UNIVERSITY OF CAPE COAST

INFLATION AND ECONOMIC GROWTH IN SIERRA LEONE

BY

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DECLARATION

Candidate's Declaration

I hereby declare that this thesis is the result of my own original work and that no part of it has been presented for another degree in this university or elsewhere.

Candidate Signature:………………………   Date:…………………….

Name: Saidu Swaray

Supervisors' Declaration

We hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.

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ABSTRACT

The study examined the relationship between inflation and economic growth in Sierra Leone using annual data for the period 1979 to 2008. Employing autoregressive distributed lag (ARDL) approach to cointegration, the study found a cointegrating relationship among the variables when real GDP was used as the dependent variable and no cointegrating relationship among the variables when inflation was used as the dependent variable. The bounds test results revealed that inflation exerted a negative and statistically significant effect on economic growth both in the short-run and long-run suggesting that higher rates of inflation is inimical to economic growth in Sierra Leone.

Also, investment as a share of GDP and government expenditure exerted a positive and statistically significant impact on economic growth both in the short-run and long-run suggesting that government expenditure and investment are critical in enhancing sustained economic growth and development. The Granger causality test result revealed a unidirectional causality between inflation and economic growth and ran from economic growth to inflation. Thus, the study concluded that government expenditure in the form of investment is an important channel through which the economy can achieve economic growth. Hence, the study recommended that government should embark on judicious investment especially in infrastructure to achieve sustained economic growth.

ACKNOWLEDGEMENTS

DEDICATION

To my family especially my foster parents, Mr. and Mrs. Patrick A. Kamara and my Late Mother Baindu B. Koroma.

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LIST OF ACRONYMS

ACC   Anti-Corruption Commission

AD   Aggregate Demand

ADF   Augmented Dickey-Fuller

AERC	African Economic Research Consortium
AIC	Akaike Information Criterion
APEC	Asia Pacific Economic Cooperation
ARCH	Autoregressive Conditional Heteroscedasticity
ARDL	Autoregressive Distributed Lag Model
AS	Aggregate Supply
BP	British Pound
BSL	Bank of Sierra Leone
BW	Bandwidth
CLS	Conditional Least Square
CPI	Consumer Price Index
CUSUM	Cumulative Sum of Recursive Residual
CUSUMSQ	Cumulative Sum of Square of Recursive Residual
CV	Critical Values
DGP	Data Generating Process
ECM	Error Correction Model
FMOLS	Fully Modified Ordinary Least Square
FSLD	Financial Sector Development and Liberalization
GDP	Gross Domestic Product
GEXP	Government Expenditure
GST	Goods and Services Tax
HQ	Hannan and Quinn
IFS	International Financial Statistics

IMF	International Monetary Fund
INF	Inflation
INPT	Intercept
INVG	Investment as a share of Gross Domestic Product
LAF	Labour Force
LnGEXP	Natural log of Government Expenditure
LnINVG	Natural log of Investment as a share of Gross Domestic Product
LnLAF	Natural log of Labour force
LnRGDP	Natural log Real Gross Domestic Product
MD	Managing Director
MDA	Ministries, Departments and Agencies
MLYE	Ministry of Labour, Youth and Employment
MOF	Ministry of Finance
MPTC	Monetary Policy Technical Committee
MRA	Master Repurchase Agreement
NAIRU	Non Accelerating Inflation Rate of Unemployment
NRA	National Revenue Authority
OAU	Organization of African Unity
OECD	Organization of Economic Cooperation and Development
OLS	Ordinary Least Square
PP	Phillips-Perron
PRGF	Poverty Reduction and Growth Facility

PRSP	Poverty Reduction Strategy Paper
PV	Probability Value
REPO	Repurchase Agreement
RGDP	Real Gross Domestic Product
SAP	Structural Adjustment Programme
SBC	Schwartz Bayesian Criterion
SDR	Special Drawing Right
SIC	Swartz Information Criterion
SLEDIC	Sierra Leone Export Development and Investment Corporation
SLPMB	Sierra Leone Produce Marketing Board
SOEs	State Owned Enterprises
SSL	Statistics Sierra Leone
TFP	Total Factor Productivity
UK	United Kingdom
USA	United States of America
USD	United States Dollar
VAR	Vector Autoregressive
WB	World Bank
WDI	World Development Indicator
WEO	World Economic Outlook
YOY	Year on Year

CHAPTER ONE

INTRODUCTION

Background to the study

This chapter focuses on the introductory chapter of the study which comprises background, statement of the problem, objectives of the study, hypotheses to be tested and significance of the study. The chapter also highlighted the significance of the study and the organisation of the study.

Inflation and economic growth nexus is arguably one of the most debated issues in the economic literature. Inflation emerged as a global phenomenon in the face of high oil and food price shocks especially in the middle of 2000. There were concerns that inflation in many emerging markets and developing countries was reaching high levels that, if left in isolation, would undermine economic growth by raising inflation expectations (Espinoza, Leon & Prasad, 2010).

High output growth and low inflation are among the fundamental objectives of macroeconomic policy. But can they coexist or is there a trade-off between lowering inflation and achieving higher economic growth? These questions remained unanswered for decades but at the operational level, there is a recognition that the relationship between inflation and economic growth depends on the level of inflation.

Although the previous rapid increase in inflation was driven mostly by food and energy prices, core inflation had started rising in many countries prior to 1980s. In general, three types of underlying inflationary challenges were facing the global economy. First, a host of countries including several in emerging Europe were experiencing a combination of strong capital inflows, rapid credit, rapid credit growth, tightening labour markets and widening current account deficits, pointing to evidence of overheating.

Second, many commodity-exporting countries, including the members of the Gulf Cooperation Council and Russia, were seeing rising export earnings, pushing up aggregate demand and stimulating domestic credit growth. Third, surging commodity prices especially food boosted inflation across the global economy. High food and fuel prices led to substantial increases in inflation, particularly in emerging markets and low income countries (Choi, Smith & Boyd, 1996).

In the last two decades a host of articles have been devoted to the theoretical and empirical analysis of the possible links between inflation and economic growth. The interest of this particular topic lies in the fact that whereas very little disagreement exists as to the negative effects that inflation may have on economic growth from a theoretical point of view, the empirical evidence documenting this negative link is not convincing (Khan & Senhadji,2000, 2001; Khan, 2002).

The roles that inflation, expected and unexpected alike, might play in reducing social welfare are quite consensual as the inconveniency generated by

inflation in the allocation mechanism of the economy are evident: the possible redistributive effects, the increase of the level of uncertainty in the economy leading to distortions in the consumption, saving and investment decisions, the increase in the degree of the tax systems can all lead to a reduction in the overall efficiency of the economy and to a decrease of the growth rate of the economy (Burdekin,2000).

Economists are with the notion that inflation is undesirable to economic growth. Evidences from Germany in the 1920s and recently Zimbabwe in 2008 to date suggest that very high inflation is harmful to an economy. Notwithstanding negative inflation otherwise known as deflation cannot cope with strong economic growth as in Japan during the 1990s and early 2000. It is thus lucid that both high and low inflation have a negative repercussion on societies' standard of living as well as the quality of life individuals live. What remains obscure is the fact that no evidence exists as to whether modest inflation is detrimental to economic growth or not (Gillmore, 2008).

In general, the consequence of inflation on economic growth depends on whether it is anticipated or unanticipated. It is believed that anticipated inflation negatively affects economic growth in many ways such as the costs of changing prices and holding cash as well as the inconsistency in relative prices of goods and services. It also reduces real value of savings and fixed incomes through the tax system. Unanticipated inflation, on the other hand, has both redistributive and negative effects on economic growth (Gillmore, 2008).

Nevertheless, anticipated inflation impacts economic growth through the following ways; often, firms change prices of goods and services during periods of high inflation episodes. This has cost implications in the form of printing new menus, re-pricing and re-packaging products on display in retail stores, upgrading computer files and the like. Based on this irregularity in prices, for individuals and firms to get relevant information in order to make decisions, they spend more time and resources. Thus, inflation decreases the level of productive economic activity thereby leading to poor economic growth. Anticipated inflation also creates costs in terms of holding cash and balances in non interest yielding bank accounts.

Inflation has been a foremost macroeconomic problem in most developing countries including Sierra Leone particularly in the 1970s. Policy makers have become highly interested in the susceptibility of those countries to inflation as a result of its persistence for more than a decade. The Budget Deficit of government's Budget is believed to some extent to be the prime cause of inflation in Sierra Leone especially during the 1980s. The government budget deficit has been a well-known feature of the fiscal system since the country gained independence in 1961. As a result, during the period 1970 and 1996, the budget was consistently in deficit.

In fact, this deficit as a percentage of GDP ranged between 1.1 percent in 1971 and 14.8 percent in 1987 respectively. Internal and external borrowing was used to finance these deficits. To do this, the government used monetary accommodation as a major way of financing its deficits. The consequence was an

increase in money supply which aggravated the inflationary situation in the country (Ministry of Finance, 2005).

During the first decade after independence in 1961, Sierra Leone's economy grew at nearly 4 percent a year. Inflation was low and the fiscal and foreign exchange positions were healthy. Since the first oil-price shock of the 1970s, persistently high inflation has become one of the major macroeconomic problems with which Sierra Leoneans have had to grapple. Sierra Leone's average annual inflation rate rose by approximately 11 percent (from 4.6 percent to 15.33 percent) throughout the rest of the 1970s. This was still lower than every regional average except the Asian and Industrial Country averages. Economic growth averaged around 3 percent in the first half of the 1970s. GDP growth fell to about 1 percent a year over 1975-1980, as a result of reduction in incomes in the mining sector (Bank of Sierra Leone, 1996).

During the 1980s, economic situation continued to worsen. Average annual inflation rate increased to almost 63 percent with 47.6 percent average jumps over the 1974-79 average. Except for the Western hemisphere, least developed countries, which recorded an average annual inflation rate of 131.5 percent during this period, Sierra Leone's average annual inflation rate exceeded every other regional average.

Budgetary revenues fell sharply from 16 percent of GDP in 1984 to 5 percent in 1986, as reductions in imports and official diamond sales reduced the tax base and increasing indiscipline in public sector management eroded collection efficiency. Major cuts in capital expenditures followed. Investments in

new social and physical infrastructure fell. Inflation accelerated mounting at 178.5 percent in 1987 (Kallon 1993).

Because Sierra Leone lacks institutional mechanisms (such as social safety-net and /or wage and tax indexation programmes) for cushioning the impact of inflation, the consequences of the double- digit inflation of the post 1973 era have been very counterproductive to the country's long-term social and economic interests. For instance, in order to cushion the effects of inflation on their already low wages, most public sector employees in Sierra Leone, especially the senior officials, resorted to demanding and taking bribes as a precondition for performing even the simplest of their official responsibilities.

Additionally, a large number of Sierra Leoneans, again resorted to moonlighting to such an extent that the average government employee now gives very little attention and diligence to his or her government job. This of course has produced a tremendous deterioration in the performance of the public sector (Kallon 1993).

The wide-ranging price and other administrative controls that were imposed during that time on goods and services such as foreign exchange, petroleum, rice and transportation throughout most of this period underestimated the recorded inflation rate compared to the actual level of inflation in the economy. Such repressed inflation generally trickles down to parallel market which was operated for a very long time in the Sierra Leonean economy (Chhibber, 1991). The implication is that, the resulting glut demand generates profitable prospects in illicit actions in parallel markets not only for goods and

services, but also foreign exchange. This is because price controls lower the prices of goods and services below their market clearing levels. Households and firms therefore resort to holding abnormally huge cash balances in order to explore such profitable incentives.

Statement of the problem

Inflation is a macroeconomic policy concern because of the consensus that low inflation engenders economic growth. World Bank suggests that higher rates of inflation are inimical to economic growth though it does not constitute a sufficient condition for economic growth. The IMF and international agencies strongly support low inflation targets, usually at a mild rate that can enhance economic growth. The focus on price stability is also supported by empirical evidence that high and variable inflation impedes efficient resource allocation and is harmful to economic growth (Pollin & Zhu, 2006).

The anti-inflation policy approach and other demand management policy measures coupled with the legalised institutional transformation and defined vision and mission of the Bank of Sierra Leone (BSL) rests on the conventional theory that inflation is undesirable in that it, among others, undermines economic growth (Dorrance, 1996; Akerlof, Dickens & Perry, 1996). More explicitly, the macroeconomic policy approach in Sierra Leone has been guided by two interrelated conventional wisdoms. One is a theory that "low and even zero inflation rates are desirable for an attainment of high and sustained rates of economic growth" (Stanners, 1993). The other is a hypothesis in monetary theory

that Central Bank independency is a prerequisite for successful price stabilisation (Cukierman, 1992).

Unfortunately, the relevance to Sierra Leone of these two conventional views remains accepted in policy but not rigorously explored (Kallon, 1993). Even more significant, some opposing views maintain absence of a trade-off between inflation and economic growth. On these accounts, policy drives towards the attainment of low and zero inflation rates may either be unwanted or not a sufficient policy approach to the attainment of high and sustainable rates of economic growth (Pollin & Zhu, 2006).

At worst, such a policy could be inimical to economic growth and development. Hence, if indeed inflation is unfavourable to economic growth, then it is imperative for us to establish a link between these two key macroeconomic variables before making any macroeconomic policy. The present study attempts to examine these issues empirically.

Objectives of the study

The main objective of this study is to investigate the relationship between inflation and economic growth in Sierra Leone.
Specifically, the study seeks to:

- Find out whether long-run relationship exists between inflation and economic growth in Sierra Leone

- Find out whether short-run relationship exists between inflation and economic growth in Sierra Leone

- Explore the nature of relationship between inflation and economic growth in Sierra Leone

- Determine policy options based on the outcome of the study.

Hypotheses of the study

The study seeks to test the following hypotheses.

- H_0: There is no long- run relationship between inflation and economic growth in Sierra Leone

- H_0: There is no short- run relationship between inflation and economic growth in Sierra Leone.

- H_0: There is no bi-directional causality between inflation and economic growth in Sierra Leone.

Significance of the study

This study is motivated by the various economic challenges that the Sierra Leonean economy is experiencing. These among others include; high levels of inflation, low levels of unemployment and low economic growth. Inflation encourages imports and discourages exports thereby exacerbating the current account or trade balance. A stable price level as well as a stable economy will attract foreign investment, reduce the level of unemployment and propel economic growth. Examining the relationship between inflation and economic growth is crucial especially to developing countries like Sierra Leone. This research represents an attempt to establish whether an identifiable causal

relationship exists between inflation and economic growth in Sierra Leone. Moreover, the study seeks to examine whether government expenditure and inflation explains real output growth. The results of these causality tests may be useful to the country for some reasons.

First, by knowing the nature of the relationship among the variables would provide vital information that would be of help in formulating macro econometric models, effective and efficient policy of the country. This is because anecdotal evidence suggests that causality tests are significant in situations in which policy makers can isolate those variables they can control in order to obtain desired values for target variables such as gross domestic product, unemployment, exchange rate, budget deficits and the rate of price change. Thus, if the causality tests happen to be the case that government expenditure has significant explanatory power for economic growth without necessarily a feedback from economic growth to government expenditure, this would be a vital relationship policy makers may explore in a bid to controlling the rate of inflation.

Finally, the cointegration analysis as well as the error correction model helps in explaining how the effects of short-run changes in the independent variables are translated into changes in economic growth. Hence the results will be also useful to the Bank of Sierra Leone whose primary objective is the achievement and maintenance of price stability in providing some clue in setting an optimal inflation target whose adverse effect on economic growth is unlikely to be very large.

Scope of the study

This study investigates the relationship between inflation and economic growth in Sierra Leone using time series data set for the period 1979 to 2008. It employs the recently developed Autoregressive Distributed Lag (ARDL) model otherwise known as the bounds testing approach to cointegration developed by Pesaran and Shin (1999) ; Pesaran, Shin and Smith (2001). The study employs five variables (real GDP as a proxy for economic growth, investment as a ratio of GDP proxied by investment, inflation, labour force and government expenditure as a policy variable); including two dummies to capture the effects of the civil unrest and financial sector liberalisation and development respectively.

Organisation of the study

The study is divided into five chapters. Chapter one focuses on the introductory chapter of the Study and it consists of background, problem statement, objectives of the study and the hypotheses to be tested, scope of the study and significance of the study. Chapter two is devoted to the review of related literature both theoretical and empirical literature on the relationship between inflation and economic growth. Chapter three focuses on the methodology which formulates empirical model and the econometric estimation techniques. This deals with data and techniques adopted in carrying out the study. In Chapter four, the study reports the econometric estimation results and discusses the time series characteristics of the dataset. Finally, Chapter five gives summary, conclusions and recommendations.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

Introduction

This chapter discusses the phenomenon of the underlying issues in the literature and in doing that the study discussed the background to the problem that has to do with the relationship between inflation and economic growth in Sierra Leone, various schools of thought in the theoretical underpinnings of the relationship between inflation and economic growth vis-a-vis Keynesian, monetarists, Neo-classical and Endogenous growth theory. The Keynesian theory presented a more comprehensive model for linking inflation and economic growth within the framework of aggregate demand and aggregate supply. Monetarists upgraded the Quantity Theory of money by reiterating the crucial role of monetary growth in shaping inflation, while Neo-classical and Endogenous growth theories sought to give explanation on the effects of inflation on economic growth through its impact on investment and capital accumulation (Gokal & Hanif, 2004)

Other macroeconomic indicators in the form of fiscal, monetary and exchange rate policies that have direct impact on the relationship between inflation and economic growth in Sierra Leone are also discussed. The analysis of

these policies shows how they are linked in establishing the relationship between inflation and economic growth in Sierra Leone.

Overview of the Sierra Leonean Economy

Rich in minerals, Sierra Leone has relied on the mining sector chiefly diamond as the backbone for her economic base. Economic growth rate was moving at a snail pace especially in the 1970s and early 1980s because of a fall in the mining sector and widespread corruption among government officials particularly in the civil service. In the 1990s and early 2000, economic activity was dwindling while economic infrastructure had become seriously dilapidated. The country's development and recovery from the civil conflicts was further exacerbated by persistent electricity shortages which is one of the prerequisites for economic growth.

