

An Empirical Study of Macroeconomic Policy and Economic Growth in Sierra Leone

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Abstract:

The Growth performance for most Sub Sahara African Countries was relatively stable in the 1970s but became volatile in the 1980s and 1990s due to unstable policies and civil unrest. This scenario was the case for Sierra Leone; real GDP in the 1970s was impressive, but unsatisfactory since the 1980s and growth performance in the 1990s was mixed. Given that macroeconomic policies are at the heart of every developing economy to foster growth of output. It is therefore imperative to investigate the macroeconomic policies conducive for the growth of output in the Sierra Leone economy from 1970-2010, within the framework of Error Correction Model (ECM). The study reveals that high budget deficit, high inflation and exchange rate instability were observed as contributing factors for the economy's poor growth performance. The war dummy is found to have a negative effect on investment and the growth of output, thus political instability which is characterized by the war period erodes confidence in the investment climate and thus affects growth. Given the welfare implication of economic growth, the Government should vigorously pursue prudent macroeconomic policies, promoting institutional and infrastructural development conducive to attract competitive local and foreign investments and hence economic growth.

Keywords:

Macroeconomic policy; Economic Growth; Budget deficit; Civil war; Inflation; Error Correction Model (ECM) and Sierra Leone

1.0 Introduction

In the broader sense, macroeconomic policy is directly concerned with the aims of growth, distribution and sustainability that are now recognized as overriding national objectives. Macroeconomic Performance rarely follows a linear trend, invariably encompassing episodes of stability and instability. Macroeconomic performance¹ of least developed countries in general and that of Africa in particular has been

¹ Monetary and fiscal policies are both commonly accorded prominent roles in the pursuit of macroeconomic stabilization in developing countries, but the relative importance of these policies has been a serious debate between the Keynesians and monetarists. The monetarist believe that monetary policy exert greater impact on economic activity while the Keynesians believe that fiscal policy rather than monetary policy exert greater influence on economic activities. Despite their demonstrated efficacy in other economies as policies that exert influence on economic activities, both policies have not been sufficiently used in the context of developing counties including Sierra Leone. Monetary policy is the control of money supply in an economy and the central bank of a country usually pursues monetary policy to lower inflation and improve the balance of payment with a view to stabilize the economy and promote growth, while fiscal policy has to do with government revenue and expenditure, the aim of fiscal policy is to generate enough revenue for government and spends wisely to reduce the budget deficit. However, for growth promotion both fiscal and monetary policies should be pursued in active co-ordination and in tandem.



unsatisfactory since the 1980s. The sources of the instability are partly blamed by external conditions. For examples terms of trade shocks, reverse capital flows, natural disaster, etc, on the other hand, if the sources are endogenous such as inappropriate domestic policies reflected in high inflation rates, high budget deficit, overvalued real exchange rate, interest rates and agricultural producers prices are at the heart of the region's poor growth performance (Abata et. al, 2012)

As in the case of most Sub-Saharan Countries, Sierra Leone experienced moderate growth in the 1970s and the growth performance of the 1980s was poor. The economy however slowed significantly during the 1980s as the decline in corporate mining spread through the monetized economy. By the end of 1980s, the economy was near collapse, characterized by declining GDP per capita, rapid inflation and severe external payments imbalance. The economic and financial decline was also caused by adverse international market conditions for domestic exports and inappropriate domestic policies. The institutional setting weakened and growing inefficiencies emerged in the infrastructure and marketing systems. In absolute terms, per capita income remained rather positive, cautioned mainly by the external financing of the trade deficit. Income per capita growth fell correspondingly with the GDP decline during the past three decades. The terms of trade deteriorated from an annual rate of 4.6% in the 1960s to -2.6% in the 1970s and -1% in the 1980s. (Government of Sierra Leone Vision 2025, pp.10-12)

The war that began in 1991 severely affected the economy. Growth performance during the war was mixed, though substantially negative and with high inflation. Real GDP declined by 10% in 1995 but grew by 5% in 1996. The overall budget deficit fell to 6% in 1996 from 12% in 1991. As the war intensified, output fell, and the associated reduction in the domestic revenue base led to a 56% decline in revenue during the first half of 1999. The end period inflation surged from 6% in 1998 to 37% in 1999. (Bank

of Sierra Leone Annual Report, 2000)

The cessation of hostilities and eventual restoration of security strengthened confidence, which facilitated economic recovery during 2000-2004. Economic activity was spurred by the country wide reconstruction and rehabilitation work. RGDP which had increased by 3.8 percent in 2000 rose sharply by 18.5% in 2001. It further increased by 27.5 % in 2002 and 9.4 % in 2003, largely on account of the broad recovery in agriculture, mining, manufacturing, construction and services sectors. RGDP grew by 7.4 % in 2008, supported mainly by the continued recovery of the agricultural sector, expanded reconstruction and other investment activities. (Bank of Sierra Annual Report, 2007)

The performance of the economy during the period 2001-2009, (the post conflict period) was better than the 1980s and 1990s, in terms of inflation rate and output performance. This is not surprising as the period of structural adjustment and stable political environment, reflected in increased in Investment-GDP ratio from 8.55% over the period 1986-1990 to 9.86% in the post war period. However, the performance on the side of the external sector (the trade account) was worse than the mid 1990s. (Government of Sierra Leone Agenda for Change 2008-12)

