



## BUSINESS CYCLE, MACROECONOMIC INDICATORS AND ECONOMIC GROWTH. THE SIERRA LEONE EXPERIENCE

Ezekiel K. Duramany-Lakkoh<sup>i</sup>,

Michael Fallah Bockarie,

Abdul-Majid Abu,

Ernest Udeh

Institute of Public Administration and Management (IPAM),

University of Sierra Leone,

Sierra Leone

### Abstract:

The study investigates the impact of business cycle fluctuation on economic growth in Sierra Leone using the autoregressive distributed lag (ARDL) model bound testing framework with annual time series data for the period 1992 to 2022. The result from the unit root shows that the variables are mixed variables of I (0) and I (1) variable series, while the bound test testifies that there is an existence of cointegration in the long run. The long-run result reveals that domestic credit to the private sector, inflation, lending interest rate, and broad money supply are the main determinants of the business cycle fluctuation on the economic growth in Sierra Leone. The result shows that broad money supply portrays a positive effect on the business cycle economic growth and statistically it is not significant at the 0.05 level of significance. It implies that for every 1% increase in the broad money supply, the business environment will be improved by 0.220 in the long run. This result implies that an increase in money supply is part of an expansionary monetary policy that tends to boost the industrial sector by expanding the investment which tends to create employment and improve the business cycle and economic growth in Sierra Leone. Policymakers are therefore encouraged to further enhance the power of appropriate monetary authorities in introducing both monetary and credit policies that will serve to increase the broad money supply.

JEL: E61, E62, P35

**Keywords:** business cycle, macroeconomic indicators, economic growth, Sierra Leone

---

<sup>i</sup> Correspondence: email [ezekiel.duramany-lakkoh@fulbrightmail.org](mailto:ezekiel.duramany-lakkoh@fulbrightmail.org)

## 1. Introduction

A business cycle is an economic fluctuation that is found in economic activities. A business cycle is a cycle of economic fluctuation in the nation's gross domestic product around its long-term growth rate. The business cycle actually shows the linear relationship between the expansionary and contractionary periods in economic activity. The intercommunication relationship between economic growth and economic fluctuation has been neglected by so many academic researchers. The rationale for this unawareness is the surprising stability of the long-term economic growth rate and its visible business cycle independence, at least among commercial economics (Duramany-Lakkoh, 2020). The certainty is that during a recession business cycle is characterized as rebuilding economic stability and bringing the gross domestic product levels to trend, suggesting that academia and economic policy analysts can do an in-depth study between the business cycle and economic growth with a specific reference to Sierra Leone independently. The paramount issue of this work is to assess the key macroeconomic variables within Sierra Leone that pass through a business cycle that has influenced economic growth during the period under study (Duramany-Lakkoh, 2021). The general aim of the study is to assess the effect of the business cycle on the economic growth in Sierra Leone, by examining the contribution of the business cycle to economic growth in Sierra Leone. And evaluating the constraints that inhibit the efficient business cycle in Sierra Leone.

### 1.1 Problem Statement

The question has been raised: Why do aggregate variables in capitalist economies repeatedly fluctuate about trends while maintaining fundamentally the same character? Before Keynes' General Theory, business cycle theory was the term used to describe efforts to address one of the primary unsolved problems in economic study, which was the answer to this issue. Furthermore, there was broad consensus among interwar business cycle theorists regarding what it would take to resolve this issue.

In this essay, we have argued that the RBC literature's primary contribution to the macroeconomic indicators of Sierra Leone has been the suggestion of a novel idea. To what extent has the theory been able to correctly explain a given percentage of the stylized data up to this point, and how successful has the RBC approach been in doing so? We acknowledge that fresh stylized facts are constantly being sought as part of the RBC research program to improve the assessment and improvement of the model paradigms. With that in mind, we submit this inquiry. We also acknowledge that there may be disagreements over model rejection criteria because most RBC models have not employed formal testing methodologies to compare their theoretical and empirical findings. More generally, it is still unclear where calibration exercises fit into the framework of more conventional econometric testing methods. This topic merits a thorough debate, of which there isn't enough room for one viewpoint here; see Kydland and Prescott (1991). Regarding this, we believe that there is nothing to be gained from

subjecting RBC models to conventional econometric tests because they are "small," abstract formulations meant to provide intuition about economic mechanisms.

A dynamic model of fluctuations with a monopolistic and competitive sector driven by preference shocks was proposed by Hall (1988). However, the RBC methodology has not yet been applied to his concept. A dynamic general equilibrium model including industry pricing collusion was put up by Rotemberg and Woodford (1989), who claimed that the inclusion of such features improved the model's capacity to describe how the economy reacts to shocks to aggregate demand. Once again, a thorough dynamic study has not been performed on their model. In the framework of a very sophisticated RBC model, Cho (1990) investigates a variety of market arrangements and discovers that while the propagation mechanism under an oligopoly with at least 10 businesses is sufficient to provide an appropriate level of variability, this is not the case in other market structures. He points out that boosting competition by adding more businesses is a potent technique to amplify swings, but the extent of supply and demand elasticities greatly influences his findings. We then discuss the role of government and stabilization policies in RBC formulations. Except for Eichenbaum and Christano (1990), where uncertainty in government purchases is one of the primary determinants of model dynamics, most RBC models examined thus far in the literature have very passive government, if any at all. They do not, however, take stabilization policies into account. This situation is somewhat a reflection of the prevalent RBC theory, which holds that agents' best responses lead to cyclical oscillations. Economic stabilization would therefore be welfare-lowering in the absence of distortionary taxes and subsidies. In an economy where distortionary taxes and subsidies are widely implemented, it is less evident that stabilization policy serves no purpose (Gbenro et al., 2023).