Mineral exports remain Sierra Leone's major foreign exchange earner. The country is a major producer of gem quality diamonds. Though rich in these resources, Sierra Leone has historically struggled to manage their exploitation and export. Annual production estimates range between USD$250 and USD$300 million. However, not all of that passes through formal export channels, although formal exports have dramatically improved since the days of the civil war. The balance is smuggled, where it is possibly used for money laundering or financing illegal activities. Efforts to improve the management of the export trade have met with some success. In October 2000, a UN-approved export certification system for exporting diamonds from Sierra Leone was put in place which led to a

dramatic increase in legal exports. In 2001, the government of Sierra Leone created a mining community development fund, which returns a portion of diamond export taxes to diamond mining communities. The fund was created to raise local communities' stake in the legal diamond trade (Sierra Leone Investment and Export Promotion Agency, 2009).

Sierra Leone has one of the World's largest deposits of rutile, a titanium ore used as paint pigment and welding rod castings. Sierra Rutile Limited, owned by a consortium of U.S and European investors, began commercial mining operations near Bonthe in early 1979. Sierra Rutile was then the largest non petroleum U.S investment in West Africa. The export of 88,000 tons realized USD\$ 75 million in export earnings in 1990 (Sierra Leone Investment and Export Promotion Agency, 2009). The company and the government of Sierra Leone concluded a new agreement on the terms of the company's concession in Sierra Leone in 1990. Rutile and bauxite mining operations were suspended due to rebel invasion on the mining sites in 1995, but exports resumed in 2005.

The bulk of the country's formal economy was destroyed during the conflict. Since the end of animosity in 2001, massive infusions of donor funds helped the country to recuperate. To a large extent, Sierra Leone's recovery will depend on the success of the government in handling corruption which, to many was the architect of the country's plunge into civil unrest. A key indicator of success will be the extent to which government manages her resources. Apart from mineral deposits, Sierra Leone has sizeable marine and timber resources which are susceptible to limited management and over exploitation.

Agriculture is the largest sector of the economy, representing in 1990, just before the civil conflict, 40 percent of GDP, employing 65 percent of the labour force, and accounting for 30 percent of the total exports. Currently, agriculture contributes approximately 45 percent to GDP and 75 percent to total employment for the country's labour force.

As a major source of foreign exchange earnings, agriculture provides the country's major primary exports such as coffee, cocoa and ginger. This sector accounts for 40 percent of total export earnings. Sierra Leone's key mineral deposits are diamond, bauxite, iron ore, rutile and gold. Earnings from these sectors contribute 60 percent of the country's foreign exchange earnings. The manufacturing sector, compared to the agricultural and mining sectors is rather small contributing 6 percent to GDP and 2 percent to the employment of the labour force. The services sector, mainly transportation, communication, insurance and finance account for, on average, about 40 percent to GDP (Ministry of Finance, 2005).

Even though the country is endowed with natural resources, it is however, yet to realize its potential fully. Sierra Leone's financial and economic conditions over the past three decades have fallen drastically due to several factors. Factors within the domain of the country included the decade civil conflict, poor governance, corruption, economic mismanagement and fiscal indiscipline. The hosting of the then Organisation of African Unity (OAU) summit in 1980 coupled with the hold back in the country's revenue base also led to the decline in the country's financial and economic situations. The decline in the country's

economic and financial conditions can also be attributed to the fall in incomes from the mining sector partly because of the depletion of the alluvial diamond deposits as well as the closure of the Marampa iron ore mining company in the early 1970s. The consequent was an uncovered budget deficit of US$38,140 in 2000 (Ministry of Finance, 2004).

This large budget deficit culminated into the expansion of government's borrowing from the banking sector thereby leading to crowding out of credit to the private sector. Factors outside the domain of the country included the oil price shocks of the 1970s, deteriorating terms of trade and foreign exchange crisis. The foreign exchange crisis came as a result of a drop in revenue from diamond exports, high foreign interest rates, increased debt problem and a fall in capital inflow. The cumulative effect was an unfavourable balance of payments.

The maintenance of low inflation and or even price stability has been the focus of many countries both developed and developing; since the extant literature suggests that sustained and predictable high rates of inflation impact economic growth negatively. Notwithstanding, many developing countries including Sierra Leone historically recorded persistently high rates of inflation especially between the 1970s and 90s. Sierra Leone, similarly, had a long history of very high inflation episodes during the same period.

In recent years, the Bank of Sierra Leone has been putting greater emphasis on maintaining low inflation that would propel economic growth in Sierra Leone. Generally, when the rate of inflation is zero, government cannot generate revenue. However, the amount of inflation tax government accrues

increases with increased inflation rate. The implication is that, as the inflation rate increases, individuals would decrease their holdings of the money base because the high powered money (monetary base) is now expensive to hold. Thus, individuals hold less currency, and banks also hold small excess reserves, and ultimately the real monetary base falls so much that the amount of inflation tax revenue received by the government falls (Quartey, 2010).

Inflationary trend

Inflation which is considered as a measure of the percentage change in the consumer price index (CPI) became a major concern for the government as well as the policy makers in the middle of the 1970s. It is widely believed that developments in the consumer price index will bring about considerable variations in a large number of macroeconomic variables. Fiscal policies, monetary growth, changes in the exchange rates and possibly the growth of real output have been considered to move pari passu with price changes.

Just after independence in 1961, the country's inflation rate was considered to be creeping, hanging around single digit. Annual inflation as measured by CPI was on average 5.5 percent between 1970 and 1974. This increased sharply to 15.9 percent between 1975 and 1979. This sudden increase was as a result of the oil price shock that hit the World and Sierra Leone was not exclusive. This situation continued until between 1980 and 1984 when the country recorded annual inflation rate of 37.9 percent. The period 1985-1989 recorded an annual inflation rate on average of 85.8 percent. In general, the 1980s was

considered as a period of high inflation, with annual consumer price headline inflation averaging 63.7 percent during the period with the peak of 179.2 percent in 1987. The high prices of imports were suspected to have caused imported inflation in the country in the early 1980s (Bank of Sierra Leone, 1998)

The situation worsened further as the period 1990 to 1992 registered an average inflation rate of 92.8 percent. There was however a sudden fall in the annual average rate of inflation to 23.9 percent between 1993 and 1994. However, the 1990s was considered by many to be a lost decade owing to the civil unrest and military coup d'états in April 1992 and May 1997 and the rebel invasion of the capital city Freetown in January 1999. The result of these animosities was deterioration in the economic performance of the country. The exchange rate was also liberalised in which the leone was continuously depreciating at 50 percent on average per annum. There was a surge in inflation at 93 percent on average. Growth in monetary aggregate slowed down during this period with average annual growth in reserve money, narrow money and broad money posted at 34.1 percent, 33.7 percent and 36 percent respectively. Economic growth plunged to an annual average of -3.2 percent (Essien, Adamgbe & Sesay, 2007).

The consumer price index decreased in both 2000 and 2002 but rose quickly to 3.1 percent in 2001 and 11.3 percent in 2003. During the first half of 2004, there was a further increase to 14.5 percent even higher than the convergence criteria target (inflation rate below 5 percent) set by the planned West African Monetary Zone.

The rise in inflation in 2003 and 2004 was attributed to a rise in fuel prices (and their effects on transportation costs), a strong growth in import demand for reconstruction, an expansionary monetary policy, partly owing to delays in donor support, and the "pass-through" impact of the exchange-rate depreciation of the Leone against the United States dollar on domestic prices. The year on year national inflation rate rose to 15.04 percent as at end June 2008 from 12.15 percent as at end December 2007 and 11.99 percent as at end June 2007. The highest monthly inflation recorded in 2008 was 15.28 percent in May 2008 while the lowest inflation rate of 9.73 percent was recorded in February 2008 (Bank of Sierra Leone, 2008). Figure 1 displays the inflationary trend in Sierra Leone for the period 1970 to 2008.

Despite the cautious implementation of both fiscal and monetary policies under the IMF backed programmes in recent years that seem to have coiled inflationary performance, it is believed that the incidence of high inflation has been linked to a negative growth in real GDP. However, inflation still poses a major threat to policy makers as shown in the monetary policy objectives of the country.
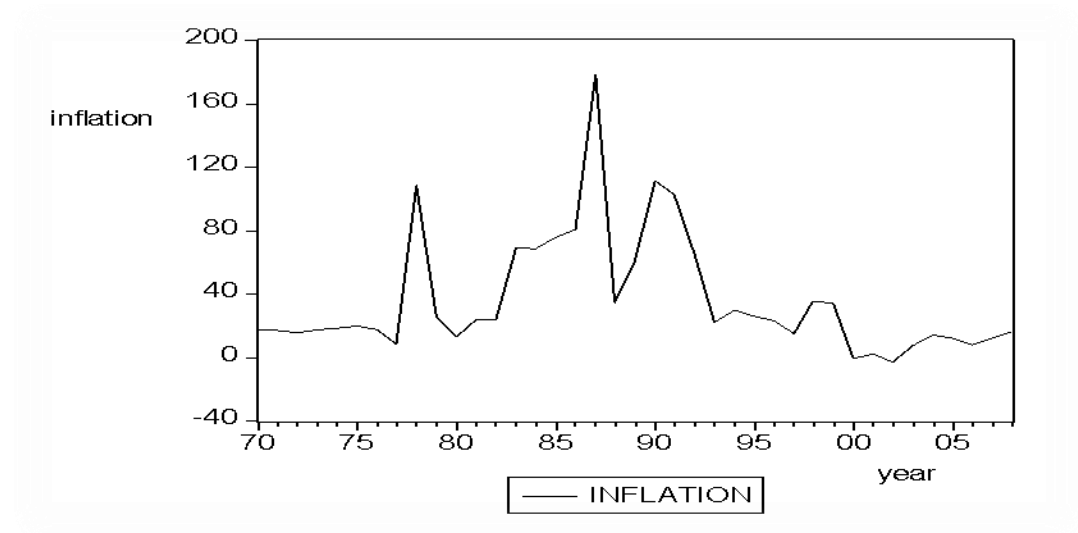
Figure 1: Inflationary trend, 1970-2008

Source: BSL data on inflation (2009)

Figure 1 depicts a plot of the inflation rate for the period 1970 to 2008. The figure shows that inflation was low in the first decade after independence. However, after the oil price shock in 1979, the economy started experiencing episodes of high inflation. This continued in the next two decades where, prior to the civil unrest, the economy recorded the highest inflation rate throughout the review period (i.e. the highest inflation rate 179.2 percent was recorded in 1987). This period coincided with the second highest budget deficit-GDP ratio of 14.5 percent during the decade. Unlike the 1980s which recorded the highest inflation rate and low economic growth, the early 1990s saw fiscal deficit as a ratio of GDP in single digit and an average inflation rate of 5.1 percent (Essien, Adamgbe & Sesay, 2007).

Economic growth trend

20

At independence in 1961, economic prospects in Sierra Leone were sound and promising as a result of the important inheritances of colonial economic management, especially corporate mining of alluvial diamonds, iron ore and bauxite.

During the decade in which the country gained independence, the economy grew significantly by 4.5 percent on average per year, except for a negative growth rate of 28 percent for 1967 as a result of military intervention. The growth was largely propelled by strong mining and agricultural productivity and exports. The economy however slowed strikingly during the 1970s and 80s as the decline in corporate mining spread through the monetised economy. The economy was near collapse by the end of 1980s. This was chiefly characterized by falling GDP per capita, rapid inflation and a severe external payments imbalance. The economic and financial decline in this period was also due to the hosting of the O.A.U. summit and severe macroeconomic mismanagement (Ministry of Finance, 2005).

By mid 1991, the civil conflict broke down which continued throughout the decade with frequent eruptions of countrywide hostilities and political instability. Growth performance during this period was mixed though to a large extent negative and with high inflation. Real GDP fell by 10 percent in 1995 but grew by 5 percent in 1996. There was a fall in the overall budget deficit of 6.3 percent in 1996 from a record 12 percent in 1991. The situation was further exacerbated by the overthrow of the Democratically Elected President in 1997. As a result, real GDP fell by 18 percent and stayed there till 1998 before decreasing

by 8 percent in 1999 as a result of high unemployment and decline in per capita incomes (Ministry of Finance, 2005).

By January 6, 1999, Freetown was invaded and the entire country was faced with renewed fighting and this brought an end to the fragile economic recovery process that started during the second half of 1998. Fall in output and the associated reduction in the domestic revenue base led to a 56 percent fall in revenue during the first half of 1999. With rising government expenditures propelled by security-related expenses, the overall budget deficit excluding grants rose to an estimated 15 percent of GDP during the year.

The cessation of hostilities and ultimate restoration of security countrywide reinforced confidence which facilitated economic recovery during 2000-2004. Economic activities were boosted as a result of countrywide reconstruction and rehabilitation projects. Real GDP, which had risen by 3.8 percent in 2000, rose sharply by 18.5 percent in 2001. It further increased by 27.5 percent and 9.5 percent in 2002 and 2003 respectively. These increases were attributed to the broad recovery in agriculture, mining, manufacturing, and construction and services sectors. There was also a 7.4 percent increase in real GDP in 2004. This increase was as a result of sustained recovery of the agricultural sector, expanded reconstruction and other investment activities. Domestic revenue also increased from 7 percent of GDP in 1999 to 12.4 percent of GDP in 2003 and at relatively the same level in 2004 (Ministry of Finance, 2005).

Figure 2 shows the economic growth trend in Sierra Leone for the period 1970 to 2008.

Agriculture is the country's major economic sector, followed by services. However, the country's GDP shares of mining since 1996 (due to cessation of rutile and bauxite exports) and manufacturing have fallen gradually.
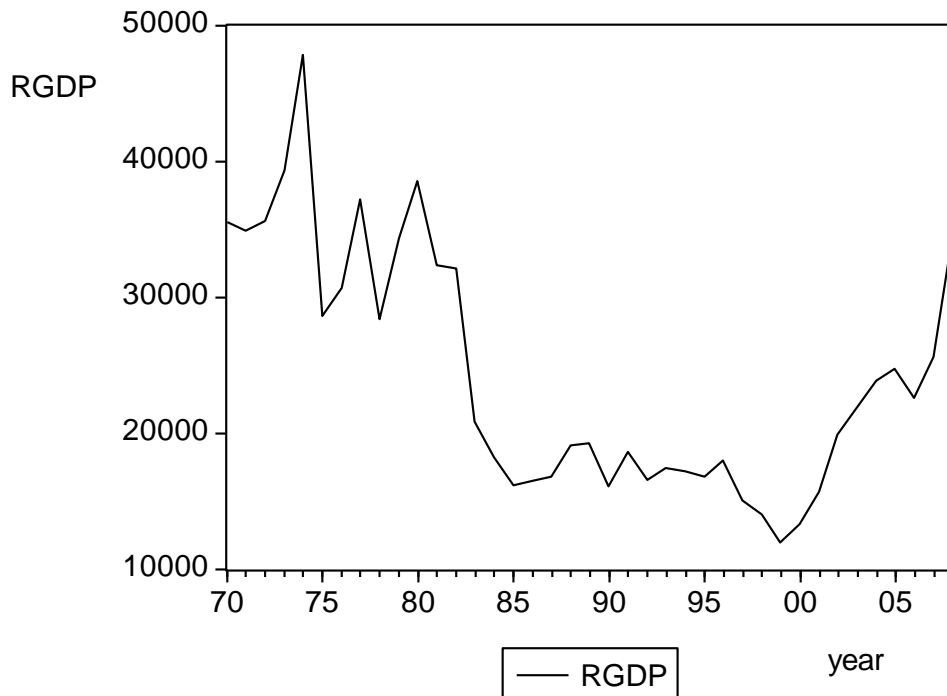
Figure 2: Economic growth trend, 1970-2008

Source: BSL data (2009)

Figure 2 shows a plot of real GDP (Economic growth). The graph seems to suggest that real GDP (Economic growth) was higher in the early 1970s prior to the oil price shocks in the later parts of the 1970s. During this period, the economy had mild inflation. However, after the shocks in 1979, inflation stepped in and the country started experiencing decreases in real GDP. The situation was even worsened when the war broke down in the early 1990s. The fall in real GDP

continued throughout this decade until it started rising by the early 2000s as a result of the end of the hostilities and massive injection of donor funds into the economy as depicted by the graph (Essien, Adamgbe & Sesay, 2007).

Fiscal policy

The conduct of fiscal policies to a larger extent falls within the ambit of the Ministry of Finance (MOF). Fiscal policy in effect is the use of taxes and changes in government expenditures to control the level of economic activity. For any economy to operate on a sound footing depends to a large extent on the ability of the government to tax its people and the way it spends the tax revenue goes a long way in affecting the disposable incomes of the tax payers and corporations and thus providing an enabling environment for business activities.

In Sierra Leone, the attainment of socio-economic development is the sole responsibility of the government and the history of fiscal policy has been one of fiscal domination where persistent fiscal deficits have been financed largely by monetary accommodation. The need to augment the speed of development on both the social and economic fronts came to the limelight after the country gained independence in 1961. This desire led to huge increases in government expenditure in the form of investments in economic, social and physical infrastructure. The Sierra Leone Produce Marketing Board (SLPMB) was then formed in the agricultural sector as a state marketing agency. The SLPMB contributed immensely in the agricultural development of the economy where it served as the sole supplier of agricultural inputs as well as a sole buyer of the

produce that was produced by farmers in small quantities. As a result of economic mismanagement, the SLPMB was virtually closed by the government (Ministry of Finance, 2004).

In the manufacturing sector, a robust industrialisation programme was undertaken. This led to the adoption of import substitution policy which culminated into the explosion of import substitution industries, most of who depended on imported raw materials and other implements. These industries could not live to expectation because of mismanagement. Their down fall was attributed to the fact that they were run by people appointed by the corrupt officials who were under their complete hegemony. These entities, then the state owned enterprises (SOEs) were run behind protective tariffs and non tariff barriers such as government subsidies, tax rebates and low interest charges. As a result of these protective barriers, some of these SOEs failed to withstand the test of time because of over protection. The situation was further exacerbated by the lack of foreign exchange to buy equipment and raw materials for these infant industries (Ministry of Finance, 2004).

The cumulative effect was an increase in government expenditure, as a percentage of GDP to 30.3 percent in 1979 although it later fell to 16.2 percent in 1989. It further fell to 10.01 percent in the early 1990s as a result of the stabilisation policies that were undertaken by the government. On average, government expenditure relative to GDP was around 20.03 percent from 1976 to 1995. The 1980s, which was regarded by many as the lost decade as a result of massive economic mismanagement accounted for 20.00 percent. During the civil

unrest between 1991 and 1995, government expenditure reduced to a record 14.8 percent as a result of stringent measures that were introduced by the structural adjustment policy (SAP) in the late 1980s (Ministry of Finance, 2005).

