

## Autoregressive Distributed Lag Model for Determinant of Economic Growth in Malaysia

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**Abstract:** In developing countries, economic growth becomes an important element in ensuring the success and prosperity of the country throughout the year including in Malaysia. However, there must be several important factors that affect economic growth in certain countries. Thus, this study sought to investigate the determinant factors that affect the economic growth of Malaysia. The determinant factors that have been used were foreign direct investment (FDI), life expectancy at birth, total natural resources and exports of goods and services. The data used were taken from the World Bank website for years 1970 until 2017 in Malaysia. The Autoregressive Distributed Lag (ARDL) model was used in estimating the relationship and effect of the determinant factors with economic growth. It was found that the trend for FDI and total natural resources tend to decline over time from 1970 to 2017, except for life expectancy at birth and exports of goods and services. Meanwhile, economic growth seems stable over the selected period (2010 until 2017). The findings also revealed that there is a cointegration relationship between economic growth and life expectancy at birth, FDI, total natural resources and exports. Hence, it is hoped that findings of this study may add to the literature in developing a good macroeconomic environment in the country.

**Keywords:** ARDL Model, Bound Test, Determinant Factors, Economic Growth, Malaysia

### 1 Introduction

Economic growth plays an important role for a country to reduce poverty and improve the quality of life of people in the future. According to BNM [1], Malaysia's economic growth grows moderately by 4.5% in the first quarter of 2019. It is due to the instability of the world economy compared to a strong growth posted in the middle of 2018 that global growth was projected to slow down in 2019 and 2020. However, another opinion from the Minister of Finance Malaysia [2], mentioned that there are many domestic and foreign challenges faced by the Malaysian economy. The major changes are related to policies as well as political developments, partly due to global trade tensions, as well as the shifting of the Malaysian Government's leading role in the country's political arena. According to Laporan Tahunan KPS [3], Malaysia's economic growth risk slows down and remains high due to BREXIT's economic and political uncertainties and a far more modest growth than expected in the Chinese economy which could have a significant spillover effect on global trade activities, investor sentiment and commodity prices.

Recently, Malaysian economy is heavily dependent on exports, as exports have contributed significantly to the country's net income from the 1960s to 2019. According to MIDA [4], Malaysia also has favourable government policies to attract foreign investments such as policies related to export-oriented and pro-foreign economic policies. These policies were enforced by the Malaysian government to enhance Malaysian economy. The process of exporting goods has been slow since recent times by following the closing issue of the 35-day history of the United States (US) government.

In addition, Lee [5] stated that Malaysia's economic outlook reveals that the country is facing an economic growth crisis due to the US-China trade war which has affected China's trade partners including Malaysia. Then, according to Sach and Warner [6], if a country adopts an open economy (globalization) it will inevitably result in a dependence on sources of imports and exports, thus, the country will be at risk of volatility when the world economy recovers.

Previously, there are numerous researchers who explore and investigate the effects of determinant factors on economic growth using data from their countries such as life expectancy [7-9], foreign direct investment (FDI) [10 - 12], natural resources [13, 14] and exports [15]. Meanwhile, in the case of Malaysia, there are also several similar studies which have been conducted such a study by [16, 17] which investigated the effect of consumption expenditure, government expenditure, exchange rate, FDI, exports, external debt and labor force on Malaysia's economic growth. These studies investigated the cointegration and causal relationship between economic growth and their selected determinant factors. Consequently, they have employed models which suit the data. However, these studies used different time period of data. Therefore, this study intends to fill the gap by using most recent data in studying the effects of the determinant factors on economic growth in Malaysia. Thus, the aim of this study is to identify the trend of economic growth and determinant factors from the years 1970 to 2017. Besides, to determine the effect of determinant factors on economic growth in Malaysia and, lastly, to identify the type of relationship between economic growth and determinant factors in Malaysia (long-run, short-run or exists neither in the long-run nor short-run).