This viewpoint is taken up by Greenwood and Huffman (1991), who show that a program of output-increasing subsidies paid to firms in low-output states has the effect of increasing welfare by an amount equal to a (uniform across all states) consumption increase of 0.68% of steady state output in a model with distortionary taxes and subsidies (Duramany-Lakkoh and Udeg, 2018). They do admit, though, that these welfare improvements pale in comparison to the gains that would result from completely eliminating the distortions. This implies that if a major role in stabilization is needed, it will only come about in tandem with an acknowledged assessment of the cost of volatility that is higher than what is now estimated. The latter are remarkably low according to Imrohroglu (1989) and Lucas (1987).

## 2. Literature Review

Economic policy is concerned with two main elements which are the stabilization of the business cycle and growth (Antonakakis & Tondl, 2014). There is considerable interest in devising government policies and institutions to influence prospects for economic growth and mitigate the distress associated with economic downturns. Proper evaluation of the benefits and costs of a given policy proposal requires knowledge of the

determinants of growth and business cycles. This is one reason for the considerable body of research aimed at understanding these phenomena. The past decades have seen considerable advances in this research. Recent empirical evidence, however, brings into question two of its basic assumptions first, that technological change is homogeneous in nature, in that it affects the ability to produce all goods symmetrically, including consumption and investment goods; and second, that business cycles are driven by shocks which affect the demand for investment goods.

Previous empirical studies on the determinants of export performance in developing and developed countries have proven that Foreign Direct Investment (FDI) has a significant positive impact on export structure. Kishor (2003) focuses on the influence of increasing foreign direct investment in India on export supply capacity. Sharma argues that the success of the East and Southeast Asian countries suggests that foreign direct investment is an important variable of export promotion. Zhang (2006) forward in his study of foreign direct investment and China's export performance that one of FDI's major growth contributions is to promote countries' exports.

According to World Trade Organization, Dillon Jr, T. J. (1994) described the annual report which dealt with aspects of the relationship between trade and FDI to know whether FDI and trade are substitutes (negatively correlated) or complements (positively correlated) and concludes that FDI is positive for both home and host countries' exports. Generally, there are many other studies indicating that FDI actually has a positive effect on the export performance of host countries.

In a related study, Van Dijk et al. (2002) conducted a similar study in Indonesia and found out that the business cycle was very significant in explaining its economic growth. Santos-Paulino (2000) while studying the effects of trade liberalization in selected 48 developing countries found that foreign direct investment significantly impacts on export volumes. Impact of business cycle on Economic Growth in India. His paper attempted to analyze the causal relationship between business cycle and economic growth in India and tried to analyze and empirically estimate the effect of business cycle on economic growth in India, using the co-integration approach for the period, 1990 – 2011. The empirical analysis on the basis of the ordinary least square method suggests that there is a positive relationship between the business cycle and GDP.

In addition, Agasha (2006) used the VEC model to analyze the determinants of the export growth rate in Uganda. The researcher used quarterly data from 1987- 2006. The researcher estimated the export growth rate as a function of Gross Domestic Product, Real exchange rate, business cycle t, Foreign Price level, and domestic credit to the private sector. The results from the long-run co-integrating regression show that GDP, business cycle, and money supply affect the export growth rate positively and significantly while Foreign Price level was found to affect the export growth rate negatively and significantly. Foreign Direct Investment was found insignificant.

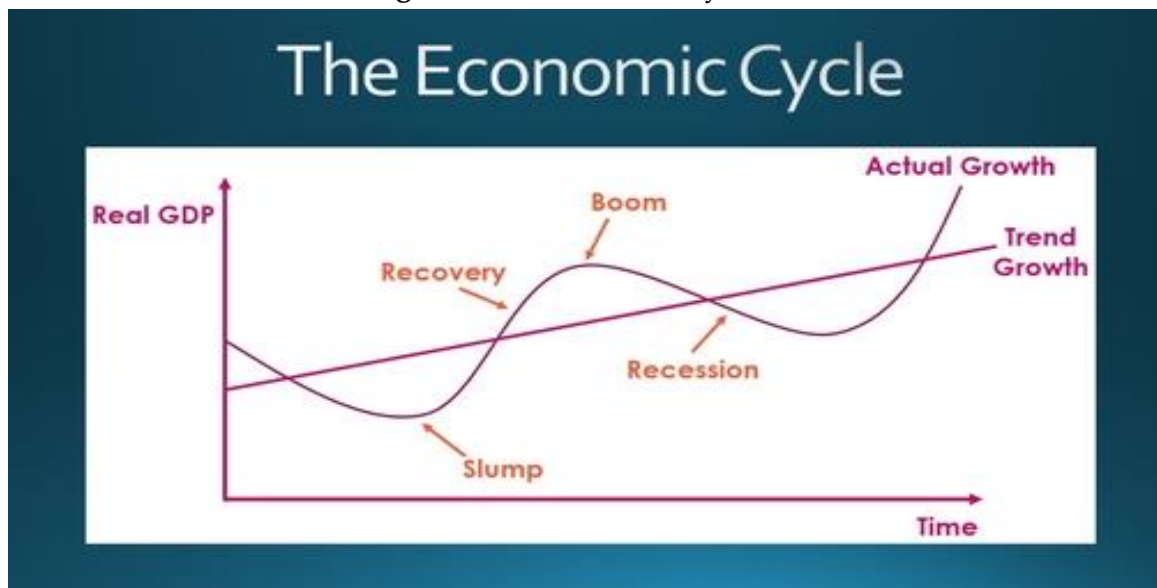
Furthermore, Menji (2010) analyzed business cycle and economic growth in Ethiopia from 1981 to 2004 using co-integration analyses and found out that, inflation, deposit interest rate, money supply, real effective exchange rate, and business cycle were

