THE NEXUS BETWEEN FINANCIAL DEVELOPMENT AND ECONOMIC GROWTH: EMPIRICAL EVIDENCE FROM GHANA

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By

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DECLARATION

I hereby declare that this thesis is my own work towards the award of MSc Economics. To the best of my knowledge and with the exception of those acknowledged in the text, it does not contain any material previously published or accepted for the award of another degree in this University.

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This thesis is dedicated to my lovely children, Joseph Boakye Danquah Ofori-Appiah, Janet Awuah Tabuaah Ofori-Appiah and Judith Danquah Ofori-Appiah

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ABSTRACT

The study examines the nexus between financial development and economic growth in Ghana over the period 1970-2013. 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 development on economic growth. The study uses five different measure of financial development including, credit to the private sector, narrow money, broad money, ratio of narrow money to broad money and domestic credit. The study also investigates whether there are other determinants of economic growth. Evidence of both long-run relationship and short-run dynamics was found amongst the various financial development indicators and economic growth. Precisely, the results showed that credit to the private sector, ratio of narrow money to broad money, narrow money, broad money and domestic credit influenced economic growth in the long-and short-run. Again, inflation and government consumption expenditure were found to impede economic growth in the long-run and short-run. Contrarily, capital stock, trade openness and FDI were found to stimulate economic growth both the long-and the short-run. When credit to the private sector was used as an indicator for financial development, financial sector liberalisation was positive. 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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CHAPTER ONE INTRODUCTION

1.1 Background of the study

Globally, a delicate concern of every economy is the attainment of greater heights in the level of growth and development through positive changes in production levels of goods and services. 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 (see Solow, 1956). 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 (see Sala-i-Martin, 1992; King and Levine, 1993, Easterly, 1993, Khan and Senhadji, 2000 and Khan et al 2005). 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 (Levine, 1997). Schumpeter (1911), McKinnon (1973) and Shaw (1973) 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 for this reason amongst many others that most developing countries opted for reform programs in their financial sectors during the eras of economic imbalances in various sectors of the economy including the financial sector.

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 (Aryeetey et al., 2000). For most developing countries the introduction of various economic reforms including financial reforms was basically aimed at reaping the benefit of high rate of economic growth obtained from a well-developed, effective and efficient financial system. Ghana is no exception to these groups of countries that have implemented some economic reforms when faced with major set-backs in its
financial sector.

Prior to the implementation of the sector-wide reforms of the financial system, Ghana financial sector was faced with financial repression and/or shallowing and hence causing its failure as an intermediary to the attainment of growth levels in real sectors (manufacturing and agriculture) of the economy (Adu et al., 2013). Ghana introduced the Financial Sector Adjustment Program (FINSAP) in 1988 to help liberalize the financial sector which was challenged in the early 1980s. This exerted a significant and positive effect on various financial systems hence the growth of the economy over the years of implementation. For instance, during the period, there was a significant increase in the banking sector as the number of banks in the economy increased relatively compared to the pre-liberalisation periods. Specifically, the number of banks in country rose from ten with 405 branches in 1988 to twenty seven with 696 branches by 2009 (Adu, et al., 2013). In addition, the banking sector of the economy became more vibrant with the increase in total bank assets from approximately 0.31% of GDP in
1993 to approximately 0.66% by 2008. Following the implementation of the FINSAP, there were appreciable upswings in various financial indicators including, capital adequacy, savings/deposit mobilization, interest rate liberalisation, sectoral credit allocation, asset allocation and concentration amongst many others.

1.2 Problem Statement

Controversies surrounding the role of the financial system to the engine of economic growth have caused the finance-growth link hence cannot be overlooked. Despite the fact that there have been various perspectives on the relationship between financial development and economic growth in terms of causation, literature shows that various economists hold different perspectives. Patrick (1966) states two major hypotheses that explain the causal link and its direction exiting between finance and economic growth. 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 Mckinnon (1973), Levine et. al., (2000), King and Levine (1993a, b), Levine, (2004), Neusser and Kugler (1998) and Ogwumike and Salisu (2009) support the supplyleading 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, 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 various studies supporting the demand-following hypothesis (see Gurley and

Shaw, 1967; Goldsmith 1969; Jung, 1986).

Although there have been various cross-sectional and panel studies in various countries (King and Levine, 1993, Fernadez and Galetovic, 1994 and Saci, et al. 2009). However there is an assertion that cross-country studies are unable to reflect country specific results mainly due to the act that, different countries pose different economic, social, political and institutional characteristics (Arestis and Demetriades, 1997; Rousseau and Wachtel, 2001 and Rioja and Valev, 2004). In this vain, it can be noted that it will appropriate and relevant to conduct a country specific analysis rather than a panel analysis on the finance-growth nexus.

