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Financial Sector Development and Economic Growth Nexus: Empirical Evidence from Sierra Leone

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ABSTRACT

The study examines the nexus between financial sector development and economic growth in Sierra Leone over the period 1980-2018. The stationarity test result shows that the order of integration of variables included in the model was a mixture of I (0) and I (1). Therefore, the study employs the bounds testing approach to Cointegration and error correction models developed within the Autoregressive Distributed Lag (ARDL) framework to explore the long-and short-run effects of financial sector development on economic growth. The study uses two different measures of financial development including, credit to the private sector and broad money. The study also investigates whether there are other determinants of economic growth. Evidence of short-run dynamics was found amongst the various financial development indicators and economic growth. The results showed that credit to the private sector and broad money influenced economic growth in the short-run. Again, inflation and government consumption expenditure were found to impede economic growth in the short-run. Contrarily, Gross capital formation and FDI were found to stimulate economic growth in the short-run. The study recommends that policy makers should take caution in the choice of financial development indicator as a policy instrument for the attainment of growth and development. Again on the basis of empirical evidence, policies to improve the accessibility of affordable credit by the private sector, including small and medium scale enterprises should be enforced.

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Introduction

The attainment of greater heights in the level of growth and development through positive changes in production levels of goods and services has been a great concern of every economy. The attainment of sustainable levels of economic growth is a core macroeconomic objective of an economy. Empirically, some traditional factors and the distinct interactions amongst each other have been identified to play a crucial role or increasing levels of growth [1]. Among these can be mentioned, capital, labour and land. Notwithstanding this, the new theories of growth have also identified technological changes as a key driver to the engine of growth as it stimulates productivity.

Over the years the relevance of an efficient and adequate financial system has also been recognized to play a role for increased levels of growth. This is buttressed by the fact that a sound financial system not only contributes to economic transformation but also creates an enabling environment conducive for the mobilization and allocation of funds geared towards increasing patterns of growth and development also note that an economy with an adequate and efficient financial system tends to experience increased growth

patterns as it encourages various technological innovations. It is on this backdrop that amongst many others that most developing country opted for reform programs in their financial sectors during the eras of economic imbalances in various sectors of the economy including the financial sector [2-10].

Development in the financial sector is the instance that makes an improvement in the quality, and efficiency of financial intermediary services. More specifically, development in the financial sector implies adequately utilizing, financial resources in mobilizing and allocating resources to prioritize development in the real sectors of an economy [11]. For many developing countries the introduction of various economic reforms including financial reforms were basically aimed at reaping the benefit of high rate of economic growth obtained from a well-developed, effective and efficient financial system. Sierra Leone is one of the countries that have implemented some economic reforms when faced with major set-backs in its financial sector.

Controversies surrounding the role of the financial system as the engine of economic growth has caused the finance-growth link hence cannot be overlooked. In spite of the fact that there have been various perspectives on the relationship between financial sector development and economic growth in terms of

causation, literature shows that various economists hold different perspectives. States two major hypotheses that explain the causal link and its direction existing between finance and economic growth [12]. These include, the supply-leading hypothesis and the demand following hypothesis.

The former perceives a unidirectional relationship running from financial development to economic growth with no feedback effect. In other words, economists supporting this argue that the establishment of efficient and adequate financial systems, markets and institutions will cause relative increase in the supply of financial services thereby leading to increasing patterns of economic growth. Various empirical studies, including [9, 13, 2, 3] supports the supply leading hypothesis. Contrarily, the demand-following hypothesis posits that the causal link is from economic growth to financial development. Intuitively, followers of this hypothesis also argue that, as an economy grows, there is a relatively high demand for financial services hence causing improvement in the financial sector. Meaning, financial sector development is positively related to increasing growth patterns. Empirically, there have been various studies supporting the demand-following hypothesis [14-16].

Although there have been various cross-sectional and panel studies in various countries [2, 3, 17, 18]. However, there is an assertion that cross-country studies are unable to reflect country specific results mainly due to the fact that, different countries pose different economic, social, political and institutional characteristics [19-21]. In this light, it can be noted that it will be appropriate and relevant to conduct a country specific analysis rather than a panel analysis on the finance-growth nexus. Moreover, literature search has shown that only few studies have been conducted in Sierra Leone (see S.M. Kargbo and P.A. Adamu). S.M. Kargbo and P.A. Adamu, uses the following financial development indicators (broad money as a ratio of GDP, domestic credit as a ratio of GDP, private credit as a ratio of GDP and private credit to domestic credit ratio) to investigate the bivariate causal linkage among financial development and economic growth. The researcher used credit to the private sector as a sole measure of financial development. According to literature it is reasonable to argue that there is no single indicator that could be considered as an adequate measure or proxy for financial development in country [22]. Hence for every economy, there should be a relative large set of proxies for the level of financial development. This study will not only fill the lacuna of increasing the time period but will also consider two different proxies of financial development including credit to the private sector, ratio of narrow money to broad money, narrow money, broad money and domestic credit. It can hence be noted from the aforementioned discussions, that an in-depth analysis of the nexus of financial sector development and economic growth in Sierra Leone is required.

The intended aims of this paper are:

- Investigate the nexus of financial Sector development and economic growth in Sierra Leone.
- To analyze the trends in selected measures of financial development in Sierra Leone
- To analyze the long and short run relationship between financial development and economic growth in Sierra Leone
- To investigate other macroeconomic determinants of economic growth in Sierra Leone

For every economy, an effective, efficient and adequate financial system is required in attaining certain levels of growth and development. This study is very essential as it will aid policy

makers formulate policies aimed at efficiently distributing and allocating resources in the country. Worded differently, this study will provide empirical findings that will assist policy makers in their decisions on resource allocation and distribution between real sectoral development and financial development. Conventionally, an empirical study like this is important in determining, whether attaining greater heights in economic growth stimulates financial development or whether achieving a sound and adequate financial system will lead to improvement in the country's growth patterns. This in turn will serve as a stepping stone for policy makers in setting up and prioritizing essential macroeconomic policies to institute competitive growth levels.