Despite progress made so far, particularly with economic growth and a fall in poverty, Sierra Leone's economic recovery remains fragile, post conflict growth was robust but thereafter slowed to 5.5 percent in 2008 and then down to 4 percent in 2009. The global recession challenged the economy as demand for the country's mineral export slowed down. The joint country assistance organizations emphasized that there is real risk that the progress made thus far will be undermined unless economic growth can be sustained and employment opportunities increased. The two major challenges are the development of new engines of growth to diversify away from reliance on mineral exports and maintain productivity growth. Both challenges can only be met if macroeconomic policy framework is conducive for investment



opportunities. Government of Sierra Leone Agenda for Change (SLAC) (2008-12)

Given the abysmal growth performance of Sierra Leone since 1970s to mid-2000s, even with the introduction of the International Monetary Fund (IMF) and World Bank adjustment programmes, we ask the question, what are the macroeconomic policy frameworks conducive to sustained economic growth in Sierra Leone? Specifically, we seek to address the following sub questions (i) Is there any correlation/relationship between investment and the growth of output? (ii) Can growth policy designs useful for increased employment opportunities and poverty reduction programs? The Sierra Leone economy provides a good test laboratory for this study, these therefore motivate the study and we propose the following hypotheses that can be tested

H₁: Long run equilibrium relationship exists between macroeconomic policy and economic growth for the Sierra Leone economy/Co-integration exists between macroeconomic policy and economic growth.

H₂: Prudent macroeconomic policy correlates positively on investments and hence economic growth.

Therefore, the purpose of this paper is to investigate empirically the macroeconomic policy framework conducive for sustained investment and hence economic growth. Data on key macroeconomic policy variables (gross fixed capital formation/investment, openness to international trade, exchange rate, and terms of trade, budget deficit and inflation) were collected from the International Financial Statistics (IFS); the World Bank, Statistic Sierra Leone (SSL), World Development Indicators (WDI) and the Bank of Sierra Leone (BSL) over the period 1970-2010 and analyzed using the framework of the Error Correction (ECM) Model estimation technique. The Co-integrating Regression Augmented Dickey–Fuller (CRADF) test is used to test the first hypothesis and the Pair-wise correlation matrices are applied to test the second hypothesis. An Econometric View (E-

views 6) is used in the analysis.

This study contributes to the current literature in the following ways. (i) This study is the first in the context of Sierra Leone to examine empirically the impact of macroeconomic policy on economic growth in Sierra Leone. (ii) It seeks to capture the impact of the ten years old (1991-2001) civil war on the macroeconomic policy variables and economic growth in Sierra Leone, and is a dummy that takes the value of one in period of war (1991-2001) and zero otherwise. (iii) It contributes to the literature by providing an econometric relationship of macroeconomic policy and economic growth for Sub Saharan Africa, while capturing both the short-run and long-run dynamics in a unify system, this understanding is important for academics and policy makers in shaping the future economic growth. An investigation in to this issue will help to provide guidelines for growth policy designs and can also be used to design policy of poverty reduction programs, since economic growth is conventionally expected to reduce poverty.

Primary weakness of the study is the limited availability of the data. Analysis is therefore restricted to a smaller number of variables than desired because of these restrictions. However, sufficient data is available for the purpose of this research.

The rest of the work is organized as follows. Section 2 is review of related literature section 3, is the material and methods, section 4, provides the result and discussion and finally section 5 is conclusion. Figures are attached as appendix.

2.0 Review of Related Literature

Short run macroeconomic policy and long term growth strategies are inextricably linked, not separate and independent. In particular, public investment affects growth directly and indirectly by improving the supply conditions of infrastructure, and thereby expanding the capital base of an economy and the potential for further accumulation, and indirectly, through its positive linkage effects with private investment (Ghosh,



2006).

Developing countries paramount concern is to access a more growth-oriented employment generating macroeconomic stance, and public investment is critical factor in achieving this, recognizing that macroeconomic policies are essential factors determining the rate and pattern of growth, and that of investment climate in general-both public and private investment. He however, stated that public expenditure investment requires at the very least a medium term time horizon, possibly longer if it is to be effective. Therefore, it most occurs within a systematic framework that involves some overall strategy for the future. In brief, there is no “one size fit all” approach to the ordering of public investment strategy, and Governments must be conscious of the long-term growth implication of public spending. Chandarsekahr, et al. (2004)

The one sector growth model of the Harrod and Domar (1950) is one of the conventional growth models. It is based on a production function with no substitute between capital and labour. It assumes investment is equal to net savings and net savings is a constant function of output. An issue in the model is that maintaining full utilization of capital requires that output grows at a rate equal to the savings rate, and of the capital output ratio. This ratio is the “warranted rate” of growth of full utilization of the capital stock. It is believed that; this is a ratio that will cause investors expectation to be realized. Another consideration of the model is that maintaining full employment of labour requires that output grows at a rate equal to the growth of the labour force. If effective rather than total labour is considered, the condition remains the same but it will be in terms of the growth of the effective labour force it is considered to be natural growth of labour force. The central tenet of the Harrod-Domar model is that both capital and labour to be fully employed while the economy grows at full employment, the warranted growth rate equals the natural growth rate. This is the Harrod-Domar equilibrium condition.

The neo-classical growth model is another focus in the conventional growth model which assumes the existence of the leontiff-type, which is fixed coefficient and the no substitution of factors of production, is relaxed, by holding a “Cobb-Douglas” type of production function and an equation for capital accumulation. (Evsey, 1939)

Solow (1956) and Swan (1956) undertook independent work and came up with a new type of growth model. In their analysis, per capita income is determined by growth rate of the population, which is a proxy for the growth rate of the labour force and growth rate of investment. However, technological progress is not captured in this model as the model assumes diminishing returns to capital. The assumption of diminishing return to capital is one of the cornerstones of the convergence or catch up hypothesis. Thus capital inflows are encouraged thereby increasing capital per effective worker. With this, per capita income can grow because of policies that affect investment. Nevertheless, this effect holds only with the transition period but not at the steady-state level. This policy does not matter for long-run growth.