Furthermore, literature search has shown that only few studies have been conducted in Ghana. (see Quartey and Prah, 2008; Esso, 2010 and Adusei, 2013). Quartey and Prah (2008) uses four 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. Esso (2010) also conducts a study on the relationship between growth and financial sector development on a panel of ECOWAS countries including Ghana. The researcher used credit to the private sector as a sole measure of financial development. Adusei (2013) 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. 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 five 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 development and economic growth in Ghana is required.

1.3 Research Objectives

The study mainly aims to investigate the nexus of financial development and economic growth in Ghana. Specifically, the study seeks to:

- To analyse the trends in selected measures of financial development in Ghana
- To analyse the long and short run relationship between financial development and economic growth in Ghana
- To investigate other macroeconomic determinants of economic growth in Ghana

1.4 Research Hypotheses

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

Hypothesis 1:

H_o: There is no relationship between financial development and economic growth in Ghana

H_1: There is a relationship between financial development and economic growth in Ghana

Hypothesis 2:

H_o: Inflation has no effect on economic growth in Ghana

H_1: Inflation has an effect on economic growth in Ghana

Hypothesis 3:

H_o: Government consumption expenditure has no effect on economic growth in Ghana

H_1: Government consumption expenditure has an effect on economic growth in Ghana

Hypothesis 4:

H_o: Capital has no effect on economic growth in Ghana

H_1: Capital has an effect on economic growth in Ghana

Hypothesis 5:

H_o: Trade openness has no effect on economic growth in Ghana

H_1: Trade openness has an effect on economic growth in Ghana

Hypothesis 6:

H_o: FDI has no effect on economic growth in Ghana

H_1: FDI has an effect on economic growth in Ghana

Hypothesis 7:

H_o: Financial liberalisation has no effect on economic growth in Ghana

H_1: Financial liberalisation has an effect on economic growth in Ghana

1.5 Justification of the Study

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.

1.6 Scope of the Study

This study will be conducted on data spanning from 1970 to 2013 and due to limited time, space and resources. That is forty-four (44) observations using annual data. The main reason for this time span is due to availability of data and also due to the fact that time-series data analysis requires a relatively longer data series for all variables included in the estimation process.

Finally, among the various measures of financial development, the study only considers only five measures including i) credit to the private sector; ii) ratio of narrow money to broad money; iii) broad money iv) narrow money and v) domestic credit. The reason of the choice of these indicators is due to the fact data shows that unlike the other indicators, each proxy for financial development has significantly increased over the years. Specifically, data from the World Bank, World Development Indicators (WDI, 2015) showed that from 2008 to 2014 credit to the private sector increase from 11.09% of the GDP to 18.96% of the GDP. In the same vain from 2008 to 2014, the ratio of narrow money to broad money increased from 49.52% of the GDP to 51.21% of the GDP. The

ratio of currency in circulation to GDP has also increased substantially between 2008 and 2014 form 5.45% of GDP to 7.34% of the GDP. Another reason for the choice of these proxies for financial development is due to unavailability of data, limited time and space.

1.7 Organization of the Study

This study is presented in five major chapters. Chapter one is be devoted to the background of the study, problem statement, objectives and hypothesis of the study, the scope and significance of the study. Chapter two is present reviews of both theoretical and empirical literature related to the subject matter. Chapter three and Chapter four presents discussion on the methodology employed for the study and presentation and discussions of the estimated results respectively. Chapter five summarizes the findings of the study, and further presents recommendations and conclusion for the study.

CHAPTER TWO LITERATURE REVIEW

2.1 Introduction

This chapter presents discussions on literature related to the focus of the study. It is divided into two sub sections. The first section discusses theoretical literature and the second section presents the empirical literature.

2.2 Theoretical review

2.2.1 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.

2.2.2 The hypothesis of finance-led growth and growth-led finance

Patrick (1966) 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.

The supply-leading hypothesis was a follow up of Schumpeter (1912) and further supported by the Keynesian growth models and McKinnon (1973) and Shaw (1973) models. 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. Patrick (1966) notes, that in practice, an economy can stimulate its growth pattern by financially investing in various innovative ventures. 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 Schumpeter, 1912; Choe and Moosa, 1999; Levine, 1997; and Levine et al., 2000). 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, Demetriades and Hussein (1996), Odhiambo, (2008), Liang and Teng (2006), Zang and Kim (2007) and Odhiambo (2010).

