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Financial Development and Economic Growth in Ghana: Evidence from Ardl Model.

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Abstract
There is a long standing debate about the nature of the relationship between financial development and economic growth. Key among the arguments is whether a causal relationship exists and the direction of causality. This study thus examined data from 1960 to 2016 for the effects of financial development on economic growth in Ghana using the ARDL cointegration approach. The result for financial development is consistent with the endogenous growth theories and the supply-leading hypothesis.The paper finds thatthere is a long run relationship between economic growth and financial development as measured using the ratio of broad money to GDP;.. In the short run, the lagged difference of economic growth and household consumption had statistically significant relationships with economic growth which means that short run fluctuations in the economic growth rate in the previous year had a positive spillover for the following year even though this does not appear to be sustained in the long run. The granger causality test shows that, relationship between financial development and economic growth flows from financial development to economic growth hence financial development is a catalyst to economic growth in Ghana. The results were obtained using the ratio of broad money to GDP whereas other measures of financial development showed no significant relationship; thus, policy should be targeted at the money supply in the economy.
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I. Introduction

The correlation existing between financial development and economic growth has also been one of the most debated issues in recent years.Authors such as Akinlo and Egbetunde (2010)have argued that an important point in the debate is the question of whether strong economic performance is finance-led or growth driven.This is because while some authors have argued that financial development is a strong determinant of economic growth, others believe that this is not the case. Many previous authors have however agreed on the point that there is a correlation between financial development and economic growth and that this relationship is potentially strong but fail to agree on the direction and the nature of this relationship(Anwar & Cooray, 2012; Fisman & Love, 2003; Lee & Chang, 2009; Zhuang et al., 2009).

Financial development can be broadly seen from two perspectives; the development of the banking sector and the development of the stock market. Earlier studies have suggested that the development of these two sectors of the financial system each has a statistically significant effect on economic growth in emerging market (Sendeniz et al, 2008).This was however not the case in developed market. This suggests that there might be a limit to the effect of financial development on economic growth. Consistent with these observations, developing countries have tended to focus on modernizing and liberalizing their financial systems to allow for greater private sector participation.

The Ghanaian economy before 1983 experienced various forms of financial repression and macroeconomic problems including low growth rates. During the 1970s the Ghanaian economy was branded by persistently high inflation of about 122.87 percent, declining exports from 21 percent of GDP to 4 percent of GDP, low productivity, flourishing illegal activities and political instability. A decline in per capita income by 30 percent increased the incidence of absolute poverty accompanied by a worsening of income distribution, growing unemployment and the exodus of skilled professionals. During that period, the financial system of Ghana was characterized by fixed low-interest rates, high rates of inflation, negative real interest rates. There was also a fall in rates of savings from 13 percent to about 3 percent of GDP; a fall in investment from 14percent to 2percent of GDP and dominance of the public sector in the domestic credit market. There was also a shallow financial sector, high budget deficit and negative growth of real GDP. The impact of these policies on

economic development was found to be depressing. This motivated financial sector reforms.(Dordunoo & Nyanteng, 1997;Aryeetey & Harrigan, 2000;Emenuga, 2004).

These reforms were called the Structural Adjustment Programme (SAP) and the Economic Recovery Programme (ERP). An important aspect of these programmes was their implication for the financial sector through the implementation of the Financial Sector Adjustment Programme (FINSAP).According to Dordunoo and Nyanteng (1997), the reforms implemented in the Ghanaian economy had measures which targeted on reversing, restoring and accelerating the growth of the Ghanaian economy. Reforms in the financial sector included interest rate deregulation, removal of credit ceiling, removal of barriers to entry and operation in the banking industry which were directed towards the financial development resulted in increasing the Central bank's authority in regulating and supervising the banking system. The FINSAP brought positive results and these measures were immediately followed by a rapid economic recovery and increased economic growth.

Previous studies have shown that the fundamental relationship existing between financial development and economic growth tends to blur in theory. However, it is believed that further empirical studies can clarify the relationship between the two variables.This has become important given that the role of financial development in economic growth has been given critical attention from finance and development experts which have resulted in extensive debates among researchers over the last five decades. The discussions have hinged around the supply-leading hypothesis (McKinnon, 1973; Shaw, 1973), demand-pulling hypothesis (Robinson, 1952; Ireland, 1994). Others are the endogenous growth theory (Greenwood & Smith, 1997; Blackburn & Hung, 1998) and the Stern-Lucas proposition (Kuznets, 1955; Meir & Seers, 1984; Lucas, 1988; Stern, 1989).

Several empirical studies over the last few years using different models show some relationship between financial development and economic growth. These studies include Petra (2012),using a Meta-Analysis, shows a link between financial development and economic growth. Akinlo and Egbetunde (2010), using vector error correction model (VECM), shows financial development is co-integrated with economic growth.Sendeniz et al (2008), using dynamic panel data techniques found statistically significant and positive interdependence between financial development and economic growth.

The problem necessitating this study, however, is that in all these studies, though there are number proofs of a relationship between the variables, evidence of the long-term relationship between financial development and economic growth in Ghana appears to be non-existent. This study goes beyond this timeline to establish the relative effect of the FINSAP in the acceleration of the economic growth of Ghana. Quite a few of these studies used cross-country regression models. However, the method is saddled with heterogeneity bias and therefore, it fails to address the country-specific effects of financial development on economic growth which may lead to inconsistent and misleading estimates (Quah, 1993;Caselli, Esquivel, & LeFort, 1996;Ghirmay, 2004).Atindehou et al. (2005) on the subject matter found a weak causal relationship in almost all the twelve West African countries included in their study. This study focuses only on Ghana.

