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IMPACT OF INFLATION AND INTEREST RATE ON ECONOMIC GROWTH IN SRI LANKA

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Abstract

Every countries are aiming to achieve the national economic goals through the price stability, full employment and price stability. In developing countries like Sri Lanka, socio-economic variables such as inflation and interest rate are seen as major influencers in achieving high economic growth. Using secondary data collected from World Bank Development indicators and Central Bank of Sri Lanka the present study empirically examined the impact of inflation and interest rate on economic growth in Sri Lanka, spanning from 1990 to 2020. The results of the autoregressive distributed lag (ARDL) technique showed that, while interest rate has a substantial negative influence on economic growth in the short term, inflation and interest rates have a statistically significant negative impact on economic growth at the 5% significant level in the long run. However, in the short run, inflation had no effect on economic growth. Additionally, ECT (-1) value of 69.70, demonstrates that the short-term discrepancy in economic growth caused by external shocks will be corrected at a rate of 70% every year after one year and move towards the long-term equilibrium. The causality analysis also demonstrated a one-way causal relationship between interest rates, inflation, and economic growth. Therefore, the government ought to minimize expenses to lower the budget deficit, devise initiatives to increase revenue, and the Central Bank of Sri Lanka ought to formulate effective monetary policies in order to preserve low inflation and stable interest rates in the country.

Key words: Inflation, Interest rate, Unit root test, ARDL Model, Granger Causality, ECM Model

Introduction

The economic condition of a country plays a crucial role in determining its ability to survive and thrive in the global arena. During the financial crisis, many countries experienced the impact of the economic downturn, which was particularly devastating for small economies. As a result, all countries make efforts towards achieving sustainable development as it contributes to the reduction of poverty, advancements in healthcare, longer life spans, improved living standards, the creation of more employment opportunities, lower unemployment rates, and the establishment of political stability, among other positive outcomes. Economic growth is influenced by various macroeconomic variables, with inflation and interest rate being particularly important factors. The research conducted by Priscilla et al. (2021) suggests that the overall economic performance of a country is consistently affected by high inflation and interest rates.

The inflation has a detrimental effect on the growth of the economy. However, in order to stimulate economic growth within a nation, it is necessary for the economy to permit a specific threshold of inflation. By fostering a healthy economy, it not only benefits society as a whole but also aids in the formulation and implementation of effective financial policies. Furthermore, scholars have provided evidence to support the notion that high inflation rates contribute to higher costs, subsequently resulting in a reduction in productive economic activities. This decrease can be attributed to the uncertainty surrounding these variables. Kasidi and Mwakanemela (2013); Singh and Kalirajan (2003); Lopez and Mignon (2011).

The savings-to-investment ratio is influenced by interest rates, which in turn affects the economy due to the imbalance in capital cost (Jelilov et al., 2016). According to Priscilla et al. (2021), increasing inflation specifically contributes to GDP growth, but high inflation can impede economic growth. However, maintaining lower inflation levels in a country can have a positive impact on economic growth and eliminate the possibility of inflationary effects on growth. Wood (1994) suggests that a desire for full employment can lead to an increase in inflation, while reducing the money supply, demand components, and government expenses can help decrease inflation.

When the country realize that inflation is to rise Central Bank rise to its interest rate to control the inflation (Economics Help, 2019). However, an increasing interest rate causes to increase the cost of borrowing which hinder the investment activities consequently slower economic growth due to the lower production. Further the interest rate is a key measure in the financial market which affect the economy as a whole. Also, nominal interest rates and inflation rates are associated each other Babalola et al. (2015) which affect the economic activities in a country therefore needed the management in interest rate. The volume of savings and investments are impartment for the growth of a country which also determine by the interest rate.