statistically insignificant to export performance. Ferdous (2011) studied the business cycle diversification in East Asian Countries. The study took eight years and eight countries' panel data of the region. The explanatory variables used included official exchange rate, and monetary policy indicators like lending rate, deposit rate, and money supply. Fixed effects estimation was used to estimate the equation. The study focused on relating regional trade integration and business cycle. The results indicated that greater integration promotes the business cycle. Devaluation of the exchange rate also helps diversification by encouraging exporters from other sectors.

## 2.1 Theory of Business Cycle

The business cycle has four main phases to economic growth as shown in Figure 1 below; the prosperity phase which we call the stage of the boom in the economic activities, the recession phase the economic downturn, the depression phase contraction in the economy, and the recovery phase.

**Figure 1:** The Economic Cycle



Economic fluctuations are a useful tool for identifying and characterizing changes in the economy. The economy could be expanding, contracting, or even going through a recession. Business cycles are another name for economic fluctuations. For example, in a business cycle, a recession is a time when the nation experiences a decrease in real incomes while trying to increase employment levels. An example of variation in the overall economic activity is economic fluctuation, which is a result of the way the nation's corporate companies are organized. For example, in the United States, the National Bureau of Economic Research is in charge of maintaining records and activities pertaining to an economy's rise from peak to trough and decline from trough to peak. The main concerns of macroeconomics, which elaborates on the prospect that the economy may

establish a short-term equilibrium that is above or below employment, form the basis of the theory of economic fluctuation in aggregate economic activity (Baum 2013).

### 3. Methodology

#### 3.1 Model Specification

The response of the business cycle to changes in macroeconomic variables depends primarily on whether those changes are transitory or permanent. Thus, to achieve the objective of this study, the determinant of the business cycle to economic growth fluctuation model from the theoretical review. The model is also based on the structure of the Sierra Leone economy.

The functional specification of the export model is given as:

$$BCEG_t = f(DCPS_t, INF_t, LIR_t, MS2_t) \quad (1)$$

Where,

BCEG = Business Cycle Economic Growth,

DCPS = Domestic Credit to Private Sector,

INF = Inflation Rate,

LIR = Lending Interest Rate, and

MS2 = Broad Money Supply.

The linear specification of model 1 is given as follows.

$$BCEG_t = \alpha + \beta_1 DCPS_t + \beta_2 INF_t + \beta_3 LIR_t + \beta_4 MS2_t + U_t \quad (2)$$

Where  $\alpha$ , and  $\beta_i$ s are parameter estimates.  $U_t$  is an error term that is identically and independently distributed with mean zero and constant variance,  $t$  is the time period and all other variables are as defined earlier

#### 3.2 Estimation Technique

To estimate the relationship between business cycle, and economic growth in Sierra Leone, the study adopted the Autoregressive Distributed Lag (ARDL) model. To carry out this estimation procedure, the study first analysed the time series characteristics of the dataset to establish the unit root properties of the variables.

##### 3.1.1 Unit Root Test

It is very important to test for the statistical characteristics of variables in the model since time series data are scarcely stationary in level forms. Regression involving non-stationary time series often to the problem of spurious regression. Time series is said to be stationary if its mean, variance, and auto-covariance are independent of time. Given this, the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests are used. The two tests are similar but there is a difference concerning the way they correct for

autocorrelation in the residuals. The PP and the ADF test the null hypothesis that a series contains a unit root (non-stationary) against the alternative hypothesis of no unit root (stationary).

**H0:**  $p = 0$  ( $Y_t$  is non-stationary),

**H1:**  $p \neq 0$  ( $Y_t$  is stationary)

### 3.1.2 The ARDL Cointegration Technique and Bound Testing Procedures

The autoregressive distributed lag (ARDL) Cointegration Test, otherwise known as Bound Test was adopted in this study to test for the cointegration relationships among variables in the model regardless of whether the variables under consideration are I (0) or I (1) or a combination of both. This approach includes lagged values of the dependent variables as well as current and lagged values of explanatory variables.

Therefore, the long-run ARDL model for the growth rate of export in Sierra Leone can, therefore, be specified from equation (2) above as:

$$\Delta \ln BCEG_t = \alpha_0 + \sum_{i=1}^p \alpha_{1i} \Delta \ln DCPS_{t-1} + \sum_{i=1}^p \alpha_{2i} \Delta \ln INF_{t-1} + \sum_{i=1}^p \alpha_{3i} \Delta \ln LIR_{t-1} + \sum_{i=1}^p \alpha_{4i} \Delta \ln MS2_{t-1} + \beta_1 \ln BCEG_{t-1} + \beta_2 \ln DCPS_{t-1} + \beta_3 \ln INF_{t-1} + \beta_4 \ln LIR_{t-1} + \beta_5 \ln MS2_{t-1} + \mu_t \quad (3)$$

Where

$\Delta$  is the difference operator,

$\alpha_0$  is the constant term,

$\beta_i$  and  $\alpha_i$  are the long-run and the short-run elasticities, respectively.

$p$  is the optimal lag length.