As a result of the unfavourable economic situation, the government, under the directives of the International Monetary Fund (IMF) and World Bank (WB) adopted the Structural Adjustment Programme in 1989 in order to avert this appalling economic situation. Government expenditure as a percent of GDP drastically fell to 8.3 percent at the later parts of the 1990s as a result of deliberate and tight expenditure cutting measures. The government also established the Sierra Leone Export Development and Investment Corporation (SLEDIC) in 1993 in a bid to intensifying the operations of export oriented manufacturing and processing industries that replaced the Sierra Leone export promotion Act of 1981 and developed the Industries Act of 1983.

To tackle deficiencies in the tax system, the authorities have undertaken reforms since 2002. Chief among these reforms include: The establishment of the National Revenue Authority (NRA) in September 2002; the lowering of the general maximum customs tariff rate from 40 percent to 30 percent; the reduction of the sales tax rate from 20 percent to 17.5 percent; the elimination of the excise tax for luxury and related goods; and the reduction of the top rate of the income tax from 40 percent to 35 percent (Bank of Sierra Leone, 2000).

In June 2004 a draft Bill (the Government Budgeting and Accountability Act) was sent to Parliament with the aim of streamlining the budgeting process and clarification of the relationships between the central and local governments

According to the authorities, tax reforms visualised for 2004 to 2005 included the implementation of basic financial accounting; the modernisation of computer systems; the replacement of financial management accounts systems with financial information management systems; and the establishment of a codification system for government accounts.

Privatisation is cited as a crucial aspect of the Country's structural reform programme. State involvement continues in several loss-making economic activities which constitutes a financial burden on the budget. As of 2002, the authorities undertook the implementation of a project drawn up by the National Commission for Privatisation. The country benefited immensely from the World Bank in this area through technical assistance. Issues relating to transparency and the proper management of public affairs have had a direct impact on the overall economic environment and on the circumstances under which stakeholders in the economic sector take their decisions and operate. Poor governance such as corruption, rent-seeking activities, disregard for the rule of law seem to have been regarded as the prime cause of the civil unrest that befell the nation which causes a lot of mayhem (Sierra Leone Investment and Export Promotion Agency, 2009).

To further preclude the occurrence of this ugly scenario, the Anti-Corruption Commission (ACC) Act 2000 was amended in October 2002. The ACC aims to enhance transparency and manage public resources to ensure responsibility, efficiency, and control of government spending. One of the ACC's strategic objectives for 2003-2008 was the drafting and passing of new Anti-Corruption legislation that would enable it to become more proactive. As a result,

the government signed the United Nations Convention against corruption in December 2003.

Fiscal policy in 2009 was geared towards consolidating macroeconomic stability and laying the foundation for sustained economic growth. The Budget for 2009 envisaged a significant reduction in primary fiscal deficit (1 percent of GDP) while accommodating an increase in public investment. Total domestic revenue was projected at 12.3 percent of GDP (from 11.8 percent in 2008) as a result of stringent enforcement of the provisions of the existing tax legislations, applications of policy measures adopted in the 2007 and 2008 Finance Acts, as well as the expected improved efficiency expected from the modernisation plan of the NRA, in particular the automation of the customs procedures and the establishment of the domestic tax department (Bank of Sierra Leone, 2008).

In addition, the Goods and Services Tax (GST) legislation was also passed by April 2009 with the view to speeding up the renegotiation of mineral rights to enhance domestic revenue collection. This would allow the government to abolish discretionary tax and duty exemptions and provide logistics to the Preventive Services and Special Duties Unit of the NRA to strengthen border patrols to reduce cross border smuggling.

Monetary policy

Since 1964 monetary policy has been conducted by the Bank of Sierra Leone (BSL) with market-based instruments. The conduct of monetary policy has been primarily geared towards attainment of price stability, curtailing inflationary

pressures and rebuilding foreign reserves. The BSL is to meet these objectives by managing the growth of its net domestic assets. These objectives would be complemented by maintaining a higher reserve-requirement ratio and using interest rates more effectively. The BSL Act 2000 also gives the Central Bank the prerogative to formulate, adopt and execute monetary policy in Sierra Leone. These functions have been assigned to the Monetary Policy Technical Committee (MPTC) within the BSL, under the auspices of the Bank Governor. The main objective set by this committee is the maintenance of low inflation, high sustainable economic growth and price stability.

Prior to 1992, direct instruments such as reserve requirements, special deposits requirements, selective credit control and moral suasion were the chief channels through which the Central Bank achieved its monetary policy objectives. The growth of money and credit were therefore sought to be limited by the Central Bank through direct constraint on the growth of commercial banks balance sheets. This implies that interest rates on government securities were determined by the administration. In terms of reserve requirements, commercial banks were urged to hold a minimum of 40 percent of their total deposits liabilities as reserve asset with the BSL (Bank of Sierra Leone, 1996)

Moral suasion was considered as a vibrant monetary policy instrument at that time because the Central Bank's Governor was able to convince the Managing Directors (MDs) of commercial banks to cooperate with the objectives and policies of the Central Bank. This was done through periodic meetings of these MDs with the Governor of the Central Bank.

Within the framework of the Structural Adjustment Programme (SAP), the implementation of monetary reforms took place with the aim of curtailing inflation and revamping the reserve position through tight monetary controls. This necessitated the replacement of administrative system of controls on interest rates and exchange rate with a system of indirect controls that were based on market related instruments (Bank of Sierra Leone, 2003)

The BSL established a tender system in January 1992 with the aim of selling ordinary Treasury Bills to the commercial banks. An effective market-determined Treasury bill auction was therefore replaced with a system of setting rates for these Treasury Bills. By August 1992, the hitherto segmented markets in treasury bills (Bank and Non-Bank) were amalgamated and this led to the adoption of the open market operations in primary markets.

Following this development a Treasury Bearer Bonds scheme was introduced in the following year (August 1993) that has a twelve month government-borrowing instruments targeting mainly the non-bank public. This treasury bearer bonds scheme was first issued on August 12 at an interest rate of 33 percent. Bids for Treasury bills are however submitted in discounts whereas Treasury Bearer Bonds are submitted in specific interest rates (Bank of Sierra Leone, 1999).

On February 28 1994, the BSL introduced a Clearing House System for commercial banks to trade Treasury Bills in a secondary market. This comprises all the sales and purchases of Treasury Bills before maturity. These reform

measures laid the groundwork for the vigorous use of open market operations as the key instrument of the conduct of monetary policy in the BSL since 1992.

At present, the primary instrument of monetary policy is open market operations. Operations are however centred on the primary market for government securities. Reserve requirement is also used as a monetary policy instrument. Because the BSL does not have independent bills, reserve and liquidity ratios are used as prudential measures. There are also very little activities in the secondary market as a result of the small size of the financial market and the high liquidity of commercial banks. There is no Published Bank Rate but the Bank charges a penal rate for liquidity deficiency of 5 percent above the highest lending rate of the commercial banks. Government securities are available for the trading area which is 91 days for Treasury Bills and 12 months for Treasury Bearer Bonds (Bank of Sierra Leone, 2004)

Monetary policy is conducted within the conduit of monetary targeting regime. Reserve money has been identified as the operational target which is used for day-to-day or week-to-week policy to achieve the final goals. Broad money has also been identified as the intermediate target which hinges on the Central Bank's ultimate policy goals and the operational target. The IMF requires the Central Bank to target the reserve money on a quarterly basis that is consistent with that on inflation and economic growth. Table 1 shows the monetary policy framework in Sierra Leone.

Table1: Monetary policy framework in Sierra Leone

Monetary Policy Instruments	Operational Target	Intermediate Target	Ultimate Policy Objects
Open market-type Reserve Requirement	Reserve Money	Broad Money	Price Stability Sustained Economic Growth

Source: Bank of Sierra Leone Monetary Policy Technical Committee (2000)

From Table 1, it is evident that the key monetary policy instruments in Sierra Leone are open market operation and reserve requirement. The operational and intermediate targets are reserve money and broad money respectively. Hence, the ultimate policy objectives of the Bank of Sierra Leone are price stability and sustained economic growth.

There are certain limitations with regards to the conduct of monetary policy in Sierra Leone. First, trading in secondary market in government securities is limited and underdeveloped. This means less than 5 percent of the total trading in government securities is undertaken in secondary markets. Second, inter-bank securities trading are almost nonexistent. Commercial banks therefore resort to the Central Bank as a first step to trade outstanding securities in between primary auctions. Repurchase Agreements (REPOs) are yet to be introduced in the securities market. The Master Repurchase Agreement (MRA) has also been

prepared and circulated to all stakeholders in the market including the commercial banks and the discount houses.

Exchange rate policy

The conduct of exchange rate policy in Sierra Leone is undertaken by the Ministry of Finance (MOF) via the Bank of Sierra Leone. However, the Central Bank runs the day-to-day administration of exchange control with the help of the commercial banks. The Bank of Sierra Leone started operation in 1964 and during this year, the Leone, which is the official currency of the country, replaced the West African pound that was in existence prior to the inception of the Central Bank. Since then, Sierra Leone has experienced differs exchange rate regimes. At first, the Leone was pegged at a par value of 1.24414 grammes of fine gold which was equivalent to 0.50 British Pounds (BP). The United Kingdom (UK) then was the country's chief trading partner.

During that period, the UK was receiving 75 percent of the country's exports while at the same time providing at least 30 percent of the country's import needs. Three years later, the Leone was devalued (1967) by 14.30 percent that matched the British Pound to a new par value of 1.06641 grammes of fine gold. This was still equivalent to 0.50 BP. This revision was as a result of the devaluation of the pound sterling in a bid to precluding the out flow of capital and a drain on the country's already low external reserves (Bank of Sierra Leone, 1997).

A dual exchange rate system referred to as the "Two-Tier" system was introduced in December 1982. This system comprises two exchange rates: The official exchange rate used for government or capital transactions that was held fixed, and a commercial exchange rate that was determined on the basis of the Central Bank's fortnight auctions. Because of the high level of malpractices in this system the government deemed it necessary to terminate it in July 1983 and consequently the standard drawing right (SDR) peg came to a halt. The Leone was then permanently linked to the U.S. dollar at an official exchange rate of Le 1= USD $ 0.3984. This linkage was justifiable on the grounds that it was the most commonly acceptable currency that was used in the parallel market for foreign exchange that came to the limelight in 1983 (Bank of Sierra Leone,1999).

A market/ fixed based exchange rate system was established in March 1984 to allow exporters of gold and diamonds to sell all or part of their foreign exchange earnings to importers at freely determined rates. This arrangement led to the introduction of the retention rate at Le 1= USD $ 0.154. The eroded credibility of the banking system, as well as the absence of exporters of agricultural products led to the failure of the scheme because of lack of significant impact on the stabilisation of trade and the exchange rate.

June 27 1986 saw another exchange rate regime; the managed floating regime. Because this system was flexible, the need for effective and retention rates faded out. The Central Bank then started weekly fixing sessions via the commercial banks. To provide a reasonable and competitive rate, the government devalued the Leone by 60 percent which was a record rate of devaluation. The

Leone was later revalued in the late 1987. The rationale for this revaluation was necessitated by the need to appreciate the Leone with a view to regulating inflationary pressures on the economy through the possible reduction of the parallel market rate that was observed to be strongly related to the official exchange rate (Bank of Sierra Leone, 1996).

Following the implementation of the Structural Adjustment Programme, the exchange rate was then liberalised in April 1990 with the aim of correcting the economic ills of the already overvalued currency. In April 1991, a floating exchange rate was then introduced that was determined freely by the market forces of demand and supply. Commercial banks were then allowed to buy and sell foreign currency to their customers. They were also allowed to trade in foreign currency among themselves or with the Bank of Sierra Leone on a freely negotiable basis. Licensed foreign exchange bureaus were also allowed to operate in the market for foreign currency.

Sierra Leone nationals and firms may hold foreign-currency bank accounts and may freely import and export currency. Foreign firms with investments in Sierra Leone may remit profits and capital without prior BSL approval on the proviso that they fulfil the regulations governing the transactions. Cash amounts over USD$ 10,000 to be taken out of Sierra Leone by residents must be reported to authorities (Bank of Sierra Leone, 2000).

In response to shortages of petroleum products owing to oil Companies' outstanding payments to suppliers, between March and 31st December 2003 the BSL allowed oil Companies to obtain foreign exchange amounting to about one

third of the total auction supplied through a temporary special window. The window used the exchange rates determined at the weekly auctions; a total of USD$ 10.15 million, or 18 percent of the total auction supply, was made available to the oil companies.

Thus, it can safely be concluded that inflation in Sierra Leone has been largely influenced by fiscal, monetary and exchange rate policies that culminated into the poor economic performance of the country (Bank of Sierra Leone, 2008).

Theoretical literature review

Here, the study succinctly elaborated on the theoretical underpinnings of the relationship between inflation and economic growth before proceeding to the empirical literature review.

The extant literature reveals the existence of several paradigms on the nature and relationship between inflation and economic growth. The Keynesian School maintains that inflation boosts economic growth through two main channels. First, inflation propels economic growth through redistributing income from workers with low marginal propensities to save to entrepreneurs who are believed to have the financial muscles to save and invest. The second channel is through boosting nominal rate of return on investment relative to the rate of interest that propels investment.

The traditional Keynesian model consists of aggregate demand (AD) and aggregate supply (AS) functions which suitably explain the relationship between inflation and economic growth. The main feature of the Keynesian model is that

the aggregate supply function is upward sloping and not vertical in the short-run. This implies that changes on the demand side of the economy affect only prices when the aggregate supply function is vertical while changes in aggregate demand affect both prices and output when the function is upward sloping. This is true because many factors move the inflation rate and the level of output in the short-run. These among others include changes in expectations; labour force; prices of other factors of production, fiscal and / or monetary policy (Gokal & Hanif, 2004).

Thus, the Keynesian theory posited that there is a positive relationship between inflation and economic growth due to the 'time-inconsistency problem'. The time inconsistency problem arises when producers assume that the prices of the products of their competitors do not change overtime and instead only the prices of their products that would increase while the other producers are operating at the same price level. Hence, the Keynesians advocate the existence of a positive relationship between inflation and economic growth. Blanchard and Kiyotaki (1987) argued that the positive relationship can be due to a consensus among some firms to supply their products at a later day at an agreed price. Therefore, even when the prices of products increase in the economy output will not decrease since producers have to accomplish the demands of the consumers with whom the agreement was made.

In contrast, the monetarists contend that during periods of high inflation episodes, the behaviour of all sectors of the economy become adjusted to the inflationary expectation, thus the effects of inflation will now be to redistribute

income from workers and savers who are holders of money balances and are deemed to be the only losers from anticipated inflation, to the capitalists who are believed to have the financial muscles. In essence, the monetarists argued that inflation imposes an inflation tax on holding of money. Thus, this will serve as an incentive to tax evaders to decrease their real money balances, reduce payment period and hold inventories rather than cash hence wastage of resources and reduction of real income thereby decelerating economic growth (Friedman, 1971). Friedman (1970) argued that inflation was a consequence of an increase in the supply or velocity of money in circulation at a rate greater than the rate of growth in the economy.

The classicalists, as revealed in the Mundell (1965) and Tobin (1965) framework, hence the so-called Mundell-Tobin effect argued that inflation impedes economic growth by raising the cost of holding money balances and thus leads to portfolio substitution of money balances in favour of capital. It is obvious in this argument that current and expected inflation discourage borrowers and reward lenders such that it now becomes rational for savers to convert their savings to financial savings to gain the expected return now and in the future. This profitable incentive denotes that high inflation reduces real interest rate which leads to high investment and hence boosts economic growth.

However, the classicalist position was challenged in the literature. It has been argued that inflation acts as a tax on investment and thus increases the costs of investment which is contrary to the proposition by the classicalists (Stockman, 1981; Fischer, 1983, Fischer, 1993). Fischer (1993) argued that current and

expected high inflation increases uncertainty about macroeconomic environment which distorts savings and investment decisions thus reducing economic growth.

The Neo-classicalists also maintained a positive relationship between inflation and economic growth. Tobin (1965) argued that people substitute current consumption for future consumption by either holding money or acquiring capital. Under this approach, individuals maintain precautionary balances despite capital yielding a higher rate of return. He further argued that through portfolio mechanism people will switch away from money with its lower return and change towards capital. The implication is that, high inflation rate permanently raises the level of output. However, there will be an ad hoc effect on output growth occurring during the transition from old capital stock to new capital stock. The impact of inflation under this condition can be referred to as a "tortoise effect" whereby it stimulates huge capital accumulation and higher economic growth, merely until the yield to capital decreases.

Simply put, the Tobin effect advocates that inflation makes people to alternate money with interest earning assets, which leads to huge capital intensity and improves economic growth. In effect, inflation shows a positive relationship to economic growth. Tobin (1972) also opined that because of the downward rigidity of wages and prices, the adjustment in relative prices during periods of economic growth could be obtained by the upward movement in price of some individual prices.

Stockman (1981) also developed a model that linked inflation and economic growth by indicating that individuals' welfare falls as a result of lower

growth in output chiefly because of a rise in inflation rate. He considers money and capital to complement each other which shows inverse relationship between inflation and economic growth. His view was motivated by the fact that firms put aside some amount of cash to finance their investment projects. At times the cash can be part of their financing package, whereas other times, banks may require compensating balances. Since inflation wear away the purchasing power of money balances during periods of high inflation episodes, implies individuals decrease their purchases of both cash goods and capital. The implication is that, there will be a corresponding reduction in the steady-state level of output. This phenomenon is referred to as the 'stockman effect' which operates through the effects on the labour-leisure decision made by individuals.

Cooley and Hansen (1989) identified the effect of capital accumulation on the assumption that the marginal product of capital and the quantity of labour is positively related and thus showed that the level of economic growth perpetually decreases during periods of higher inflation rate. The consequence is that, a fall in the quantity of labour as a result of an increase in inflation will lead to a decline on the return to capital as well as economic growth.