Price stability, low unemployment and interest rate are important macroeconomic variables to achieve sustainable economic growth of a country. The research findings of these indicators illustrate complicated such as inflation and interest rate have intensified the economic growth. Anak & Kok (2021); Taderera et al. (2021); Fitriani (2019); Bhat et al. (2016) have found that in the long run, inflation has a positive effect and interest rate has an negative effect. These two variables have a negative effect on economic growth Chughtai et al. (2015), Babalola et al. (2015). Similarly, studies such as Yuliastant et al. (2020), Havi & Enu (2014), Ramlan (2017) show that inflation and interest rates have no effect on economic growth. Thus, although various studies have produced mixed results. Further, the relationship between such variables and economic growth has often been discussed by scholars from various countries. However, very limited research was conducted in Asian developing countries like Sri Lanka. Therefore, the present study try to investigate the relationship between these variables and economic growth in Sri Lanka using time series data from 1990-2020 by applying ARDL approach.

Literature Review

Anak & Kok (2021) used Co-integration, Autoregressive Distributed Lag (ARDL) technics and Toda-Yamamoto Causality approach to investigate the effect of inflation rate, interest rate and unemployment rate on the economic growth of Malaysia. The findings implied that the inflation has a positive impact on economic growth and interest rate has a negative impact on economic growth in long-run. According to Ramya's (2020) study, there is an insignificant negative relationship between GDP and interest rates and a positive insignificance association between inflation and GDP in India. Yuliastant et al. (2020) also found the similar findings in South East Asian countries. Anthony and Oluwabunmi (2020) observed that inflation and real exchange rate negatively impact economic growth, while interest rate and money supply positively impact it. In a study conducted by Nguyen (2021), the threshold between inflation and GDP growth in Vietnam was examined and it was confirmed that inflation has a negative impact on GDP growth.

In their study, Davcev et al. (2018) examined the relationship between inflation, interest rate, and output growth in Bulgaria, Romania, and FYROM by analyzing time series data. Their findings revealed that growth is significantly influenced by both inflation and the interest rate. However, the specific nature of this relationship differs from country to country. The research conducted by Ramlan et al. (2017) in Malaysia revealed that economic growth is positively correlated with the interest rate, but negatively correlated with inflation. The impact of interest rates and inflation on Ghana's economic growth was also empirically studied by Mensah & Okyere (2015). According to their calculation, interest rates have a significant negative impact on economic growth, while inflation has a positive but insignificant impact on economic growth.

Bhat & Laskar (2016) looked into how interest rates and inflation affected India's GDP using the Multiple Linear Regression (MLR) method. A significant and positive association between the variables was found by the study. In a study conducted by Semuel & Nurina (2015), the impact of inflation rate, interest rates, and exchange rates on Indonesia's gross domestic product (GDP) was examined using monthly time series data from June 2005 to December 2013. The findings of the study revealed a significant negative correlation between interest rates and GDP, indicating that higher interest rates negatively affected the GDP. On the other hand, there was a significant positive correlation between exchange rates and GDP, suggesting that higher exchange rates had a positive influence on the GDP. However, inflation did not have a significant impact on the GDP. Danladi (2022) analyzed how inflation affects economic growth in Nigeria using ARDL and considering variables such as GDP, inflation, interest rate, money supply, and government consumption expenditure from 1990 to 2020. The ARDL model findings suggest that inflation, interest rate, and money supply have a notable negative influence on economic growth, while government consumption expenditure has a significant positive influence.

Babalola et al. (2015) investigated the impact of inflation and interest rate on Nigerian economic growth by employing OLS, Johansen cointegration test and Augmented Dickey-Fuller (ADF) test. The study confirmed inflation and interest rate have a negative impact on economic growth during the study period. Saymeh & Orabi (2013) examined the effect of interest rate, inflation rate, and GDP on macroeconomic growth in Jordan over the period 2000-2010. A unit root test was performed to check the integration order of the variables. Johansen cointegration test validated the existence of the relationship among variables. Granger Causality results showed that indirectly causal relationship between only inflation and interest rate.

Methodology of the Study

This study utilized time series data from 1990-2020. The data used for the study was sourced online from the World Bank Development Indicators and Central Bank of Sri Lanka. The data sources are shown in Table 1 below.