$i = 1, 2, 3, \dots$

To trace the existence of cointegration, the F-statistic is computed from ARDL regression of equation (3). The null hypothesis of no cointegration will also be tested by restricting the lagged level variables equal to (i.e.  $H_0 = \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = 0$ ) against the alternative that  $H_1 = \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq \beta_6 \neq 0$ . The bounds tests will provide two asymptotic critical value bounds. The lower bound assumes variables are I (0) whilst the upper bounds assume I (1) variables hypothesis of no cointegration is rejected if the computed F-statistic is greater than the upper] critical value bound; otherwise, the null hypothesis is not rejected. Once the cointegrating relationship is ascertained, the error correction estimates of the ARDL model are obtained. The diagnostic test statistics of the selected ARDL model are examined from the short-run estimates at this stage of the estimation procedure. Similarly, the test for parameter stability of the model can be performed. The error correction representation of equation (3) is specified as follows:

$$\Delta \ln BCEG_t = \alpha_0 + \sum_{i=1}^p \alpha_{1i} \Delta \ln DCPS_{t-1} + \sum_{i=1}^p \alpha_{2i} \Delta \ln INF_{t-1} + \sum_{i=1}^p \alpha_{3i} \Delta \ln LIR_{t-1} + \sum_{i=1}^p \alpha_{4i} \Delta \ln MS2_{t-1} + \delta ECM_{t-1} + \mu_t \quad (4)$$

where  $\alpha_i$  represents the short-run coefficients and  $\delta$  is the speed of adjustment parameter or feedback effect which is expected to be negative and significant.  $ECM_{t-1}$  is the cointegration residual lagged one period obtained from equation (4). Secondary data for the study were sourced from World Development Indicators, International Financial Statistics Yearbook, World Economic Outlook, and Bank of Sierra Leone database.

#### 4. Presentation and Discussion of Empirical Findings

##### 4.1 Correlation Analysis

Before performing the regression estimation, correlation analysis was performed to see any possible correlation between variables. This approach can help to measure the strength of the regression results. That is, if for example, the correlation analysis indicates a positive association between business cycle and economic growth, then, the regression analysis should also indicate the same. Otherwise, the results will be sensitive to changes in method and specification and thus can be concluded to be weak. Table 4.1 presents the correlation coefficient matrix for BCEG and the independent variable. The correlation results suggest the existence of a strong positive correlation between business cycle variables and economic growth.

The correlation coefficient matrix is presented in Table 4.1, the coefficient matrix reveals that all variables are highly correlated with economic growth since their coefficient value are positive (i.e. 0.4328 for domestic credit to the private sector, -0.6185 for the inflation rate, -0.3488 for lending rate, and 0.1694 for broad money supply). These results are consistent with both theoretical and empirical expectations. However, Table 1. shows that the model is free from multicollinearity because the highest value of correlation is 61.8% between the consumer price index (CPI) and domestic credit to the private sector.

**Table 1:** Correlation Matrix

Variables	RGDP	DCPS	INF	LIR	MS2
RGDP	1.0000				
DCPS	-0.4328* (0.0150)	1.0000			
INF	-0.6185* (0.0002)	0.3869* (0.0316)	1.0000		
LIR	-0.3488 (0.0545)	0.7719* (0.0000)	0.5211 (0.0026)	1.0000	
MS2	0.1694 (0.3623)	-0.5875* (0.0005)	-0.1385 (0.4574)	-0.4352* (0.0144)	1.0000

Source: STATA 15 output.

The results show that there is a negative correlation between BCEG and inflation though it is statistically significant at the 0.05 level of significance. Hence inflation and domestic credit to private reveal a positive correlation and it is not significant at the 5% level of



significance. Except for the broad money supply that portrays a weak positive correlation with the dependent variable (business cycle and economic growth BCEG).

#### 4.2 Stationarity Test

Although the bound test Autoregressive Distributed Lag (ARDL) approach to cointegration does not require the pretesting of the variables for unit roots. It is important to conduct this test to confirm the order of integration of the variables. Hence, to ensure that some variables are not integrated at higher order, there is a need to complement the estimated process with unit root tests. Given this, before applying the (ARDL) approach to cointegration, unit root tests were conducted to investigate the stationarity properties of the data. Therefore, the Augmented Dickey-Fuller (ADF) and Phillips Perron (PP) tests were applied to all variables in levels and the first difference to determine their order of integration and confirm stationarity. The maximum lag length used was determined based on the lag selection by the Schwartz-Bayesian Criterion (SBC) and Akaike Information Criterion (AIC). The results of both Augmented Dickey-Fuller and Philips Perron for unit root with intercept only in the model for all variables are presented in Table 2.

**Table 2:** Stationarity Test Results

Variables	Augmented Dickey-Fuller		Phillips Perron		Order of integration
	Level	1st difference	Level	1st difference	
RGDP	-4.697**		-4.697**		I (0)
DCPS	-2.240**		-2.286**		I (0)
INF	-4.545**		-4.545**		I (0)
LIR	-2.396**		-2.367**	-2.765**	I (0)
MS2		3.671**		-4.448**	I (1)

Source: STATA 15 output.

From the unit root test results in Table 2, it found that all of the variables are integrated of order one I (0), which is stationary, except MS2 which is integrated of I (1), which is not stationary at first difference. The decision rule states that we accept the null hypothesis if the absolute critical value at a 5% level of significance is greater than the absolute t-statistic value.