## 2 Methodology

Secondary data extracted from the World Bank were used. The variables involved were Gross Domestic Product (GDP) in Malaysia as dependent variable, life expectancy at birth, FDI, total natural resources and exports of goods and services as the determinant factors. Time series data from 1970 to 2017 (annually) were used in this study. Detailed descriptions of the variables are shown in Table 1. As for the dependent variable, GDP, which is measured as the value of real GDP per capita (%), was used as an indicator for economic growth. Unit measurement used for life expectancy at birth was the average number of years of an infant is expected to live with mortality rates at the time of birth remain constant in the future. This represents the overall population's mortality and describes the trend of mortality that occurs across all age groups in a given year. Meanwhile, net inflow (new investment inflows with less disinvestment) in the reporting economy from foreign investors, and is divided by GDP was the unit measurement used for FDI. The unit measurements used for total natural resources and exports of goods and services were in percent of GDP.

Table 1: Variables Description

Variable	Label	Unit of Measurement	Source of Data	Time Period
Economic Growth	GDP	Real GDP per capita(%)	World Bank	1970 – 2017
Life Expectancy at Birth	Life	Average years		
Foreign Direct Investment	FDI	Net inflows (% ofGDP)		
Total Natural Resources	Resources	(% of GDP)		
Exports of Goods and Services	Exports	(% of GDP)		

### A Trend Analysis

Descriptive analysis was used in investigating the existence of time series element in the determinant factors and economic growth. Since the data are annually, therefore, the study would possibly consist of trend and irregular elements. The line chart is used to analyse the trend of those variables. The

analysis is distributed to permit scientists to know historical patterns existing in the variables' datasets.

### **B Autoregressive Distributed Lag (ARDL) Model**

The Autoregressive Distributed Lag (ARDL) model has been used in estimating the relationship between economic variables in a single-equation time series [18]. The ARDL model is useful for predicting and disabling long-term relationships from short-term dynamics. According to Pesaran, Shin and Smith [19], if the variables have different order of integration where the variables are stationary at  $I(0)$ ,  $I(1)$  or mixed between order  $I(0)$  and  $I(1)$ , the ARDL should be used. The general equation of the ARDL model obtained from Stock and Watson [20] is expressed as in Eq. (1). While Eq. (2) shows ARDL model for this study.

$$y_t = \alpha_0 + \alpha_1 y_{t-1} + \alpha_2 y_{t-2} + \dots + \alpha_p y_{t-p} + \theta_1 X_{t-1} + \dots + \theta_2 X_{t-2} + \dots + \theta_q X_{t-q} + u_t \quad (1)$$

$$\begin{aligned} GDP_t = & \alpha_0 + \alpha_1 GDP_{t-1} + \alpha_2 GDP_{t-2} + \dots + \alpha_p GDP_{t-p} + \beta_1 Life_{t-1} + \beta_2 Life_{t-2} \\ & + \dots + \beta_q X_{t-q} + \gamma_1 FDI_{t-1} + \gamma_2 FDI_{t-2} + \dots + \gamma_r FDI_{t-r} + \delta_1 Resources_{t-1} + \\ & \delta_2 Resources_{t-2} + \dots + \delta_s Resources_{t-s} + \theta_1 Exports_{t-1} + \theta_2 Exports_{t-2} + \\ & \dots + \theta_v Exports_{t-v} + u_t \end{aligned} \quad (2)$$

where  $GDP_t$  is the economic growth at time  $t$ ,  $X_t$  are the determinant factors at time  $t$ ,  $a_0$  is constant,  $\beta$ ,  $\gamma$ ,  $\delta$  and  $\theta$  are the coefficients and  $u_t$  is the error term at time  $t$ .

### **C Unit Root Test**

The unit root test was conducted through Dickey-Fuller (DF) or Augmented Dickey-Fuller (ADF) in order to verify the stationarity or order of the variables. Hossain [21] claimed that the ADF test should start from "with trend and intercept". If the series is not stationary, the test should proceed "with intercept but no pattern". Then, if the series are not yet stationary, proceed with "no intercept and no trend". However, if the series is stationary at first ("with trend and intercept"), stop the test and make use of the obtained result. As stated by Dickey and Fuller [22], if the variables are stationary at level, it is known that the variables has integrated at order zero,  $I(0)$  while if the variables are stationary at the first difference, it has integrated at order one  $I(1)$ . The DF test is present in Eq. (3)