The study establishes the long term relationship using data spanning 56 years starting from 1960 to 2016 and then determines the short term relationships taking into consideration the pre-FINSAP and post-FINSAP periods. This provides empirical evidence of the role of financial development in the growth of the Ghanaian economy.

The paper is organized in sections. In Section2we exploredtheoretical and empirical literature on the subject under review and section 3 we outline our model. Section 4 presents the discussion of resultsand sections5 and 6 look at the findings and conclusions of the study.

II. Literature Review

Financial deepening is a concept that seeks to describe the level of financial development in an economy and it refers generally to the increase in the provision of financial services in an economy. Financial deepening is measured by the indicators such as the ratio of currency to money supply (Cu/M2+); credit to the private sector as a ratio of the GDP and ratio of money supply to GDP (M2+/GDP).

There is an important theoretical debate about whether financial deepening leads to higher economic growth or whether the later leads to the former. This is akin to the proverbial chicken and egg debate. There are two broad sides to this debate;the "demand-leading" side and the "supply leading" side. The proponents of the demand leading theory argue that economic growth coupled with technological expansion and increased production, will require additional financial resources which will cause a further deepening of the financial system. Thus, economic growth creates the demand for financial services which leads financial deepening (Ireland, 1994; Quartey & Afful-Mensah, 2014; Smith et al., 2015; Wu, Rui, & Wu, 2012). On the other hand, the supply side school of thought argue that, before the production and technological expansion occurs, financial resources must have already been deployed (McKinnon, 1973; Shaw, 1973).

Thus, it is the deepening that creates the growth. This outcome however has been shown to be dependent on the level of inflation. During periods of high inflation, financial deepening is not expected to significantly impact economic growth (P. Rousseau & Sylla, 2003; P. Rousseau & Wachtel, 2009). This implies

that appropriate additional policies must be in place to make financial deepening effective in stimulating growth (Quartey& Afful-Mensah, 2014).

Economic growth is viewed as an increase in the level of economic activities- as measured by the GDP- over a given period of time. It can also be described as a process of steady increases in the productive capacity of the economy of a given time period which leads to higher national production and income (Jhingan, 2006; Todaro & Smith, 2006). Growth is characterized by increased productivity, structural transformation, increases in per capita income and international flow of factors of production (Ajibike, 2016).

In the theoretical literature on economic growth, the main dialogue is about the sources of growth. Theorists have sought to find answers to the question: where does growth come from? Two dominant viewpoints give answers as "outside" and "inside". The earliest theorists who attempted to answer the question on the sources of economic growth were of the view that the factors that cause economies to grow are not factors that are found in the economic system-that is they are outside the system. This viewpoint is collectively called the neoclassical theories. These theories effectively argue that growth is exogenous to the economy. The implication of this theoretical perspective is that policy measures targeting economic variables are not potent in bringing about growth (Ayadi, Arbak, Ben-naceur, & Groen, 2013; Bayraktar-Sağlam & Yetkiner, 2014; Jones & Manuelli, 1997; Kopf, 2007; Laeven, Levine, & Michalopoulos, 2015; Murdoch & Sandler, 2002; Ngepah, 2017). In effect if we wanted the economy to grow, we just have to sit down and wait for it to happen.

As a response to criticisms of classical and neoclassical growth theories, a new set of theories emerged called the endogenous growth theories (Azémar & Desbordes, 2013; Lucas, 1988, 1990; Pack, 1994; Romer, 1994). A major proposition by endogenous growth theorist is that policy interventions are effective in influencing long-run growth. Jhingan (2006) explains that the emphasis of the various endogenous growth models was on technological progress that was as a result of increases in investment and human capital. This theory argues that growth can be induced by implementing measures that affect one or more economic variables (Azam & Ahmed, 2015; Bayraktar-Sağlam & Yetkiner, 2014; Ganegodage & Rambaldi, 2014; Kopf, 2007; Laeven et al., 2015; Parker, 2012). Their models allow for economic growth to be influenced by policies aimed at changing economic variables- hence growth can come from "inside" factors. One such variable is financial development, which is the focus of this study.

La Porta, Lopez-de-Silanes, & Shleifer (2002) found a positive relationship between financial development and economic growth. They used the level of financial sector liberalization to measure financial development in a cross section of countries. A large private sector involvement was taken to signify a higher level of financial development (Ayadi et al., 2013). The finding was that state ownership of banks adversely affected economic growth. This finding appears to justify the introduction of FINSAP in Ghana (Quartey & Afful-Mensah, 2014).Examining a different sector of the financial system, Levine & Zervos (1998) used stock market development-size and liquidityto proxy financial development and found that stock market development was positively correlated with banking sector development. This implies that both sectors of the financial system develop in the same direction over time and so using either of them to proxy financial growth would yield qualitatively similar results(Ayadi et al., 2013). They found a positive relationship also between stock market development and economic growth. They however did not investigate causality.