From the result above, it is clear that the corresponding critical values at level for each of the I(0) variables are greater than the t-statistic values, hence we accept the null hypothesis at level and conclude that the variables are non-stationary. But at the first difference, the corresponding critical value at 5% is less than the t-statistic values of these variables, and we, therefore, reject the null hypothesis and accept the alternative hypothesis, and conclude that MS2 is stationary at first differencing for both ADF and PP tests, which shows that these variables are integrated at order one I (1).

Similarly, the corresponding critical values for BCEG, DCPS, INF, AND LIR, are less than the t-statistic value. Hence, we reject the null hypothesis and conclude that these variables are stationary in levels, i.e. they are integrated of order zero I (0). Since the unit

root test results above confirmed the absence of I (2) variables, the ARDL framework is used for estimation.

### 4.3 Bound Test for Cointegration Analysis

Fundamentally, the primary objective of this study is to assess the effect of the business cycle on economic growth in Sierra Leone. Given this, it is essential to test the existence of long-run relationships among variables within the framework of the bounds-testing approach to cointegration. The decision rule states that the null hypothesis, of no cointegration, must be accepted if the f-statistic is less than the lower bound. However, if the computed F-statistic is less than the lower critical bound, then the test fails to reject the null hypothesis, suggesting that a long-run relationship does not exist. Thus, the results of the ARDL F-bounds test are computed below in Table 3.

**Table 3:** Bounds Test Cointegration Result

Test statistic	Value	Signif.	I (0)	I (1)
		Asymptotic: n=1000		
f-statistic	3.739	10%	2.450	3.520
k	4	5%	2.860	3.49
		2.5%	3.250	4.490
		1%	3.740	5.060

Source: STATA 15 output.

Based on the results in Table 3, we conclude that the calculated F-statistic 3.739 is higher than the upper bound critical value at the 5 percent level of significance (3.49). This simply shows that the null hypothesis of no cointegration is rejected at the 5 percent level and that there is indeed a cointegration relationship among the determinants of the business cycle and economic growth. Therefore, the study proceeds to estimate both the long-run and short-run models within the ARDL framework. The long-run result is presented in Table 4 below.

### 4.4 Long-Run Estimation

**Table 4:** ARDL Long-Run Result

Variables	Coefficient	Std. Error	t-Statistic	Probability
DCPS	-8.032	1.849	-4.350	0.002
INF	1.051	0.446	2.360	0.043
LIR	0.568	0.476	1.190	0.263
MS2	0.220	0.435	-0.510	0.625

Source: STATA 15 output.

From the table above, the result reveals that there is a negative relationship between the domestic credit to the private sector and the business cycle economic growth (BCEG) though it is statistically significant at the 0.05 level of significance. The expected sign is not in line with the actual sign estimated from the result. It implies that for every 1%

decrease in the bank loan to the private sector the economic growth will fall by approximately by 8.032 under the study period. This result implies that most commercial banks in Sierra Leone are in most cases unwilling to fund the real sector of the perceived risks of the business environment and price failures, instability, and other hazards, which commonly and negatively affect the ability of borrowers to repay their loans and advances following the governing terms and conditions of such loans.

Similarly, the results show that a broad money supply portrays a positive effect on the business cycle economic growth and statistically it is not significant at the 0.05 level of significance. The sign is in line with the prior expected sign from theory. It implies that for every 1% increase in the broad money supply, the business environment will be improved by 0.220 in the long run. This result implies that an increase in money supply is part of an expansionary monetary policy which tends to boost the industrial sector by expanding investment which tends to create employment, improvement in the business cycle, and economic growth in Sierra Leone. This is because a situation of this nature would help to put the banks in a comfortable position to grant credit to the real sector, thereby enhancing the requirements of the population, raw materials for the industry, and jobs for the citizens. When this type of fit is achieved, the overall economic activity or market size will expand tremendously and the nation will be the ultimate beneficiary.

Furthermore, the result indicates that the lending rate has a positive effect on the business cycle economic growth and statically it is not significant at the 5% level of significance in the long run. It means that for every 1% increase, the lending rate will discourage the investor by increasing their access to loans by 0,568 in the long run. This result implies that a high and rising lending rate has a positive and significant relationship with the business cycle in Sierra Leone. As the literature posits, a high and prohibitive lending rate discourages "better" (low-risk) borrowers, who regard the rate as too expensive, and encourages "bad" (high-risk) borrowers, who regard the rate to be cheap (Mullineux and Murinde, 2001). However, this contrary empirical evidence may be ascribed to the fact that most entrepreneurs in Sierra Leone no longer look up to the bank for funding. Rather, they raise funds from the local money.

#### **4.5 Short-Run Estimation**

The estimation of the short-run model with the Autoregressive Distributed Lag Model (ARDL) is based on the Akaike Information Criterion (AIC) employed. The result below it shows that DCPS, INF, and MS2 are the key determinants of the business cycle and economic growth in the short run. The result shows that all the independent variables are not statistically significant at the 5% level of significance. The result indicates that both domestic credit to the private sector and broad money supply have a positive impact on business cycle and economic growth though it is not statistically significant. Expect an inflation rate that hurts the business cycle and economic growth in the short run.

**Table 5:** Error Correction Model Representation for Selected ARDL Model- ARDL (2,3,4,0,4)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-34.685	23.071	-3.430	0.008
RGDP	-0.285	0.277	-1.030	0.330
DCPS	10.169	9.478	1.070	0.311
INF	-0.218	0.096	-2.260	0.050
MS2	1.054	0.786	-1.500	0.169
ECT(-1)*	-1.304	0.381	-3.430	0.008
R-squared	0.9390	Mean dependent var	2.197654	
Adjusted R-squared	0.8238	S.D. dependent var	1.446543	
S.E. of regression	2.41569908	Akaike info criterion	41.74674	
Sum squared resid	8.756098	Schwarz criterion	42.36527	
Log-likelihood	67.070316	Hannan-Quinn criterion	41.93583	
F-statistic	79.23542	Durbin-Watson stat	2.119274	
Prob(F-Statistic) 0.000000				

Source: STATA 15 output.