Table 1: Data sources and Measurement of Variables

Variables	Measurement	Source
GDP Growth rate	GDP growth (annual %)	WBDI
Inflation	Consumer price index (2010 = 100)	WBDI
Interest rate	Bank Rate (annual %)	CBSL
Unemployment	Unemployment, total (% of total labor force)	WBDI
Budget deficit	Deficit (% GDP)	WBDI
Foreign direct investment	Foreign direct investment, net inflows (% GDP)	WBDI

World Bank Development Indicators (WBDI)
Central Bank of Sri Lanka (CBSL)

Model Specification

$$GDPG_t = \delta_0 + \beta_1 CPI_t + \beta_2 IR_t + \beta_3 UNE_t + \beta_4 BD_t + \beta_5 FDI_t + u_t$$

Where; $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ = Parameters
δ_0 = Intercept
$GDPG_t$ = GDP Growth Rate
CPI_t = Consumer Price Index

IR_t = Interest Rate
UNE_t = Unemployment
BD_t = Budget Deficit
FDI_t = Foreign Direct Investment
u_t = Error Term

Unit Root Test (ADF)

Since macroeconomic variables are not always stationary, this leads to inaccurate or misleading estimates when conducting empirical analyzes (Keorite & Mubarak, 2016). Therefore, it is important to conduct stationarity tests of variables to measure accurate results and select an appropriate study model. Therefore, this study conducted the Augmented Dickey-Fuller (ADF) unit test to determine the stationarity of the variables.

ARDL Model

Autoregressive Distributed Lag (ARDL) model is employed to determine the existence of a cointegration relationship among the variables in the short-run and long-run. ARDL technique often suitable for small sample sizes (Demirhan, 2020; Pesaran et al., 2001). The following mathematical representation of the ARDL model concerning the variables is presented below in equation (1).

$$\mathbf{\Delta GDPG_t = \delta_1 GDPG_{t-1} + \delta_2 CPI_{t-1} + \delta_3 IR_{t-1}\delta_3 + \delta_4 UNE_{t-1} + \delta_5 BD_{t-1} + \delta_6 FDI_{t-1} + \sum_{i=0}^{q} \beta 1i\, \Delta GDPG_{t-1} + \sum_{i=0}^{q} \beta 2i\, \Delta CPI_{t-1} + \sum_{i=0}^{q} \beta 3i\, \Delta IR_{t-1} + \sum_{i=0}^{q} \beta 4i\, \Delta UNE_{t-1} + \sum_{i=0}^{q} \beta 5i\, \Delta BD_{t-1} + \sum_{i=0}^{q} \beta 6i\, \Delta FDI_{t-1} + U_t} \quad \text{……(1)}$$

$GDPG_t$ = GDP Growth Rate
CPI_t = Consumer Price Index
IR_t = Interest Rate
UNE_t = Unemployment
BD_t = Budget Deficit
FDI_t = Foreign Direct Investment
Δ =The differentiation operator
δ_0 = Constant
U_t = Error Term
$\delta_1 \rightarrow \delta_3$ = variables Long-run coefficients
$\beta_1 \rightarrow \beta_3$ = variables short-run coefficients

Following the long-run relationship equation (1), the short-run dynamic relationship among the dependent and independent variables is tested by estimating an ARDL-error correction model which expressed by the equation (2).

$$\mathbf{\Delta GDPG_t = \delta_0 + \sum_{i=0}^{q} \beta 1i\, \Delta GDPG_{t-1} + \sum_{i=0}^{q} \beta 2i\, \Delta CPI_{t-1} + \sum_{i=0}^{q} \beta 3i\, \Delta IR_{t-1} + \sum_{i=0}^{q} \beta 4i\, \Delta UNE_{t-1} + \sum_{i=0}^{q} \beta 5i\, \Delta BD_{t-1} + \sum_{i=0}^{q} \beta 6i\, \Delta FDI_{t-1} + \lambda ECT_{t-1}} \quad \text{……(2)}$$