2.2.3 McKinnon and Shaw hypothesis

The McKinnon and Shaw hypothesis (1973) 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. 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.

2.3 Empirical review

Osiniski (2000) uses annual data from fifteen (15) transition economies of Central and Eastern and Former Soviet Union to investigate the finance-growth nexus. 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.

Calderón and Liu (2002) 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. 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.

Unalmis (2002) analyzed the direction of causality between economic growth and financial development in Turkey. 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.

Further, investigating the role of financial sector development in attracting foreign direct investment (FDI) hence enhancing economic growth, Hermes N., and Lensink, R., (2003) employs the use of panel cointegration analysis on 67 countries. Data obtained spanned from 1970 to 2000. The results established a strong relationship that, economies with a well-developed financial sector stimulate economic growth. Again, the results showed that out of the 67 selected countries, 37 mostly found in Latin America and Asia had a sufficiently developed financial system hence attracting FDI inflows leading to some levels of economic growth in their respective economies.

Using a panel dataset from 1980 to 2000, Liang and Reichert (2006) analyzed the relationship between a country's economic growth and its financial development for seventy (70) developing countries and twenty (20) advanced countries totally ninety (90) economies. The Pooled Ordinary Least Square (P-OLS) and Granger causality test was used for the estimations of the study. The results from the P-OLS revealed that there is a strong evidence for financial developed in driving growth while the granger causality test

showing mixed results, with evidence of supply – leading relationship existing between finance and growth for both group of countries.

Ren (2006) assess the relationship between financial development in China and its economic growth. 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.

Similarly, Jalil and Ma (2008), explores this relationship in the case of Pakistan and China. The study was conducted on data spanning from 1960 to 2005. The study uses the autoregressive distributed lagged framework for its estimations. The results showed that in the case of Pakistan deposit liability ratio and credit to the private sector had a positive long-run effect on economic growth. Results on China also showed that though both deposit liability ratio and credit to the private sector stimulates economic growth, their effects were insignificant. The researchers argued that the results obtained from China could be attributed to ineffective resource allocation.

Quartey and Prah (2008) examined the bivariate causal linkage between financial development and economic growth in Ghana on data spanning from 1975 to 2006. The results show evidence of a one-way causality running from economic growth to financial development hence giving support to the growth-led finance hypothesis. This evidence was found when growth of broad money supply to GDP ratio was used as a proxy. However, the study finds no evidence of the supply-leading hypothesis.

In a review on financial development and economic growth for ten new EU members, Caporale et al. (2009) used a dynamic panel model in the form of GMM and a granger causality test for estimation. The data period was from 1994 to 2007. The results indicated that the levels of stocks and credit markets are not well-developed and hence limits the contribution to economic growth in these economies. However, the results also revealed that a well-developed financial market accelerates growth and hence evidence of a unidirectional relationship from finance to growth

Estrada et al. (2010) also conducted a study on the effect of financial development on economic growth for a panel of 125 countries in Asia. The sample period was from 1987 to 2008 with panel data estimation for cross country growth regression. The results confirmed that financial deepening significantly affects economic growth positively for developing countries. There was also evidence that finance-growth evidence from developing countries is not significantly different from that of other regions. In this study, inflation, lag of real per capita GDP and government expenditure were found to have negative impact on real per capita GDP whiles trade openness and liquid liabilities influenced growth positively.

Another study on the effect of finance on economic growth by Akinlo and Egbetunde (2010) was conducted for ten SSA countries. 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.

Saibu et al (2011) conducts a similar study in Nigeria. The autoregressive distributed lagged (ARDL) model was adopted on data spanning from 1970 to 2009. 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.

Adeniyi et al (2012) 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. 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.

Adusei (2013) uses annual time series data from 1971 to 2010 conducts a related study in the case of Ghana. 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.

In another study on how FDI influence economic growth, Sghaier and Abida (2013) also investigated the influence of financial development of economic growth as well for four countries in North Africa, including Algeria, Egypt, Morocco and Tunisia. Using a panel dataset, the study covered the period 1980 to 2011 with the Generalized Method of Moments as an estimation technique. Employing various measures of financial development, the study found that a well-developed financial market enhances both FDI inflows and the level of a country's economic growth.

Samargandi et al. (2013) also studied if this relationship was monotonic for middle income countries. 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, whiles 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 whiles 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.

Araç and Özcan (2014) studied the link between financial development and growth for

Turkey using a quarterly data from 1987: 1 to 2012: 4. 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.

Abida (2015) 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). 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.