Some studies have used panel data to access the finance-growth relationship. For instance Levine, Loayza, & Beck (2000) used a GMM panel estimator to examine the finance-growth relationship. Similarly, Beck, Demirgüç-Kunt, & Levine (2000) used a panel data to examine the relationship between finance and the sources of growth. Both studies find positive relationships for the respective variables. Beck et al. (2000) however explains that, the transmission channel of financial development is through improvement in productivity rather than through capital accumulation. These authors' findings suggest a linear relationship between growth and financial development. Rioja & Valev (2004) however find that the contribution of financial development differs from industrialized countries and developing countries. That is, the channel of contribution is different. In a follow-up paper, Rioja & Valev (2004a) found that one size did not fit all; they find that the impact of financial development on economic growth was stronger for rich countries compared to poor countries. This implies that it is necessary to contextualize the finance-growth relationship. Thus, this study seeks to identify the nature of this relationship for Ghana.

Other authors have examined the finance-growth relationship using time-series techniques and have reached similar conclusions. Demetriades & Hussein (1996) found that the relationship between financial development and economic growth was bi-causal in a sample of developed countries. Rousseau & Wachtel (1998)however using a sample of five countries found that that the relationship was uni-direction; from finance to growth. Arestis, Demetriades, & Luintel (2001)on the other hand examined developing countries and arrived at the same conclusions using quarterly data from different countries. Their study used both bank and stock market variables to proxy financial development and they found that the relationship was stronger for banking sector proxy. Bekaert, Harvey, & Lundblad (2001, 2004) also found that financial liberalization had an impact on economic growth through higher capital accumulation and efficient allocation of resources.Abu-Bader &

Abu-Qarn (2008) also found a bi-causal relationship in the case of Egypt, an emerging economy using a data from 1969-2001. They used a tri-variate VAR model.These studies however did not address the long-term high frequency factors that affect the finance-growth relationship.

This was however addressed by Christopoulos & Tsionas (2004) who found that the long-term causality run from finance to growth just as was found previously. These studies show that the conclusions on the relationship between financial development and economic growth is overwhelmingly positive and the causality runs from financial development to economic growth (Ayadi et al., 2013). The key concern of this study however is to establish whether these conclusions are valid in the context of Ghana given that the structural characteristic of Ghana is different and unique. One important feature of Ghana's economic structure is the fact that the country transitioned from agriculture sector dominance to service sector dominance without being dominated by the manufacturing sector as in most of the industrialized nations.

A cross country study by Beck, Chen, Lin, & Song (2012) found that there is a positive relationship between banking sector R&D and economic growth. The authors used the level of R&D expenditure to proxy financial innovation. Using bank credit as a proxy for financial development, Amore, Schneider, & Zaldokas (2013) found that in the USA, exogenous increases in access to credit led to increase in level of research outputs and patents for firms outside the financial industry. The implication of their finding is that financial development boosted economic growth through its effect on promoting technological innovation. Laeven, Levine, & Michalopoulos (2015) used a Schumpeterian model of growth that allows financial development to be endogenous. According to Laeven, Levine, & Michalopoulos (2015) financial development is an important determinant of economic growth. They argue that regardless of the existing level of development, economic growth will be slow without continuous financial development. They examine the role of financial development in enhancing economic growth from a unique perspective. They use a growth model with technology and show that technological innovation thrives on a corresponding level of financial development with a cross-country data. Unlike other studies that only predict that only the level of financial development affects technological growth and economic growth, their study concluded that financial development plays a dominant role in shaping the rate of technological advancement and economic growth.

The direction of causality is also in dispute in the empirical literature and it appears to vary from one country to another. For instance, using four proxies of financial development: ratio of money to GDP, ratio of M2 minus currency to GDP, ratio of bank credit to the private sector to GDP, and the ratio of credit issued to private sector to total domestic credit Abu-Bader & Abu-Qarn (2008)found that the direction was two-way using data from six countries, four of which were North African countries. Using data on similar countries however, Abdelhafidh (2013)found the direction to flow from growth to finance (proxied by savings). Kar & Pentecost (2000) on the other hand studied Turkey, a country similar to Egypt in many ways and used five proxies of financial development and found that the direction of causality varied with the proxies. Their study used vector error correction methodology (VECM). Their findings were that when money to income ratio is used, the direction was from finance to growth and reverses when bank deposits, private credit to GDP and domestic credit to GDP were used. In the context of Egypt, the findings of Bolbol, Fatheldin, & Omran (2005) and Omran & Bolbol (2003) give possible sources of the diverse direction. In their study, they found that market factors were more important in causing economic growth and then the resultant growth feeds banking sector development (Ayadi et al., 2013).

III. Empirical Method

3.1 Data

The positivist paradigm is adopted for this paper because it is quantitative in nature and most studies in this area are quantitative, hence the positivist paradigm. The positivist paradigm views reality to be singular, that is, there is a single reality that exists in any case and this reality is objective and tangible. Reality is deemed to be independent of time and context. This paradigm thrives on deductive logic, thus interpretation of findings are based objectively on the results obtained. Annual time series data on Ghana spanning the period 1960-2016are used in the study to estimate the long and short-run relationship between financial development and economic growth.Data is obtained from the World Development Indicators of the World Bank for all the 57 years. This source is deemed to be the most reliable and comprehensive source for macroeconomic data on Ghana.