$GDPG_t$ = GDP Growth Rate
CPI_t = Consumer Price Index
IR_t = Interest Rate
UNE_t = Unemployment
BD_t = Budget Deficit
FDI_t = Foreign Direct Investment

δ_0 = Constant
λ = Speed of adjustment parameter with a negative sign
ECT_{t-1} = Error correction term
$\beta_1 \rightarrow \beta_3$ = Independent variables short-run coefficients

Granger Causality

Although regression analysis deals with the dependence of one variable on the other variables, it does not necessarily, imply causation (Gujarati, 2012). The Granger causality test is used to determine the causality between the variables considered for the study.

Empirical Results and Discussion

Order of Integration and Cointegration test results

Tables 2 shows the findings of unit root tests for variables at the level and the first difference with an intercept using the Augmented Dickey-Fuller test (ADF).

Table 2: ADF Unit root test Results

Variables	ADF Test (Constant Only)		
	Level	1st Difference	Conclusion
GDPG	0.2626	0.0000***	I(1)
CPI	1.0000	0.0182**	I(1)
IR	0.0979*	0.0000***	I(0)
UNE	0.0227**	0.0038***	I(0)
BD	0.0407**	0.0010***	I(0)
FDI	0.0011***	0.0000***	I(0)
H_0=Variable has a unit root			
H_1=Variable has no unit root			

Source: Prepared by researchers based on Eviews 10, 2023

Note: *, **, *** indicate significance at 1 percent, 5 percent, and 10 percent.

As shown in Table 2, based on the results of the unit root test, variables such as GDP growth rate (GDP) and inflation rate (INF) are stationary at first difference I(1) and unemployment rate (UNE), interest rate (IR), budget deficit (BD), and foreign direct investment (FDI) are shown to be stationary at the level I(0). Consequently, the ARDL model has been chosen to this study since the dependent variable is fixed in first difference and the other variables are fixed in level and first difference.

The Optimal Leg Length Test

Selecting the optimal lag is a crucial step when dealing with time series data. The optimal lag length selection is explained by Table 3 based on VAR test results for the variables of GDPG, INF, IR, UNE, BD, and FDI.

Table 3 Leg length Selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-256.4969	NA	2.933334	18.10324	18.38613	18.19184
1	-112.1231	219.0499*	0.001765*	10.62918	12.60940*	11.24936*
2	-74.63796	41.36295	0.002267	10.52676*	14.20431	11.67852

Source: Prepared by researcher based on Eviews 10, 2023

According to the optimum Lag length Selection, the LR, FPE, SC and HQ criteria suggest that one period of delay can be included in the VAR model as the optimal period, while the AIC qualification specifies that two periods of delay can be included in the VAR model as the optimal period. The VAR model's suggested one lag was used to estimate the ARDL model, and Figure 1 shows how the AIC eligibility criteria were used to determine the appropriate lag level for each variable.

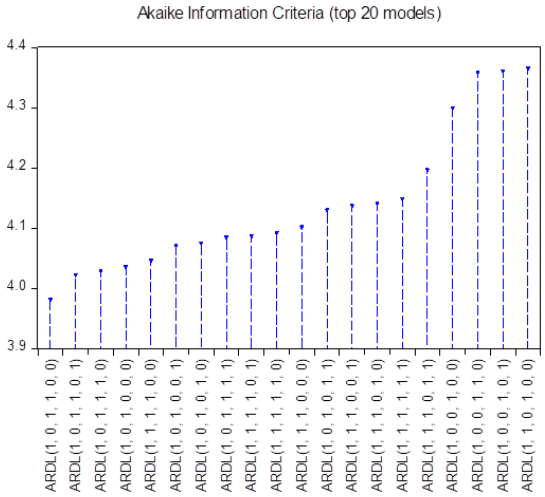

Figure 1. The Optimal Lag Length Period

Source: Prepared by researchers based on Eviews 10, 2023

As explain in Figure 2, the ARDL model has chosen lag length periods of 1, 0, 1, 1, 0, 0, for the variables GDPG, INF, IR, UNE, BD and FDI. Additionally, this demonstrates how the optimal lag period is selected based on the criteria that yields the lowest number.