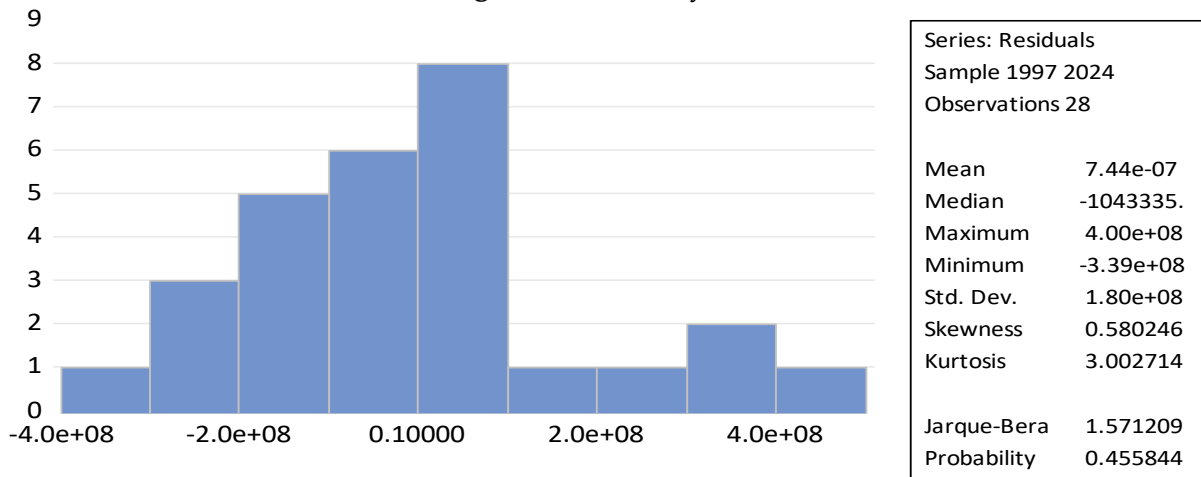
From the short-run result shown in Table 5, the coefficient of the error correction term ECT (-1) has a negative sign with a statistically significant coefficient at the one percent level. With a coefficient of 1.304, the result indicates that approximately 130.4 percent of the disequilibrium caused by the previous year's shocks converges back to the long-run equilibrium in the current year. The result indicates a very high speed of adjustment to long-run equilibrium.

They further reveal that the value of the R-squared is 0.9390, indicating that approximately 93 percent of the variation in the dependent variable (business cycle economic growth) is well explained by the exogenous variables, which is an indication of a very good fit. The overall model is highly statistically significant as shown by the probability value of the F-statistic (0.000000). Moreover, the Durbin-Watson statistic of 2.119274 confirms the existence of no autocorrelation in the residuals and therefore ensures that the estimated results are not spurious.

#### 4.6 Normality Test

The model also passed the Normality test based on the Jarquer-Bera value of 1.571209 and the probability of 0.455844 which is above the required normal 5 percent level. Hence, the residuals are normally distributed across observations as shown in Figure 2.

**Figure 2: Normality Test**



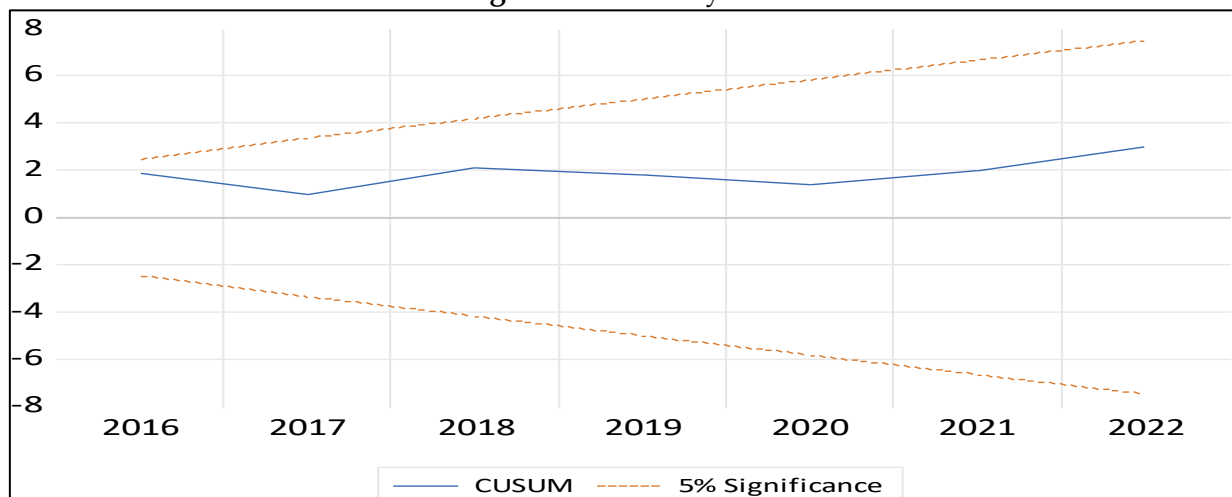
Source: STATA 15 output.