3.2Empirical Strategy

3.2.1 Estimation Techniques

a) Stationarity Test

Unit root tests using Augmented Dickey-Fuller (ADF) (Dickey and Fuller, 1979) are performed to determine the time-series properties of the variables employed in the study. The stationarity test is also carried out to ensure that none of the variables is I(2) stationary since such data will invalidate the methodology. The auxiliary regression is run with an intercept and specified as;

$\Delta y_t = \alpha_0 + \alpha_1 y_{t-1} + \sum_{j=1}^{p} \gamma_j \Delta y_{t-j} + \varepsilon_t$……(1)

Where "yt" is the variable whose time series properties is being investigated, Δ is the difference operator and εt is the random error term and assumed to be white noise. The augmented terms are added to convert the residuals into white noise without affecting the disturbance of the test statistic under the null hypothesis of a unit root.

3.2.2 Autoregressive Distributed Lag (ARDL) Model

The test for the presence of a long-run relationship between the variables in this study is done within the framework of bounds testing approach developed by Pesaran et al. (2001). The bounds testing approach employs Autoregressive Distributed Lag models. Cointegration describes the existence of equilibrium or stationary relationships among time series variables, each of which is individually non-stationary. More importantly, evidence of cointegration among the variables rules out the possibility of the estimated relationship being spurious. The choice of ARDL model for the estimation was informed by the following reasons. Firstly, the ARDL model is suitable and also efficient in small sample data sizes, unlike other cointegration techniques which in the same situation would result in considerable loss of degrees of freedom. The model is, therefore, appropriate for this study with only 57 observations. Also, the ARDL model enables the cointegration to be estimated by the ordinary least squares (OLS) method once the lag of the model is identified. This is, however, not the case for other multivariate cointegration techniques such as the Johansen Cointegration Test developed by Johansen (1990). This makes the ARDL procedure very simple, as one can also estimate the long-run and short-run components of the model simultaneously, thus, removing the problems associated with omitted variables and autocorrelations.

Finally, The ARDL procedure generates consistent estimates of long-run coefficients that are asymptotically normal regardless of whether the regressors in the model are purely I(0), purely I(1) or mutually cointegrated(Pesaran et al., 2001). In general, the technique provides unbiased estimates of the long- run model and valid t-statistics even in situations when the variables are endogenous.The bounds test approach to cointegration under the ARDL model involves three stages. The first stage is to establish the existence of a long-run relationship between the variables. Once the existence of a long-run relationship has been established, the conditional ARDL (p,q1, …qn) is estimated in the second stage to capture the long-run equilibrium relationship between the variables. The third and final step in the ARDL bound approach is to estimate an error correction model to capture the short-run dynamics of the system.

3.3 Model Specification

The study specifies an empirical growth model that introduces financial development and trade openness as additional explanatory variables together with labour (Human Capital) and Capital (proxied by Gross Fixed Capital Formation).Investigating whether a long-run relationship exists between economic growth and financial development is done by estimating the following Unrestricted Error Correction Model (ECM):

$\Delta DY_t = \alpha_0 + \alpha_1 \Delta DY_{t-1} + \alpha_2 \Delta FD_t + \alpha_3 \Delta Trade_t + \alpha_4 LForce_t + \alpha_5 \Delta GOVSize_t + \alpha_6 \Delta KAP_t + \alpha_7 \Delta HCons_t + \varepsilon_t$…… (2)

Where:

DY =Economic Growth

FD =Financial Development

$Trade$= Measure of trade openness

$LForce$ =Labour force/Human Capital

$GOVSize$ = Size of Government

KAP = Gross Fixed Capital Formation

$HCons$ = Household Consumption

Also, Δ denotes the first difference operator, α_0 is the drift parameter and εt is the white noise error term. In determining the existence of cointegration, the study first estimates the first differenced components of the above equation using Ordinary Least Squares (OLS).

The Aikake's Information Criterion (AIC) is employed to select the optimum number of lags. The study then ascertains the presence of a long-run relationship by restricting the coefficients of the lagged level variables to zero. Restricting the coefficients of the lagged level variables to zero is done by conducting a Wald test for the joint significance of the coefficients of lagged levels of the variables. Here the null hypothesis of no cointegration of the study is tested against the alternative hypothesis of cointegration among the variables.

That is;

H_0: $\theta_1 = \theta_2 = \theta_3 = \theta_4 = \theta_5 = \theta_6 = 0$.

H_1: $\theta_1 \neq \theta_2 \neq \theta_3 \neq \theta_4 \neq \theta_5 \neq \theta_6 \neq 0$.

The second stage in the ARDL approach is the estimation of the long-run elasticity between financial development and economic growth. Once the presence of a long-run relationship is established, the study proceeds to estimate the long-run ARDL model to obtain the long-run coefficients and their asymptotic standard errors. The estimated model is as follows:

$$\Delta DY_t = \alpha_0 + \sum_i^p \alpha_1 \Delta DY_{t-i} + \sum_i^q \alpha_2 \Delta FD_{t-i} + \sum_i^r \alpha_3 \Delta Trade_{t-i} + \sum_i^s \alpha_4 LForce_{t-i} + \sum_i^u \alpha_5 \Delta GOVSize_t + \sum_i^v \alpha_6 \Delta KAP_{t-i} + \sum_i^w \alpha_7 \Delta HCons_{t-i} + \varepsilon_t \ldots\ldots (3)$$

The orders of the lags in the ARDL model are selected by the Schwarz Bayesian Criterion (SBC) before the selected model is estimated by OLS.