Again, taking into consideration the fact that cross-country studies do not properly account for time dimension and further assume that entities of different countries are homogeneous across time, it leads to wrong conclusions of the distinct relationship existing between financial development and economic growth in each country. Likewise, countries included in cross country studies may differ in terms of some economic and institutional policies they each have adopted, thereby making it relevant to acquire country specific results to enable non-refutable conclusions. Hence, the relevance of this study, this study will also add to existing literature by contributing to existing debate and provide different views and ideas to policy makers.

Research Hypothesis

To achieve the stated objectives this study seeks to test the following hypotheses.

Hypothesis 1

Ho: There is no relationship between financial development and economic growth in Sierra Leone.

H1: There is a relationship between financial development and economic growth in Sierra Leone.

Hypothesis 2

Ho: Inflation has no effect on economic growth in Sierra Leone.

H1: Inflation has an effect on economic growth in Sierra Leone.

Hypothesis 3

Ho: Government consumption expenditure has no effect on economic growth in Sierra Leone.

H1: Government consumption expenditure has an effect on economic growth in Sierra Leone.

Hypothesis 4

Ho: Capital has no effect on economic growth in Sierra Leone.

H1: Capital has an effect on economic growth in Sierra Leone.

Hypothesis 5

Ho: FDI has no effect on economic growth in Sierra Leone.

H1: FDI has an effect on economic growth in Sierra Leone.

Literature Review

Theoretical review

Endogenous Growth Model

Endogenous growth theory is a theory used to explain how factors within an economy can be used to enhance economic growth. It is of the view that endogenous factors are the key factors that stimulate and/enhance economic growth in the long-run. Primarily, policy measures such as subsidies for research and development, education, investment in human capital, knowledge and innovation are the significant contributors for long-run economic growth and development. In addition, the rate of technological progress is also a key driver of long term economic growth and presumed to take place through capital deepening. The theory tries to overcome the shortcoming of the exogenous models of growth, which studies how exogenously factors such as rate of savings and

technological progress affect growth in the long-run however fails to explain how it takes place. The endogenous growth theory uses microeconomic foundation to build macroeconomic models such as how individuals maximize their utility constrained to their budget and firms maximize profits relative to the cost incurred. Endogenous growth theories also suggest through an open society that encourages technology inflows and ideas from other nations' economies will experience rapid growth rates. Again, since the private sector might not invest at optimal, another way to stimulate investment in research and development is through government intervention. Also the process of "learning by doing" tries to include financial system into its model to explain a direct effect of financial development on economic growth.

The Hypothesis of Finance-Led Growth and Growth-Led Finance

Identified the finance-led growth (supply-leading) hypothesis and the growth-led finance (demand-following) hypothesis as the two extreme possibilities of the relationship between financial sector development and economic growth [12].

The supply-leading hypothesis was a follow up of and further supported by the Keynesian growth models and models [23, 9, 10]. Basically, this approach performs two main functions including, stimulating and promoting entrepreneurial responses in various sectors of the economy and transferring resources from sectors that do not play significant roles in growth to growth oriented sectors of the economy. Notes, that in practice, an economy can stimulate its growth pattern by financially investing in various innovative ventures [12]. The empirical supports of the supply-leading hypothesis argue that for an economy to attain sustainable levels of growth and development, it first has to develop its financial sector (see for example [23, 24, 7, 13]). In other words, financial development leads to economic growth. The existence of an effective and efficient financial system in terms of channeling scarce resources from abundant sectors to other sectors in need of it, would aid allocate financial resources efficiently hence leading to the progress of various macroeconomic indicators such as economic growth. Alternatively, demand-following hypothesis (growth-led hypothesis) argues that economic growth leads to financial development. Under this hypothesis, a major trait of a growing economy is the automatic development in various sectors which includes the financial sector. In light of this, in response to a growing economy there is an automatic expansion of the financial sector through the establishment of various financial institutions, expansion of financial assets and liabilities and other related financial services. Various empirical studies have supported the demand following hypothesis. Among these can be mentioned, [25- 28].

Mckinnon and Shaw Hypothesis

The postulates financial liberalization hypothesis which posits that the level of financial liberalization in a financially repressed economy, mostly developing countries, enhance savings which helps to increase credit supply to ensure capital accumulate, hence investment and induce economic growth [9]. McKinnon and Shaw argued that stringent regulations and practices (such as deposit interest rate ceiling, minimum or maximum lending rates and restrictions on lending quantity) in financial sector markets results in repression in the sector. These regulations reduce interest rates and as such causes a decline in domestic investment and savings and in effect impedes economic growth and development. Hence the hypothesis advocates for financial liberalization where there is high and positive real interest rates to help induce financial savings,

which also increase credit supply to firms to allow them carry out a positive net present value projects. This leads to increased capital formation, investment and then economic growth. This gives clear indications that activities of the financial market significantly influence the economic growth of an economy.

Empirical Review

Uses annual data from fifteen (15) transition economies of Central and Eastern and Former Soviet Union to investigate the finance-growth nexus [29]. The study uses the cross country correlation analysis and the panel estimation techniques on annual data covering the period 1993 to 1998. The study finds that both economic growth and financial development cause each other. Hence in this case offering support for both the export-led finance and growth led finance hypothesis.

Use the vector autoregressive (VAR) model and the Granger causality estimation technique on annual data from one hundred and nine (109) developing and industrial economies [30]. The study uses annual dataset from 1960 to 1994. The results evidenced a significant impact financial development on economic growth. The study also showed that there exist a bidirectional relationship between finance and economic growth. This implies that the study shows that finance leads to economic growth and also economic growth leads to financial development. In addition, it was found that this relationship was higher for developing countries than industrialized economies.

Analyzed the direction of causality between economic growth and financial development in Turkey [31]. The study adopts co-integration techniques and the Granger causality test for its estimations. Data for the study was from 1970 to 2001. The study uses five different proxies including credit to the private sector, money supply, domestic credit, domestic investment and stock market development to measure financial sector development. The results show that in both the short run and the long run development of the financial sector positively and significantly influences economic growth. The study also found evidence of both the growth-led finance and finance-led growth hypothesis. Specifically, a bi-directional relationship was found to exist.