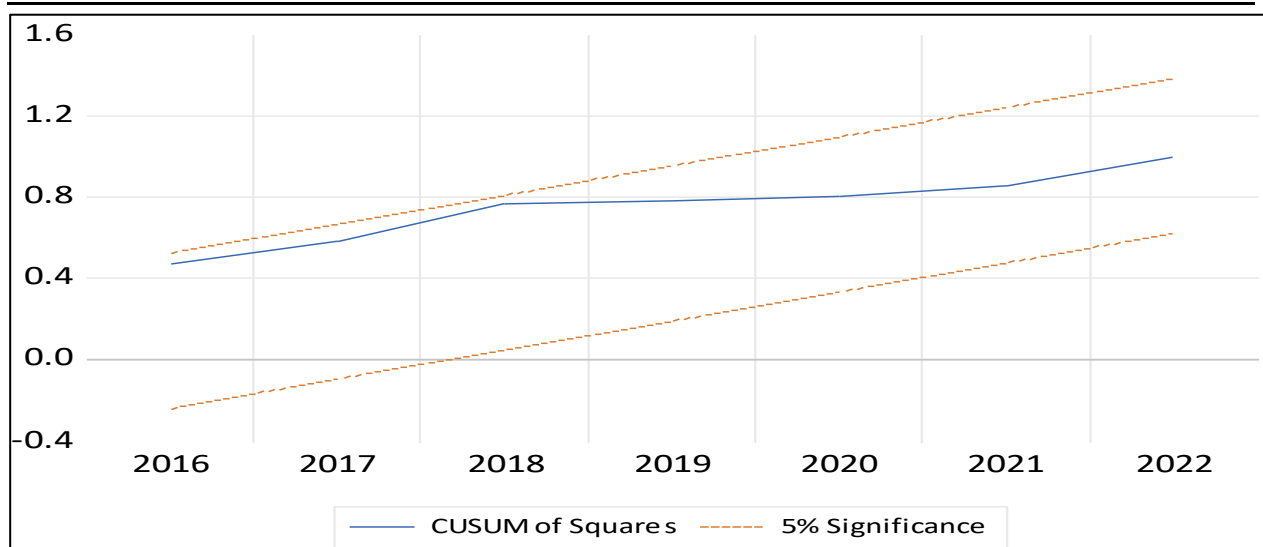
### 4.7 Stability Test

Pesaran and Pesaran (1997) suggest that the test for the stability for parameters using cumulative sum of recursive residuals (CUSUM) and cumulative sum of squares of recursive residuals (CUSUMSQ) plots be conducted after the model is estimated. This is done to get rid of any bias in the results of the estimated model due to unstable parameters. The results for CUSUM and the results depict that the plots of CUSUM and CUSUMSQ for the estimated ARDL model show CUSUMSQ are depicted in Figure 2.

An absence of instability of the coefficients since the plots of all coefficients fall within the critical bounds at a 5 percent significance level. Therefore, the estimated coefficients in the model are stable over the study period.

**Figure 3: Normality Test**





Source: STATA 15 output.

## 5. Conclusion

The general aim of the study is to assess the effect of the business cycle on the economic growth in Sierra Leone, examine the contribution of the business cycle to economic growth in Sierra Leone, and evaluate the constraints that inhibit the efficient business cycle in Sierra Leone. The results show that broad money supply portrays a positive effect on the business cycle economic growth and statistically it is not significant at the 0.05 level of significance. The sign is in line with the prior expected sign from theory. It implies that for every 1% increase in the broad money supply, the business environment will be improved by 0.220 in the long run. This result implies that an increase in money supply is part of an expansionary monetary policy that tends to boost the industrial sector by expanding the investment which has a tendency of creating employment, improvement in the business cycle, and economic growth in Sierra Leone. This is because a situation of this nature would help to put the banks in a comfortable position to grant credit to the real sector, thereby enhancing the requirements of the population, raw materials for the industry, and jobs for the citizens. When this type of fit is achieved, the overall economic activity or market size will expand tremendously and the nation will be the ultimate beneficiary. Policymakers are therefore encouraged to further enhance the power of appropriate monetary authorities in introducing both monetary and credit policies that will serve to increase the broad money supply. This is important because there is a consensus in the literature that a vibrant business cycle serves to accelerate economic growth and development and spread between deposit and lending rates. Extension of credit alone does not increase productivity; it should be complemented by adequate supervision and monitoring by the lending banks.

## Conflict of Interest Statement

The authors declare no conflicts of interest.

### About the Author(s)

**Dr. Ezekiel K. Duramany-Lakkoh** is the current Dean of the Faculty of Accounting and Finance at the Institute of Public Administration and Management (IPAM) University of Sierra Leone, he is also the Group CEO and President of JIT Capital Group an investment and financial services company.

ORCID: [orcid.org/0000-0001-9363-1933](https://orcid.org/0000-0001-9363-1933)

**Michael Fallah Bockarie** is a Lecturer in the Department of Accountancy at the Institute of Public Administration and Management (IPAM) University of Sierra Leone.

**Abdul-Majid Abu** is a Lecturer in the Department of Financial Services, University of Sierra Leone, Sierra Leone.

**Dr. Ernest Udeh** is Assistant Dean in the Faculty of Business Administration and Entrepreneurship, University of Sierra Leone, Sierra Leone.