Effiong (2016) investigates how financial development through institutional quality affects growth over the period 1986 to 2010. 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.

2.4 Conclusion

Empirical literature reviewed shows that studies conducted on the nexus of a country's financial sector development and economic growth cuts across both developed and developing such as, Ghana, Malaysia, Kenya, Nigeria, and Sierra Leone among many others. Many of these studies conducted have their sample sizes starting in the 1970s.

Only few studies included financial liberalisation in their estimations and most studies used only or two proxies for financial development. In light of this the study seeks to fill that gap.

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CHAPTER THREE METHODOLOGY

3.1 Introduction

This chapter presents discussions on econometric techniques used to achieve the objectives of the study. Specifically, it discusses the model specification, data type and sources and further presents discussion on the estimation strategy including stationarity tests, cointegration analysis and error correction techniques. Finally, the last section discusses the various diagnostic and stability tests conducted to ensure the reliability of the estimates.

3.2 Model specification

The baseline model for this study is based on the endogenous growth model. Following Quartey and Prah, (2008), Adusei (2013) and based on theoretical literature, the baseline model for the study is specified as:

$$Y_t = f(FD, Z, FL) \quad (3.1)$$

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), trade openness (TO_t), foreign direct investment (FDI) and FL_t denotes financial liberalisation.

Given this the functional form of equation 3.1 can be re-expressed as:

$Y_t = f(FD, INF, GCEX, K, TO, FDI, FL, \varepsilon_t)$ (3.2) 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) is included in the first model (Model 1), the ratio of narrow money to broad money (N_B_t) is included in Model 2, broad money (BM_t) is included in Model 3, Narrow money (NM_t) is included in Model 4 and domestic credit (DC_t) is included in model 5. For all five models the study includes all control variables as expressed in equation 3.2 respectively.

The estimable form of the models in logarithm form can be expressed as:

$$LnY_t = \alpha_o + \beta_1 LnCRD_t + \beta_2 LnINF_t + \beta_3 LnGCEX_t + \beta_4 LnK_t + \beta_5 LnTO_t + \beta_6 FDI_t + \beta_7 FL + \varepsilon_t \quad (3.3)$$

$$LnY_t = \alpha_o + \beta_1 LnN\_B_t + \beta_2 LnINF_t + \beta_3 LnGCEX_t + \beta_4 LnK_t + \beta_5 LnTO_t + \beta_6 FDI_t + \beta_7 FL + \varepsilon_t \quad (3.4)$$

$$LnY_t = \alpha_o + \beta_1 LnNM_t + \beta_2 LnINF_t + \beta_3 LnGCEX_t + \beta_4 LnK_t + \beta_5 LnTO_t + \beta_6 FDI_t + \beta_7 FL + \varepsilon_t \quad (3.5)$$

$$LnY_t = \alpha_o + \beta_1 LnBM_t + \beta_2 LnINF_t + \beta_3 LnGCEX_t + \beta_4 LnK_t + \beta_5 LnTO_t + \beta_6 FDI_t + \beta_7 FL + \varepsilon_t \quad (3.6)$$

$$LnY_t = \alpha_o + \beta_1 LnDM_t + \beta_2 LnINF_t + \beta_3 LnGCEX_t + \beta_4 LnK_t + \beta_5 LnTO_t + \beta_6 FDI_t + \beta_7 FL + \varepsilon_t \quad (3.7)$$

where α_o represents the constant term, β_i is the parameter coefficient (where $i = 1,2,3...n$), ln represent natural logarithm operator, ε represents the Gaussian white noise. CRD_t represents credit to the private sector, N_B_t represents the ratio of narrow money to broad money, BM_t represents broad money, NM_t represents narrow money, DC_t represents domestic credit All other variables as previously stated.

All variables are expressed in log form as shown in equation 3.3, 3.4, 3.5, 3.6 and 3.7. The series are logged due to the fact that logging i) enables the variables to be converted to the same unit of measurement and ii) minimizes heteroskedasticity in the model (Gujarati, 2004).

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3.3 Variable description

Economic growth

It 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 has been widely used as a proxy for economic growth. For the purposes of this study, real gross domestic product (GDP) per capita is used to measure economic growth and it is represented by "Y".

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. 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 proxied that have been used in measuring financial development. For this study, five (5) proxies were used to measure financial development. Among these can be mentioned, i) credit to the private

sector (CRD), ii) narrow money to broad money ratio (N_B), iii) broad money (BM), iv) narrow money (NM), and v) domestic credit (DC).