Assesses the relationship between financial development in China and its economic growth [32]. The study employs the Granger causality estimation technique on annual data from 1985 to 2003. The results showed that, financial development measured using the stock market capitalization is caused by economic growth. However, the study finds no evidence of causal relationship when market volatility and liquidity was used as a measure of financial development.

Another study on the effect of finance on economic growth by was conducted for ten SSA countries [33]. With a panel dataset from 1980 to 2005, the study employed the vector error correction model for estimation. Again, with money supply as a proxy for finance, the results revealed a one-way causality running from finance to growth in countries such as Congo Republic, Gabon, Nigeria and Central African Republic whiles for countries like Zambia, there exist a one-way causality running from growth to finance. Evidence of bidirectional relationship was found in Chad, Swaziland, South Africa, Sierra Leone and Kenya.

Conducts a similar study in Nigeria. The autoregressive distributed lagged (ARDL) model was adopted on data spanning from 1970 to 2009 [34]. It was evident that in the long run financial sector

development and foreign direct investment inhibits Nigeria's economic growth. The results further showed that the influence of FDI on economic growth changed based on a specific measure used at any particular point in time. Thus, foreign direct investment was only significant when a stock market index was included in the estimable model. Further the results showed that the size of the financial market did not matter for economic growth but rather the financial market liquidity.

In their study on the relationship between FDI and growth for Ghana, Gambia, Nigeria, Sierra Leone and Cote d'Ivoire, incorporated financial development to examine its impact on economic growth [35]. The study employed a panel dataset covering the period 1970 to 2005 with the vector error correction causality test for estimation. Using total liquidity liabilities and credit by financial sector and to the private sector as proxies for financial development, the study found significant evidence of the relevance of financial deepening on economic growth for these small open developing countries. The study found that the level of FDI inflows on economic growth was a result of the level of financial development.

Uses annual time series data from 1971 to 2010 conducts a related study in the case of Ghana [22]. The Fully Modified Ordinary Least Square (FM-OLS), Error Correction Model (ECM) and Generalized Method of Moments (GMM) were employed for estimations. The results showed that finance hinders economic growth in Ghana and hence concluded that the level of financial liberalization in the country undermines growth hence not beneficial to the economy. Specifically the FM-OLS and ECM results shows that money supply to GDP ratio and domestic credit to GDP ratio hampers economic growth in the long-and short-run whereas the private sector credit as a share of GDP encourages growth, however insignificant.

Also studied if this relationship was monotonic for middle-income countries [36]. Their study used a panel dataset from 1980 to 2008 for a panel of fifty two middle income countries. The study used the pooled mean group estimator for its estimations. It was shown that financial development hinders economic growth, while the dynamic fixed effect revealed a negative and significant relationship. Again, after considering a non – linear relationship between growth and finance, the long run results revealed an inverted U – shaped relationship while the short run results showed an insignificant effect of finance on growth. However, a negative relationship between finance and growth was found in all the models employed.

Studied the link between financial development and growth for Turkey using a quarterly data from 1987: 1 to 2012: 4 [37]. The study employed the Johansen cointegration, Granger causality and Bounds tests approaches for its estimations. The study found evidence of cointegration amongst the variables in the model. In addition, the study reveals evidence of a causal relationship between financial development and economic growth. However, the direction of causality was found to depend on the proxy of financial development used. In most cases the results shows evidence of bidirectional relationship between finance and economic growth in Turkey.

Employed the GMM estimator on panel data covering the period 1980 to 2012 in a related study in three (3) North African countries (Morocco, Tunisia and Egypt) [38]. The results show that growth is directly related to development in the financial sector. It was also revealed that though democracy has a small negative effect on

economic growth, economic freedom was found to be beneficial for growth.

Investigates how financial development through institutional quality affects growth over the period 1986 to 2010 [39]. The study was conducted using twenty-one (21) sub-Saharan African countries. Pooled Ordinary Least Square estimator and the GMM were employed. The study finds that, development in the financial sector amongst SSA countries has failed to significantly contribute to their growth patterns. Contrarily, institutional quality was found to stimulate economic growth.

Methodology

Theoretical Model Specification

The baseline model for this study is based on the endogenous growth model. Following and based on theoretical literature, the baseline model for the study is specified as: [40, 22]

$$Y_t = f(FD_t, Z_t)$$

Where Y_t represents economic growth; FD_t represents financial development and Z_t represents a set of control variables including inflation (INF_t), government consumption expenditure ($GCEX_t$), capital stock (K_t), and foreign direct investment (FDI) Given this the functional form of equation can be re-expressed as:

$$Y_t = (FD_t, INF_t, GCEX_t, K_t, FDI_t, BM_t)$$

Where all variables are as previously defined Based on the various measures used for financial development, the study includes each proxy separately in the model. Specifically: credit to the private sector (CRD_t) and broad money (BM_t).

Variable Description

• Economic Growth

Annual percentage growth rate of real GDP at market prices based on constant local currency; GDP refers to the growth and improvement in the market value of all goods and services in a country (economy) during a particular time-frame. In other words, it refers to the economic value of services and goods produced within the borders of the particular country. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. For the purposes of this study, real gross domestic product (GDP) growth rate is used to measure economic growth and it is represented by "GDP".

• Financial Development

Development in the financial system is often described as the process of causing an improvements or change in the quality, quantity and efficiency of financial intermediary services which broadly includes the capital and money markets. Development in the financial system is often described as the process of causing an improvements or change in the quality, quantity and efficiency of financial intermediary services which broadly includes the capital and money markets. Financial development is also viewed to take place when various financial instruments, markets and intermediaries correlate and operate together with the aim of reducing costs involved in providing information, enforcement and transactions. There are various proxies that have been used in measuring financial development. For this study, two (2) proxies were used to measure financial development. Among these can be mentioned, credit to the private sector (CRD), and broad money (BM).

Credit to the private sector simply refers to the resources given to the private sector by the financial sector. These resources may come in various forms including, loans, trade credits and non-equity purchases. The study measures credit to the private sector as a share of GDP.