### References

- Agasha, N. (2006). Determinants of export growth rate in Uganda. *School of Statistics and Planning Makerere University. 1987-2006*, 1-24.
- Antonakakis, N., & Tondl, G. (2014). Does integration and economic policy coordination promote business cycle synchronization in the EU?. *Empirica*, 41, 541-575.
- Baum, C., Caglayan, M., & Ozkan, N. (2013). The role of uncertainty in the transmission of monetary policy effects on bank lending. *The Manchester School*, 81(2), 202-225.
- Cho, J. and Cooley, T. (1990) The business cycle with nominal contracts, Mimeo. (Bradley Policy Research Center, University of Rochester. Rochester, NY).
- Christiano, L. and Eichenbaum, M. (1990). Current real business cycle theories and aggregate labor market fluctuations. Mimeo. (Federal Reserve Bank of Minneapolis, Minneapolis MN, and Northwestern University, Evanston IL).
- Danthine, J. P., & Donaldson, J. B. (1993). Methodological and empirical issues in real business cycle theory. *European Economic Review*, 37(1), 1-35.
- Dillon Jr, T. J. (1994). The World Trade Organization: a new legal order for world trade. *Mich. J. Int'l L.*, 16, 349.
- Duramany-Lakkoh, E. K. (2020). The Effect of Fiscal Policy on Financial Sector Development in Sierra Leone: A Time Series Approach. *International Journal of Development and Economic Sustainability*, 8(4), 1-23.
- Duramany-Lakkoh, E. K. (2021). Surveying the Socioeconomic and Business Dimensions of Microfinance Institutions in Rural Sierra Leone before the Ebola Outbreak: A Descriptive Statistical Approach. *Journal of Financial Risk Management*, 10 (2), 172-186.
- Duramany-Lakkoh, E. K., and Udeh, E. (2018). A Stakeholder Perspective on the Effect of e-Banking on Customer Satisfaction in Commercial Banks Using Funnel Ranting Method. *International Journal of Business Management Review*, 4(9), 75-91

- Eichenbaum, M. (1991). Real business cycle theory: Wisdom or whimsey, *Journal of Economic Dynamics and Control* 15, 607-626.
- Ferdous, F. B. (2011). Pattern and Determinants of Export Diversification in East Asian Economies, International Conference on Social Science and Humanity IPEDR Vol. 5, IACSIT Press, Singapore.
- Gbenro, O. B., Duramany-Lakkoh, E. K., & Kamara, S. (2023). An Assessment of the Stakeholders' Perception of Reinsurance and Insurance Products and Services on the Performance of Insurance Companies. *International Journal of Development and Economic Sustainability*, 11(2), 1-37.
- Greenwood, J. and Huffman, G. (1991). Tax analysis in a real business cycle model: On measuring Harberger triangles and Okun gaps, *Journal of Monetary Economics* 27, 167-190.
- Hall, R. (1988). A non-competitive model of fluctuations, Working paper no. 2576 (NBER, Cambridge, MA).
- Imrohorglu, A. (1989). Cost of business cycles with indivisibilities and liquidity constraints, *Journal of Political Economy* 97, 1364-1383.
- Kydland, E. F., and Prescott E. C. (1982). The econometrics of the general equilibrium approach to business cycle. *The Scandinavian Journal of Economics* 93. 161-178.
- Lucas, R. E. (1987). *Models of business cycles*. Basil. Blackwell. New York.
- Menji, S. (2010). Export performance and determinants in Ethiopia. retrieved from [https://mpa.ub.uni-muenchen.de/29427/1/MPRA\\_paper\\_29427.pdf](https://mpa.ub.uni-muenchen.de/29427/1/MPRA_paper_29427.pdf)
- Mullineux, A. W., & Murinde, V. (2001). *Developing financial structures to foster enterprise development*. Institute for Development Policy and Management, University of Manchester.
- Pesaran, M. H., Shin, Y., & Smith, R. P. (1997). Pooled estimation of long-run relationships in dynamic heterogeneous panels. Retrieved from <https://www.econ.cam.ac.uk/people-files/emeritus/mhp1/jasaold.pdf>
- Rotemberg, J. and Woodford, M. (1989). Oligopolistic pricing and the effect of aggregate demand on economic activity. Working paper 3206 (NBER. Cambridge, MA).
- Santos-Paulino, A. U. (2000). *Trade liberalisation and export performance in selected developing countries* (No. 00, 12). Department of Economics Discussion Paper.
- Sharma, K. (2003). Factors determining India's export performance. *Journal of Asian Economics*, 14(3), 435-446.
- Van Dijk, D., Osborn, D., & Sensier, M. (2002). *Changes in the variability of the business cycle in the G7 countries* (No. EI 2002-28).
- Zhang, X. F. (2006). Information uncertainty and analyst forecast behavior. *Contemporary Accounting Research*, 23(2), 565-590.



Creative Commons licensing terms

Authors will retain copyright to their published articles agreeing that a Creative Commons Attribution 4.0 International License (CC BY 4.0) terms will be applied to their work. Under the terms of this license, no permission is required from the author(s) or publisher for members of the community to copy, distribute, transmit or adapt the article content, providing a proper, prominent and unambiguous attribution to the authors in a manner that makes clear that the materials are being reused under permission of a Creative Commons License. Views, opinions and conclusions expressed in this research article are views, opinions and conclusions of the author(s). Open Access Publishing Group and European Journal of Economic and Financial Research shall not be responsible or answerable for any loss, damage or liability caused in relation to/arising out of conflict of interests, copyright violations and inappropriate or inaccurate use of any kind content related or integrated on the research work. All the published works are meeting the Open Access Publishing requirements and can be freely accessed, shared, modified, distributed and used in educational, commercial and non-commercial purposes under a [Creative Commons Attribution 4.0 International License \(CC BY 4.0\)](https://creativecommons.org/licenses/by/4.0/).