The third and last step in the ARDL bound approach is to estimate an Error Correction Model (ECM) to capture the short-run dynamics of the system. The Error Correction Model provides the means of reconciling the short-run behaviour of an economic variable with its long-run behaviour. The Error Correction Model is specified as follows:

$$\Delta DY_t = \gamma_0 + \sum_{j=0}^n \gamma_1 \Delta DY_{t-i} + \sum_{j=0}^n \gamma_2 \Delta FD_{t-i} + \sum_{j=0}^n \gamma_3 \Delta Trade_{t-i} + \sum_{j=0}^n \gamma_4 LForce_{t-i} + \sum_{j=0}^n \gamma_5 \Delta GOVSize_t + \sum_{j=0}^n \gamma_6 \Delta KAP_{t-i} + \sum_{j=0}^n \gamma_7 \Delta HCons_{t-i} + \delta ECT_{t-1} + \varepsilon_t \ldots\ldots (4)$$

Where γi (i=1……6)represent the short-run dynamics coefficients of the model's convergence to equilibrium. ECTt-1 is the Error Correction Term. The coefficient of the Error Correction Term,δ, measures the speed of adjustment to obtain equilibrium in the event of shocks to the system. It is expected to be negative so as to confirm the existence of cointegration among the variables in the model.

3.3.1 Model Residual Diagnostics and Stability test

For the reliability of the goodness of fit of the model a diagnostic and stability tests were conducted. This was done to take care of heteroscedasticity, autocorrelation, normality and functional form that are linked to the model. According to Pesaran and Pesaran (1997), the Cumulative Sum (CUSUM) and the Cumulative Sum of Squares (CUSUMQ) are employed in performing parameter stability tests. It is important to investigate whether the above long-run and short-run relationships established in the study are stable for the entire period of study.

3.3.2 Granger-Causality Test

Granger's concept of causality is based on the assumption that the future cannot cause the past; rather the present and past cause the future. The idea of Granger causality is that a variable (X) Granger-causes another variable (Y) if variable Y can be better predicted using past values of both X and Y than it can be predicted using the past values of Y alone. The paper adopts the Granger-Causality procedure based on ECM to determine the causal relationship between economic growth and financial development. If cointegration is present, the following error correction models can be used to test for Granger causality both in the short and long run.

$$\Delta DY_t = \beta_0 + \sum_{t=1}^n \beta_{1i} \Delta DY_{t-i} + \sum_{t=1}^n \beta_{2i} \Delta FD_{t-i} + \varphi ECT_{t-1} + \varepsilon_t \ldots\ldots (5)$$

$$\Delta FD_t = \sigma_0 + \sum_{t=i}^n \sigma_{1i} \Delta FD_{t-i} + \sum_{i=1}^n \sigma_{2i} \Delta DY_{t-i} + \vartheta ECT_{t-1} + \mu_t \ldots\ldots (6)$$

Where FD_t represents the proxies for financial development.

The joint hypotheses of Granger non-causality for both models are specified as follows:

(a) Financial development does not cause economic growth in the long run

$H_0: \varphi = 0$…….. (7)

(b) Economic growth does not cause financial development in the long run

$H_0: \vartheta = 0$…….. (8)

(c) Financial Development does not bring economic growth in the short run

$H_0: \beta_{2_1} = \beta_{2_2} = \cdots \beta_{2_n} = 0$……. (9)

(d) Economic growth does not cause financial development in the short run

$H_0: \sigma_{2_1} = \sigma_{2_2} = \cdots \sigma_{2_m} = 0$……..……. (10)

The rejection of both null hypotheses stated in equations 7, and 8 will indicate a bi-directional causal relationship between economic growth and financial development in the long run. Likewise, a rejection of the null hypotheses in equation 9 and 10 is an indication that there is no causal relationship between financial development and economic growth in the short run. If only one of the hypotheses is rejected, the implication is that there is unidirectional causal relationship running from economic growth (financial development) to financial development (economic growth) in the long-run.

IV. Discussion of Results

4.1 Summary Statistics and Correlations

The paper analyses the relationship between financial development and economic growth using annual data for the period 1960-2016. There are four sections in this chapter. Section one examines the time series properties of the data. It presents the results of the unit root tests carried to examine the stationary properties of the variables. Section two presents the results of the bounds test approach to cointegration in examining the existence of a long-run relationship between the variables. The third section presents and discusses the results of the estimated long-run relationship between the variables using the ARDL approach. This section also contains the results of the Error Correction Model for the selected ARDL Model in examining the short-run dynamics of the model. The last section presents the results of the causal relationship that exists between the variables conducted using the Granger Causality tests under the Error Correction Framework.