Broad money is the sum of currency outside banks; demand deposits other than those of the central government; the time, savings, and foreign currency deposits of resident sectors other than the central government; bank and traveler's checks; and other securities such as certificates of deposit and commercial papers.

It is expected that financial development encourages economic growth. A strong, effectively and efficiently functioning financial system is a very powerful driver to the engine of economic growth and development. This is because an economy with a solid financial system is most likely to stimulate domestic savings, which in turn leads to various productive ventures in the local industries. It is therefore expected that financial development should be positive.

• Inflation

Inflation is the persistent rise in the price levels of goods and services over a specified period of time. It also expresses the persistent decline in the purchasing power of a domestic currency or the persistent increase in the consumer prices of goods and services. The study used inflation rate computed using the consumer price index as a measure of inflation and it is represented by "INF". It is expected that inflation is negatively related to economic growth. Therefore, the expected sign of α_2 is expected to be negative.

• Government Consumption Expenditure

Government consumption expenditure refers to spending made by the government on goods and services to satisfy individual (citizens) and/or collective needs of the populace in a country. Government consumption expenditure is measured in nominal terms as a share of GDP in this study and represented as "GCEX". The effect of government consumption expenditure on economic growth is ambiguous. This implies that if the economy spends more than it produces it impedes growth. Alternatively, if government expenditures are mainly channeled to productive venture, it will improve upon domestic production and growth. Hence the parameter estimate GCEX is therefore expected to either have a positive or negative effect on economic growth.

• Capital Stock

Capital stock denotes the availability of the various factors of production excluding labour in an economy. The study uses gross fixed capital formation as a measure of capital stock. The study expresses capital stock as a share of GDP and represented by "GCF". It is expected to have a positive impact on economic growth. It is therefore expected that the parameter estimate will be positive.

• Foreign Direct Investment (FDI)

It is the net inflows of investment in any economy other than that of the investor purposely to obtain a long-term control related to management issues, thus about 10% or more of the company's shares in that particular country. The study uses FDI inflows as a percentage of GDP to measure foreign direct investment. It is expected to enhance economic growth. Therefore, FDI is expected to be positive.

Data Source and Type

Data for the variables understudy was obtained from various

sources including, Bank of Sierra Leone Statistical Bulletins (various issues), and the World Bank, World Development Indicators [41]. Annual data for the period 1980-2018 is used. The choice of this period is due to the availability of data of the choice variables.

Estimation Procedures

For most time series regression analysis, consistency in the data and parameter estimates is very relevant. Therefore, for this reason, the study follows three major steps to estimate the parameters included in the estimable model. Firstly, the study examines the stationarity properties of the variables included in the model. Secondly, the study tests for the presence or otherwise of Cointegration (long-run relationship) amongst the variables. Finally, the study estimates the long-and short-run parameter estimates.

The Bounds test to cointegration uses the F-statistic in checking the existence of the long-run equilibrium among the variables. The null hypothesis of no cointegration thus ($H_0: \rho_1 = \rho_n = 0$) is verified against the alternative hypothesis of the presence of a long-run relationship, hence cointegration relationship ($H_1: \rho_1 \neq \rho_n \neq 0$). The test uses the F-statistic in comparison with the critical value bounds which depends on the stationarity properties of the variables, thus a mixture of I(0) and I(1). This approach provides two bounds within which cointegration decisions are based. The upper bound assumes all series to be I(1) while the lower bound assumes all series are I(0). After obtaining the computed F-statistics, if it is greater than the upper bound critical value, then a conclusion can be drawn that there is an existence of a long-run relationship among the variables, hence cointegration. On the other hand, there will be no evidence of the existence of cointegration if the F-statistic estimated is less than the lower bound value. In a case where the F-statistic falls between the upper and lower bound critical values, no conclusive inference can be made. After establishing for the presence of a long-run relationship (Cointegration) among the variables the study further investigated the long-and short-run parameter estimates using the error-correction model (ECM) within the ARDL framework.

Empirical Model Specification

Where the series are of different order of Cointegration, the appropriate test to use is the Bounds Cointegration test. If series are not cointegrated based on Bounds test, we are expected to estimate only the short run. However, both the long run and short run models are valid if there is Cointegration. "Bounds Tests", to see if long-run relationships are present when we have a group of time-series, some of which may be stationary, while others are not.

The model is "autoregressive", in the sense that y_t is "explained (in part) by lagged values of itself. It also has a "distributed lag" component, in the form of successive lags of the "x" explanatory variable. Sometimes, the current value of x_t itself is excluded from the distributed lag part of the model's structure. Let's describe the model above as being one that is ARDL (p,q), for obvious reasons. Given the presence of lagged values of the dependent variable as regressors, OLS estimation of an ARDL model will yield biased coefficient estimates.

$$y_t = \beta_0 + \beta_1 y_{t-1} + \dots + \beta_k y_{t-p} + \alpha_0 x_t + \alpha_1 x_{t-1} + \alpha_2 x_{t-2} + \dots + \alpha_q x_{t-q} + \varepsilon_t \tag{1}$$

where ε_t is a random "disturbance" term, which we'll assume is "well-behaved" in the usual sense. In particular, it will be serially independent. The ARDL / Bounds Testing methodology of has

a number of features that many researchers feel give it some advantages over conventional Cointegration testing. For instance:

- It can be used with a mixture of I(0) and I(1) data.
- It involves just a single-equation set-up, making it simple to implement and interpret.
- Different variables can be assigned different lag-lengths as they enter the model.
- the ARDL model provides an unbiased estimation of the long-run model ;
- it further provides authentic t-statistics though some of the regressors might be endogenous;
- it is also very efficient in cases of relatively small samples;
- the technique is also adequate in allowing for the introduction of optimal lags of both the dependent and explanatory variable, thus each variable is allowed its optimal speed of adjustment to the equilibrium and
- It corrects for endogeneity problems in the model with use of the lagged of the regressors in the model.

We can see from the form of the generic ARDL model given in equation (1) above, that such models are characterized by having lags of the dependent variable, as well as lags (and perhaps the current value) of other variables, as the regressors. If the disturbance term, ϵ_t , is autocorrelated, the OLS will also be an *inconsistent* estimator, and in this case Instrumental Variables estimation was generally used in applications of this model.