In a similar study by Rodrik and Subramanian (2004) on the India economy, they observed that macroeconomic policy particularly fiscal, should be given priority attention to capital and public investments by making them of higher proportion in gross government expenditure, thereby creating more jobs and enhancing the quality of public spending and the attainment of sustainable growth and development. Hence the India Government must put a stop to the unproductive foreign borrowings, wasteful spending and uncontrolled money supply and embarked upon specific policies aimed at achieving increased and sustained productivity in all sectors of the economy.

In general until macroeconomic policies are effectively implemented and particularly geared towards enhancing the overall productivity of the economy. Only then can their potential benefit effects be appreciably felt in the country.



To this end, emphasis should be placed on basic infrastructure (examples transportation, energy, water, road network, and communication etc) that would attract investment so as to enhance GDP growth.

The empirical work associated with the new growth model consists of cross-country regressions, typically the Summer-Helton (1988) international comparism project data. Those results have been reviewed and their robustness examined in an extremely useful paper by Levine and Renelt (1992) using forty cross sectional growth studies published in 1980. Each study regresses the growth rate over a given period against a variety of variables; well over fifty regressors have been used in these studies. Among the regressors are variable related to trade policy; exchange rates; inflation; fiscal policy and investment. They concluded that several measures of economic policy are related to long run growth, the relationship between growth and almost every macroeconomic indicator other than the investment ratio is fragile.

In a panel data study for six Latin America countries on the impact of macroeconomic policy on growth, (Rodrik, 1999), revealed that changes in the term of trade, the growth rate of GDP and the share of public investment in GDP are all significantly correlated with investment and growth. Public and private investment are positively associated, other variables perceived to affect investment and economic growth, includes a measure of economic instability, the stock of internal government debt and exchange rate depreciation do not enter the investment equations significantly. Only the debt to export ratio made a significant entry in one equation.

In a careful study on the determinants of the Chilean investment, Sulimano (1983) found out strong evidence that uncertainty or instability of output, the real exchange rate and the real interest rate reduces investment and economic growth. His evidence also shows a complex relationship between the level of the real exchange rate and investment, an overvalued

exchange rate tends to encourage investment and growth but the higher investment is unusable

Devis and Petri (1987) used evidence from cross-sectional regressions, regressing percapita real growth over the period 1970-1985 against the standard new growth theory variables, plus indicators of macroeconomic performance. Both the regression evidence and data presented demonstrated the existence of suggestive correlation between growth and variables related to macroeconomic management, reflected in these regressions are the inflation rate, external debt-ratio and the budget surplus matters for growth. The negative relationship between growth and inflation is “prima facie” evidence that the quality of macroeconomic management comes from the apparently negative relationship between growth and the increase in size of the budget deficit.

In the study of a sample of 69 developing countries on a panel data regression analysis, to determine the impact of inflation on investment, during the structural reform period. Clarke (1993) confirmed that inflation and the size of government in addition to the extent of the structural reforms were statistically and economically very significant determinants of the growth patterns in these countries for the period (1993-1997). The increase in inflation and the volume of government spending decreased the growth, while the structural reforms had a positive influence. On one hand, they enable a more productive use of the existing resources, and on the other hand technological advancement enhancing the opening of the economy towards international exchange and foreign investment. This empirical analysis includes investment as an explanatory variable, and confirms high significance in explaining the growth in these economies. The estimated parameter shows that a one percentage point increase in the share of investment in the structure of GDP increases at the rate of economic growth by 0.94 percentage point.

The macroeconomic story of the 1980s depicts policy success and failures in dealing with



shocks at the turn of the decades. Some of the countries adjusted immediately, others later and some did it gradually and successful. Others appeared to have adjusted in the mid of 1980s but still not dealt with their budget deficit and suffers from rising inflation. The general lesson from the episodes is that growth does not return until adjustment especially on the fiscal front are made. Therefore macroeconomic policies have an important effect on the rate of investment and output. (Corden, 1990)

On balance, literature survey reveals that numerous studies have looked at the macroeconomic policy and economic growth; results of these studies are mostly inconclusive. These contradictory conclusions emerging from the empirical literature are one of the motivations for the present investigation. To the best of our knowledge, in the context of Sierra Leone this is the first study that looks at how macroeconomic policy impacts on the economic growth in the event of war. However, the empirical literature is dominated with panel data studies. In the case of time series studies on specific issues, the African economies are biased against in the literature. This study is different from most of the previous studies in the literature by examine the case of a typical Sub-Saharan Africa economy (Sierra Leone) that is structurally constrained and the investment and growth climates are still quite underdeveloped and has been fraught with war for a long period. (1991-2001).

3. Materials and Methods

The study adopts a quantitative approach in the analysis. It makes use of secondary time series data in the regression. The literature discussed so far indicates that investment, openness, control of budget deficit, exchange rates, inflation and interest rate are important for growth. Devis and Peri (1987), Levine and Renelt (1992) demonstrated the existence of strong correlation between growth and variables related to macroeconomic management.