Results of Stationarity Test

The study tested for stationarity in the variables by estimating for the presence of unit roots in all the variables used in our ARDL model. The Augmented Dickey-Fuller (ADF) test for unit root was adopted to test each variable at levels for the presence of unit root. In all estimations, we tested the null hypothesis of the presence of a unit root (non-stationarity) against the alternative hypothesis of no unit-root (stationarity). The Mackinnon (1996) critical values were used in making conclusions as to rejecting or failing to reject the null hypothesis. The ADF test results for the variables at levels are provided in Table 4.1 below:

Table 4.1Table 4. 1 ADF Test Results on Stationarity for the Variables at Levels

Variable	ADF Test Statistics	MacKinnonP-ValueZ(t)
ΔY	-4.824	0.0000
FDCredit	-4.476	0.0002
FDBankCredit	-0.521	0.8879
FDBM	-1.139	0.6992
FDStockTrade	-5.344	0.0000
FDStockTurn	-2.508	0.1136
MKTCap	-2.581	0.0969
Trade	-0.942	0.7737
Hcons	-2.018	0.2786
GOVSize	-1.941	0.3132
LForce	3.813	1.0000
KAP	-1.720	0.4206

Source: Author's Estimation from WDI data, 2019

From table 4.1, it is realized that all the variables with the exception of trade openness (LNOPENNESS) have their absolute ADF test statistics greater than their corresponding critical values. This is an indication that LNOPENNESS is stationary at levels. Since all the coefficients of the remaining variables are less than the ADF critical values (in absolute terms) at the 5% and 10% significance levels, we fail to reject the null hypothesis that there are unit roots in all these variables at levels. Against this background, the first differences of these variables were taken in order to obtain stationary variables. Table 4.2 presents the results of the ADF test for unit roots of the first differences of the variables.

Table 4. *2 ADF Test Results on Stationarity for the First Differences of the Variables.*

Variable	ADF Test Statistics	MacKinnonP-ValueZ(t)
DY	-3.987	0.0015
FDCredit	-2.890	0.0002
FDBankCredit	-0.240	0.0000
FDBM	-1.091	0.0000
FDStockTrade	-5.117	0.0000
FDStockTurn	-2.105	0.0000
MKTCap	-2.934	0.0415
Trade	-1.093	0.0000
HCons	-1.444	0.0000

GOVSize	-2.201	0.0000
LForce	-0.199	0.2331
KAP	-1.467	0.0000

Source: Author's Estimation, 2019

From table 4.2 above, the ADF statistics for DY, FDCredit, FDBankCredit, FDBM, FDStockTrade, FDStockturn, MKTCap, Trade, HCons,GOVSize and KAP (in absolute terms) are greater than the ADF critical values at both the 5% and 10% significance level. We therefore reject the null hypothesis that the variables have a unit root after first differences. The results show that all the variables with the exception of LForce are stationary after first differencing at the 5% significance level.

Bound Test Approach to Cointegration

Having ascertained the absence of I(2) variables in the series, the ARDL approach to cointegration is now applied to estimate the conditional error correction model by ordinary least squares in order to test for the presence of long-run relationship between the variables. Prior to testing the presence of a long-run relationship among the variables, it is important that we determine the **lag length** of the ARDL model.Pesaran and Shin (2001) suggest that, for an ARDL model which uses annual data, the maximum number of lags should be two. The optimal lag length of the model is chosen based on the Akaike Information Criteria which suggested a maximum lag length of one period.

We compare the F-statistic computed from the results of the conditional error correction model to the lower and upper critical value bounds developed by Narayan (2004). The F-statistic tests the null hypothesis that the coefficients of the lagged levels are zero, that is, there is no long-run relationship between financial development, economic growth and the other control variables. The results of the bounds test for the presence of a long-run relationship are presented in table 4.3 below:

Table 4. *3 Bounds Test for the Presence of Cointegration*

Critical Value Bounds of the F Statistics (Restricted Intercept and No Trend)

	90% level		**95% level**		**99% Level**	
k=6	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
n=54	2.12	3.23	2.45	3.61	3.15	4.43

Calculated F-Statistic: 5.383***

*Note: * Significant @10% level; **Significant @ 5% level,; *** Significance @1%level*
Source: Author's Estimation, 2019

From table 4.3, the calculated F-Statistic of 5.383 lies above the upper critical bound of the 1% significance level of 4.43. This implies that, the null hypothesis of no cointegration among the variables in our ARDL model is rejected at the 1% significance level. This result confirms the existence of a long-run relationship between economic growth (DY), broad money to GDP ratio (BM), Government Spending (GOVSize),Gross Capital Formation(KAP), Labour (LForce) and trade openness (Trade).

4.2 Empirical Results.

4.2.1 Results of the Estimated Long-Run Elasticity using the ARDL Approach

The results of the bound test in table 4.3 clearly show that a long-run relationship exists among the variables hence equation (3) is estimated. The study estimates the relationship that exists between economic growth and financial development with the model ARDL (2,0,0,0,2,0,0) with the appropriate lag length selected based on the Akaike InformationCriterion (AIC). The results obtained are reported in Table 4.4. below. The coefficients indicate the long run elasticities.

Table 4. *4: Long-Run Estimates using the ARDL Approach*

ARDL (2,0,0,0,2,0,0) selected based on the AIC Dependent Variable is DY					
	D.DY	Coef.	Std. Err.	T	P>t
ADJ					
	DYL1.	-1.136575	.1932185	-5.88	0.000

LR					
	BM	-.2492352	.1286039	-1.94	0.059
	GOVSize	.1838404	.3517393	0.52	0.604
	KAP	.0701716	.190204	0.37	0.714
	HCons	.0584138	.1689181	0.35	0.731
	LForce	.6269234	.4848255	1.29	0.203
	Trade	.0462212	.0486984	0.95	0.348
SR					
	DY LD.	.2750707	.1485298	1.85	0.071
	HCons D1.	-.0162195	.1655639	-0.10	0.922
	HCons LD.	-.3005276	.1527228	-1.97	0.056
	_cons	-39.91483	29.58118	-1.35	0.184
Number of Obs. =54R-Squared= 0.5240Adj. R-Squared= 0.4133					

*Note: * Significant @10% level; **Significant @ 5% level,; *** Significance @1%level*
Source: Author's Estimation, 2019

The R-Squared value of 0.52 for the error corrected model implies that approximately 52% of the variations in the dependent variable (DY) is explained by variations in the independent variables.