To avoid the adverse effects of the multicollinearity associated with including many lags of “x” as regressors, it was common to reduce the number of parameters by imposing restrictions on the pattern (or “distribution”) of values that the α coefficients could take. Perhaps the best known set of restrictions was that associated with the for the estimation of DL (∞) model. These restrictions imposed a polynomial rate of decay on the coefficients. This enabled the model to be manipulated into a new one that was autoregressive, but with an error term that followed a moving average process.

Before we start, let’s recall what a *conventional* ECM for cointegrated data looks like. It would be of the form:

$$\Delta y_t = \beta_0 + \sum \beta_i \Delta y_{t-i} + \sum_{j_1} \Delta x_{1t-j_1} + \sum \delta_k \Delta x_{2t-k} + \varphi z_{t-1} + \epsilon_t ; \quad (2)$$

Here, z, the “error-correction term”, is the OLS residuals series from the long-run “Cointegrating regression”,

$$y_t = \alpha_0 + \alpha_1 x_{1t} + \alpha_2 x_{2t} + v_t \dots\dots\dots (3)$$

The ranges of summation in (2) are from 1 to p, 0 to q1, and 0 to q2 respectively. After making sure none of our variables are of I(2) we can Formulate the following model:

$$\Delta y_t = \beta_0 + \sum \beta_i \Delta y_{t-i} + \sum_{j_1} \Delta x_{1t-j_1} + \sum \delta_k \Delta x_{2t-k} + \theta_0 y_{t-1} + \theta_1 x_{1t-1} + \theta_2 x_{2t-1} + \epsilon_t ; \quad (4)$$

Notice that this is *almost* like a traditional ECM. The difference is that we’ve now replaced the error-correction term, z_{t-1} with the terms y_{t-1} , x_{1t-1} , and x_{2t-1} . From (3), we can see that the lagged residuals series would be $z_{t-1} = (y_{t-1} - a_0 - a_1 x_{1t-1} - a_2 x_{2t-1})$, where the a’s are the OLS estimates of the α ’s. So, what we’re doing in equation (4) is including the same lagged levels as we do in

a regular ECM, but we’re *not restricting* their coefficients. This is why we might call equation (4) an “unrestricted ECM”, or an “unconstrained ECM”. call this a “conditional ECM”.

Granger Causality

If economic growth shares a long run relationship with other economic variables that we are studying, the next step is to examine causality, since if two or more variables are cointegrated; there is causality in at least one direction. We proceed to determine whether economic growth granger cause financial sector development and other variables and vice-versa, using Autoregressive distributed lag model (ARDL).

According to, if two variables are co integrated, then a more than a compressive test of causality, which has become known as an error correction model, should be adopted. The cointegration term is known as the error correction term since the deviation from the long run equilibrium is corrected gradually through a series of partial short run adjustment.

The Granger approach to the question of whether x causes y is to see how much of the y can be explain by past values of y and then to see whether adding lagged values of x can improve the explanation. Y is said to be Granger-caused by x if x helps in the prediction of y. it is important to note that the statement ‘x Granger causes y’ does not imply that y is the effect of the result of x. Reviews runs bivariate regressions of the form:

- $y_t = \alpha_0 + \alpha_1 y_{t-1} + \dots + \alpha_c y_{t-c} + \beta_1 x_{t-1} + \dots + \beta_c x_{t-c} + \dots\dots\dots$
- $x_t = \alpha_0 + \alpha_1 x_{t-1} + \dots + \alpha_c x_{t-c} + \beta_1 y_{t-1} + \dots + \beta_c y_{t-c} + \dots\dots\dots$

For all possible pairs of (x,y) series in the group. The reported f-statistics are the wald statistics for the joint hypothesis $\beta_1 = \dots \beta_c = 0$. For each equation, the null hypothesis is therefore that x does not Granger-cause y in the first regression and that y does not Granger-cause x in the second regression. If economic growth share along run relationship with other macroeconomic variables that we are studying, the next step is to examine causality, since if two or more variables are co integrated; there is causality in at least one direction. We then proceed to determine whether financial Sector development Granger-cause GDP growth rate and other variables individually and vice-versa.

Stationarity Test

In every time series model is there is a need to investigate the stationarity properties of the variables. This is important as most time series variables are non-stationary and estimations with these might produce spurious results. Again, testing for the stationarity properties will also aid in determining the order of integration and hence guide in choosing an appropriate econometric technique. The study employs the Augmented Dickey-Fuller (ADF) test.

Diagnostic Test

Diagnostic tests were done to check for serial correlation, Auto-regressive Conditional Heteroscedasticity (ARCH), normality of residuals and stability of the model. Because we have a model with an autoregressive structure, to ensure the model is “dynamically stable”. We check that all of the inverse roots of the characteristic equation associated with our model lie strictly inside the unit circle. We can trick EViews into giving us the information we want in order to check that this condition is satisfied.

Apriori Expectations

Independent Variable	Dependent Variable	Expected Sign
CRD	GDP	+
BM		+
INF		-
GCEX		+/-
GFC		+
FDI		+

Credit to the private sector (CRD) and broad money (BM) used as proxies for financial development. Development in the financial system is often described as the process of causing an improvements or change in the quality, quantity and efficiency of financial intermediary services which broadly includes the capital and money markets. It is expected that financial development encourages economic growth. A strong, effectively and efficiently functioning financial system is a very powerful driver to the engine of economic growth and development. This is because an economy with a solid financial system is most likely to stimulate domestic savings, which in turn leads to various productive ventures in the local industries. It is therefore expected that financial development should be positive.

The coefficient of the variable representing inflation (INF) is expected to be negative. As GDP is the total production that occurs in the economy thus if prices rise due to inflation, the cost of factors of production increases. This means that people will buy less of that commodity due to an increase in its price. If we aggregate this phenomenon for all goods across all sectors we see that a huge drop in aggregate production which leads to a slowdown in the economy and hence reducing the GDP growth rate.