$$\Delta y_t = \mu + \beta_{t-1} + \delta y_{t-1} + \varepsilon_t \quad (3)$$

where  $y_t$  is the difference for each variable (GDP, Life, FDI, Resources and Exports) at time  $t$ ,  $t$  is linear time trend  $\mu$  is intercept,  $\beta$  and  $\delta$  are coefficients and  $\varepsilon_t$  is the error term at time  $t$ . If the error terms are serially correlated, the method needs to be modified. The simplest way to do that is to add many lags of dependent variable  $\Delta y_t$  in the Eq. (4). It is to make sure that  $\varepsilon_t$  appears as white noise. The ADF test is based on the following regression,

$$\Delta y_t = \delta + \alpha y_{t-1} + \sum_{j=1}^n \beta_j \Delta y_{t-j} + y_t + u_t \quad (4)$$

where  $\Delta y_t$  is the difference for each variable (GDP, Life, FDI, Resources and Exports) at time  $t$ ,  $t$  is linear time trend,  $\delta$  is intercept,  $\alpha$  and  $\beta$  are coefficients and  $u_t$  is an error term. The null hypothesis of the ADF test is that  $\delta = 0$  indicates a unit root exists in  $y_t$ . The null hypothesis needs to be rejected so that the variable is stationary.

### D Co-Integration Test Using ARDL Model

Following a study done by Nkro and Uko [23], this study used an ARDL approach for cointegration or bound test for a long-run relationship. The ARDL co-integration approach helps to identify the co-integrating variable(s) unlikely to Johansen and Juselius co-integration process. Harris and Sollis [24] revealed that ARDL model approach has some advantages as compared to other co-integration test. It is stated that, ARDL is suitable to use for small sample sizes and the variables have different order of integration. It also generates reliable estimates of the long-run model and produces accurate t-statistics even some of the predictor variables are endogenous. The co-integration test used in ARDL was bound test and it uses the previous estimated Eq. (1). According to studies by Pesaran et al. [19] and Narayan, Sharma, Poon and Westerlund [25], the ARDL method consists of two steps to estimate long-term relationship. Firstly, long-term relationship between the variables in the equations needs to be analyzed whether it is existing under the estimation. Second is to estimate the long-term and short-term coefficients of the same equation. Long-term relationship between the variables is verified by using the following Eq. (5).

$$GDP_t = c + \beta_1 GDP_{t-1} + \beta_2 Life_{t-1} + \beta_3 FDI_{t-1} + \beta_4 Resources_{t-1} + \beta_5 Exports_{t-1} + \varepsilon_t \quad (5)$$

where  $GDP_t$  is economic growth at time  $t$ ,  $c$  is constant,  $\beta$  is the coefficient and  $\varepsilon_t$  is the error term at time  $t$ . The null hypothesis of the cointegration test should be rejected by comparing the F calculated value through the tabular values according to the critical limits (upper and lower limit) suggested by Pesaran et al. [19].

### E Error Correction Model (ECM)

After checking the long-run relationship, error correction model (ECM) needs to be done if there exists a long-run relationship between the variables. The ECM model is used to determine the short run relationship between the variables. It describes the speed of adjustment to bring balance in the dynamic model following a disruption. The ECM coefficient indicates how the variable returns to equilibrium slowly or quickly. In the case here, it should be negative and significant. A study done by Bannerjee, Dolado and Mestre [26] stated that there exists a stable, long-run relationship which is proven by a highly significant value of error correction term. The ECM estimates by using Eq. (6).

$$\begin{aligned} \Delta GDP_t = c + \sum_{i=1}^n \beta_{1i} GDP_{t-k} + \sum_{i=0}^n \beta_{2i} \Delta Life_{it-k} + \sum_{i=0}^n \beta_{3i} \Delta FDI_{it-k} + \\ \sum_{i=0}^n \beta_{4i} \Delta Resources_{it-k} + \sum_{i=0}^n \beta_{5i} \Delta Exports_{it-k} + \sum_{i=1}^n \beta_{6i} ECM_{t-1} + \varepsilon_t \end{aligned} \quad (6)$$

where  $\Delta GDP_t$  is the difference of economic growth at time  $t$ ,  $c$  is constant,  $\beta$  is the coefficient,  $ECM_{t-1}$  is the lagged value of the error term and  $\varepsilon_t$  is the error term at time  $t$ .