Also, another school of thought maintains that inflation is harmful to economic growth. According to this theory, economic growth is created by factors within the production process – economies of scale, increasing returns or induced technological change and not exogenous factors such as increases in population. This advocates that the economic growth rate depends on capital. Variables such as inflation reduce the rate of return and this in turn decreases capital

accumulation and thus reduces economic growth. Other models of endogenous growth explain growth further with human capital. The consequence is that growth depends on the rate of return to human capital as well as physical capital. The inflation acts as a tax that decreases the return on all capital and economic growth (Gillman, Harris & Matyas, 2002).

This model argues that a rise in inflation decreases the marginal value of today's last unit of consumption thereby motivating individuals to work less. With less labour, the marginal product of capital is eventually reduced yielding a slower rate of capital accumulation. Further, because the empirical works on the endogenous growth model do not make provision for the measurement of the growth accounting residual which is unique in diverse countries, they tend to exhume the private and public sector choices that make the rate of growth of this residual to vary across economies (Gillman et al., 2002).

Tribedy (1991) also supported the notion that inflation is undesirable to economic growth. According to him, inflation affects economic growth in three folds. First, the sluggishness of nominal prices in response to inflationary pressures owing to cost of adjustment causes many sectors in the economy to experience a fall in real prices such that economic growth falls. This occurs as a result of frequent change in prices of productive goods and services during inflationary episodes. Second, inflation leads to dispersion of relative prices which in turn develops uncertainty and increased risk that intensifies speculative short-run investments at the peril of productive investments. Third, inflation penalises the value of money balances in favour of increase in money demand for

transactions purposes or investment in physical assets rather than debt instruments. As a result, investment and economic growth become adversely affected especially when inflation is fully anticipated in such a way that economic agents can equally adjust their nominal prices.

Vogel (1974) argued that inflation impedes economic growth by causing distortions in the economy. The distortions are in the form of overvalued exchange rate that favours imports at the detriment of export, food price controls in favour of politically influential working class and financial disintermediation that results from low and negative interest rates.

Empirical literature review

Several studies have been undertaken to examine the relationship between inflation and economic growth. These studies chiefly tried to investigate the inflation-economic growth trade-off hypothesis as posited by the Phillips curve theory. The interest in this area has been exclusively focused on whether inflation negatively affects economic growth or not. Empirical studies conducted so far attempted to establish the relationship between inflation and economic growth. The study thus investigates the assumption made by the short-run Phillips curve that there exists a trade-off between inflation and unemployment and / or economic growth in the short run.

The bulk of the studies on the relationship between inflation and economic growth are cross country and panel studies that to a large extent covered industrialised countries in the United States of America, Canada and Western

Europe. A majority of such cross country studies hold a strong view in favour of the existence of a trade-off between inflation and economic growth in the short-run (Barro, 1995).

Kormendi and Meguire (1985) are prominent economists who have shifted the old school empirical acumen concerning the impact of inflation on economic growth. These conventional wisdoms were interpreted as the Tobin (1965) effect because the relationship between inflation and economic growth was considered to be positive and negative for the Stockman's (1981) cash-in-advance economy with capital inclusive. The nexus between inflation and economic growth according to them was negative and significance. However, Fischer (1993) and Barro (1995) confirm the relationship to be negative. Levine and Zervos (1998) and Sala-i-Martin (2002) also found that inflation was not a healthy determinant of economic growth.

For instance, De Gregorio (1991) used data on 12 Latin America countries during the period 1951 to 1985 to examine the relationship between inflation and long-run economic growth. Using a simple endogenous growth model, he was able to explain how inflation affects the allocation of resources and hence economic growth. This model was an extension of monetary model used in the 1970s and early 1980s to analyse the effects of inflation on steady state income and on welfare. The model took into consideration technology that allowed sustainable growth by expanding it to capture the effects of inflation on the rate of growth of income. The results found that high inflation has been one of the key factors hindering economic growth during the period. The main conclusion of his

paper was that, persistent inflation may reduce economic growth prospects in Latin America and thus cautioned that it should be bore in mind that the model and evidence presented in the paper did not allow lessons to be drawn about the relationship between inflation and economic growth which is at the centre of discussion on macroeconomic management and policy in Latin America in particular and the World in general.

Gillman et al. (2002) used data set on three panels of countries to examine the relationship between inflation and economic growth. The first comprised twenty-nine (29) Organisations for Economic Cooperation and Development (OECD) countries; the second panel consisted of eighteen Asia-Pacific and Economic Cooperation (APEC) countries of which six of them are member of the OECD countries and the third panel considered all forty-one countries. They found that the reduction of high (double digits) to moderate (single digit) inflation exerted a significant positive effect on economic growth for OECD countries and less for the Asian Pacific and Economic Cooperation (APEC) countries. They also realised that the impact of an anticipated deceleration of inflation might only be observed when there is no sudden growth in the World economy owing to shocks.

Khan and Senhadji (2001) re-examined the relationship between inflation and economic growth, using econometric analysis. They used unbalanced panel data set of 140 developed and developing countries for the period 1960 – 1998. They obtained data from the World Economic Outlook (WEO) database and comprise the following variables. The growth rate of GDP in local currency in constant 1987 prices, inflation calculated as the growth rate of the consumer price

index (CPI), the initial income level measured as the five-year average of GDP per capita in 1987 purchasing power parity prices, gross domestic investment as a share of GDP, population growth, the growth rate of terms of trade and the five-year standard deviation of terms of trade.

According to them, regression of real GDP growth on the level of inflation would give robust result to the extreme inflation observations with potential to skew the result. They suggested that the log transformation be used to eradicate the strong asymmetry in the inflation distribution. They estimated a log model of inflation using conditional least squares (CLS) along other regression parameters. Their empirical results found a negative relationship between inflation and economic growth.

Ghosh and Phillips (1998) used a large panel of 3,603 annual observations on real per capita GDP growth, and period average consumer price inflation (CPI) on 145 countries for the period 1960 – 1996. The decision-theoretic ('tree') analysis which is superior to standard regression analysis in terms of its robustness was used to complement the panel regression. Their results showed a negative and statistically significant relationship between inflation and economic growth.

Christoffersen and Doyle (2000) used panel data to examine the relationship between inflation and growth. The aim of their work was to look at the growth rate of export market and structural reforms in a bid to establishing the nexus between inflation and economic growth and the impact of disinflation. They used data on annual real GDP, share of exports, population, direction of

trade to 1996, transition reform index export market growth and a dummy to show the impact of war for the period 1990 – 1997. They modelled the relationship between inflation and output as did Sarel (1995). Their results showed that export market growth is strongly related to output in transition. Further, they found that there is no indication that disinflation acquires significant output cost even at mild inflation rates. In effect, they found a negative relationship between inflation and economic growth.

Sarel (1995) also used panel data with 248 observations from 87 developed and least developing countries in order to model the effect of inflation on economic growth. He found a negative and statistically significant relationship between inflation and economic growth suggesting that inflation seemed to have influenced growth only in a sub-sample of countries that have high rate of inflation and the high inflation rate was associated to the least developing countries.

Malla (1997) examined the relationship between inflation and economic growth for 11 Organisation for Economic Cooperation and Development (OECD) countries (U.S.A, U.K, Belgium, France, Germany, Norway, Canada, Japan, Finland, Greece and Australia). He adopted the model by Kmenta (1971) in his empirical analysis. The model was estimated in pooled or combined time series and cross-sectional form. Using annual data on real GDP, inflation, government expenditure, exports, net capital stock, and labour force for the period 1966 to 1998 and the application of shazam version 7 to estimate the equations, he found a negative coefficient on inflation suggesting that any positive effect of inflation

on economic growth would more than outweigh the negative effects. The results also revealed that even if inflation had been at a constant rate for some time, and therefore surely fully anticipated, the result implies that any lost growth from high inflation must be accounted for by a loss from an increase in inflation.

Bruno and Easterly (1998) examined the relationship between inflation and economic growth. They defined high inflation crisis as an annual inflation that is more than 40 percent for two or more years. They chose the 40 percent optimal level because the moderate inflation literature had ascertained that inflation around 15 percent to 30 percent has no negative impact on economic growth. Their criterion chose evidence of 32 inflation crises from 26 countries. On average inflation during the crisis periods was in triple digits and double digits (20 percent) in the non crisis period. They found a simple robust pattern of growth before, during and after these discrete inflation crises. They used per capita growth and per capita growth relative to the world average as two alternative measures of growth. These results found no evidence of any relationship between inflation and economic growth at annual inflation rates less than 40 percent which was their definition of high inflation. They however found a short-to medium-run negative link between high inflations and growth and concluded that there was no lasting harm to growth from discrete high inflation crises as countries tend to recuperate back toward their pre-crises growth rate.

Lee and Wong (2005) examined the relationship between inflation and economic growth for Taiwan and Japan using quarterly data from 1965-2002 for Taiwan and 1970-2001 for Japan. Their results found a negative relationship

between inflation and economic growth in both countries and recommended there is need for inflation targeting if economic growth was to be achieved.

Mallik and Chowdhury (2001) used cointegration analysis to examine the effect of inflation on economic growth for four South Asian countries (Bangladesh, India, Pakistan and Sri Lanka). The rationale of their study was to establish the relationship between inflation and economic growth for these countries because they were under pressure from the International Monetary Fund, World Bank and the Asian Development Bank to reduce their inflation rates in order to promote economic growth. None of these countries had experienced inflation crisis before except Bangladesh during 1972 – 1974. They calculated economic growth rates from the difference in logs of real GDP at 1990 prices and inflation rates from the difference of logs of consumer price index (1990 = 100) for all four countries using annual data from the IMF International Financial Statistics CD – ROM for the period 1974 – 1997 for Pakistan and 1966 – 1997 for Sri Lanka respectively. Results of unit root tests when they used Dicky-Fuller and Augmented Dicky-Fuller showed that both growth rate and inflation were integrated of order zero for the countries except Sri Lanka where the growth rate was integrated of order zero and inflation rate of order one when they included a time trend. They also found that inflation and economic growth were positively related and that the sensitivity of inflation to changes in growth rates was larger than that of growth to changes in inflation rates.

Fischer (1993) investigated whether inflation has any negative effect on economic growth. He posited that investment and productivity growth can be

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reduced through the negative effect of inflation on growth. According to him, low inflation and small fiscal deficit are not necessary for high growth even in the long-run. Similarly, high inflation is not consistent with sustained growth. He however found a negative relationship between inflation and economic growth.

Thirlwall and Barton (1971) in cross-country studies of developed and developing countries found a positive relationship between inflation and economic growth for a cross-section of developed countries and an inverse relationship for a cross-section of 7 developing countries.

Barro (1995) systematically examined the potential reverse causality from economic growth to inflation for five South America countries (Bolivia, Brazil, Argentina, Uruguay and Chile) during the period 1960 to 1990. To control for inflation in these countries, he used the past value of inflation (lagged inflation) as an instrument that was devoid of serial correlation problem to be a proper instrument. His results showed a unidirectional causality between inflation and economic growth running from economic growth to inflation implying inflation caused economic growth in these countries and recommended that they should bring their inflation rates down in a way that will engender economic growth.

Alexander (1997) used a pooled time series and cross-section data for 11 OECD countries over the period 1966 to 1988. He regressed simple growth data against inflation data. This was done by using a regression of growth data on net capital and labour increments and subsequently added annual inflation rate, annual change in inflation rate, government expenditure and exports. His results found a negative and statistically significant coefficient of inflation on economic

growth suggesting that inflation has a negative effect on economic growth for the 11 OECD countries. This was in conformity with the study by Barro (995).

Pollin and Zhu (2006) investigated the relationship between inflation and economic growth for 80 countries including Sierra Leone for the period 1961 – 2000. They used a simple panel data model in which they segregated the effects of inflation on economic growth by including a series of control variables. They eliminated from the model countries that had population below two million in order to show that the countries' trends of economic activity can be understood as having characteristics that are unique to that country. For their model to be consistent with that of the Bruno-Easterly mechanism, they used a panel. Their results found a positive and higher coefficient of inflation for low income countries than with the middle income countries.

Sepehri and Moshiri (2004) argued that there is the possibility for multi-country studies to exhibit a negative relationship between inflation and economic growth. Using dataset from four categories of countries at a variety of stages of development, their results showed no statistically noticeable, long-run relationship between inflation and economic growth for the OECD countries. The results therefore indicated that there is a potential bias in the estimation of the relationship between inflation and economic growth by merely combining different countries at different stages of development. The existence of such a degree of heterogeneity across countries at various levels of development also suggests the incompatibility of targeting a sole, homogeneous numerical policy target related to all developing countries.

Espinoza et al. (2010) examined the relationship between inflation and economic growth using a panel of 165 countries including Sierra Leone covering the period 1960 to 2007. They used a smooth transition model to investigate the speed at which inflation becomes inimical to economic growth. Using data on the ratio of investment to GDP, population growth, initial GDP, the rate of change in terms of trade and the variability of the terms of trade, they average these data over 5-year periods to smooth out the business cycle fluctuations. Their results showed that inflation exerted a negative effect on economic growth, suggesting the need for a prompt policy response to inflation.

Bittencourt (2010) investigated the effects of inflation on economic growth for four Latin American countries (Argentina, Bolivia, Brazil and Peru for the period 1970 – 2007. They investigated the role of the poor macroeconomic performance in the 1980s and early 1990s during periods of high inflation episodes in determining economic growth in that region. In order to provide consistent and informative estimates on their research, they used principal component analysis to get independent variables that have more explanatory power to reduce model uncertainty. They also used high-frequency data without necessarily the usual averaging to better pin down the effects of inflation on economic growth.

Finally, they explore the novel panel time-series analysis and cross-sectional and time series variation in the data. Their results showed that inflation was inimical to economic growth during the study period in that region. They recommended that political liberalization in this region should be accompanied by

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the adoption of the right economic institutions so that the cost of generating high inflation will be high thereby precluding macroeconomic factors growth and prosperity.

Drukker, Gomis-Porqueras and Hernandez-Verme (2005) used a new approach to investigate the ageing question of the super-neutrality of money. In order to modify the question of the super-neutrality, they employed new econometric techniques for estimation and inference in panel data models with a sample of 138 countries for the period 1950 – 2000. They found strong evidence that inflation has a negative effect on economic growth.

Fang, Miller and Yeh (2009) empirically re-examined the nexus between aggregate inflation and its unpredictability chiefly on the basis of whether a negative relationship exists between inflation and economic growth. To measure inflation and its variability, they used quantile regressions and cross-sectional data from 152 countries. They considered two measures of inflation to include the mean and median and used the standard deviation, relative variation and median variation as measures of inflation variability. According to them, the relationship between inflation and its variability is positive across quantiles; higher inflation relates more with inflation variability and inflation variability increases inflation. They concluded that inflation has a perverse effect on economic growth.

The bulk of the studies on the relationship between inflation and economic growth are cross country and panel studies that to a large extent cover industrialised countries particularly in Europe, the United States of America and Canada. Majority of such cross country and panel studies carry strong evidence in

support of the existence of a trade-off between inflation and economic in the short-run (Khan & Senhadji, 2001; Barro, 1995; Fischer, 1993). However, the cross country studies are associated with several shortcomings prominent among them include:

First, they eliminate the analysis of institutional factors such as change in legal framework that are germane to the relationship between inflation and economic growth within and without those developed countries. Second, panel data and/or pool data analysis set apart econometric analysis in cross-country studies. More often than not some data gaps are reported and sometimes they even use country dummies. As a result, the healthiness of the econometric results becomes suspect. Third, generalisations from cross-country econometric results are doubtful. Therefore, the country specific analysis would give better integration in the analysis of country specific conditioning factors. Most of the recent studies specifically focus on the case studies of a particular country by applying time series data to test for the existence of the relationship between inflation and economic growth.

For instance, Mubarik (2005) examined the relationship between inflation and economic growth in Pakistan using annual time series dataset on consumer price index (CPI based on 1990 – 1991), real GDP (at constant factor cost of 1980 – 1981), population and total investment for the period 1973 – 2000. He also did sensitivity analysis to avoid specification bias. His results found a negative effect of inflation on economic growth. The Granger causality test revealed a uni-directional relationship between inflation and economic growth.

Seleteng (2005) also examined the relationship between inflation and economic growth for Lesotho using quarterly time series data on consumer price index (base year = 1995), real GDP (at constant 1995 prices), population and real gross fixed capital formation (real investment; also based on the 1995 constant prices) for the period 1981 – 2004. In order to get a smooth estimate of the long-term trend component of the series, he used the Hodrick-Prescott filter method which can be found in E-Views software. His results showed a negative and bi-directional relationship between inflation and economic growth which is different from the result obtained by Mubarik (2005) for Pakistan.

Ahmed and Mortaza (2005) empirically explored the relationship between inflation and economic growth for Bangladesh. They examined the short-run and long-run relationships between real GDP and consumer price index using co-integration procedure and Error correction model. They used annual time series dataset on real GDP and CPI for the period 1980 – 2005. Their results suggested a statistically significant long-run negative relationship between inflation and economic growth for Bangladesh. Their finding was consistent with Mallik and Chowdhury (2001) who mentioned that the relationship between inflation and economic growth for Bangladesh moved from positive to negative especially during the 1990s.

Sweidan (2004) investigated whether there is a structural break between inflation and economic growth for Jordan. He used the Autoregressive conditional Heteroscedasticity (ARCH) model to estimate a proxy to inflation variability and a multiple regression model to affirm stylised facts about the determinants of

economic growth. He uses annual time series data for the period 1970 – 2003. His results found a negative and statistically significant relationship between inflation and economic growth for Jordan.

Faria and Carneiro (2001) found out the relationship between inflation and economic growth for Brazil using the Vector Autoregressive (VAR) model and an annual data for the period 1980 – 1995. Their results showed that inflation does not affect economic growth in the long-run only in the short-run.

Nell (2000) investigated whether low or zero inflation is a precondition for faster real economic growth rates in the case of South Africa. In order to study the costs and benefits of inflation, he divided South Africa's inflationary experience into four inflationary episodes. The results found a negative relationship between inflation and economic growth in South Africa. The results were in conformity with Sarel's (1996) empirical study which posited that high inflation is inimical to economic growth. As a result of this negative relationship between inflation and economic growth especially during the 1980s in South Africa, he argued that the South Africa's Reserve Bank (SARB) approach to tackling inflation was too conservative and thus the use of deflationary policy as a measure to control inflation was costly to the economy because the cost of addressing inflation was far more than the benefits. He recommended the use of other measure if the Government desires to control inflation in order to promote economic growth.