Government consumption expenditure is measured in nominal terms as a percentage of GDP in this study and represented as

“GCEX”. The effect of government consumption expenditure on economic growth is ambiguous. This implies that if the economy spends more than it produces it impedes growth. Alternatively, if government expenditures are mainly channeled to productive venture, it will improve upon domestic production and growth. Hence the parameter estimate is therefore expected to either have a positive or negative effect on economic growth.

The study uses gross fixed capital formation as a measure of capital stock. The study expresses capital stock as a percentage of GDP and represented by “GFC”. It is expected to have a positive impact on economic growth. It is therefore expected that the parameter estimate will be positive.

The study uses FDI inflows as a percentage of GDP to measure foreign direct investment. It is expected to enhance economic growth. Therefore, FDI is expected to be positive.

Empirical Analysis and Interpretation of Result Introduction

This chapter is devoted to the presentation and discussion of the empirical results. Specifically, it presents discussions on the descriptive statistics of the variables, trend analysis, stationarity and Cointegration. The econometric characteristics of the variables provide the basis and justification for subsequent estimation procedures. Auto Regressive Distributed Lag Model commonly called Bound Test and thereafter Wald test was conducted to check for short term causation were then employed to analyze the nexus between financial sector development and economic growth: Evidence from Sierra Leone.

Descriptive Statistic

Before going to the econometric estimation, it is worth to have a look at descriptive statistics of the variables in Table 4.1. This is essential due to these statistics summarize the statistical properties of the series of the model.

Table 4.1 Descriptive Analysis of the Variables

	GDP	BM	DCR	FDI	GCEX	GCF	INF
Mean	2.569231	32.31026	4.451282	3.123077	9.669231	12.11538	31.75641
Median	4.100000	26.50000	3.500000	1.000000	9.700000	10.90000	14.90000
Maximum	26.40000	88.40000	8.200000	32.30000	14.30000	41.50000	178.7000
Minimum	-20.60000	2.600000	1.600000	-28.60000	6.300000	-2.400000	-3.300000
Std. Dev.	8.510463	21.91429	1.915982	8.342613	1.923149	7.747683	37.76485
Skewness	-0.182582	1.046528	0.545669	-0.076221	0.425702	1.601395	2.020053
Kurtosis	5.163859	3.088848	2.090312	10.19665	2.980120	7.417118	7.358128
Jarque-Bera	7.825398	7.131768	3.280148	84.19928	1.178588	48.37429	57.38808
Probability	0.019986	0.028272	0.193966	0.000000	0.554719	0.000000	0.000000
Sum	100.2000	1260.100	173.6000	121.8000	377.1000	472.5000	1238.500
Sum Sq. Dev.	2752.263	18248.98	139.4974	2644.769	140.5431	2281.011	54194.98
Observations	39	39	39	39	39	39	39

Source: Author

Unit Root Test Results

Before proceeding to the ARDL bound test, it is essential to verify the stationary status of all variables to determine their order of integration and ensure that the variables are not integrated of order (2). Lack of stationary of data may lead to an inappropriate statistical result and misleading inference. Because the bound test is based on the assumption that the variables are I(0) or I(1) and F-statistics provided by Pesaran et al. To verify the applicability of the ARDL bound approach, the order of integration of variables (Table) have been tested by employing two test such as the Augmented Dickey-Fuller which will check for the null hypothesis of the existence of a unit root. The null hypothesis for the test states that the data series under consideration has unit root while the alternative hypothesis claims that there is no unit root or the data is stationary. In the Table 4.2, it is found that all variables are I(0), I(1), or a combination of both, and none of them is integrated of I(2). Therefore, it is qualified to apply the ARDL method.

A summary of unit root test results regarding order of integration based on different unit root criteria such as ADF is given in Table 4.2.

Table 4.2: Augmented Dickey Fuller (ADF) Results (Unit root test)

Variables	ADF-TEST	T-statistics @ 5%	P-values	Decision
GDP	Level	-5.538877	0.0000	I(0)
BM	Level	-2.885127	0.0565	I(1)
	First Diff	-8.596464	0.0000	
DCR	Level	-2.250191	0.1928	I(1)
	First Diff	-6.373274	0.0000	
FDI	Level	-3.800136	0.0062	I(0)
GCEX	Level	-2.680384	0.0867	I(1)
	First Diff	-8.118951	0.0000	
GCF	Level	-2.603047	0.1012	I(1)
	First Diff	-5.890684	0.0000	
INF	Level	-1.436514	0.5536	I(1)
	First Diff	-6.634703	0.0000	

Exogenous: Constant

Source: Author

Lag Length: 1 (Automatic - based on SIC, maxlag=9)

SIC was used for ADF to select the lag length; the maximum number of lags was set to nine. According to ADF and PP unit root tests all the dependent variables, i.e. GDP, BM, DCR, FDI, GCEX, GCF and INF are combination of both I(0) and I(1) and none of the variables is of I(2). Thus, the variables are qualified to run for ARDL estimation technique.

Bound Test Cointegration Results

A two-step procedure is used in estimating the long run relationship: an initial examination of the existence of a long-run relationship among the variables is followed by an estimation of the short run and long-run parameters. The F statistics will be calculated. If the computed F-statistic exceeds the corresponding upper critical bound value of a given significance level, the null hypothesis (of no cointegration) is rejected, which means there is an evidence of long run level relationship between the independent variables and dependent variable. Alternatively, there will be no long run relationship and inclusive when F-statistics lies blow the lower critical value or within the lower and upper critical value. The Bound Cointegration test was based on ARDL model which suggests 2 (two) lags. The results of the bound test are given in Table 4.3.