ARDL Long-run Relationship

In order to test the existence of a long-term relationship between the independent variable (inflation, interest rate, unemployment, budget deficit, foreign direct investment) and the dependent variables (GDPG), F the statistic is calculated, and Table 4 shows the results of the Bound test of the ARDL model.

In order to test the existence of a long-term relationship between the independent variable (inflation, interest rate, unemployment, budget deficit, foreign direct investment) and the dependent variable (GDPG), F statistic is calculated. Table 4 shows the results of the Bound test of the ARDL model.

Table 4 Result of ARDL-Bound Test

ARDL Bounds Test					
Dependent Variable: GDPG, ARDL (1, 0, 1, 1, 0, 0)					
Test Statistic	Value	Significance	I(0) Bound	I(1) Bound	Decision
F- Statistic	7.673	10%	2.08	3	Cointegration
K		5%	2.39	3.38	Exist

Source: Prepared by researchers based on Eviews 10, 2023

The long-run relationship among variables, using the ARDL-Bound test, was established through F-statistics and critical values comparison. ARDL-Bound test result for the model in equation (1) can be found in Table 4. The

results show that the F-statistic of 7.673 exceeds the upper bound set for a significance level of 5 percent. This result strongly suggests that there is a lasting relationship among the variables.

Table 5 Result of ARDL-Bound Test of Long-run Relationship

ARDL Bounds Test Long Run Coefficients ARDL (1,0,1,1,0,0), Dependent Variable: GDPG, Time Period: 1990-2020			
Variables	**Coefficient**	**t – Statistic**	**P- Value**
CPI	-0.046802	-2.537603	0.0192**
IR	-0.596116	-2.376827	0.0270**
UNE	-0.474201	-2.391809	0.0262**
BD	88.84643	3.417540	0.0026**
FDI	0.196882	0.270564	0.7894

Source: Prepared by researchers based on Eviews 10, 2023

Note: *, **, *** indicate significance at 1 percent, 5 percent, and 10 percent.

According to the findings from the above Table 5, it was observed that inflation had a significant and negative impact on economic growth. The coefficient value of -0.046802 shows that there is an inverse relationship between inflation and economic growth in the long-term. This means that a 1 percent improvement in inflation will correspond to a 4.7 percent decline in economic growth. The findings of the present study are consistent with those of Yuliastant et al. (2020); Davcev et al. (2018); Ramlan (2017); Chughtai et al. (2015); Babalola et al. (2015) and Havi & Enu (2014).

Additionally, the long-term impact of the interest rate on economic growth is found to be negative and significant. The coefficient of -0.596116 suggests that a 1 percent increase in the interest rate corresponds to a significant decrease of 59.6 percent in economic growth. These results align with the research conducted by Taderera et al. (2021); Ank & Kok (2021); Fitriani (2019); Davcev et al. (2018); Nuhuman (2017; Bhat et al.(2016); Chughtai et al.(2015); Babalola et al. (2015); Mensah & Okyere (2015); Semuel & Nurina (2014); Havi & Enu (2014) and Jaradat et al. (2014).

Also the unemployment has a significant negative impact on economic growth in the long run. Meaning that a 1 percent increase in unemployment will cause a 47.4 percent decrease in economic growth in the long-run. Further, the budget deficit has a significant positive impact on economic growth. Indicating that a 1 percent improvement in budget deficit will result in 88.84 percent increase in economic growth in the long-run. Foreign direct investment has a positive and statistically insignificant impact on economic growth in the long-run.

Following the long-run estimation, the short-run dynamic relationship between the variables is tested by using the Error Correction Model (ECM) and the findings illustrated by Table 6. The short-run speed of adjustment, known as ECM (-1), has been estimated to be -0.697013. This result is as expected, with a significant negative sign at the 5 percent level. The speed of adjustment value indicates that the current year sees a reversion of approximately 69.7 percent of the disequilibrium caused by the shock in previous years, back to the long run equilibrium.