Erbaykal and Okuyan (2008) examined the relationship between inflation and economic growth for Turkey. They used quarterly time series data on Gross Domestic Product (Y) and consumer price index (CPI) for the period 1987:1 –

2006:2. To examine the long-run relationship between the two variables, they used the Autoregressive Distributed Lag (ARDL) model. Their results showed that there is no statistically significant long-run relationship between the variables. A negative and statistically significant short-run relationship was however found. They concluded that there was uni-directional causality running from inflation to economic growth. This finding is in line with Mubarik (2005) who found a uni-directional relationship between inflation and economic growth for Pakistan.

Hussain (2005) re-examined the relationship between inflation and economic growth for Pakistan. He used the same methodology, variables and dataset that were used by Mubarik. Unlike Mubarik who used smoothed dataset to examine the relationship between inflation and economic growth, he used unsmoothed datasets for the same variables and the same time period. By extending his sample period from 1973 – 2000 to 1973 – 2005, he was able to know that the results of the Granger causality test used for the identification of linear causation changes significantly as the sample period was extended. However, he did find a negative relationship between inflation and economic growth. He therefore concluded that inflation in Pakistan is subject to demand and supply shocks and not necessarily a monetary phenomenon.

Gokal and Hanif (2004) found out whether a significant relationship exists between inflation and economic growth in the context of Fiji as posited by theory and empirical literature. In order to investigate the bivariate connection between inflation and economic growth they used dataset set of 34 annual observations on

real GDP growth, annual average CPI inflation rate and year-on-year (YOY) CPI inflation rate for the period 1970-2003. By comparing the YOY inflation rate and annual average inflation with growth, they realized that the YOY inflation rate revealed no palpable link with growth whereas annual average inflation appeared to show evidence of a negative relationship with growth since the mean and median growth rates fall as inflation rises. This implies that the average inflation rate might be a more stable measure of inflation that the YOY because its computation involves the averaging of two years of CPI data. There results showed a weak negative correlation coefficients and a uni-directional relation running from economic growth to inflation. The results demonstrated that the bulk of Fiji's inflation is imported with domestic factors in the form of per unit labour costs and output gap being limited.

More recently, Chimobi (2010) empirically examined the relationship between inflation and economic growth in Nigeria. The study employed two econometric models to achieve empirical results. The first observes the short-run and long-run relationship between GDP and CPI by applying the Johansen (1988) co-integration test and the associated Error correction Model and the second model applies the Granger-causality test to investigate the direction of causality between the two variables. To establish the nexus between inflation and economic growth, economic growth and inflation were proxy by the GDP and CPI respectively. Using annual time series data for the period 1970 – 2005 the results showed no evidence of co-integrating relationship between the two variables for the Nigeria data implying no long-run relationship between inflation and

economic growth for Nigeria. This result was the same when he employed the vector Autoregressive (VAR) – Granger causality at two lag periods. He however concluded that the causality that runs from inflation to economic growth is a signal that inflation indeed has an impact on economic growth. This result is consistent with the finding by Ahmed and Mortaza (2005) who empirically explored the current relationship between inflation and economic growth in the context of Bangladesh using annual dataset for the period 1980 – 2005.

Salami and Kelikume (2010) also attempted to examine the nexus between inflation and economic growth for Nigeria using country specific time series data. They extended the data set used by Chimobi (2010) from 1970-2008. This period was chosen because of the unpredictability that befell the Nigerian economy between 1960 and 1970 as a result of political instability that culminated into the 1967-69 civil unrest. In their estimation, they attempted to find out the direction of the inflation growth nexus. To obtain their empirical results, they employed the conventional model of testing for causality proposed by Granger (1969). The concept of the Vector Autoregressive model (VAR) was applied in this situation.. To identify the significant variables in the growth-inflation model, they included the following variables in their model: Growth rate of real GDP, Growth rate of real CPI, Growth rate of the ratio of broad money supply to GDP (a measure of financial deepening) and the Growth rate in terms of trade. They observe two different sample periods (1970-2008 and 1980-2008) their results showed a negative and statistically significant relationship between inflation and economic growth.

Frimpong and Oteng-Abayie (2010) investigated the relationship between inflation and economic growth in Ghana using annual dataset on the growth rate of gross domestic investment as a proportion of GDP (It), growth rate of aggregate labour force (Lt), the growth rate of terms of trade (Tt) and the growth rate of money supply (Mt) for the period 1960 – 2008 The paper specifically focused on the following questions: Is inflation harmful? At what level? To understand the historical trend of the inflation-growth nexus in Ghana more precisely they followed the approach of Mubarik (2005) by categorizing the whole sample into 8 observations. The essence of this grouping was to choose a range of inflation from the sample minimum and maximum levels of inflation rate. By doing a sensitivity analysis, their results found a negative relationship between inflation and economic growth for Ghana.

Their policy recommendation to the Ghanaian government based on the outcome of their study was that, policies aimed at nurturing fiscal discipline and dwindling inflation geared towards cautious public expenditure management, adherence to public procurement rules, efficient and effective domestic revenue mobilization and acceleration of growth agenda through public private partnerships must be vigorously reinforced.

Quartey (2010) investigated the revenue maximising and the growth maximising rate of inflation for Ghana. He was interested in two key issues. First, to ascertain the revenue maximising rate of inflation for Ghana and second, to investigate whether the revenue maximising rate of inflation was also growth maximising. He used data on real GDP growth, real balances, budget deficit as a

proportion of GDP, exports as a proportion of GDP, private investment as a share of GDP and inflation obtained from Bank of Ghana and the World Development Indicator (WDI) for the period 1970 to 2006. To address the issue of whether the revenue maximising rate of inflation was also growth maximising, a cointegration framework was used to analyse the inter-relationships between growth and inflation. The rationale was to build a non-linear model that includes the squared term on inflation as an explanatory variable. He used the Augmented Dickey-Fuller and the Phillips-Perron unit root tests to know the stationarity of the variables. To address these two key issues, he used the Johansen cointegration approach to analyse the effect of inflation on long-term growth. The cointegration results revealed a negative impact of inflation on economic growth. His conclusion was that, price stability led to higher growth rate and the Ghanaian economy has operated below the growth maximising rate of inflation in recent times. He recommended that government should pursue the price stability policy but should also be mindful of the trade-off between inflation and employment.

After reviewing literature, both theoretical and empirical on the relationship between inflation and economic growth, the study further reviewed literature in other areas that are not directly related to the relationship between inflation and economic growth but were found germane to the study. In particular, Kargbo and Adamu (2010) examined the relationship between financial development and economic growth in Sierra Leone. Employing the ARDL approach and using real GDP (calculated by dividing nominal GDP by CPI) as a measure for economic growth, share of investment as a proxy for gross fixed

capital formation, their results found a positive and statistically significant impact of investment on economic growth thus suggesting that investment is critical in Sierra Leone.

Kouassy (1994) examined the IS/LM models and the assessment of the real impact of public spending on economic growth in Ivory Coast. To test the impact of public spending on economic growth, he used a simple model with cash balance and the different components of public spending as regressors. The results of his findings suggested the need for a prudence analysis of the features of public spending in terms of its impact on private activities, its demand push effects as well as its global effect on economic growth. Hence, to undertake any public sector reform in Africa in general and Ivory Coast in particular, according to him, there should be an imitation of the experience of such reforms in developed countries before applying to the African context.

Smith and Wahba (1995) examined the role of public finance in economic development for 56 least developed countries including Sierra Leone. As an initial exercise, they used a simple neoclassical production to specify and estimate an equation that investigated the extent to which the rate of growth of GDP per capita for the 56 countries could be linked to the growth in the labour force, rate of growth in gross domestic investment and the rate of growth of exports. Government expenditure was included in the model in the form of crude disaggregated form because labour force growth would not take into consideration the human capital aspects of the labour input. Using rate of growth of GDP per capita as a proxy for economic development and growth as well as a dependent

variable, the growth rates in labour force, investment and exports as well as government expenditure as explanatory variables, the results showed that growth in investment, and in exports; government expenditure exerted a positive impact on economic development. However, labour force exerted a negative and insignificant effect on economic development and growth. This to them was a reflection of the relationship between the growth of the labour force and population growth.

Summary

The chapter has reviewed the related literature on the relationship between inflation and economic growth in Sierra Leone. Before the review of the theoretical and empirical literature, the background of the Sierra Leonean economy was discussed. This included the cur issues in the economy that have direct link with the relationship between inflation and economic growth. They take the form of major macroeconomic policies that are implemented in the economy. These macroeconomic policies included the fiscal, monetary and exchange rate policies. Fiscal policy deals with the use of taxes and changes in government expenditure to control the level of economic activities in the country.

Monetary policy is geared towards attainment of price stability, curtailing inflationary pressures and rebuilding foreign reserves. The exchange rate policy saw the resurgence of various exchange rate regimes to include a dual exchange rate system, market based and the managed floating exchange rate regimes.

CHAPTER THREE

METHODOLOGY

Introduction

This chapter attempts to find a systematic framework that gives the study the empirical model for the analysis and the econometric estimation techniques adopted in carrying out a study of this nature. This helps in establishing the link between inflation and economic growth in Sierra Leone.

Theoretical model specification

The literature on inflation and economic growth during the 1950s and 1960s emphasised positive impact of inflation on capital accumulation that occurs as a result of shifting the portfolio away from money when the rate of return on money falls. Subsequent contributions describing the various complementarities between real money balances and capital through the production function or as a result of a cash-in-advance constraint predicted that higher inflation would reduce capital accumulation and this discourages savings and investment thereby reducing economic growth. Similarly, all the costs of inflation explained in Fischer and Modigliani (1978) as well as the impact inflation has on the taxation of capital yielded a negative relationship between the level of income and inflation.

The general transmission mechanism that occurs from inflation to economic growth to some extent is based on the adverse selection and moral hazard problems that occur in credit markets. In general, inflation reduces real returns to savings in the form of information asymmetry which exacerbates an informational friction afflicting the financial system. This friction in the financial market might result to credit rationing and thus limit the availability of investment capital in the form of the level of investment and thus reduces the efficiency of the allocation of savings to viable investment projects (the efficiency of investment), which ultimately affects the long-run economic growth (Li, 2006).

As a result, models which succinctly explain the negative relationship between inflation and economic growth one way or the other might vary in their sources of financial market imperfections and the specifications of an adverse selection problems that occur in capital markets.

Barro (1995) suggested that inflation can decrease economic growth through a fall in the propensity to invest. He used a pooled dataset with the assumption that there is a linear relationship between inflation and economic growth as well as inflation and investment.

As presented in the literature, all the findings argued in favour of the existence of a relationship between inflation and economic growth. To better understand the economic growth trend prevailing in Sierra Leone, an endogenous growth model is introduced which explains that economic growth depends on the rate of return on both physical and human capital. Inflation decreases the rate of

return and this in turn reduces capital accumulation and thus reduces economic growth.

An endogenous growth model in the form of a Cobb-Douglas production function is formulated to capture the relationship between inflation and economic growth given by equation (1).

$$Y_t = AK_t^{\alpha} L_t^{\beta} \tag{1}$$

Where Y denotes the aggregate output at time t, K is the aggregate capital stock at time t, L denotes labour stock at time t while A denotes total factor productivity (TFP). α and β are coefficients of elasticity for capital and labour respectively.

The total factor productivity (TFP) captures growth in output that is not accounted for in the production function through increases in physical inputs (capital and labour) in the model.

Following Barro (1995), Khan (2005), Sargsyan (2005); Khan and Senhadji (2001), the study augmented equation (1) with some variables that are assumed to affect the relationship between inflation and economic growth.

Given the possibility of a feedback from economic growth to inflation and vice versa, the study formulated the following models to allow for this possibility given by equations (2) and (3) respectively.

$$Y_t = AINF_t^{\beta_1} INVG_t^{\beta_2} LAF_t^{\beta_3} GEXP_t^{\beta_4} \tag{2}$$

$$INF_t = AY_t^{\alpha_1} INVG_t^{\alpha_2} LAF_t^{\alpha_3} M2_t^{\alpha_4} \tag{3}$$

Where INF is inflation at time t, Y is real GDP at time t, INVG is ratio of investment to GDP at time t, LAF is labour force at time t, GEXP is government expenditure at time t and M2 is real money balances at time t.

Empirical model specification

Transforming equations (2) and (3) into log linear form in order to reduce the errors and variances, the following empirical models are formulation and are denoted by equations (4) and (5) assuming $Y_t = LnRGDP_t$

$$LnRGDP_t = \beta_0 + \beta_1 INF_t + \beta_2 LnINVG_t + \beta_3 LnLAF_t + \beta_4 LnGEXP_t + \beta_5 FSLD + \beta_6 WAR + \varepsilon_t \qquad (4)$$

$$INF_t = \alpha_0 + \alpha_1 LnRGDP_t + \alpha_2 LnINVG_t + \alpha_3 LnLAF_t + \alpha_4 LnM2_t + \alpha_5 FSLD + \alpha_6 WAR + \mu_t \qquad (5)$$

Where Ln denotes natural logarithm, LnRGDP is Real GDP (economic growth) at time t, INF is inflation at time t, INVG is the ratio of investment to GDP at time t, LAF is labour force at time t, GEXP is government expenditure at time t, M2 is real money balances at time t, FSLD is a dummy for financial sector development and liberalisation and WAR is a dummy for the civil unrest.

A priori expected signs

The coefficients, $\beta_1, \beta_2, \beta_3$ and β_4 in equation (4) are the elasticities of the various variables while the coefficients $\alpha_1, \alpha_2, \alpha_3, \alpha_4$ in equation (5) are the various elasticities of the variables. α_0 and β_0 are the drift components, t denotes time and ε is the error term. Also, $\alpha_5, \alpha_6, \beta_5$ and β_6 are the coefficients of the two dummies in equations (4) and (5) respectively. The following are the a priori expected signs for equation (4) : $\beta_1 < 0, \beta_2 > 0, \beta_3 > 0, \beta_4 > 0, \beta_5 > 0$ and

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β_6<0. Also, the coefficients on equation (5) take the following a priori expected signs: $\alpha_1 > \alpha_2 > \alpha_3 > \alpha_4 > 0.$

The bulk of the literature suggested that inflation is harmful to economic growth and thus is inversely related to economic growth so its coefficient is expected to be negative. Investment is believed to exert a positive impact on economic growth since it is a major channel for sustained economic growth so we expect the coefficient to exhibit a positive sign. Labour force is also expected to be positive. Government expenditure is also another channel that feeds economic growth so its coefficient is expected to be positive. An increase in money supply has a positive relationship with inflation and since inflation is inversely related to economic growth, it is expected that increase in money supply increases inflation so Money supply is expected to exert a positive impact on inflation. The WAR dummy by every indication is expected to be negative while the dummy financial sector liberalisation and development is expected to pose a positive impact on economic growth

Data description and sources

Economic Growth is defined as the sustained increases in a country's gross domestic product overtime. The extant literature suggests that real gross domestic product can be used as an efficient measure of economic growth. Many researchers use GDP deflator and consumer price index interchangeably to deflate nominal GDP as a measure of economic growth.

The GDP deflator to some extent is considered to be more efficient than the CPI as a deflator because it considers both producer and consumer goods whereas the CPI covers both consumer goods and services. However, because of data unavailability on GDP deflator for Sierra Leone to cover the study period, the study used CPI to deflate GDP as a measure of economic growth and has been widely used by other researchers. In particular, Kargbo and Adamu (2010) used GDP/CPI as a measure of economic growth for Sierra Leone. Thus, the study employs real gross domestic product as a measure of economic growth and is measured by dividing nominal GDP by the consumer price index. This implies that (CPI 2000=100).

Erbaykal and Okuyan (2008) also used real GDP as a measure of economic growth for Turkey by deflating nominal GDP series with consumer price index based on 1987=100. Ahmed and Mortaza (2005) used GDP/CPI as a measure of economic growth in examining the relationship between inflation and economic growth in Bangladesh.

Inflation is defined as a persistent increase in the general price level of goods and services. Although there is no general consensus on the effect of inflation on economic growth, several empirical studies have however found a negative effect of inflation on economic growth. Inflation affects the real sector through financial intermediaries and subsequently impacts on economic growth negatively.

Empirical evidences have shown that different measures of financial sector development are strongly and positively associated with the level of

investment, efficiency of investment and real economic growth. Hence, inflation may affect the real sector through the banking system by reducing the overall amount of credit available to businesses. Higher inflation reduces the real rate of return on assets which in turn discourages saving but encourages borrowing (Quartey, 2010). The negative impact inflation has on economic growth as revealed in the literature suggests that it is imperative to include it in the model since it is a critical variable in the analysis. Thus, inflation in this study is measured by the growth rate of consumer price index and is measured as follows: Assume P_t =CPI where t= 0,1, 2,… implies the growth rate of P_t is calculated as: $P_t^* = P_1 - P_0 / P_0 *100\%$ where P_0 is the base price and P_1 is the current price. This can be rewritten as: $P_t^* = \Delta \ln P_t$. Assuming $P_t^* = INF_t$, implies inflation rate is obtained from the growth rate of the consumer price index as measured above (Bank of Sierra Leone, 1998).

The share of investment is used as a proxy for the ratio of gross fixed capital formation to nominal GDP. Fischer (1993) includes investment in his model to show that inflation reduces growth by reducing investment and productivity growth. Investment as share of GDP had always been one of the most significant factors associated with the output growth. As mentioned in Sala-i-Martin (2002) countries that invest more tend to grow faster than those countries that save and invest less. Some African countries like Sierra Leone which had low growth rates accounted only for 10 percent of investments in GDP. Meanwhile, in such Asian countries like the four Asian Tigers (South Korea, Singapore, Hong Kong and Taiwan) investments yielded up to 50 percent of GDP. Investment is

one of the main sources for growth in Sierra Leone and is expected to have positive significant effect on economic growth.

Labour force (labour participation rate) is chosen instead of population growth because it denotes a proportion of the total population aged between fifteen (15) and sixty-five (65) years and is the active and productive population in the country. Solow (1956) and Swan (1956) advised that labour force should be included in an endogenous growth model because of its impact on the work force and this has been proven empirically in many researches that included labour force to be a good measure of economic growth.