The coefficient for DYL1 is statistically corrected at the 1% level and it indicates that the errors of the previous period will be corrected for the subsequent periods. Its negative sign is interpreted to mean that the values of the variables will eventually converge in the long run regardless of short run shocks.

Table 4.4 reveals that with the exception of financial development, which shows statistical significance at the 10% level, all other variables do not have a statistically significant relationship with economic change in the economic growth rate.The coefficient of BM shows that when the rate of change of the broad money supply as a percentage of GDP is reduced, by one percentage point, the economicgrowth rate increases by 0.25 percentage point.This suggests that there is a causal effect of financial development on the economic growth rate. When broad money supply increases proportional to the GDP for any given year, this has a tendency to cause higher inflation. Higher inflation however does not guarantee real growth. As a consuming economy, higher money supply may disillusion economic agent and result in lower productive efforts as described by classical labour supply theories. This means that the rate of broad money growth should be reduced over time in order to achieve faster real economic growth.

The positive coefficient of KAP, GOVSize, HCons, LForce and Trade are in accordance with a-priori expectations of a positive relationship between these variables and economic growth. However, despite these positive relationships, the coefficients were statistically insignificant suggesting that, the observed relationships are due to chance and provides no evidence that these variables cause long run economic growth in Ghana.

In the short run however, it can be seen from table 4.4 that the lagged difference of economic growth and household consumption have statistically significant relationships with economic growth. On the short run relationship between the lagged differences of DY, we note firstly that it is significant as in the case of the first lag.We explain this to mean that short run fluctuations in the economic growth rate in the previous year had a positive spillover for the succeeding year. This pattern however, may not be sustained in the long run. For instance, it can be observed from the data that Ghana achieved a significantly higher growth rate of 14 % in 2011 which was a significant jump over the previous year's figure. This seemed to have affected growth in 2012 positively but this effect has whittled away eventually and the economy grew below 5% after 6 years, which is around the average growth rate before the shock. The 2011 shock was due to the commencement of commercial crude oil production in the previous year.

On household consumption, it can be seen that there is a negative and statistically significant short run relationship between household consumption and economic growth. This suggests that an increase in the proportion of household income spent on consumption in the previous year will have an adverse effect on current year growth rate. In other words, if households decide to spend a bigger proportion of their income this year than they did last year, the economy will grow at a slower pace next year. This can be explained by noting first that there is an inverse relationship between consumption and savings. Thus, spending more will mean that they will save less. Businesses rely on savings from households for their investment. Hence, a lower savings rate will lead to one or both of two things; either loanable funds are unavailable, or they are expensive or both. This results in lower investments and lower economic growth.

Economic growth and financial development

Table 4.4 reveals that there is a negative and statistically significant relationship between economic growth and financial development as indicated by the coefficientof the ratio of broad money supply to GDP (BM). Observably, financial development as proxied by BM is an important factor contributing to economic growth in the Ghanaian economy. The coefficient of BM indicates that in the long run, a one percentage point

increase in rate of financial development reducedreal economic growth rate by approximately 0.25 percentage point.

The negative and statistically significant effect of BM lends support to the views of the endogenous growth theorists as well as the supply leading view of the relationship between financial development and economic growth. The endogenous growth theory postulates that the financial sector promotes innovations, income distribution and the speed of technological progress thus contributing to long term economic growth (King and Levine, 1993). In addition, the outcome also lends support to the Supply-Leading Hypothesis which assumes that intermediation activities of the financial institutions make the real sector to increase their productive capacities (McKinnon, 1973; Shaw, 1973; Neusser&Kugler, 1998). The results obtained are similar to results found in Quartey and Prah (2008) for Ghana, Xiaohui Liu and Chang Shu (2002), for China, Odhiambo (2007) for three sub-Saharan African countries.

Model Residual Diagnostics

To determine the quality of the long-run ARDL model, various diagnostics tests on the properties of the residuals were applied. These include the conventional tests of serial correlation, heteroskedasticity, functional form and normality. Results of the model residual tests are presented in Table 4.5.

Table 4. 5. *Residual Diagnostics Tests*

Test Statistics	LM Version
Serial Correlation	CH SQ(1) = 0.022(0.8809)
Functional Form	F (3,40) = 1.90(0.1451)
Normality	CH SQ(2) = 0.30491(0.859)
Heteroskedasticity	CH SQ(53) = 54 (0.4360)

A: Lagrange Multiplier test of residual serial correlation

B: Ramsey's RESET test using the square of fitted values

C: Based on a test of skewness and Kurtosis of residuals

D: White's Test (and IM-test) for Homoskedasticity

From Table 4.5, the p-valuesof (*0.8809*), (*0.1451*), (*0.859)* and (*0.4360*) prove that the null hypothesis of no serial correlation, correct model specification, normality of residuals and homoscedasticity respectively cannot be rejected at the 1% level of significance. This shows that the quality of the model is satisfactory.

