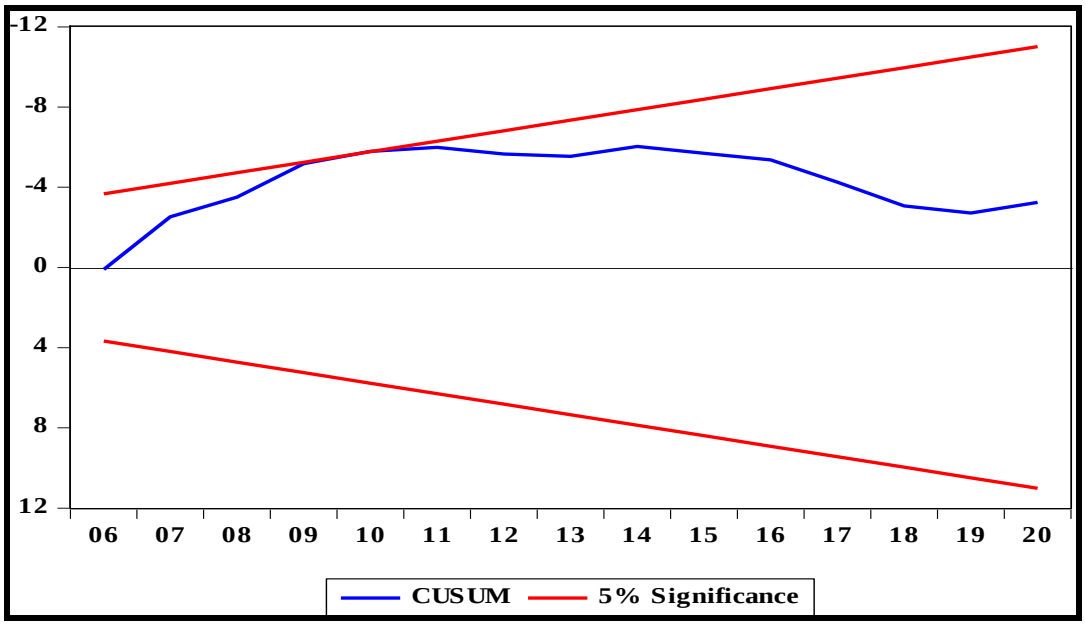

Figure 1. Plot of CUSUM Statistics for Malaysian EG model

Source: Authors' estimation

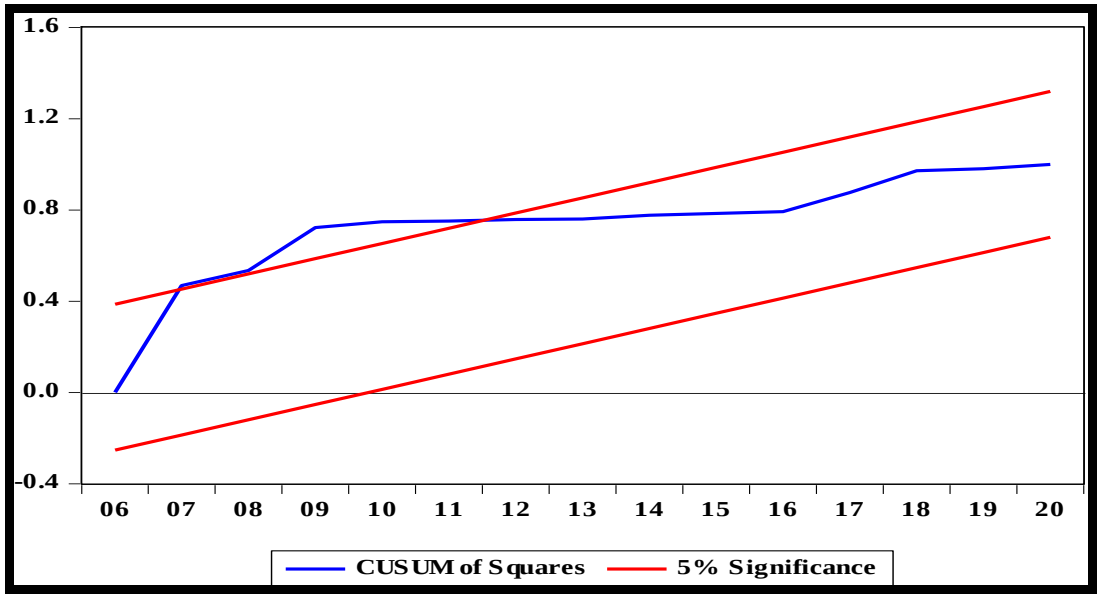

Figure 2. Plot of CUSUMSQ statistics for Malaysian EG model

Source: Authors' estimation

From the results, the plot of CUSUM statistic based on AIC for EG is within the 5% significance level, indicating that the model for Malaysia's EG has long-run stability. Similarly, the plot of CUSUMSQ statistical crosses the lines of the significance level, which means the model has an instability period from 2007 to 2012. The instability may be attributed to the global financial crisis and its persistent effect on

the following periods of the economy. The results of CUSUM and CUSUMSQ may be considered by the policymakers in targeting sustainable growth in the Malaysian economy.

CONCLUSION

This study is conducted to identify the long-run relationship between the EG, which was proxied by the GDP and its explanatory variables of the SE, and other selected macroeconomics variables in Malaysia. This study applied the annual time series data starting from 1970 until 2020. The study used the ADF test for the stationarity analysis and adopted the ARDL bound testing to develop estimation modelling of the EG. The ARDL and ECM approach results verified the existence of the long- and short-run relationships between the EG and its determinants. The long- and short-run showed that all the underlying variables have significantly influenced the EG and can be considered the most important factors that stimulating a higher EG in the country, except for TB which negatively affected the growth.

Although the driving role of the former variables in their relation to the EG in Malaysia, this study provides empirically new evidence for the policymakers in the country to strengthen the EG, thereby supporting the TOR and AGRE sectors. Additionally, although SE plays a significant role in driving the growth in the Malaysian economy, policymakers have to strictly check its negative side on the economy. Results reveal that the tax burden has to be revised to its lower rational rate to boost the demand side of tourism services in the economy, which may last to end up with the enhancement for the EG. To rely on tourism in motivating EG, policymakers should focus on attracting local and international tourists instead of immigrant workers posing as tourists by providing warm hospitality to tourists, designate as a "National Tourism Year", establish a very high-level tourism development and promotion government agency and promote the use of multiple languages among service providers.

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