### F Pair-Wise Granger Causality Test

This study also used Granger causality test in examining the causal relationship between determinant factors and economic growth in Malaysia. The Granger-causality test with the lag length of  $k$  is based on Eq. (7) and Eq. (8).

$$GDP_t = \alpha_0 + \alpha_1 GDP_{t-1} + \dots + \alpha_k GDP_{t-k} + \beta_1 X_{it-1} + \dots + \beta_k X_{it-k} + \varepsilon_1 \quad (7)$$

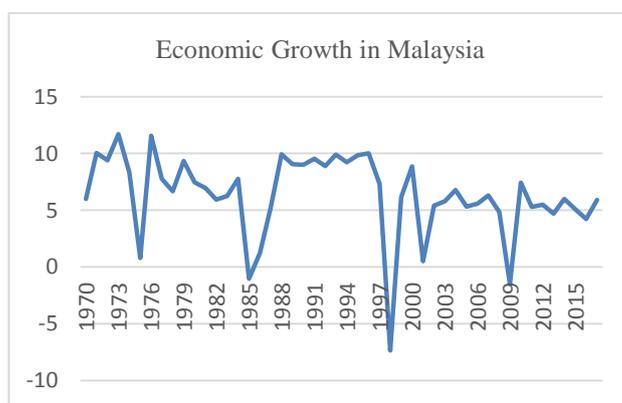
$$X_{it} = \alpha_0 + \alpha_1 X_{it-1} + \dots + \alpha_k X_{it-k} + \beta_1 GDP_{t-1} + \dots + \beta_k GDP_{t-k} + \varepsilon_2 \quad (8)$$

where  $GDP_t$  is Gross Domestic Product (GDP) in Malaysia in the year  $t$ ,  $X_{it}$  is determinant factors and

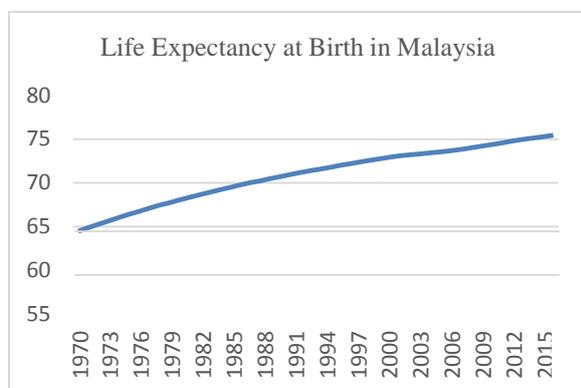
$\alpha$  and  $\beta$  are slope coefficients.

### 3 Results and Discussion

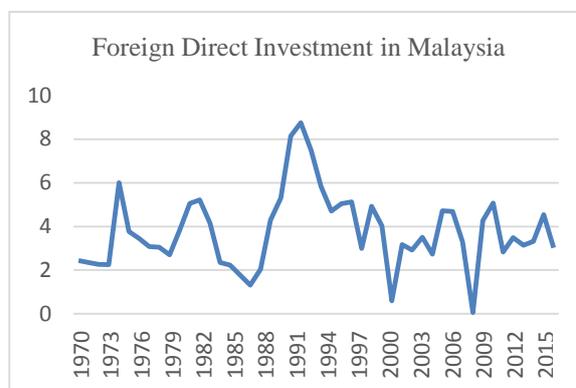
Figure 1 shows the trend plot of each determinant factors and economic growth from the years 1970 until 2017. The data demonstrate a descending pattern as well as an ascending pattern towards the ongoing years. As it can be seen from Figure 1 (b) and 1 (e), the trend of FDI and Resources respectively shows downward trends from the years 1970 until 2017 while the Life and Exports trends seem increasing from the years 1970 until 2017. Trend for the economic growth in Malaysia, which is shown in Figure 1 (a), seems to be stable starting from the years 2010 until 2017 after having a fluctuation in 2009. The other two obvious fluctuations that can be seen from the figure are in years 1985 and 1997.