Granger Causality

The study adopts the Granger-Causality procedure based on a bi-variate VECM to determine the causal relationship between economic growth and financial development. Results of the Granger causality tests under the restricted error correction framework are summarized and presented in Table 4.6 below.

Table 4. *6 Results of Bi-Variate Granger Causality Test*

Null Hypothesis	F- Statistic	P-Value
BM does not granger-cause DY	16.0455***	0.000
DY does not granger-cause BM	0.571	0.2051

, ** and * denote rejection of the null hypothesis at 10%, 5% and 1% level of significance respectively*
Source: Author's Estimation, 2019

From table 4.6, the results indicate that the null hypothesis that the growth in broad money supply as a ratio of GDP (BM) does not granger-cause economic growth is rejected at the 1% level of significance. However, the null hypothesis that economic growth does not granger cause BM is not rejected. This is an indication that, there is auni-directional causality between economic growth and financial development when broad money as a ratio of GDP is used as proxy for financial development. This outcome is therefore consistent with the supply-leading hypothesis which asserts that a well-developed financial system has the potential of catalyzing technological innovation and economic growth.

In summary, the results of the Granger causality test performed under the error correction framework reveal the existence of a bi-directional causality between economic growth and financial development when financial development is proxied by ratio of domestic credit to private sector to GDP. There is however uni-directional causality between economic growth and ratio of broad money supply to GDP with causality running

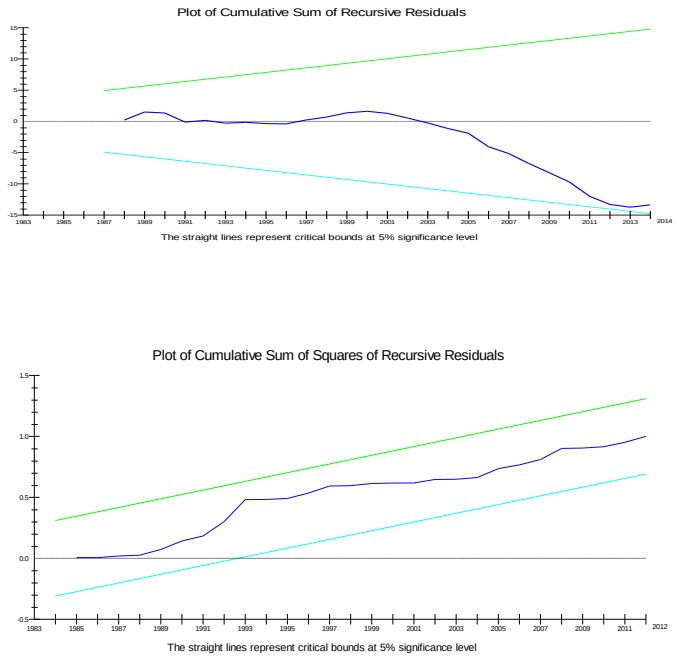
from financial development to economic growth.It can therefore be concluded that causality is sensitive to the choice of proxy used for financial development.

Stability Test of Results

We realize from Table 4.6 that our ARDL (2,0,0,0,2,0,0) model passes the standard diagnostics test. However, it is important to investigate whether the above long and short-run relationships that have been established in the study are stable using the Cumulative Sum (CUSUM) and the Cumulative Sum of Squares (CUSUMQ) test proposed by Brown et al. (1975).

On the one hand, the CUSUM test employs the cumulative sum of recursive residuals based on the first 'n' observations, updated recursively and plotted against the break points. The CUSUMQ on the other hand, uses the squared recursive residuals and follows the procedure above. Instances where both the CUSUM and CUSUMQ stay within the 5% critical bound, the null hypothesis that all coefficients are stable cannot be rejected. The plots of both the CUSUM and CUSUMQ as shown in figure 4.1clearly indicate that, both plots stay within the 5% critical bounds indicating that, the null hypothesis of stable coefficients cannot be rejected. We therefore conclude that the parameters are stable over the sample period and that there is no evidence of a structural change during the period under study.

Figure 4.1: Plot of CUSUM and CUSUMQ graph of model stability.



Source: Author's Estimation, 2019

V. Conclusion Policy Recommendations

The most important conclusion of the study is that there is a long run relationship between financial development and economic growth in Ghana. This confirms the argument of a section of the literature who state that financial development explains economic growth. Secondly, the findings lead to a conclusion that the relationship between financial development and economic growth flows from financial development to economic growth. That is to say that financial development is a catalyst to economic growth in Ghana contrary to arguments of a section of the literature that argues that financial development is as a result of economic growth.

We conclude also that the argument of the endogenous growth theory that postulates that the financial sector promotes innovations, income distribution and the speed of technological progress thus contributing to long term economic growth are valid in explaining the case of Ghana. Furthermore, the findings of the study also leads to the conclusion that the Supply-Leading Hypothesis which assumes that intermediation activities of the financial institutions make the real sector to increase their productive capacities and ultimately result in economic growth are valid for Ghana.

Finally, it is worthy of note that the results reveal that the relationships established in this paper between financial development and economic growth are sensitive to the choice of proxy for financial development. The variable that shows consistent significant relationship is the ratio of broad money to GDP. Thus, policy will be more effective if it targets this variable.

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