Table 6 provides evidence suggesting that, in the short run, inflation does not play a major role in determining economic growth, while interest rates have a significant negative effect on economic growth. Unemployment has a negative and significant impact on economic growth. Budget Deficit has a positive and significant impact on economic growth.

Table 6: Results of ECM Model

Error Correction Model (ECM) Time Period: 1990 – 2020			
Variables	**Coefficient**	**t- statistic**	**P-Value**
C	-0.151724	-0.245797	0.8086
D(GDPG(-1))	-0.051856	-0.349768	0.7306
D(CPI)	-0.038082	-0.429033	0.6730
D(IR)	-0.075505	-0.490380	0.6298
D(IR(-1))	-0.706499	-3.977779	0.0009***
D(UNE)	-1.852382	-3.045951	0.0070***
D(UNE(-1))	1.227747	2.289740	0.0343**
D(BD)	63.29529	2.394302	0.0277**
D(FDI)	0.762269	1.450486	0.1641
ECT(-1)	**-0.697013**	**-2.206253**	**0.0406*** **
R-squared	**0.817963**	**Adjusted R-squared**	**0.726945**

Source: Prepared by researchers based on Eviews 10, 2023

Note: *, **, *** indicate significance at 1 percent, 5 percent, and 10 percent.

Granger Causality

If the probability value is higher than 5 percent, the alternative hypothesis will be accepted.

Table 7: Granger Causality results

Direction of causality	P – Value	Conclusion
D(CPI) ➔ D(GDPG) D(GDPG) ← D(CPI)	0.3385 0.6256	No causality
D(IR) ➔ D(GDPG) D(GDPG) ← D(IR)	0.0159** 0.1705	Uni-directional

Source: Prepared by researchers based on Eviews, 2023

Note: *, **, *** indicate significance at 1 percent, 5 percent, and 10 percent.

The findings of the ganger causality are presented in Table 7. According to the results, it is evident that there is no Granger causality between GDPG and CPI, meaning that GDPG does not cause CPI and vice versa. Nevertheless, the study discovered a one-way causal relationship between the interest rate and GDP growth. This implies that changes in the interest rate do not have a causal influence on GDP growth, but GDP growth does have a causal influence on the interest rate.

Diagnostic Tests

After estimating ARDL tests, it is necessary to ensure the quality of the performance of the model and its safety from econometrics problems, by using the following tests.

Table 8, presents the post-estimation test that was conducted to assess the suitability of the model. This included a serial correlation LM test, an examination of heteroscedasticity, and Ramsey's RESET test. The p-value for the Serial Correlation LM test (Breusch-Godfrey) was found to be 0.1028, which is higher than the significance level of 5%. This indicates that the model is free from autocorrelation. Similarly, the value for Heteroscedasticity (Breusch-Pagan-Godfrey) was 0.8089, also exceeding the 5% threshold. This suggests that can accept the assumption of homoscedasticity for the model. Furthermore, Ramsey's RESET Test provided additional confirmation that the model was correctly specified.

Table 8: Standard Model Quality Tests

T – Statistics	F-Statistic	P- Value
Serial Correlation LM test: Breusch- Godfrey	1.698425	0.1028
Heteroskedasticity Test: Breusch-Pagan-Godfrey	0.545856	0.8089
Ramsey's RESET Test	3.596890	0.0724

Source: Prepared by researchers based on Eviews 10, 2023

Normality Test

The normal distribution of errors is illustrated in figure 2. According to the Jarque-Bera test, the p-value of 0.405161 is greater than 5%, which indicates that the model is confirmed to be normally distributed.