a) Economic Growth



b) Life Expectancy at Birth



c) Foreign Direct Investment

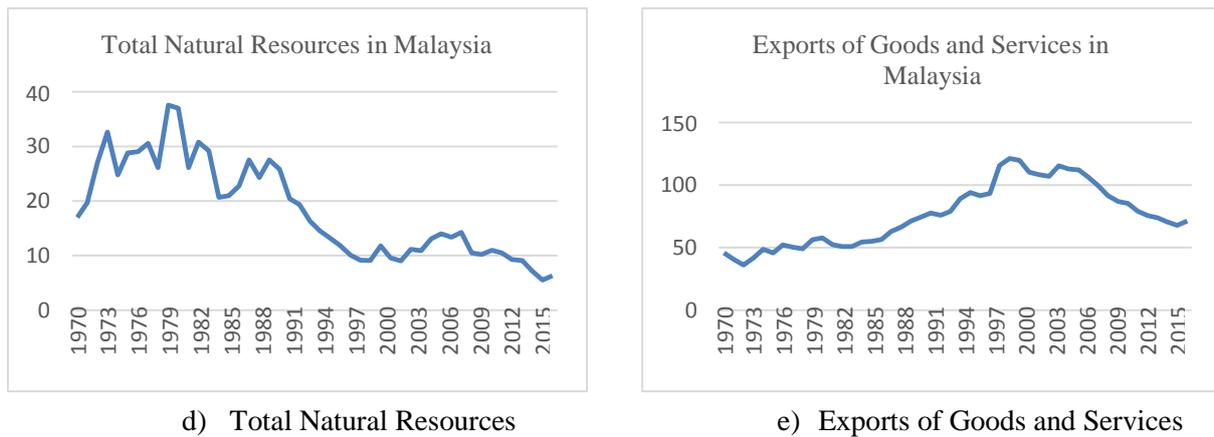


Figure 1: Trend of Determinant Factors and Economic Growth in Malaysia

Table 2 shows the ADF unit root test results for GDP, Life, FDI, Resources and Exports. The null hypothesis of the ADF test is that the series is non-stationary and the level of significance of the ADF statistics for all variables is 5% or less. GDP, Life and FDI variables are found stationary in their levels. While Resources and Exports variables that are non-stationary in its level become stationary at their first difference. It is concluded that all the variables in ADF test are stationary at different level of stationary which indicates that the order of the integration for each of the variables are mixed,  $I(0)$  or  $I(1)$ .

Table 2: Unit Root Test Result (t-statistic) using ADF Method and AIC Selection Criteria

<i>With intercept and trend</i>			
<b>Variable</b>	<b>Level</b>	<b>1<sup>st</sup> Diff</b>	<b><math>I(d)</math></b>
GDP	-6.089044***		$I(0)$
Life	-4.777982***		$I(0)$
FDI	-3.508605**		$I(0)$
Resources	-1.831214	-3.439042*	$I(1)$
Exports	-1.027163	-5.129266***	$I(1)$

Notes on significant test: \*\*\* 1% significant, \*\*5% significant and \*10% significant

Based on Akaike Information Criterion (AIC) selection criteria and maximum lag order of 4 for both dependent and independent variables in the ARDL model, which is automatically calculated by the system, the time lag number determined for each of the variables are four periods for GDP, FDI, and Resources variables, one period for Life and zero period for Resources variable. Therefore, the selected model of ARDL for these variables was ARDL (4, 1,4,4,0). After substituting the coefficient values obtained into the estimated equation, the substituted equation obtained is as Eq. (9) below.

$$\begin{aligned}
 GDP_t = & 85.124 - 0.372_1GDP_{t-1} - 0.538GDP_{t-2} - 0.227GDP_{t-3} - 0.364GDP_{t-4} \\
 & - 47.759Life + 46.847Life_{t-1} + 1.907FDI + 0.357FDI_{t-1} + 1.055FDI_{t-2} + 0.250FDI_{t-3} \\
 & + 0.891FDI_{t-4} + 0.392Re\ sources + 0.335Re\ sources_{t-1} - 0.201Re\ sources_{t-2} \\
 & - 0.335Re\ sources_{t-3} - 0.160Re\ sources_{t-4} - 0.138_1Exports
 \end{aligned} \tag{9}$$

After estimating the ARDL model, the results were obtained as in Table 3. Based on the table, the statistical tests of the regression equation indicate that the estimated model is a good fit model as the coefficient determination value (R-squared) was equal to 0.708. Meaning that, all the explanatory

variables explain about 70.80% of the changes in economic growth. Next, the result indicates that there was a significant relationship between economic growth and determinant factors as the p-value which was equal to 0.001 is less than the alpha value, 0.05 (by default) which resulted in the rejection of null hypothesis. Cointegration was used to describe the long-term stable relationship of the level value of variables and all variables must be stationary by using bound testing.