One common indicator used for macroeconomic stability is government expenditure (Easterly & Rebelo, 1993). According to the Keynesian proposition, an increase in government expenditure, if bond financed, raises aggregate demand, which leads to an increasing demand for cash balance. Government expenditure is expected to propel economic growth without a crowding out effect on the private sector. Malla (1997) used government expenditure in his model to examine the relationship between inflation and economic growth for 11 OECD countries. It is thus used as a policy variable for economic growth in this study since an increase in government expenditure especially in productive activities like road construction, provision of electricity can boost economic growth. However, because of inflationary pressures and crowding out effect on private investment, government expenditure may tend to lower economic growth and the coefficient is expected to have a positive sign.

Money supply M2 consists of M1 which comprises currency, that is, paper money and coins in the hands of the non-bank public, checkable deposits in commercial banks and other depository institutions plus savings and time deposits or quasi money. Inflation is based on the existence of a stable demand for real money balances assumed to be a function of interest rate and M2 being the broad definition of money supply under the control of the Bank of Sierra Leone (BSL). Thus, the study divided money supply by consumer price index (CPI) in order to obtain real money supply which is used in this study (Ahmed & Mortaza, 2005).

The fact that the BSL is independent and thus control the money supply, implies that if the money supply is kept stable, the price level will also be stable. However, if the money supply is increased then there will be a corresponding increase in the price level thereby resulting in inflation. This phenomenon is sometimes described as seignorage. The expected sign of money supply will be positive in this situation because an increase in the money supply by a given amount will increase the price level by that same amount.

The dummy variable WAR takes the value of one (1) in periods of the civil unrest (1991-2001) and zero (0) otherwise. The variable financial sector liberalisation and development (FSLD) is included in the model to discern the effect of financial intermediaries on economic growth. It has been argued in the literature that various measures of financial market development are strongly and positively associated with the level of investment, efficiency of investment and hence economic growth (King & Levine, 1993 a; b; Atje & Jovanovic, 1993; Levine & Zervos, 1998). Xu (2000) also reinforced that investment is a crucial

channel that propels economic growth through financial sector development. However, it has not been ascertained that the impact of inflation on economic growth is either through the level of investment or efficiency of investment. Thus, financial sector liberilisation and development is calculated as a dummy for financial liberalisation with one (1) during the period of liberalisation (1989-2008) and zero (0) otherwise.

Data on all the variables are acquired from various issues of the Bank of Sierra Leone's annual reports as well as various issues of national accounts from Statistics Sierra Leone (SSL), World Development Indicators (WDI), and Ministry of labour, youth and unemployment and the International Financial Statistics (IFS). These data sets were crossed checked from the various sources for consistency and were proved to be consistent with each order.

Estimation procedure

To establish the long run and short run relationships between inflation and economic growth the study employed Autoregressive Distributed Lag (ARDL) model approach to cointegration and error-correction model. The Augmented Dickey-Fuller (ADF) and the Phillips-Perron test statistics were employed to analyse the time series properties of our data set. This was done by carrying out the unit roots test to determine whether our variables are stationary. Finally the study performed causality test by employing the pairwise Granger causality tests.

Autoregressive Distributed Lag (Bounds Test) Approach to Cointegration

Since the focus of this study is to establish the relationship between inflation and economic growth, an appropriate technique is to employ cointegration and error correction analysis.

The Autoregressive Distributed Lag (ARDL) approach otherwise known as the bounds testing approach to cointegration popularised by Pesaran and Pesaran (1997), Pesaran and Shin (1999) and Pesaran et al. (2001) is used in this study. The study formed the Autoregressive Distributed lagged model of equations (4) and (5). This approach to cointegration has some econometric advantages over the Engle and Granger (1987) and maximum likelihood-based approach proposed by Johansen and Juselius (1990), Johansen (1991) and the fully modified ordinary least squares (FMOLS) procedures of Phillips and Hansen (1990). First, the bounds test does not require pretesting of the series to determine their order of integration since the test can be performed irrespective of whether they are purely $I(0)$, purely $I(1)$ and this avoids the pretesting problems associated with standard cointegration analysis which requires the classification of the variables into $I(1)$ and $I(0)$ that are mutually integrated. Second, Laurenceson and Chai (as cited in Shrestha & Chowdhury, 2005; and Jalil, Ma & Naveed, 2008) have observed that the ARDL modelling integrates or incorporates sufficient number of lags to capture the data generating process (DGP) general to specific modelling framework.

This approach also solves the problem of endogeneity found among macroeconomic variables. Pesaran and Shin (1999) argued that modelling the ARDL with the right lags will correct the problems of endogeneity as well as

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serial correlation. Jalil et al. (2008) also supported the view that the problem of endogeneity will be resolved if the estimated ARDL model is devoid of serial correlation. One key feature of this approach is that, all the variables are assumed to be endogenous. The implication is that, both the long-run and short-run parameters of the model are estimated jointly. Therefore, the issue of endogeneity is crucial since the causal relationship between inflation and economic growth cannot be established in advance.

Finally, unlike the Johansen and Juselius (1990) cointegration test, the ARDL has superior small sample properties. In other words, the ARDL approach is more robust and performs better for small sample sizes (such as in this study) than other co-integration techniques (Pesaran and Shin, 1999). Further, the error correction model (ECM) can be derived from the ARDL through a simple linear transformation. We can then use OLS for our estimation and identification once the order of the ARDL has been determined (Pesaran et al., 2001). It is imperative to use this approach in analysing the underlying relationship since the share of investment to GDP and labour force in our model are endogenous and thus the ARDL has been increasingly used in modern econometric analysis in recent years.

An ARDL representation of equations (4) and (5) are formulated as follows:

$$\Delta LnRGDP_t = \alpha_o + \sum_{i=1}^{p} \alpha_{1i} \Delta LnRGDP_{t-i} + \sum_{i=1}^{p} \alpha_{2i} \Delta INF_{t-i} + \sum_{i=1}^{p} \alpha_{3i} \Delta LnLAF_{t-i} +$$

$$\sum_{i=1}^{p} \alpha_{4i} \Delta LnINVG_{t-i} + \sum_{i=1}^{p} \alpha_{5i} \Delta LnGEXP_{t-i} + \delta_1 LnRGDP_{t-1} + \delta_2 INF_{t-1} + \delta_3 LnINVG_{t-1} +$$

$$\delta_4 LnLAF_{t-1} + \delta_5 LnGEXP_{t-1} + \gamma_1 WAR + \gamma_2 FSLD + \upsilon_t \qquad (6)$$

$$\Delta INF_t = \lambda_o + \sum_{i=1}^{p} \lambda_{1i} \Delta LnRGDP_{t-i} + \sum_{i=1}^{p} \lambda_{2i} \Delta INF_{t-i} + \sum_{i=1}^{p} \lambda_{3i} \Delta LnLAF_{t-i} +$$

$$\sum_{i=1}^{p} \lambda_{4i} \Delta LnINVG_{t-i} + \sum_{i=1}^{p} \lambda_{5i} \Delta LnM2_{t-i} + \sigma_1 LnRGDP_{t-1} + \sigma_2 INF_{t-1} +$$

$$\sigma_3 LnINVG_{t-1} + \sigma_4 LnLAF_{t-1} + \sigma_5 LnM2_{t-1} + \gamma_1 WAR + \gamma_2 FSLD + \upsilon_t \qquad (7)$$

Where Δ is the first difference operator. The parameters α_{ij} are the short-run parameters in equation (6) and δ_{ij} are the long-run multipliers while the parameters λ_{ij} and σ_{ij} are the short-run and long-run parameters in equation (7) respectively. All the variables are defined as before.

The ARDL model testing procedure begins with the bound test. Equations (6) and (7) are estimated by the OLS method. The F-test or Wald test is used to test for the presence of long-run relationship among the variables in equations (6) and (7) given as follows:

The null hypotheses of no long-run relationship among the variables in equations (6) and (7) are tested against the alternative hypotheses of a long- run relationship as follows:

$H_0: \delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = 0$

$H_1: \delta_1 \neq \delta_2 \neq \delta_3 \neq \delta_4 \neq \delta_5 \neq 0$ and

$$H_0 : \sigma_1 = \sigma_2 = \sigma_3 = \sigma_4 = 0$$

$$H_1 : \sigma_1 \neq \sigma_2 \neq \sigma_3 \neq \sigma_4 \neq 0$$

The ARDL procedure involves two stages. At the first stage the existence of the long-run relationship between the variables under consideration is tested by computing the F-statistic for testing the significance of the lagged levels of the variables in the error correction form of the underlying ARDL model.

However, the (asymptotic) distribution of this F-statistic is non-standard, irrespective of whether the regressors are I(0) or I(1). Pesaran et al. (1996a) have tabulated the appropriate critical values for different numbers of regressors (k), and whether the ARDL model contains an intercept and/or trend. They give two sets of critical values. One set assuming that all the variables in the ARDL model are I (0) implying the lower critical bound assumes there is no cointegration relationship among the variables whereas the upper critical bound assumes the variables are I (1) implying the presence of a cointegration relationship among the variables. For each application, this provides a band covering all the possible classifications of the variables into I (0) and I (1). If the computed F-statistic falls outside this band, a conclusive decision can be made regardless of whether the underlying variables are I (0) or I (1), or fractionally integrated. In other words, if the calculated F- statistic falls outside the upper critical value, then a null hypothesis of no cointegration will be rejected regardless of whether the variables are I (0) or I (1) implying a long- run relationship among the variables.

On the other hand, if the computed F-statistic falls below the lower critical value, then we will fail to reject a null hypothesis of no cointegration relationship

among the variables. However, if the computed F-statistic falls within the critical value band, the result of the inference is inconclusive and depends on whether the underlying variables are I(0) or I(1). This necessitates the testing for unit root on the variables under investigation (Pesaran & Pesaran, 1997).

The second stage is to estimate the coefficients of the long-run relationships and make inferences about their values using the ARDL option on the proviso that the long-run relationship between the variables to be estimated is not spurious.

The ARDL approach estimates $(p + 1)^k$ number of regressions in order to attain the optimal lags for each variable, where p is the maximum number of lags to be used and k is the number of variables in the equation (Shrestha & Chowdhury, 2005). The model is selected based on the Schwarz-Bayesian Criterion (SBC) or the Akaike Information Criterion (AIC). The SBC uses the smallest possible lag length and is considered as the most parsimonious model whereas the AIC chooses the maximum necessary lag length (Shrestha & Chowdhury, 2005; Jalil et al., 2008).

Given that cointegration has been established from the ARDL model above, the long-run and error correction estimates of the ARDL are then obtained. The diagnostic test statistics of the selected ARDL model can then be examined from the short-run estimates at this stage of the estimation procedure. The test for parameter stability can also be performed at this stage by plotting the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ) to know whether the coefficients of the estimated model are stable over the study period.

The orders of the lags of the ARDL models are selected using the Schwartz-Bayesian Criteria (SBC), the Akaike Information Criteria (AIC), the $\bar{R}^2$ criterion or the Hannan and Quinn (HQ) criterion.

Long-Run Estimates of the Selected ARDL Model

Having established cointegration relationship, we then proceed to estimate the selected long-run ARDL model in order to obtain the long run coefficients and their asymptotic standard errors. Here, the study concentrated on the economic growth model because this is the only model that gave cointegrating relationship.

$$LnRGDP_t = \alpha_0 + \sum_{i=1}^{q_1} \delta_1 LnRGDP_{t-i} + \sum_{i=0}^{a_1} \delta_2 INF_{t-i} + \sum_{i=0}^{a_2} \delta_3 LnINVG_{t-i}$$
$$+ \sum_{i=0}^{a_3} \delta_4 LnGEXP_{t-i} + \sum_{i=0}^{a_4} \delta_5 LnLAF_{t-i} + \gamma_1 WAR + \gamma_2 FSLD + \mu_t \qquad (8)$$

Once the selected long-run ARDL model is estimated, the study then moves on to estimate the short-run elasticities of the variables within the framework of the error correction representation of the ARDL model. The study determines the speed o f adjustment to equilibrium by employing the error correction side of the ARDL. The existence of long-run relationship among the variables necessitates the estimation of the unrestricted ARDL error correction representation as shown below:

The study specifies an Error Correction Model (ECM) to estimate the short-run adjustments to equilibrium in the model as follows:

$$\Delta LnRGDP_t = \alpha_0 + \sum_{i=1}^{p} \alpha_{1i} \Delta LnRGDP_{t-i} + \sum_{i=0}^{p} \alpha_{2i} \Delta INF_{t-i} + \sum_{i=0}^{p} \alpha_{3i} \Delta LnINVG_{t-i}$$

$$+ \sum_{i=0}^{p} \alpha_{4i} \Delta LnGEXP_{t-i} + \sum_{i=0}^{p} \alpha_{5i} \Delta LnLAF_{t-i} + \lambda_1 WAR + \lambda_2 FSLD + \psi ECM_{t-1} + \mu_t \qquad (9)$$

Where ψ is the speed of adjustment parameter and ECM_{t-1} is the residual obtained from equations (6) which is the cointegration residual lagged one period. The coefficients represent the short-run dynamics while (ψ) is the speed of adjustment to long-run equilibrium as a result of a shock to the system.

The coefficient of this lagged error correction term (ψ) is expected to be negative and statistically significant in order to further confirm the presence of cointegrating relationship among the variables in the model.

The reliability of the goodness of fit of the model is also determined by conducting the diagnostic and stability tests of the model. The diagnostic test takes care of heteroscedasticity; autocorrelation, normality and the functional form that are linked with the model selected. The CUSUM and CUSUMSQ are used to perform parameter stability tests as suggested by (Pesaran & Pesaran, 1997).

Causality Test Approach

The concept of causality as argued by Wold (1953) is crucial and fundamental to all social sciences. He further went on to say that regression relationships may or may not involve a causal hypothesis because the introduction of a causal hypothesis makes the analysis more determinate and thus makes the resulting conclusions more specific. This statement was further buttressed by

Feige and Pearce (1979) who argued that causal relationships between economic variables are the bread and butter of econometric analysis.

Thus there are several approaches to causality theory including the variability determination approach, the realisation approach, the information approach and the causal priority approach. Because the study aims to find out the informational efficiency of the relationship between inflation and economic growth on the basis of an information set, implies the study adopts the information approach to causality. This approach to causality is prominent among other approaches because it is simple and empirically testable. To illustrate this approach, assume we have two variables, prices and money supply denoted by p_t and m_t. Applying the informational causation implies that m_t informationally causes p_t if the information set predicting m_t is also a prerequisite for predicting p_t but not vice versa. Thus, causality theory with respect to the information approach is due to Granger (1969).

Granger causality test

Granger (1969) definition of causality states that X_t causes Y_t if the past history of X_t can be used to predict Y_t more accurately than simply using the past history of Y_t only. This test enables an evaluation of the information content in the past values of a variable in predicting the contemporaneous as well as the future path of another. It is therefore vital for two main reasons. First, it is equivalent to the econometric exogeniety in the sense that unidirectional causality that runs from the explanatory variables to the dependent variables serves a prerequisite

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for the consistent estimation of distributed lag models that do not involve lagged dependent variables. Second, it can be likened to leading indicators and rational expectations. Thus, Granger (1969) observed that it is difficult to determine the direction of causality between two related variables. His definition of causality warrants the estimation of the following model:

$$X_t = \sum_{i=1}^{\infty} \alpha_i Y_{t-i} + \sum_{i=1}^{\infty} \beta_i X_{t-i} + \mu_t \tag{10}$$

$$Y_t = \sum_{i=1}^{\infty} \lambda_i X_{t-i} + \sum_{i=1}^{\infty} \lambda_i Y_{t-i} + \eta_t \tag{11}$$

Where $\alpha_i = (i = 1, 2, ..., \infty)$ so that Y_t fails to cause X_t. The error terms are assumed to fulfil the criteria $E(\mu_t) = E(\eta_t) = E(\mu_t \mu_s) = E(\mu_t \mu_s) = 0$; and $E(\mu_t \mu_t) = \delta_\mu^2$, $E(\eta_t \eta_t) = \delta_\eta^2$.

Causality in equation (10) should run from Y_t to X_t on the proviso that the estimated coefficients on the lagged variable (Y_t) are significantly different from zero. In other words, the coefficients α_i are different from zero, i.e., $\alpha_i \neq 0$. Seemingly, causality in equation (11) runs from X_t to Y_t provided the estimated coefficients on X_t as a group are significantly different from zero, $\lambda_i \neq 0$. Bidirectional causality occurs if X_t causes Y_t and Y_t causes X_t. In other words, the lagged values of both X_t and Y_t as a group in equations (10) and (11) are significantly different from zero.

Unit Root Tests

It is imperative to conduct the statistical properties of macroeconomic variables when dealing with time series data. The bulk of time series data are not often stationary in level terms. As a result, regressions involving nonstationary time series often lead to the problem of spurious regression.

Thus, to eliminate the possibility of these spurious regressions and erroneous inferences, the study determined the order of integration of these series through unit root tests both in the levels and in the first differences with (trend and intercept and intercept only) .Several tests are employed to test for unit roots. The augmented Dickey-Fuller (ADF) and the Phillips-Perron are considered reliable and as such accepted by many in econometric analysis for the test for unit roots and are employed in the study. These tests are used to determine the order of integration of the series.

The PP test, otherwise considered as a nonparametric test simplifies the ADF procedure by allowing for less restrictive assumptions for the time series. The null hypothesis to be tested is that the variables under consideration have a unit root against the stationarity alternative. In each case, the lag-length is chosen using the Akaike Information Criterion (AIC) and Swarz Information Criterion (SIC). The sensitivity of ADF tests to lag selection renders the Phillips-Perron test an important additional tool for making inferences about unit roots. The basic ADF is thus specified as follows: Extricate

$$\Delta X_t = \beta_1 + \lambda_1 X_{t-1} + \sum_{i=1}^{n} \rho_1 \Delta X_{t-i} + \varepsilon_{1t} \qquad (12)$$

Where X_t represents the series at time t, Δ is the first difference operator, β, ρ, λ are the parameters to be estimated and ε is the stochastic random disturbance term.