However, the authors consider the fact that, inspite of investment being an important variable

of an economy, the growth of real GDP is considered to depend on investment, openness of an economy to trade, exchange rate, the terms of trade, budget deficit as a ratio of GDP, inflation, investment as a ratio of GDP. A war dummy is included in the model to account for the impact of the rebel war on the economy. Hence, the model has been chosen based on economic theory and their relevance to the study; we specify the model thus;

$RGDP =$
 $F(OPEN, XR, TOT, BGDGP, INF, INVGDP,$
and WAR Where, OPEN=Openness to international trade, XR = Nominal Exchange rate, TOT = Terms of Trade, BGDGP=Budget Deficit as a ratio of GDP, INF= the rate of Inflation and INVGDP = Gross Domestic Investment as a ratio of GDP and WAR dummy is introduced to capture the effect of the rebel war on the economy.

In linear form the model can be decomposed thus;

$$\begin{aligned}
 RGDP_t &= \delta_0 + \delta_1 OPEN_t + \delta_2 XR_t + \delta_3 TOT_t \\
 &+ \delta_4 BGDGP_t + \delta_5 INF_t + \delta_6 INVGDP_t \\
 &+ \delta_7 WAR_t \\
 &+ \mu_t
 \end{aligned}$$

Taking natural logarithm, equation (1) yields;

$$\begin{aligned}
 lnRGDP_t &= \delta_0 + \delta_1 lnOPEN_t + \delta_2 lnXR_t + \delta_3 lnTOT_t \\
 &+ \delta_4 lnBGDP_t + \delta_5 lnINF_t + \delta_6 lnINVGDP_t \\
 &+ \delta_7 WAR_t \\
 &+ \mu_t
 \end{aligned} \tag{2}$$

$\delta_1, \delta_3, \delta_6 > 0$, $\delta_4, \delta_5 < 0$ and $\delta_2 > 0$ or < 0 . $\delta_7 < 0$. μ_t is the error term

The rationale for making the restriction in the above model is based on economic theory and their expected behaviour in the signs (coefficients to be estimated) and can be tested in the analysis.

3.1 Estimation Procedure

The focus of this paper is to establish macroeconomic policy variables that influence the growth of output in Sierra Leone for the period 1970-2010, using time series annual economic data. It is important to note that most



time series data are non-stationary; hence using the OLS may imply that the result obtained would be spurious in the sense that the variables may seem to have causation when there is no causation. Hence the regression is meaningless, or nonsense regression. A classic example is the very strong positive, non linear relationship between inflation and cumulative rainfall for the United Kingdom, 1958-1978, with a coefficient of determination: R-squared very close to 0.998 but with a low Durbin Watson and a high significant value of the constant and hence the residuals may be serially correlated (Hendry, 1980)². However, to overcome this notion, time series data requires being de-trended in a regression analysis. Thus we apply the idea of differencing for stationary at certain level or order. If a series is level stationary, we denote I (0) and stationary at first difference, we denote I (1), the series is integrated of first order, in general an I(d) process is a series that is stationary after differencing d-times (Hannan and Quinn, 1979).

Thus, we test for unit root of the series using the Augmented Dickey-Fuller (ADF) unit root test and the Phillip-Perron (PP) unit root test.

3.2 Tests for Unit Root:

The Augmented Dickey-Fuller test and the Phillip-Perron test are applied to test for the existence of unit root. We test the null hypothesis that the series is non-stationary I (1), against the alternative hypothesis that the series is stationary I (0). If the test statistic is less than the critical value we reject the null in favour of the alternative hypothesis. Both tests have the same null hypothesis that unit root exist. Dickey and Fuller (1979) and (Phillips and Perron, 1988)

The Augmented Dickey Fuller (ADF) test regression is given by

$$\Delta x_t = \mu + \beta t + \delta x_{t-1} +$$

² An indication of spurious regression is a value of R-squared greater than the Durbin-Watson Statistic and has no economic meaning

$$\dots \sum \delta_i \Delta x_{t-1} + \dots \delta_m \Delta x_{t-m} + \mu_t \quad (3)$$

$$\Delta x_t = \mu + \delta x_{t-1} + \dots \sum \delta_i \Delta x_{t-1} + \dots \delta_m \Delta x_{t-m} + \mu_t \quad (4)$$

Equation (3) contains a trend term, while equation (4) does not contain a trend time, and the lag terms are introduced in the model as additional regressors to account for heteroskedasticity and auto-correlation.

The regression test equation of the Phillip Perron is similar to the ADF-test but the lag m, is omitted to adjust for the standard error in order to correct for auto-correlation and heteroskedasticity. Thus the PP test equation is specified as

$$\Delta x_t = \mu + \beta t + \delta x_{t-1} + \dots \sum \delta_i \Delta x_{t-1} + \mu_t \quad (5)$$

The inclusion of the time trend in both unit root tests equations signifies that we can drop it if found to be insignificant, but dropping it requires caution.

3.3 Tests for Co-integration

It is important to note that, if the series are stationary at differencing, conclusion made regarding information about the variables in the regression can only be valid for short run dynamics, while in the long run considerable and useful information would have been lost. To overcome this problem, we employ co-integration test using the Co-integrating Regression Augmented Dickey-Fuller (CRADF). Co-integration test is applied, to test whether the dependent variable exhibit long run equilibrium - relationship with the explanatory variables. This test uses residuals form of a co-integration regression, we estimate the model using OLS estimation by minimizes the sum of the squares residuals, Engel and Granger in Econometrica (1987) considers this test as one of the preferred test of co-integration and became known as Co-integration Regression Augmented Dickey Fuller (CRADF).