Table 4.3 Bounds Test Results

Test Statistic	Value	Df	Probability
F-statistic	1.467894	(5, 15)	0.2579
Chi-square	7.339468	5	0.1966
Null Hypothesis: C(16)=C(17)=C(18)=C(19)=C(20)=C(21)			
Null Hypothesis Summary:			
Normalized Restriction (= 0)	Value	Std. Err.	
C(16) - C(21)	-1.140040		0.591925
C(17) - C(21)	0.794749		0.677110
C(18) - C(21)	2.616374		1.940898
C(19) - C(21)	-0.085352		0.428183
C(20) - C(21)	3.677699		2.588489

Source: Author

Since we found that the value of F-Statistic (1.467894) to be less than the upper bound value of the Pesaran critical value which is (4.010) in an unrestricted trend and no intercept model at 5%. The conclusion here was that there exist no long run relationship among the variables. Put simply there is no Cointegration among the variables. As such gross domestic product (GDP) growth rate, credit to the private sector (CRD) percentage of GDP, broad money (BM) percentage of GDP, inflation rate (INF), government consumption expenditure (GCEX) percentage of GDP, gross capital formation (GFC) percentage of GDP, and foreign direct

investment (FDI) percentage of GDP does not move together in the long run. The implication has been that any further empirical analysis must be short run.

ARDL Output; Long Run Equation with Coefficients

For ARDL we conducted the Wald Test to determine if a long-term relationship exists among the variables.

ARDL Model

Dependent Variable: D(GDP)

Method: Least Squares

Date: 10/09/19 Time: 16:58

Sample (adjusted): 1983 2018

Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-44.60162	34.62760	-1.288037	0.2172
GDP(-1)	-1.442021	0.645319	-2.234586	0.0411
BM(-1)	0.492768	0.409879	1.202229	0.2479
DCR(-1)	2.314393	1.835603	1.260835	0.2266
FDI(-1)	-0.387332	0.534224	-0.725038	0.4796
GCEX(-1)	3.375719	2.597425	1.299640	0.2133
INF(-1)	-0.301981	0.280616	-1.076136	0.2989
R-squared	0.802591	Mean dependent var		0.011111
Adjusted R-squared	0.539380	S.D. dependent var		12.01068
S.E. of regression	8.151528	Akaike info criterion		7.325486
Sum squared resid	996.7112	Schwarz criterion		8.249205
Log likelihood	-110.8587	Hannan-Quinn criter.		7.647889
F-statistic	3.049227	Durbin-Watson stat		2.031391
Prob (F-statistic)	0.015975			

Source: Author

In the model above the R-square is 0.802591 that is 80%. Meaning the model is nicely fitted because the R-square is greater than 60% which is more than 5%.

Also, the F-statistic and it corresponding probability (p-value), since the p-value is 0.015975 that is less than 5% meaning that the independent variables can jointly influence the dependent variable, GDP growth rate or jointly significant to explain the dependent variable.

Proxies used as financial development indicators showed a positive relationship with economic growth. Results obtained from other models confirm aprior expectations. The results obtained confirm studies by in China and Pakistan [31, 42].

The results further show that inflation was negatively related to economic growth. This confirms aprior expectations. This result is not surprising, because ceteris paribus, as the cost of goods and services increase it causes low patronage of goods and services. This trickles down to production, since what is been produced are not been patronize, hence causing disincentive to produce. Therefore on the aggregate level reduces the level of production

in the economy, hence growth level. Thus persistent levels of inflation undermine the growth rate of the economy.

Again, the result shows that government consumption expenditure causes a decline in economic growth confirming apriori expectations. The result may be because of high government consumption expenditure, relative to low levels of production in the economy. Again, the result obtained may be attributed to the fact that a chunk of government expenditure is not diverted into productive ventures, hence impeding the country's growth patterns.

Again, the results showed that foreign direct investment was negatively related to economic growth. This unconfirmed the aprior expectation. The empirical findings show that the impact of foreign investment on economic growth is negatively significant. In other words, the contribution of more investment firms has negative impact on economic growth.

Short-Run Results

The study further proceeds to investigate the short-run dynamics of the variables included in the equation. The results are presented in Table 4.5. The error correction term (ECM-1) measures the speed of adjustment of convergence to the long-run equilibrium of an endogenous variable in response to a shock in an explanatory variable. In Table 4.5, it is evident that the coefficient of the ECM-1 is negative and statistically significant. Again, the negative and significant coefficients of the ECM-1 show that the estimated models are stable.

Speed of Adjustment Short Run Error Correction Term (ECT)

Dependent Variable: D(GDP)

Method: Least Squares

Date: 10/09/19 Time: 17:38

Sample (adjusted): 1983 2018

Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.105562	1.303675	0.080973	0.9363
D(GDP(-1))	-0.071727	0.322557	-0.222369	0.8263
D(GDP(-2))	-0.112847	0.208005	-0.542520	0.5935
D(BM(-1))	-0.005758	0.100515	-0.057286	0.9549
D(BM(-2))	0.012358	0.103812	0.119040	0.9064
D(DCR(-1))	-0.459242	1.790461	-0.256493	0.8002
D(DCR(-2))	1.114216	1.812815	0.614633	0.5457
D(FDI(-1))	-0.280794	0.233545	-1.202313	0.2433
D(FDI(-2))	0.264553	0.261233	1.012709	0.3233
D(GCEX(-1))	-1.565573	1.169637	-1.338513	0.1957
D(GCEX(-2))	0.505617	1.287113	0.392830	0.6986
D(GCF(-1))	-0.119386	0.267432	-0.446416	0.6601
D(GCF(-2))	0.404232	0.323794	1.248423	0.2263
D(INF(-1))	0.066944	0.094329	0.709684	0.4861
D(INF(-2))	-0.075168	0.056840	-1.322457	0.2009
ECT(-1)	-1.036611	0.436742	-2.373511	0.0278

WALD TEST Analysis for Short Run Dynamics of the Variables Since the p values (0.8273) more than 5% we accept the null hypothesis and conclude that c(2) and c(3) i.e. GDP growth rate lag one and lag two does not influence the dependent variable GDP

growth rate in the short run. Meaning they are not significant in explaining current GDP growth rate. As GDP growth is the annual percentage growth rate of GDP at market prices based on constant local currency could lead to the fact that it is in monetary value, so could not be significant.

Also Since the p values (0.9820) more than 5% we accept the null hypothesis and conclude that c(4) and c(5) i.e. Broad Money lag one and lag two does not influence the dependent variable GDP growth rate in the short run. That is Broad Money (BM) they are not significant in explaining current GDP growth rate. According to standard macroeconomic theory, an increase in money supply of money should lower the interest rate in the economy, leading to more consumption and lending/borrowing. In the short run this should, but does not always correlate to an increase in total output and spending, and presumably GDP growth rate.