Table 3: Statistical Test of the ARDL Estimated Model

<b>R-squared</b>	0.708
<b>F-statistic</b>	3.708
<b>Prob(F-statistic)</b>	0.001

Table 4 shows the result of ARDL bound F-test for cointegration relationship. Result shows that the computed F-statistic was 8.0318 that is greater than the upperbound critical value of 4.45 at 5% significant level which indicates there is a long-run cointegration relationship among economic growth and the determinant factors (life expectancy, FDI, total natural resources and exports). Since there is a significant long-run cointegration relationship between the economic growth and the independent variables, estimation of long-run equation has proceeded. The long-run equation is based on Eq. (10).

$$GDP_t = c_1 + c_2 GDP_{t-1} + c_3 Life_{t-1} + c_4 FDI_{t-1} + c_5 Resources_{t-1} + c_6 Exports_{t-1} + e \quad (10)$$

Table 4: Results of Bounds Test for Cointegration

	Critical Value	
	Lower Bound	Upper Bound
<b>Computed F-statistic: 7.097104</b>		
1% significance level	2.638	3.772
5% significance level	3.178	4.45
10% significance level	4.394	5.914

Table 5 shows the long-run estimation results generated from the estimation of the ARDL model. Based on the table, the FDI variable and exports variable have a significant positive effect on the economic growth at a significant level of 5%. The corresponding coefficient value for the foreign direct investment variable is 1.784 which means that if there is a 1% increase in FDI, then it increases the economic growth by 1.78%. As for the exports variable, the corresponding coefficient value for exports is -0.055 which indicates that 1% increase in FDI will slow down economic growth by 0.06%. While at a 5% of significant level, the rest of the variables are not significant on economic growth. Therefore, we can conclude that in the long term, the development of FDI and exports leads to the development of economic growth.

Table 5: The Summary Estimation of Long-Run ARDL Model

Independent Variable	Coefficient	t-Statistic	Probability (p-value)
Life	-0.365	-1.425	0.166
FDI	1.784	8.464	< 0.001
Resources	0.012	0.196	0.846
Exports	-0.055	-3.009	0.006

Therefore, Eq. (10) can be estimated as follows.

$$GDP_t = 85.124 - 2.501 GDP_{t-1} - 0.365 Life_{t-1} + 1.784 FDI_{t-1} + 0.012 Resources_{t-1} - 0.055 Exports_{t-1} \quad (11)$$

After obtaining the long-run equation according to the co-integration model, ECM model is estimated to test the short-run relationship between economic growth and all the independent variables based on the Eq. (12).

$$\begin{aligned}
D(GDP)_t = & c_1 + c_2 D(GDP_{t-1}) + c_3 D(GDP_{t-2}) + c_4 D(GDP_{t-3}) + c_5 D(Life_t) + \\
& c_6 D(FDI_t) + c_7 D(FDI_{t-1}) + c_8 D(FDI_{t-2}) + c_9 D(FDI_{t-3}) + c_{10} D(Resources_t) \\
& + c_{11} D(Resources_{t-1}) + c_{12} D(Resources_{t-2}) + c_{13} D(Resources_{t-3}) + ECM_{t-1} \\
& + E_t
\end{aligned}
\tag{12}$$

where  $ECM_{t-1}$  is the lagged value of the error term in the long-term relationship model. Based on the estimation of the ECM model under the ARDL model and the following result (Eq. 13) is obtained.

$$\begin{aligned}
D(GDP)_t = & 85.124 + 1.129 D(GDP_{t-1}) + 0.591 D(GDP_{t-2}) + 0.364 D(GDP_{t-3}) \\
& - 47.759 D(Life_t) + 1.908 D(FDI_t) - 2.196 D(FDI_{t-1}) - 1.141 D(FDI_{t-2}) \\
& - 0.89 D(FDI_{t-3}) + 0.392 D(Resources_t) + 0.696 D(Resources_{t-1}) \\
& + 0.495 D(Resources_{t-2}) + 0.160 D(Resources_{t-3}) - 2.500 ECM_{t-1}
\end{aligned}
\tag{13}$$