It is widely known that the ADF tests do not consider cases of heteroscedasticity and non-normality that are regularly disclosed in raw data of economic time series variables, and are also unable to discriminate between stationary and non stationary series that have a high degree of autocorrelation. The PP test for unit roots is therefore employed in the empirical analysis in order to resolve this problem. The PP test is also superior to the ADF test in situations where the time series variables under consideration have serial correlation and a structural break. This is based on the assumptions inherent in both tests. The ADF test assumes the error terms are independent with a constant variance whereas the PP test assumes the error terms are weakly dependent and heterogeneously distributed and thus provides robust estimates over the ADF and is specified as follows:

$$\Delta X_t = \alpha + \lambda_2 X_{t-1} + \theta\left(t - T/2\right) + \sum_{i=1}^{m} \theta_i \Delta_{t-i} + \varepsilon_{2t} \tag{13}$$

In both equations (12) and (13), $\varepsilon_{1i}, \varepsilon_{2i}$ are the covariance stationary random error terms. The following hypotheses are therefore tested in both situations:

H_a : Series contains unit root

H_b : Series is stationary

The null hypothesis is that: The series contains unit roots, implying non stationary against the alternative hypothesis that it does not contain unit roots, implying stationary. The decision rule is that, if the ADF and PP statistics are higher (in absolute terms) than the critical values, we fail to accept the null hypothesis and conclude that there is no unit root implying stationary. Also, if the ADF and PP statistics are less negative than the critical values then we fail to reject the null hypothesis and conclude that there is unit root implying non stationary.

Summary

The chapter has succinctly elaborated on the theoretical underpinnings of the relationship between inflation and economic growth and proceeded to formulating both theoretical and empirical models. The theoretical model adopted in the study is the endogenous growth model which posited that economic growth depended on one key variable; the rate of return on both physical and human capital. According to the endogenous growth model, inflation reduces the rate of return and this in turn decreases capital accumulation and thus reduces the growth rate of the economy.

The endogenous growth model in the form of a Cobb-Douglas production function was then formulated to capture the relationship between inflation and economic growth. The empirical models were formulated by taking natural logarithm on both sides of the theoretical model. This allowed the possibility of a feedback from economic to inflation and vice versa. It further described the data

set and sources used in carrying out the study and also described the variables used in the research. The chapter also delved into the estimation techniques in which the ARDL approach to cointegration has been elaborated on and deemed as an appropriate technique in carrying out a study of this nature as a result of the numerous advantages it has over the other estimation techniques some of which are discussed inter alia.

Thus, the unrestricted error correction models of the empirical model specifications were formed to estimate the short-run adjustment to equilibrium in the ARDL model. Unit root test was conducted to ensure that the variables are not integrated of an order higher that one to avoid spurious regression and Granger causality test was conducted to establish if there exists any causal relationship between inflation and economic growth and in which direction does the causality exist.

The systematic framework of this chapter now establishes the relationship between inflation and economic growth which guides us in our estimation. This has a link with the estimation of our models as well as guiding us to interpret our estimation results in the subsequent chapters and make policy recommendations based on the outcome of the findings

CHAPTER FOUR

RESULTS AND DISCUSSION

Introduction

This chapter presents and discusses the results of the study. The aim is to understand empirically the relationship between inflation and economic growth in Sierra Leone. The study first tested for unit roots in order to determine the stationarity status of the variables using the Augmented Dickey-Fuller (ADF) and Phillips Perron tests and then tested for cointegration and causality using the Autoregressive Distributed Lagged Model (ARDL) and the Pair wise Granger causality test respectively. The analysis of these tests then helped us to ascertain the relationship between inflation and economic growth and thus aided us in discussing the results vividly.

Presentation of results

Unit Root Tests Results

Although the bounds test approach to cointegration does not necessitate the pretesting of the variables for unit roots, it is however vital to perform this test to verify that the variables are not integrated of an order higher than one. The aim is to extricate the result from spurious regression. The order of integration of the variables was tested using the Augmented Dickey-Fuller (ADF) and Phillips-

Perron (PP) unit root tests. The Schwarz-Bayesian Criterion (SBC) and Akaike Information Criterion were used to determine the optimal number of lags included in the test. Appendices A, B, C and D report the results of the unit root tests with intercept and trend both at levels and 1st differences and with intercept only also at levels and first differences.

Appendices A, B, C and D show that the ADF and PP statistics for the levels of all the variables except inflation (INF) do not exceed the critical values (in absolute terms) implying that the variables are non stationary at levels except inflation which is stationary at level. However, when first differences are taken on each of the variables, the ADF and PP statistics are higher than their respective critical values (in absolute terms) implying stationary after first differences. The study concludes that (real GDP, investment as a ratio of GDP, labour force, government expenditure and real money balances) are each integrated of order one or I (1) while (inflation) is integrated of order zero or I (0) according to both the ADF and PP statistics.

Cointegration Analysis

Since the focus of this study is to establish the relationship between inflation and economic growth, it is imperative that to test for the existence of a long-run equilibrium relationship between these two variables within the framework of the bounds testing approach to cointegration. Given that the study employs annual data, a lag length of 2 is used in the bounds test. Pesaran and Shin (1999) suggest a maximum lag length of 2 for annual data in the bounds testing

approach to cointegration. After the lag length was determined, the F test statistic, computed within the framework of the UECM model has been compared with the upper and lower critical values in Narayan (2004). Table 2 reports the bounds test results for economic growth and inflation. The case when economic growth is used as the dependent variable and the case when inflation is used as the dependent variable.

Table 2: Bounds test results (LnRGDP is dependent variable)

F-statistics	Critical Values (CV): Significant at 5%	
	Bottom CV	Top CV
F_{LnRGDP}(LnRGDP|INF,LnINVG,LnLAF,LnGEXP)=5.5972	3.058	4.223
F_{INF}(INF|LnRGDP,LnINVG,LnLAF,LnM2)= 2.71672		
K = 4		

Source: Estimation results (2011) Note: k is number of regressors in equations 6 & 7 respectively. Critical values are obtained from Appendix A2 Narayan (2004:27)

The presence of long-run relationships between equations (6) and (7) has been tested using the bounds tests approach to cointegration. The calculated F-statistics reported in Table 2 show that; for equation (6) where LnRGDP is the dependent variable, $F_{LnRGDP}(.) = 5.5972$ and for equation (7) where INF is the dependent variable, $F_{INF}(.) = 2.71672$. It is conspicuous from the F-statistics results that there exists a long-run relationship among real GDP, inflation, investment , labour force and government expenditure in equation (7) because the F-statistic (5.5972) is higher than the top critical bound value (4.223) at the 5 percent significance level. This implies that the null hypothesis of no

cointegration among the variables in equation (6) can be rejected. However, the null hypothesis of no cointegration among the variables in equation (7) cannot be rejected because it is obvious that its F-statistic (2.71672) is lower than the top critical bound value.

Thus, the existence of a long-run relationship among the variables in equation (6) implies cointegration and no cointegration in equation (7) because of evidence of the non existence of a long-run relationship. The study went on to estimate the selected long-run ARDL model in equation (8) in order to obtain the long-run coefficients and their asymptotic standard errors.

Static long-run results (LnRGDP is dependent variable)

Table 3 reports the long-run relationship results. From Table 3, the long-run relationship results show that inflation exerted a negative and statistically significant effect on economic growth while investment as a ratio of GDP and government expenditure exerted a positive and statistically significant effect on economic growth. Labour force however was not significant.

Thus, from Table 3, it follows that any disequilibrium in the system as a result of a shock can be corrected in the short-run by the error correction model. Hence the error correction model is generated as follows which estimated the short-run adjustments to equilibrium.

ECM = LnRGDP + 0.011102INF -0.63304LnINVG - 0.81387LnLAF- 0.45052LnGEXP + 2.2037FSLD +0.61049WAR+ 45.4198INPT

Table 3: Long-run estimates based on SBC-ARDL (1, 1,0,2,1,0,0) Dependent variable is LnRGDP

Variable	Coefficient	Standard Error	T-Ratio (Prob.)
INF	-0.011102	0.0050724	-2.1887 (0.042)**
LnINVG	0.63304	0.33191	1.9073 (0.073)*
LnLAF	0.81387	2.8743	0.28315 (0.780)
LnGEXP	0.45052	0.13882	3.2454 (0.006)***
FSLD	-2.2037	0.61579	-3.5786(0.003)***
WAR	-0.61049	0.23253	-2.6254(0.020)**
INPT	-45.4198	23.9560	-1.8960 (0.079)*

Diagnostic Test

Test Statistics	LM Version	F Version
Serial Correlation	CHSQ (1) = 0.15341 (0.695)	F(1, 17) = 0.087380 (0.771)
Functional Form	CHSQ (1) = 1.6191 (0.203)	F(1, 17) = 0.96986 (0.339)
Normality	CHSQ (2) = 1.6574 (0.437)	Not applicable
Heteroscedasticity	CHSQ (1) = 2.7490 (0.597)	F(1, 28)= 2.8245 (0.104)

Source: Computed by Author using Microfit Version 4.1 developed by Pesaran and Shin (1999). Note: ***, ** (*) imply significance at the 1, 5 & 10 percent levels respectively.

Short-run dynamic results (LnRGDP is dependent variable)

      The existence of a long-run relationship among real GDP and its explanatory variables (inflation, investment as a share of GDP, labour force and government expenditure) necessitates the estimation of the long-run coefficients and the short-run dynamic parameters. The Schwarz Bayesian Criterion (SBC) is used in the estimation of the ARDL model. Table 4 reports the short-run dynamic results of the estimated ARDL model.

Table 4: Short-run dynamic results (LnRGDP is dependent variable)

Variable	Coefficient	Standard Error	T-Ratio	[Prob]
dINF	-0.0043794	0.9213E-3	-4.7535	(0.0000)***
dLnINVG	0.17002	0.087156	1.9508	(0.065)*
dLnLAF	0.063833	0.73063	0.087367	(0.931)
dLnLAF1	-1.3030	0.58745	-2.2180	(0.038)**
dLnGEXP	0.39086	0.099314	3.9356	(0.001)***
FSLD	-0.22538	0.089758	-2.5110	(0.022)**
WAR	-0.36188	0.10750	-3.3663	(0.004)***
INPT	-26.9236	13.3599	-2.0153	(0.060)*
ECM(-1)	-0.26858	0.12644	-2.1241	(0.046)**

R-Squared	0.75498	R-Bar-Squared		0.60525
S.E. of Regression	0.095579	F-stat. F(8, 21)	6.9330	(0.000)
Mean of Dependent Var.	0.0063167	S.D. of Dependent Variable		0.15213
Residual Sum of Squares	0.16444	Equation Log-likelihood		35.5282
Akaike Info. Criterion	23.5282	Schwarz Bayesian Criterion		15.1210
DW-statistic	1.9663			

Source: Estimation results using Microfit Version 4.1. Note: ***, ** (*) imply significance at the 1, 5 & 10 percent levels respectively.

From Table 4, it is evident that the results of the short-run dynamic coefficients on inflation, investment as a ratio of GDP and government expenditure have the expected negative and positive signs respectively as in the long-run and exert statistically significant coefficients on economic growth. The dummies financial sector liberalisation and development and WAR are negative as in the long-run and exert statistically significant coefficients on economic growth. The coefficient of the error correction term is negative as expected.

Granger causality tests results

After establishing cointegration among the variables, Granger causality test was then applied to measure the linear causation among the variables. Table 5 reports the results of the Granger causality tests.

Table 5: Pairwise granger causality tests results.

Null Hypothesis:	F-Statistics	Prob.	Remarks:
INF does not Granger Cause LnRGDP	0.78773	0.4668	Null not rejected
LnRGDP does not Granger Cause INF	5.75048	0.0094	Null rejected
LnINVG does not Granger Cause LnRGDP	0.87042	0.4321	Null not rejected
LnRGDP does not Granger Cause LnINVG	0.65301	0.5299	Null not rejected
LnLAF does not Granger Cause LnRGDP	0.83536	0.4465	Null not rejected
LnRGDP does not Granger Cause LnLAF	0.24363	0.7858	Null not rejected
LnGEXP does not Granger Cause LnRGDP	0.94179	0.4045	Null not rejected
LnRGDP does not Granger Cause LnGEXP	10.5204	0.0006	Null rejected

Source: Estimation results using E-views 5

The Granger causality test results in Table 5 suggests that the null hypothesis of inflation does not Granger cause real GDP is not rejected, implying inflation does not Granger cause real GDP. However, the null hypothesis that real GDP does not Granger cause inflation is rejected, implying real GDP Granger causes inflation. Also, the null hypothesis of real GDP does not Granger cause government expenditure is not rejected, implying real GDP does granger cause government expenditure. But the null hypotheses that real GDP does not Granger cause investment as a ratio of GDP and labour force, vice versa are rejected.

Discussion

From Table 3, it is seen that inflation, investment as a ratio of GDP and government expenditure have the expected signs and exert statistically significant effects on real GDP in the long-run. It thus follows that a 1 percent decrease in inflation increases real GDP by 0.11 percent in Sierra Leone according to the finding in this study.

The negative relationship between inflation and economic growth as revealed in this study is in line with studies by other researchers. Stockman (1981) argued that individuals' welfare falls whenever there is an increase in inflation. The negative and significant effect of inflation on economic growth is an indication that inflation causes economic growth in the long-run which is consistent with the results by Bittencourt (2010) for four Latin American Countries (Argentina, Bolivia, Brazil and Peru) that inflation has a negative effect on economic growth. Ahmed and Mortaza (2005) found a statistically significant long-run negative relationship between inflation and economic growth for Bangladesh. Gokal and Hanif (2004) also found a statistically significant negative effect of inflation on economic growth for Fiji.

The results however contradict the findings by Erbaykal and Okuyan (2008) and Chimobi (2010). The findings by Erbaykal and Okuyan (2008) showed no statistically significant long-run relationship between inflation and economic growth for Turkey but however found a negative and statistically significant short-run relationship between inflation and economic growth. Chimobi (2010) found no cointegrating relationship between inflation and economic growth for Nigeria implying no long-run relationship between the two

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variables. Also, Mallik and Chowdhury (2001) found a positive relationship between inflation and economic growth for four South Asian Countries (Bangladesh, India, Pakistan and Sri Lanka).

The strong association between investment as a share of GDP and long term economic growth performance is well established. The four Asian Tigers (South Korea, Hong Kong, Taiwan and Singapore), the most successful countries during the past thirty years in achieving rapid and sustained economic growth , is a good example. These countries have been able to maintain rates of GDP expansion in the order of 7-8 percent, supported by rates of gross capital formation of about 30 percent of GDP; high growth and high investment have thus moved pari passu (Schmidt-Hebbel & Solimano, 1996). As mentioned in Sala-i-Martin (2002), countries that invest more tend to grow faster than those countries that invest less. This is confirmed by the positive and statistically significant effect of the ratio of investment to GDP. The positive and significant impact is consistent with the findings by Kargbo and Adamu (2010) for Sierra Leone. The size of the coefficient indicates that a 1 percent increase in investment to GDP ratio increases real GDP by 0.63 percent.

Government expenditure in this study is positive and statistically significant as expected. This means a 1 percent increase in government expenditure increases real GDP by 0.45 percent. The positive impact is in conformity with the findings by Kouassy (1994) for Ivory Coast. Most African countries have embarked on public sector reforms that are dominated by austerity measures. In most cases, these reforms were implemented without evaluating the

impact of government expenditure on economic growth. Thus, it is imperative to bring in adequate corrective measures to be adapted to the peculiar economic structures and the behaviour of agents in Africa that would allow us to capture the full impact of government expenditure on economic growth and other economic aggregates (Kouassy, 1994).

Thus, the positive and significant effect of government expenditure on real GDP is an indication that government expenditure is a key channel through which we can achieve sustained economic growth. The insignificant relationship of labour force to economic growth in the long-run suggests that there is a shortage of skilled labour in the country due to brain drain and the effect of the civil unrest. Smith and Wahba (1995) found a negative and insignificant impact of labour force on economic growth in examining the role of public finance in economic development and growth for 56 least developed countries including Sierra Leone, implying a reflection of a strong relationship between the growth of the labour force and population growth.

The dummy, financial sector liberalisation and development is negative and statistically significant. This negative effect is an indication that for us to achieve economic growth, we should have further financial sector reforms that would facilitate financial sector development for economic growth. Importantly, the WAR dummy has expected sign and statistically significant. The negative impact is an indication that the economy lost a lot of viable resources during the decade civil unrest that would have been translated into meaningful economic projects and thus growth of the economy.

From Table 4, it is evident that the results of the short-run dynamic coefficients on inflation, investment and government expenditure have the expected signs as in the long-run. The coefficient on inflation suggests that short-run changes in inflation have negative and statistically significant effect on economic growth. The results further indicate that the coefficient of short-run changes in investment exerts a positive and statistically significant impact on economic growth. This positive and significant impact of investment on economic growth is in line with the findings by Kargbo and Adamu (2010) for Sierra Leone.

Also, short-run changes in government expenditure exert a positive and statistically significant impact on economic growth. This means that an increase in government expenditure in the short-run exerts a positive impact on economic growth. However, short-run changes in labour force exerted a negative and significant effect on economic growth in the previous period. The negative effect is an indication that the labour force in Sierra Leone does not have the required training and skills to undertake meaningful productive activities that would translate into economic growth. Smith and Wahba (1995) argued that in the short-run, social spending in the form of education and training such as building schools with the aim of improving on the quality of the labour force may reveal a negative relation to economic growth. Thus, resources used to build schools may not necessarily translate into economic growth in the short-run. They concluded that education and training policies that might be implemented in the short term should be germane to the social and economic requirements of the economy.

The coefficient of the lagged error correction term is negative and statistically significant as expected at the 5 percent significance level, suggesting that it would take a long time for the system to return to its equilibrium once it is out of equilibrium. This negative and significant coefficient is an indication that cointegrating relationship exists among real GDP, investment as a ratio of GDP, inflation labour force and government expenditure. The size of the coefficient on the error correction term (ECM) denotes that about 27 percent of the disequilibrium caused by previous years' shocks converges back to the long-run equilibrium in the current year. Thus, the study discerns that the variables in the model show evidence of moderate response to equilibrium when shocked in the short-run.

It is theoretically argued that a genuine error correction mechanism exists whenever there is a cointegrating relationship among two or more variables. The error correction term is thus obtained from the negative and significant lagged residual of the cointegration regression. It determines the speed of adjustment to long-run equilibrium. The negative coefficient is an indication that any shock that takes place in the short-run would be corrected in the long-run. The rule of thumb is that, the larger the error correction coefficient (in absolute term), the faster the variables equilibrate in the long-run when shocked (Acheampong, 2007).