The Co-integration Augmented Dickey Fuller (CRADF) test regression equation is given by



$$\Delta e_t = \alpha_1 e_{t-1} + \delta_1 \Delta e_{t-2} + \dots + \delta_m \Delta e_{t-m} + \mu_t \quad (6)$$

The Δe terms are included to eliminate any autocorrelation so that $\mu_t \sim \text{IID}(0, \delta^2)$, notice that there is no constant in the regression. A constant can be included in either the co-integrating regression or the CRADF but not both. With a constant in the co-integrating regression equation, the residuals have zero mean, we do not expect the residuals to have a deterministic trend and so linear trend is not included. We carry the CRADF test thus:

$$H_0: \alpha = 0$$

and the e_t are $I(1)$, the series are not cointegrated

$$H_1: \alpha < 0$$

and e_t are $I(0)$, the series are cointegrated

The test statistics under the null has a non standard t-distribution, if the calculated value of the test statistic is less than the critical value then the null hypothesis of no co-integration is rejected; the series are co-integrated. m , is the number of lagged terms is selected in the same way as for the unit root tests. We use Mackinnon (1991) critical values to make a decision on the test statistic and not the individual unit root values of the ADF test.

3.4 The Error Correction Model (ECM)

The ECM of the model includes both the effects

of the short-run and long-run forces on changes in RGDP and in general, the ECM is written as;

$$\Delta G_t = \delta_0 e_{t-1} + \sum_{j=1}^T \delta_1 \Delta A_{t-j} + \sum_{j=1}^T \theta_j \Delta B_{t-j} + V_t \quad (7)$$

If

$\delta_0 e_{t-1}$ is significantly different from zero, then A and B have been found to be co-integrated, thus having long-run relationship. T is the number of lags necessary to obtain white noise and V_t is another random disturbance term, Δ denotes the difference operator. The error correction term e_{t-1} depicts the extent of disequilibrium between A and B. The coefficient of e_{t-1} expected to have a negative sign and significance, this is the speed of adjustment.

The ECM reveals further that the change in A_t not only depends on lagged changes in B_t but also on its own lagged changes. This is appealing due to its ability to induce flexibility by combining the short-run and long-run dynamics in a unified system. Thus the estimates of the parameters of the ECM are generally consistent and efficient (Hendry and Richard, 1983)

3.5 The Pair-wise Correlation

The pair-wise correlation is applied to determine the first hypothesis that correlation exist between macro-economic policy and economic growth and to also determine the existence of multi-collinearity among the independent variables.

3.6 Data Description and Source

Table 1: presents the data description and sources.

Table 1

Variable	Symbol	Description	Source
Budget Deficit as a ratio of Gross Domestic Product	BGDP	Total Government Expenditure minus total government revenue scale by GDP	IFS CD-ROM WDI
Inflation	INF	The consumer price index with 2000 as the base year	IFS CD-ROM WDI
Real GDP	RGDP	Gross Domestic Product at Constant prices	SSL/World Bank
Nominal Exchange Rate	XR	Period Average of the price of US dollar in Leones	BSL/World Bank
Openness	OPEN	Sum of export and import scaled by GDP	IFS CD-ROM
Terms of Trade	TOT	The ratio of export to price of import (with 2000=100)	IFS CD-ROM/ World Bank
Gross Investment as a ratio of Gross Domestic Investment	INVGDP	Sum of Public Investment and Private Investment scaled by GDP-the share of investment is the gross fixed capital formation as a ratio of GDP	IFS CD-ROM WDI
Civil War	WAR	A dummy introduced in the model to capture the impact of the rebel war on the macroeconomic policy and economic growth.	It takes the value of one in period of war (1991-2001) and zero otherwise

4.0 Result and Discussion

Table 2: Result of the Augmented Dickey Fuller (ADF) Unit Root Test

Variable		Augmented Dickey Fuller (ADF) Unit Root Test				Conclusion
		One-lag model		Two-Lag Model		
		Constant	Constant and Trend	Constant	Constant and Trend	
LN RGDP	level	-2.423629	-2.402523	-2.423629	-2.402523	I(1)
	Δ level	-7.800147**	-7.944834**	-7.800147**	-7.944834**	
LN OPEN	level	-2.157412	-1.653314	-2.157412	-1.653314	I(1)
	Δ level	-7.046057**	-7.576259**	-7.046057**	-7.576259**	
LN XR	level	-0.789409	-1.697490	-0.789409	-1.697490	I(1)
	Δ level	-3.055261**	-3.022135**	-3.055261**	-3.022135	
LN TOT	level	-2.685971	-3.541731	-2.685971	-3.541731	I(1)
	Δ level	-5.156554**	-5.086148**	-5.156554**	-5.086148**	
LN BGDP	level	-0.358888	-2.317355	-0.358888	-2.317355	I(1)
	Δ level	-7.088354**	-6.996083**	-7.088354**	-6.996083**	
LN INF	level	-2.611258	-2.600040	-2.611258	-2.600040	I(1)
	Δ level	-7.909030**	-7.957457**	-7.907030**	-7.957457**	
LN INVGDP	level	-3.476623	-3.372653	-3.476623	-3.372653	I(1)
	Δ level	-7.817491**	-7.789067**	-7.817491**	-7.789067**	

* Means 1%, ** means 5%, Δ = first difference and I (1) = order of integration

The result of the ADF unit root test shows that all the variables are not stationary in level but

stationary at first difference. Thus the variables are integrated of order one, we denote as I (1).