There are two positive significant relationships between foreign direct investment variable and economic growth variable as well as total natural resources variable and economic growth both at a significance level of 5% in the short run. Meanwhile, there is also a negative significant relationship between life expectancy and economic growth. The corresponding coefficient value for foreign direct investment variable is 1.908 which means that if there is a 1% increase in foreign direct investment, then it increases the economic growth by 1.91%. As for the resources variable, the corresponding coefficient value for resources is 0.392 which indicates that 1% increase in foreign direct investment will improve the growth by 0.40%. Meanwhile, the corresponding coefficient value for life expectancy is -47.760 which indicates that 1% increase in foreign direct investment will slow down the growth by 47.76%. While analysing the short-run coefficients, it is pertinent that the adjustment coefficient must be evaluated. Here, the error correction coefficient is significant at a significance level of 5% with a corresponding coefficient -2.50 and p-value 0.000, therefore, if there is a 1% deviation from the long-run equilibrium for growth, the model will adjust itself 2.5% each time period significantly. However, the speed of adjustment at 2.50% seems to be over adjusted or may not be practical and, therefore, it cannot be accepted that the model is a sustainable equilibrium.

Granger causality has been tested through the error correction model to see if the explanatory variables cause the dependent variable. Table 6 shows the Granger causality between life expectancy, FDI, natural resources and exports were run on the ARDL model with the optimal lag of 2. This test is to establish the direction of causal relationship between each independent variables and economic growth. For the test on direction of causal relationship between each independent variables and economic growth, the results show that there is no causal relationship between all independent variables and economic growth since the corresponding  $p$ -values for  $F$ -statistic of causality are bigger at 5% significance level. However, there is only one unidirectional Granger-causality between resources and economic growth since the corresponding  $p$ -value for  $F$ -statistic are bigger at 10% significance level, so the null hypothesis of causality that resources does not Granger-cause GDP could be rejected. This means that an increase in economic growth (GDP) does Granger-cause an increase in the resources.

Table 6: Granger Causality Test

Null Hypothesis	F-Statistic	Probability (p-value)
Life does not Granger Cause GDP	1.6338	0.2076
GDP does not Granger Cause Life	0.0732	0.9296
FDI does not Granger Cause GDP	0.2290	0.7963
GDP does not Granger Cause FDI	0.8723	0.4256
Resources does not Granger Cause GDP	2.7485	0.0758
GDP does not Granger Cause Resources	1.1846	0.3161
Exports does not Granger Cause GDP	1.3446	0.2719
GDP does not Granger Cause Exports	0.4302	0.6533

#### 4 Conclusion

The main purpose of this study is to identify the trend of economic growth and determinant factors and their relationship from the years 1970 to 2017 using ARDL model. Based on the findings, it can be concluded that the trend of FDI and Resources, respectively, shows downward trends from the years 1970 until 2017 while the Life and Exports trends seem to increase from the years 1970 until 2017. As for economic growth in Malaysia trend, it seems to be stable starting from the years 2010 until 2017 after having a fluctuation in 2009. Analysis from unit root test shows that the variables have different levels of stationary, in other words, having a mixed order of integration. It fulfils the requirement to proceed with the bound testing procedure in ARDL model. The result of the bound test shows that there is an existence of a cointegration relationship between Life, FDI, Resources, Exports and economic growth that has an equilibrium condition which keeps them in proportion to each other in the long run. However, only FDI and Exports have a statistically significant impact on economic growth in the long run. On the other hand, a short-run analysis based on ECM model found that there are two positive significant relationships between FDI and economic growth variable as well as Resources and economic growth both at a significance level of 5% in the short run. There is also a negative significant relationship between Life and economic growth. Meanwhile, the findings from the Granger causality test indicate that the causal effects that extend from resources to economic growth is unidirectional at 10% significance level. This finding supports the expectation that resources may lead to economic growth and confirms that policies which promote Resources are important in influencing economic growth. Hence, the results show that there is one-way causality running from Resources to Life only and the others having no causality. To conclude, in this study, economic growth and determinant factors have both long-run and short-run relationships. Hence, it is hoped that with the help of the statistical modelling as proposed in this study, the government is able to develop good macroeconomic environments in the country.

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