As well for credit to the private sector, since the p values (0.8269) more than 5% we accept the null hypothesis and conclude that c(6) and c(7) i.e. Credit to the private sector (CRD) lag one and lag two does not influence the dependent variable GDP growth rate in the short run. Therefore CRD they are not significant in explaining current GDP growth rate. As such the financial resources provided to private sector such as through loans, purchases of non-equity securities, and trade credits and other account receivable, which establish a claim for repayment could be insignificant in the short run.

FDI growth rate is also found to be not significant. Since the p values (0.1337) more than 5% we accept the null hypothesis and conclude that c(8) and c(9) i.e. Foreign Direct Investment (FDI) lag one and lag two does not influence the dependent variable GDP growth rate in the short run. FDI they are not significant in explaining current GDP growth rate. As such FDI which is net inflows investment in an economy could be significant if stringent measures are in place with multinational corporations (MNCs).

Since the p values (0.2602) more than 5% we accept the null hypothesis and conclude that c(10) and c(11) i.e. GCEX lag one and lag two does not influence the dependent variable GDP growth rate in the short run. Simply GCEX they are not significant in explaining current GDP growth rate.

Furthermore since the p values (0.3293) more than 5% we accept the null hypothesis and conclude that c(12) and c(13) i.e. GCF lag one and lag two does not influence the dependent variable GDP growth rate in the short run. As such GCF they are not significant in explaining current GDP growth rate. Gross capital formation (GCF) which includes land improvements (fences, ditches, drains etc), plant, machinery and equipment purchases; and the construction of roads could not impact growth in the short run may in the long run.

Lastly, Since the p values (0.2351) more than 5% we accept the null hypothesis and conclude that c(14) and c(15) i.e. INF lag one and lag two does not influence the dependent variable GDP growth rate in the short run. Put simply there is no short run relationship between the variables i.e. INF they are not significant in explaining current GDP growth rate.

Diagnostic and Test

The study further conducts the various diagnostic and stability tests to check if the respective models are free from any econometric problems. The results are presented in Table 4.6. The diagnostic test results shows there is absence of serial correlation and

heteroskedasticity in the model.

Table 4.6: Auxiliary Diagnostic Test

	P-values
R-squared	(0.802591)
Adjusted R-Squared	(0.539380)
Normality Test (Jacque Bera)	(0.31919)
Serial Correlation (LM Test)	(0.1375)
Heteroscedasticity (Breusch .P. Godfrey)	(0.2984)
F-Statistics	(0.015975)

Stability Test (CUSUM TEST)

The stability of long run is checked through stability tests such as cumulative sum of recursive residuals (CUSUM). According to indicated that if the result stay within 5% level (portrayed by two straight lines) prove that the result is significant and there is a stable relations over the study period.

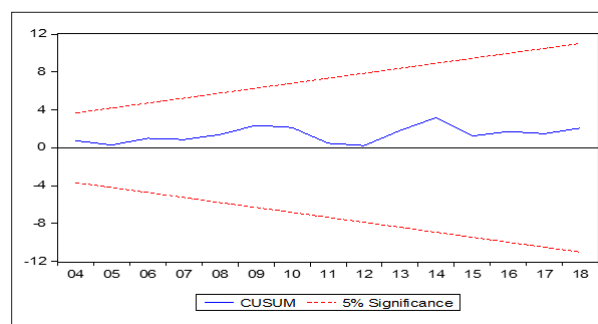


Figure 4.1: Stability Test (CUSUM TEST)

From the graph, it can be seen that the line is within critical limits which can conclude that the short runs estimates are stable and the estimated model is reliable.

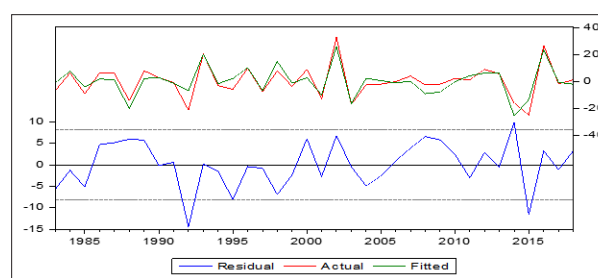


Figure 4.2: Actual Fitted Residual Graph

The graphs above show the actual fitted residual of the data. From this we can see that the residuals are well fitted into the model and rather stationary. This is important because it allows for the entire model to minimize the effect of the white noise process. The implication was that the model's predictive capacity is enhanced [43-55].

Conclusion and Recommendations

Conclusion

This study aimed to investigate financial sector development and economic growth nexus: Empirical evidence from Sierra Leone over a period spanning from 1980 to 2018. The short-run effect of financial development on economic growth was examined. Finally the study investigates other determinants of economic growth. The ARDL bounds test approach to Cointegration was employed.

The study found evidence of only a short run relationship amongst the various financial development indicators and economic growth. As such monetary policy variables have only a short run effect of real gross domestic product (RGDP) growth. The results showed that credit to the private sector, and broad money influenced economic growth in the short run estimate though not significance. Again, inflation and government consumption expenditure were found to impede economic growth in the short-run. Contrarily lag one coefficient of FDI was negative but insignificantly related to economic growth and gross capital formation was positive but as well insignificance.

Recommendations

Based on the findings the study recommends the following: The study recommends that policy makers should take caution in the choice of financial development indicator as a policy instrument for the attainment of growth and development. Based on the findings policies aimed at improving channels to access credit available to the private sector should be implemented as this will help expand the production capacity of the economy, hence the overall growth. In other words, based on empirical findings policies that improve access to affordable credit by private sector, including small and medium scale enterprises should be enforced. As this will spur the needed expansion and innovation in the various sectors of the economy, increase employment levels and in effect enhance growth.

Further, studies should expand the list of control variables in order to gather more determinants of economic growth in Sierra Leone as this may help inform policy makers on what factors they need to enhance economic growth.

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