Table 3: Result of the Phillip- Perron Unit Root Test

Variable		Phillip- Perron Unit Root Test		
		Constant	Constant and Trend	Conclusion
LN RGDP	level	-2.338578	-2.285840	I(1)
	Δ level	-7.933807**	-8.219323**	
LN OPEN	level	-2.157412	-1.427412	I(1)
	Δ level	-7.045423**	-8.349148**	
LN XR	level	-0.487622	-1.529427	I(1)
	Δ level	-2.974399**	-3.529758**	
LN TOT	level	-2.119613	-2.914542	I(1)
	Δ level	-5.211649**	-5.103425**	
LN B GDP	level	-0.358888	-2.253743	I(1)
	Δ level	-7.088354**	-6.996083**	
LN INF	level	-2.537989	-2.458274	I(1)
	Δ level	-8.426626**	-8.816373**	
LN INV GDP	level	-3.458040	-3.359685	I(1)
	Δ level	-9.974922**	-10.85392**	

* Means 1%, ** means 5%, Δ=first difference and I (1) = order of integration

The Phillip-Perron test in table 3, above also confirms the existence of unit root at first differencing. The graphs of the series as shown in appendix figures 1 and 2 clearly indicate that the series are non stationary in levels, but stationary at first difference.

Table 4: Result of the CRADF test

Null Hypothesis: E has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic based on SIC, MAXLAG=2)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-5.191710	0.0001
Test critical values: 1% level	-3.615588	
5% level	-2.941145	
10% level	-2.609066	

MacKinnon (1996) one-sided p-values.

Included observations, 38 after adjustment and at 0.05 McKinnon (1991) critical values correspond to **-3.5009**, and the test statistic is **-5.191710**. Thus the test statistic is less-than the critical value, we reject the null hypothesis of no co-integration, and concludes that the series are co-integrated. Hence there exist long-run equilibrium relationship between RGDP and the Explanatory variables. Therefore the hypothesis that long run equilibrium relationship exists between the macroeconomic policy variables and economic growth is supported

Table 5: Result of the Error Correction Model (ECM)

Variable	Dependent Variable: DLN RGDP			
	Coefficient	Std. Error	t-Statistic	Prob.
C	0.005930	0.032848	0.180520	0.8581
DLN XR	0.626504	0.123272	5.082283	0.0000***
DLN XR(-1)	-0.677818	0.117381	-5.774521	0.0100***
DLN INF	-0.189970	0.043538	-4.363357	0.0002***



DLNINF(-1)	-0.107396	0.056323	-1.906784	0.0697*
DLNTOT	0.261793	0.127477	2.053642	0.0480**
DLNTOT(-1)	0.097433	0.051284	1.899864	0.0662*
DLNBGDP	-0.298459	0.191029	-1.562370	0.1222
DLNBGDP(-1)	-0.097188	0.076979	-1.262521	0.2106
DLNOPEN	0.444593	0.149108	-2.981681	0.0062***
DLNOPEN(-1)	0.520409	0.228900	2.273519	0.0331**
DLNINVGDP	0.054425	0.054803	0.993102	0.0032***
DLNINVGDP(-1)	0.188477	0.064503	2.922001	0.0079***
DWAR	-0.129150	0.015664	-8.245145	0.0001***
E(-1)	-0.406877	0.413807	-0.983253	0.0093**

$R^2 = 0.697397$, $Adj R^2 = 0.569347$, $F\text{-statistic} = 5.446921$, $Prob(F\text{-statistic}) = 0.000187$

*** Significant at 1%, ** Significant at 5%, * Significant at 10%, D.W=2.01

The result in table 5, above indicates that inflation has a negative effect on real gross domestic product and significance at the 1% and the one lag period value is significant at 10%. Given the welfare effect of economic growth, it implies that a country with high inflation typically see depreciation in its currency in relation to the currencies of its trading partners. Budget deficit is found to negatively affect growth and insignificant in both periods (Current and one lag period). Given that inflation is significant in the model, it can suggest that the channel via which the budget deficit affects RGDP is the money printing –phenomenon. The revenue obtains from the printing-inflation phenomenon is seniorage, because it is not beneficial to growth if not accompanied with the growth of output of the economy.

The current value of the degree of openness of the economy to international trade is found to have a positive elasticity with RGDP and the one period lag value has a positive elasticity with RGDP and significant at 5%. Investment is found to have a positive effect and very strong level of significant even at 1% on RGDP. The term of trade is found to have a positive effect on RGDP and significant at the 5% while the one period lag value is significant at 10%. Given the significance of openness and the term of trade, macroeconomic policies that encourage export and the movement of resources (for example, the elimination of trade barriers) to attract technological transfers and foreign direct investment are important for economic growth in Sierra Leone. Opening of an economy enhances technological advancement towards international exchange and foreign investment hence economic growth.

The current period nominal exchange rate is found to have a positive effect on RGDP, while the one period lag value is found to have a negative effect on RGDP and both periods exchange rate are highly statistically significant even at the 1%. Thus depreciation of the exchange rate is contractionary for the Sierra Leone economy as established by Levine and Renelt (1992) in some African economies. The war dummy is found to have a negative effect on Real GDP and significant at the 10% level and hence reduces the growth of output

The F-statistic shows that at the 1% level of significant the variables are jointly significant, the error correction term is found to be significant at 1% and has the relevant sign (-0.406877). It shows that 40.68% of the disequilibria (deviation from the long-run) are covered up in a year so that in the long-run the short-run dynamic model converges to the long-run model.