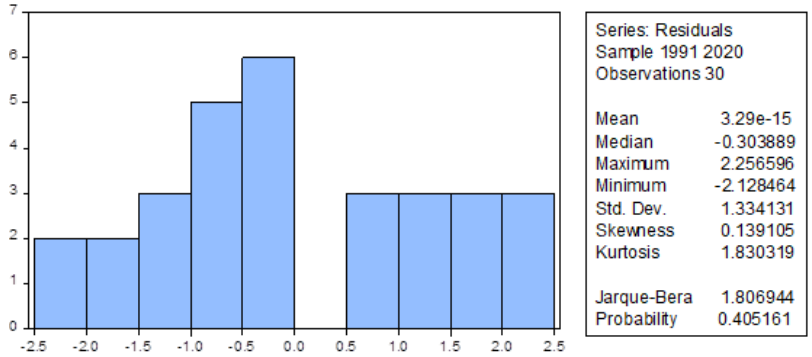

Figure 2: Normality Test

Stability of the mode

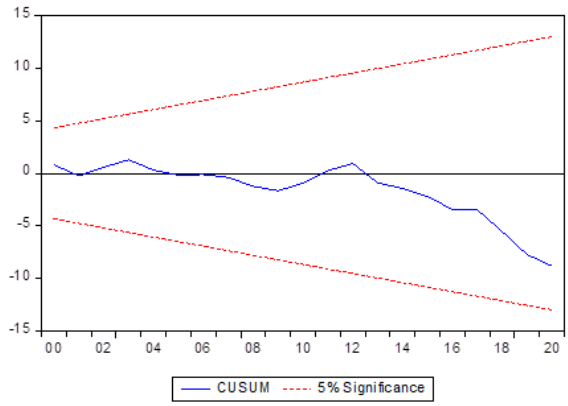

Figure 3: CUSUM Test

The study uses the cumulative sum (CUSUM) test to check the ARDL model fits, which was created by Durbin, Brown, and Evans (1975). As seen in Figure 3. the decision of the coefficient estimations are acceptable since the plotted CUSUM statistics are within the 5% significance threshold which indicates that the model is stable and not spurious.

Conclusion and Policy Implications

This study aims to empirically investigate how both inflation and interest rates have influenced the economic growth of Sri Lanka over a specific time frame, namely 1990 to 2020.To ascertain whether the variables were stationary, the study conducted the Augmented Dickey Fuller (ADF) unit root test. By utilizing the ARDL approach, we are able to estimate the correlation between variables in both the long-run and short-run was estimated. The results of this study support the existence of a long-term cointegrating relationship between inflation, interest rate, and economic growth in Sri Lanka throughout the study period. The empirical findings suggest that inflation and interest rate are negatively and significantly related to economic growth at a significance level of 5%.

In the short term, the findings suggest that inflation has a negative impact on economic growth, although it is not statistically significant. On the other hand, the interest rate has a significant and negative effect on economic growth, with a 5% significance level. The short-run speed of adjustment value is also negative and significant, indicating that any deviation from the long-run equilibrium caused by a shock will be corrected by approximately 70% every year. Moreover, the results of the Granger causality test support the notion that there is a one-way causal relationship between interest rate and economic growth, meaning that changes in the interest rate cause changes in economic growth, but not the other way around. However, no causal relationship was found between inflation and economic growth. The research findings demonstrate that inflation has a negative and significant effect on economic growth when observed in the long-run, however, it is insignificance in the short-run.

An increase in inflation lowers the inclination to invest. Reduction in investment leads to higher pricing for products and services, which in turn again reduces demand for the final goods and services that investors produce. Interest rate has a negative short- and long-term effect on economic growth. In order to make the cost of capital less than the marginal productivity of capital, interest rates must be kept at comparatively low levels. The Monetary Policy Rate (MPR) must be pursued by the Central Bank of Sri Lanka (CBSL) in order to accomplish this. Therefore, the Central Bank of Sri Lanka should create and adhere to sound monetary policies, the government should endeavor to reduce its budget deficit, cut spending, and broaden the revenue base, and these actions will help to keep inflation low and interest rates stable in Sri Lanka.

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