The Granger causality test results in Table 5 suggests that the null hypothesis of inflation does not Granger cause real GDP is not rejected, implying inflation does not Granger cause real GDP. However, the null hypothesis that real GDP does not Granger cause inflation is rejected, implying real GDP Granger

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causes inflation. Thus, a unidirectional causality has been identified from economic growth to inflation at the 1 percent significance level. However, this result is not in conformity with the Bounds tests results in this study and this is in conformity with studies by other researchers.

The unidirectional causality between inflation and economic growth is in line with the findings of Erbaykal and Okuyan (2008) for Turkey and Chimobi (2010) for Nigeria. Erbaykal and Okuyan (2008) found a unidirectional causality between inflation and economic growth running from inflation to economic growth. Chimobi (2010) identified a unidirectional causality between inflation and economic growth running from inflation to economic growth.

Moreover, Gokal and Hanif (2004) found a unidirectional causality between inflation and economic growth for Fiji running from economic growth to inflation which is in conformity with this study. There is also a unidirectional causality between economic growth and government expenditure and runs from economic growth to government expenditure. This is an indication that government expenditure is a critical variable in achieving economic growth.

Diagnostic and parameter stability tests

The diagnostic tests of the estimated ARDL model indicate that the model passes all the tests (serial correlation, functional form misspecification, non-normal errors and heteroscedasticity).

Seemingly, Hansen (1992) warned that estimated parameters of a time series data may vary over time. As a result, it is imperative that to conduct

parameter tests since model misspecification may arise as a result of unstable parameters and thus has the tendency of biasing the results. Hence, Pesaran and Pesaran (1997) advise that we always employ the CUSUM and CUSUMSQ tests once the model is estimated to assess the parameter constancy. These tests were proposed by Brown, Durbin and Evans, (1975).

Appendices E and F report the plots of the CUSUM and CUSUMSQ for the estimated ARDL model. The graphs indicate the absence of any instability of the coefficients because the plots of these graphs are confined within the 5 percent critical bounds of parameter stability suggesting that all the coefficients of the estimated model are stable over the study period.

Summary

The chapter targets itself to empirically test the relationship between inflation and economic growth in Sierra Leone using the Autoregressive Distributed Lagged Model (ARDL) and Granger causality test. The results disclosed a long-run cointegrating relationship between inflation and economic growth in Sierra Leone.

The short-run estimates reveal a negative and statistically significant impact of inflation on economic growth. This is an indication that the variables showed evidence of moderate response to equilibrium in the short-run once shocked. The implication is that the real side of the economy is burdened with sticky expectations that may suppress economic growth in the short-run.

The long-run estimates, however, reveal a negative and statistically significant impact of inflation on economic growth just as in the short-run. The negative impact is an indication that inflation is harmful to economic growth in Sierra Leone. However, investment has a statistically significant positive effect on economic growth in both the short-run and the long-run. The positive impact suggests that investment is a key channel for economic growth in Sierra Leone. Also, government expenditure exerted a positive and statistically significant impact on economic growth in both short-run and long-run.

The diagnostic and parameter stability tests reveal that the model passes the tests of serial correlation, functional form misspecification, non normal errors and heteroscedasticity and the graphs of the CUSUM and CUSUMSQ indicate the absence of any instability of the coefficients because the plots of these graphs are confined within the 5 percent critical bounds of parameter stability suggesting that all the coefficients of the estimated ARDL model are stable over the study period. Finally, the Granger causality test result revealed a unidirectional causality between inflation and economic growth.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

This chapter summarises, concludes and gives policy recommendations derived from the study for the consideration of the Sierra Leonean government. The aim is to elaborate on the major findings in the study and thereafter suggest policy recommendations to the Sierra Leonean government for her consideration.

The chapter first summarises the findings of the study and then concludes the major findings of the study before prescribing policy recommendations. The target of the research was to investigate empirically the relationship between inflation and economic growth in Sierra Leone using Sierra Leonean data set. The empirical results show that the objectives of the research were met within the time frame.

Summary

Inflation has long been a major problem for both developed and developing countries. While some countries have made progress in addressing the problem, others including Sierra Leone have not been able to achieve sustained economic growth as a result of the perverse effects of inflation on economic growth. The Keynesian thought posits the notion that inflation and economic

growth can be positively related, while other theories suggest that inflation is detrimental to long-run economic growth. Various empirical studies yield conflicting results.

There are strong arguments that inflation is inimical to economic growth, especially in the long-run. Inflation makes it difficult for economic agents to make correct decisions since changes in relative prices become obscured (Harberger, 1998). Inflation imposes variable costs, especially menu costs. If inflation is high, then its variability also becomes high and this makes it difficult for economic agents to forecast inflation. Seemingly, if inflation cannot be correctly anticipated, both savers and investors may be misled in making decisions that are harmful to economic growth.

The study set itself to meet three objectives. First, to examine both the long-run and short-run relationships between inflation and economic growth in Sierra Leone; and most importantly to identify a causal relationship between inflation and economic growth as well as the direction of causality. These results may then warrant policy recommendations. In the empirical literature analysis reviewed, the study explored the relationship between inflation and economic growth in Sierra Leone over the period 1979 to 2008 and it was clear that the bulk of the literature posited that the relationship between inflation and economic growth was negative.

In order to estimate the long-run relationship and short-run dynamic parameters of the model, the Autoregressive Distributed Lagged Model (bounds testing) approach to cointegration was employed. The study then started the

estimation process by testing for the stationarity properties of the variable using the Augmented-Dickey Fuller (ADF) and Phillips-Perron test statistics. The unit roots results suggest that all the variables except inflation were stationary after taking first difference on each while inflation was stationary at levels. The study then proceeded to examining the long-run and short-run relationships between inflation and economic growth.

The bounds tests results revealed that in the long-run, inflation exerted a statistically significant negative effect on economic growth while investment as a ratio of GDP and government expenditure posited statistically significant positive effects on economic growth. The negative and statistically significant impact of inflation on economic growth is in line with the traditional Keynesian theory, the neoclassical theory as posited by Stockman and some endogenous growth theories. This is an indication that high inflation episode is unattractive to economic growth in Sierra Leone.

The positive and statistically significant effects of investment and government expenditure show that government expenditure can boost economic growth through increased investment. This means government expenditure is a complement to domestic investment. Thus, the projects government undertakes reduce the cost of production thereby making investment attractive. The dummy, financial sector liberalisation and development shows a negative sign suggesting that there is need for more financial sector reforms implementation that would promote financial development thereby leading to the growth of the economy.

The short-run results revealed that inflation has a negative effect on economic growth as in the long-run. Further, investments as a share of GDP and government expenditure are also positive as in the long run. However, labour force exerts a statistically significant negative effect on economic growth in the previous period denoting that for the economy to achieve economic growth, the labour force should be strengthened. The existence of a long-run relationship among real GDP, inflation, investment as a ratio of GDP and government expenditure is further confirmed by a negative and statistically significant coefficient on the lagged error correction term and the size of this coefficient suggest that about 27 percent of the disequilibrium caused by previous years' shocks converges back to the long-run equilibrium in the current year.

The diagnostic tests results show that the model passes the test of serial correlation, functional form misspecification, non normal errors and heteroscedasticity. The graphs of the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ) exhibit that there exists a stable relationship between inflation and economic growth over the study period.

Seemingly, the Granger causality test revealed an interesting result. The aim was to identify any causal relationship between inflation and economic growth and in which direction. The result showcased a unidirectional relationship between inflation and economic growth and ran from economic growth to inflation.

Conclusions

The study has empirically examined the relationship between inflation and economic growth in Sierra Leone using Sierra Leonean data set for the period 1979 to 2008. The empirical evidence revealed the following findings: First, both the long-run and short-run results found statistically significant negative effects of inflation on economic growth. This means inflation is inimical to economic growth and hence, for the government to achieve sustained economic growth, inflation has to be kept low. Second, government expenditure and investment exerted a positive and statistically significant effect on economic growth. This is an indication that government expenditure and investment are critical in achieving sustained economic growth in Sierra Leone.

Third, the Granger causality test results revealed a unidirectional relationship between inflation and economic growth running from economic growth to inflation implying that economic growth causes inflation whereas the Bounds tests results from the long-run shows that the direction of causality is from inflation to economic growth and is in conformity with other studies cited above.

Recommendations

The study brought to light the importance of government expenditure and investment in influencing economic growth in Sierra Leone. The results showcased the implementation of both long-run and short-run policies for enhanced economic growth. In other words, government should embark on

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contractionary fiscal policy where taxes are reduced on certain imported commodities like fuel and food stuffs. This will encourage the private sectors to come on board in complementing government's effort to achieving economic growth. Thus, the key policy recommendations for improved and sustained economic growth are boost in government expenditure and investment. Sierra Leone government should pursue policies that stimulate production and thus encourage economic growth. One such policy instrument has to do with government expenditure.

Also, private investors should complement the efforts of government in expanding output so that the demand for goods and services of the consumers will be met. This is because if the demand for goods and services of the consumers are not met they may be forced to pay more money for the scarce goods and services hence more money chasing few goods which will ultimately stimulate inflation.

The positive relationship between economic growth and government expenditure is an indication that government expenditure plays a crucial rule in enhancing sustained economic growth and development. The implication is that, government expenditure is a complement to domestic investment. Policy makers should therefore provide more infrastructural facilities that would attract investment.

Good infrastructural facilities are lacking in Sierra Leone and are arguably responsible for the economic downturns and demise of the country. One such facility is investment in electricity. Freetown, the capital city of Sierra Leone has

been considered as the darkest city in the World. This is evidenced in the country's dismal economic performance in decades.

Since investment is critical in the findings of this study as evident in the empirical results, there should also be investment in the construction of major roads and bridges that have link with big towns since the country is besieged with poor road networks. This will facilitate the transportation of perishable crops from their production sites to big towns that would make the farmers realize good proceeds from them thereby boosting economic growth and development. The government should think about constructing the bridge linking the capital city, Freetown and the Lungi International Airport.

In present day Sierra Leone, where the economic decay of the 1980s and 1990s plunged the economy's long-run productive capacity and sent many firms into bankruptcy, the economic environ is strewn with few firms which are generally owned by Lebanese, Indian and a few African merchants. Such a monopolistic commercial organisation stimulates inflation because of the well known phenomenon that imperfectly competitive firms tend to restrict supply in order to charge higher prices than perfectly competitive firms. Hence, it is rational to conclude that policies that would engender more competition in the economy, which would lead to long-run economic growth, can also result in significant reduction in inflation.

Thus, the major policy conclusion drawn from this study is for the Sierra Leonean government to judiciously divert it spending to meaningful

infrastructural development vis-a-vis investment that would pave the way to sustained economic growth and development.

Limitations of the study

The major limitation came from the dearth of data. The sample space was not wide enough to cover more periods especially the period prior to independence and immediately after independence. This debars the use of the Johansen framework. Thus data unavailability was the prime constraint in this study and is common to Sub-Saharan African countries. Further, other variables such as fiscal deficits, exchange rate, domestic credit to the private sector, etc should have been included in the models to know their full impacts on the relationship between inflation and economic growth but there was not enough data on these variables to cover the study period. Also, GDP deflator would have been used to deflate the GDP to obtain real GDP which is used in this study as a measure of economic growth but there was not enough data point on this variable for Sierra Leone to cover the study period which necessitated the use of the consumer price index as a deflator.

Moreover, the bounds tests approach adopted in this study also showcased some flaws. Pesaran and Pesaran (as cited in Erbaykal & Okuyan, 2008) argued that the existence of a cointegrating relationship can be examined between the series regardless of whether they are I (0) or I (1) on the proviso that the dependent variable is I (1) and the independent variables are either I (0) or I (1). This means the bounds tests approach may not produce a robust result in

situations where the dependent variable is I (0). This was evident in the current study. The bounds test procedure in this study failed to produce a long-run cointegrating relationship among the explanatory variables (real GDP, investment as a ratio of GDP, labour force and real money balances) when inflation was used as the dependent variable because the F-statistic fell below the critical bounds value of Narayan (2004) since inflation was an I (0) variable.

Future direction of research

It is worthy to note that, the study only examined the relationship between inflation and economic growth in Sierra Leone in which case both the long-run and short-run relationships were established as well as causality and the direction. The long-run and short-run results disclosed a negative impact of inflation on economic growth suggesting that high inflation is inimical to economic growth.

The study however failed to unravel that level of inflation that would either promote or distort economic growth since it is argued in the literature that some level of inflation is desirable to economic growth. Hence, future direction of research on this topic should consider the possibility of exploring the optimal level of inflation that would either propel or harm economic growth and development in the country. Also, the possibility of using other estimation techniques should also be explored.

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APPENDICES

APPENDIX A

UNIT ROOT TESTS (ADF AND PP) FOR ORDER OF INTEGRATION

LEVELS WITH INTERCEPT AND TREND

Var.	ADF Stats [LL]	{C.V.}	(P.V.)	PP Stats. [BW]	{C.V.}	(P.V.)
LnRGDP	-0.703926 [0]	-3.221728	(0.9632)	-0.054086 [7]	-3.221728	(0.9933)
INF	-3.440662 [0]	-3.221728	(0.0655)*	-3.374881 [1]	-3.221728	(0.0746)*
LnINVG	-3.109307 [0]	-3.221728	(0.1230)	-3.169651 [3]	-3.221728	(0.1101)
LnLAF	-0.695116 [1]	-3.221728	(0.9637)	-1.835921 [4]	-3.221728	(0.6610)
LnGEXP	-0.686884 [0]	-3.221728	(0.9647)	-0.863062 [2]	-3.221728	(0.9470)
LnM2	-0.187260 [0]	-3.221728	(0.9902)	-0.172234 [2]	-3.221728	(0.9965)

Source: Computed by Author using Eviews-5. Note: * denotes 10 percent level of significance, LL is lag length, BW is bandwidth, CV is critical value and PV is probability value.

APPENDIX B

UNIT ROOT TESTS (ADF AND PHILLIPS PERRON) FOR ORDER OF INTEGRATION 1ST DIFFERENCES WITH INTERCEPT AND TREND

Var.	ADF Stats [LL] {C.V.}	(P.V.)	PP Stats. [BW] {C.V.}	(P.V.)
LnRGDP	-5.145383 [0] -4.323979	(0.0015)** *	-5.16837 [4] -4.323979	(0.0014)***
LnINVG	-9.672389 [0] -4.323979	(0.0000)** *	-19.12451 [12] -4.323979	(0.0000)***
LnLAF	-6.451465 [3] -4.323979	(0.0043)***	-4.65595 [3] -4.323979	(0.0046)***
LnGEXP	-5.163358 [0] -4.323979	(0.00014)***	-5.17118 [1] -4.323979	(0.0014)***
LnM2	-7.010392 [0] -4.323979	(0.0000)***	-5.20457 [4] -4.323979	(0.0002)***

Source: Computed by Author using Eviews-5. Note: ***, denotes 1 percent level of significance, LL is lag length, BW is bandwidth, CV is critical value and PV is probability value.

APPENDIX C

UNIT ROOT TESTS (ADF AND PHILLIPS PERRON) FOR ORDER OF INTEGRATION LEVELS WITH INTERCEPT ONLY

Var.	ADF Stats [LL]	{C.V.}	(P.V.)	PP Stats. [BW]	{C.V.}	(P.V.)
LnRGDP	-1.413293 [0]	-2.622989	(0.5620)	-1.524360 [1]	-2.622989	(0.5073)
INF	-2.755940 [0]	-2.622989	(0.0772)*	-2.637054 [2]	-2.622989	(0.0973)*
LnINVG	-2.063650 [0]	-2.622989	(0.3408)	-2.611670 [2]	-2.622989	(0.2517)
LnLAF	-0.765836 [4]	-2.622989	(0.9912)	0.917356 [4]	-2.622989	(0.9943)
LnGEXP	-1.451542 [1]	-2.622989	(0.5428)	-1.094562 [2]	-2.622989	(0.7042)
LnM2	-0.922156 [0]	-2.622989	(0.7665)	-1.114015 [3]	-2.622989	(0.6965)

Source: Computed by Author using Eviews-5. Note: * denotes 10 percent level of significance; LL is lag length, BW is bandwidth, CV is critical value and PV is probability value.

APPENDIX D

UNIT ROOT TESTS (ADF AND PHILLIPS PERRON) FOR ORDER OF INTEGRATION 1ST DIFFERENCE WITH INTERCEPT ONLY

Var.	ADF Stats	[LL]	{C.V.}	(P.V.)	PP Stats.	[BW]	{C.V.}	(P.V.)
LnRGDP	-3.852320	[0]	-3.689194	(0.0068)** *	-3.843206	[1]	-3.689194	(0.0069)***
LnINVG	-9.470065	[0]	-3.689194	(0.0000)** *	-10.53382	[2]	-3.689194	(0.0000)***
LnLAF	-2.697587	[0]	-2.625121	(0.0686)*	-2.643936	[3]	-2.625121	(0.0965)*
LnGEXP	-4.930794	[0]	-3.689194	(0.0005)***	-4.948854	[2]	-3.689194	(0.0004)***
LnM2	-5.003074	[0]	-3.689194	(0.0004)***	-5.204576	[4]	-3.689194	(0.0002)***

Source: Computed by Author using Eviews-5. Note: ***, * denote 1 percent and 10 percent level of significance respectively; LL is lag length, PV is probability value, CV is critical value and BW is bandwidth.

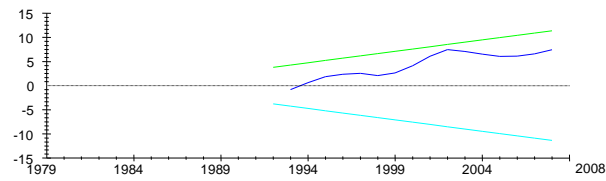**PLOT OF CUMULATIVE SUM OF RECURSIVE RESIDUALS (CUSUM)**

Figure 4: Plot of Cumulative Sum of

Recursive Residuals

The straight lines represent critical

APPENDIX F

PLOT OF CUMULATIVE SUM OF SQUARES OF RECURSIVE
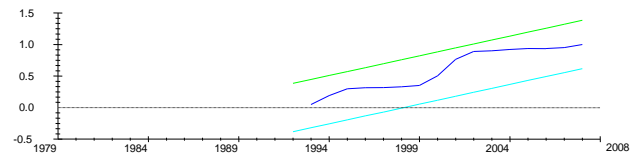
RESIDUALS (CUSUMSQ)

Figure 5: Plot of Cumulative Sum of

Square of Recursive Residuals