Table6: Pair-wise correlation Result

Variable	DLNRGDP	DLNXR	DLNTOT	DLNOPEN	DLNINVGDP	DLNINF	DLNBDGP	DWAR
DLNRGDP	1	-0.06365	0.26315	0.567141	0.083649	-0.55177	-0.10834	-0.21408
DLNXR	-0.06365	1	-0.5446	-0.29061	-0.29935	-0.063341	0.086493	0.526589
DLNTOT	0.26315	-0.5446	1	0.107695	0.132592	0.316571	-0.55833	-0.35065
DLNOPEN	0.567141	-0.29061	0.107695	1	0.381272	-0.648761	-0.23086	-0.37722
DLNINVGDP	0.083649	-0.29935	0.132592	0.381272	1	-0.054413	-0.2645	-0.49476
DLNINF	-0.55177	-0.06334	0.316571	-0.64876	-0.05441	1	-0.11668	0.070616
DLNBDGP	-0.10834	0.086493	-0.55833	-0.23086	-0.2645	-0.11668	1	0.450023
DWAR	-0.21408	0.526589	-0.35065	-0.37722	-0.49476	0.070616	0.450023	1

There exists a negative correlation between inflation and investment for both the current and the one lag period value. High inflation affects investment and hence economic growth. There is negative correlation between Budget deficit and investments. It is also the case that high budget deficit may serve as a catalyst for an economy to transfer the burden to investors by way of high taxation to help finance the deficit; this will ultimately erodes investors confidence and hence economic growth. There exist a positive correlation between openness and investment. The study also found a negative correlation between the war dummy and investment. This implies that during war investment is eroded, as potential investors may not be sure of profitable returns for their investments, even existing investors will move out of the economy with resources, (capital flight) implying that the economy is losing investors confidence and hence reduces the growth of output. The result further reveals the existence of no multicollinearity among the explanatory variables- (no correlation co-efficient of a value 0.70 or more). Hence the hypothesis that correlation exist between prudent macroeconomic policy and growth is supported.

5.0 Conclusion and Implication for policy

The study investigates empirically the role of fiscal deficit, inflation, openness to international trade, exchange rate and investment as major factors affecting economic growth for the Sierra Leone

economy using 1970-2010 macroeconomic data collected from the International Financial Statistics, the World Development Indicators, including data from the Government policy documents and were analyzed using the error correction model technique. A war dummy is included in the model to account for its effect on investment and economic growth.

The study acknowledges the fact that by the accelerator principles growth of output is responsible for the growth of investment. However, the quality of investment atmosphere is also a necessary factor that determines growth of output. This follows from the traditional production function which maintains a positive marginal productivity of capital. Investment is found to have a positive effect on RGDP, the implication is that foreign and local investors inevitably will seek out stable countries with strong economic performance. A country with such positive attributes will draw investment funds away from other countries perceived to have more political and economic risk. To this end, the government should strive to ensure appropriate political, legal, infrastructural and strong macroeconomic climate conducive to attract investment. The emphasis should be on the development of basic economic infrastructure such as energy, good road network, telecommunication and water supply

Inflation is found to have a negative effect on growth of the economy and significant while



the budget deficit is detrimental to growth and found to be insignificant. Thus fiscal and monetary authorities should control the deficit and the money supply as these are potential sources for high inflation.

The depreciation of the nominal exchange rate is found to reduce RGDP. This indicates that declining exchange rate obviously decreases the purchasing power of income and capital gains derived from any returns. Moreover, the exchange rate influences other income factors such as inflation, interest rate and even capital gains from domestic securities and the general investment climate. No doubt that, the nominal exchange rate and investment turns out to be highly significant even at the 1% relative to the other growth variables in the model. To this end, policy makers should not only rely on the depreciation policy to improve the balance of payment as a way of enhancing growth, but to also ensure the scaling-up of manufacturing industries, infrastructural development conducive for export and investments.

The war dummy is found to negatively affect investment and the growth of output and is significant in the model. It is the case that war can cause a loss of confidence in a currency and a movement of capital to the currencies of more stable countries. To this end, the government should improve on the existing political climate, good governance and effective institutional arrangements that can attract investment to enhance economic growth.

Hence macroeconomic policy management is essential for economic growth. The authors look forward to a more extensive study on the topic with a view to further provoke policy discourse. An interesting area worth researching is the nexus between poverty and economic growth. Such a study might guide and inform policy makers on the stability of economic growth and poverty reduction in Africa and globally.

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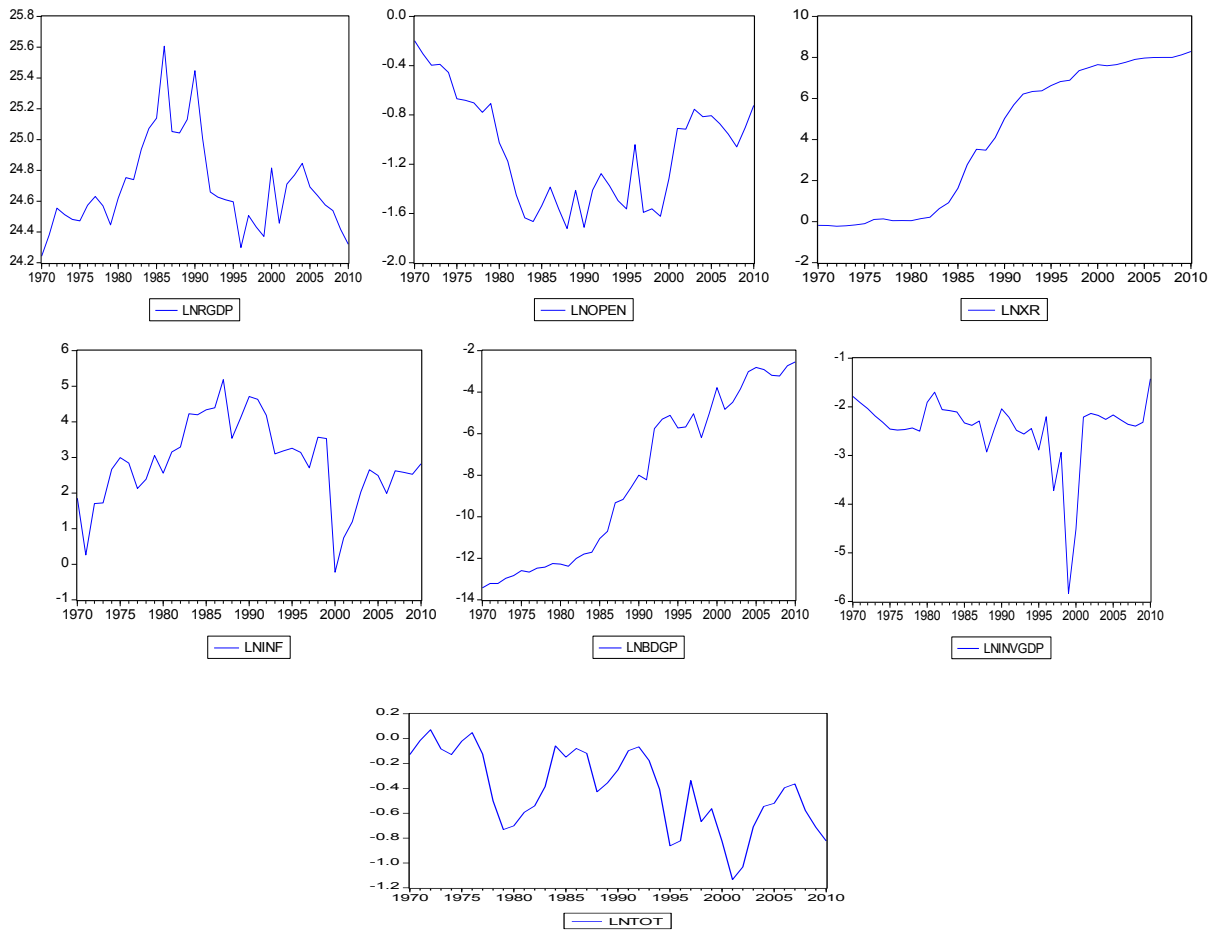
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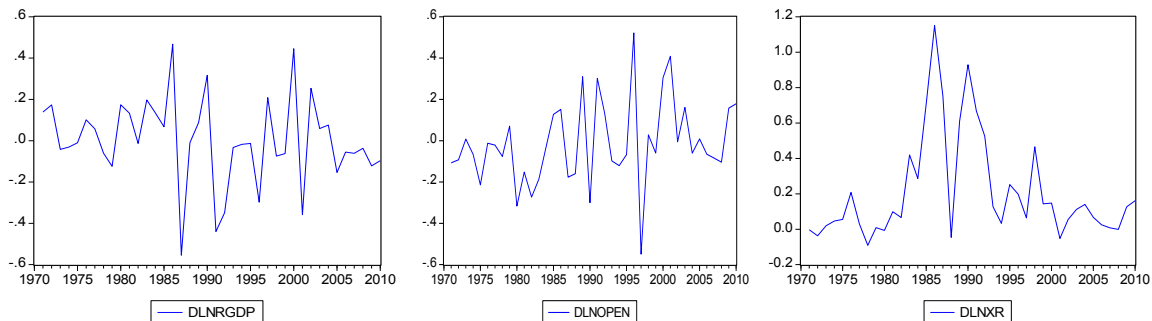
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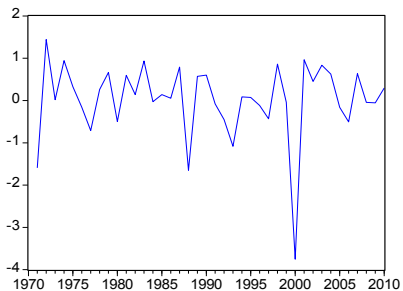
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Appendix Figure 1: (Non-Stationary in Levels)

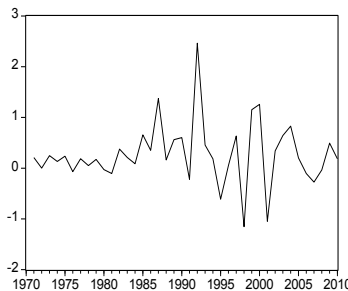


Appendix Figure 2: (Stationary at first difference)

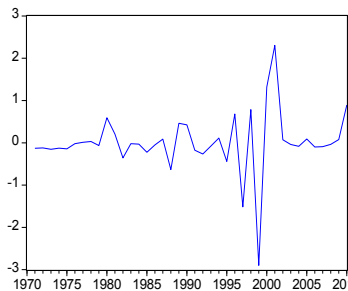




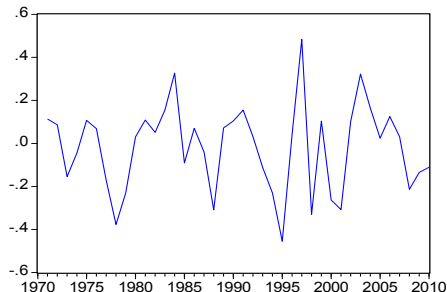
DLNINF



DLNBDGDP



DLNINV/GDP



DLNTOT