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. Narrow money in defined as money supply categorized to include physical money including coins and currency in circulation, demand deposits and other liquid assets held by the monetary authorities. The study uses M1 as a share of GDP as a measure for narrow money. Broad money denotes a measure of money supply which includes not only all components of narrow money but further includes, all monies held in easily assessable accounts, checking accounts, savings accounts, time deposits and overnight loans held by commercial banks. The study uses M2+ as a share of GDP as a measure of broad money. Lastly, domestic credit includes the net credit to various sectors of the economy excluding credit to the central government, measured on gross basis. The study measures domestic credit provided by financial sector as a share of
GDP.

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 and 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. Hence $\beta_1 > 0$.

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 β_2 is expected to be negative, thus $\beta_2 < 0$.

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 β_3 is therefore expected to either have a positive or negative effect on economic growth. Thus, $\beta_3 > 0$ or $\beta_3 < 0$.

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 "K". It is expected to have a positive impact on economic growth. . It is therefore expected that the parameter estimate, β_4 will be positive (i.e. $\beta_4 > 0$).

Trade openness

Trade openness measures an economy's level of integration of bilateral trade relative to other countries. In other words, it measures a country's level of liberalisation related to trade with the rest of the world. Trade openness is computed as the sum of export and imports to GDP ratio and represented as "TO". It is expected to have a positive impact on economic growth. Therefore it expected that $\beta_5 > 0$.

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 nominal FDI inflows as a share of GDP to measure foreign direct investment. It is expected to enhance economic growth. Therefore, β_6 is expected to be positive, thus $\beta_6 > 0$.

Financial liberalisation

Financial liberalisation refers to the removal or deregulation of entire financial system in the domestic economy including liberalisation of the capital account. For this study, financial liberalisation is measured as a dummy variable. It is divided into two periods thus the pre-liberalisation periods of the financial system and the post liberalisation periods of the financial system. From 1970 to 1987 which the pre-liberalisation periods is given zero (0) and from 1988 to 2013 which represents the post liberalisation era is given one (1). It is expected to have a favourable effect on economic growth. Therefore the parameter β_7 is expected to obtain a positive sign, thus $\beta_7 > 0$.

3.4 Data sources and type

Data for the variables understudy was obtained from various sources including, Bank of Ghana Statistical Bulletins (various issues), and the World Bank, World Development Indicators (WDI, 2015). Annual data for the period 1970-2013 is used. The choice of this period is due to the availability of data of the choice variables.

3.5 Estimation strategy

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.

3.5.1 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.

3.5.1.1 Augmented Dickey-Fuller test

Dickey and Fuller (1979) developed the Augmented Dickey-Fuller (ADF) test as an improvement of the Dickey-Fuller (DF) test. The ADF test is an augmented version of the DF test for larger time series and more complicated models. The ADF test includes

the augmented term so as to change the residuals into stochastic error term without changing the distribution of the test statistics under the null hypothesis of a unit root. Though the ADF test procedure is similar to the DF test, it is applied to a particular model. A generalized version of the ADF test is specified below:

$$\Delta Q_t = \alpha + \beta t + \gamma Q_{t-1} + \sum_{t=1}^{k} \delta_t \Delta Q_{t-1} + \varepsilon_t \quad (3.8)$$

where α is the constant term, β is the time trend coefficient, k is the optimal lag length, Δ is the difference operator, t represents the time trend and ε represents the Gaussian white noise. The null hypothesis of unit-root hence non-stationarity test (i.e $\gamma = 0$) is tested against the alternative hypothesis of no unit root hence stationarity (i.e $\gamma \neq 0$). If the McKinnon critical values is lesser than the computed test statistics, then the null hypothesis is rejected and a conclusion is drawn that the series are stationary, hence the absence of unit root in the series. On the contrary if the computed test statistic is lesser than the McKinnon critical values, it leads to the non-rejection of the null hypothesis, hence a conclusion can be drawn that the series are non-stationary and hence have unit root.

3.5.1.2 Phillips-Perron test

The Phillips-Perron (PP) test as developed by Philips and Perron (1988) was an improved development of the ADF test to correct any heteroskedasticity and higher order autocorrelation in the series. Specifically, the PP-test is a non-parametric stationary technique modified based on the ADF test to correct any higher order autocorrelation and heteroskedasticity in the residuals. The test is non-parametric in nature and therefore appropriate for varying time series models with unit root. It is also able to cater for higher

levels of autocorrelation and heteroscedasticity. Therefore, the test provides robust estimates over and above most traditional time-series unit root testing procedures. The generalized PP-test is expressed as:

$$\Delta Q_{t-1} = \alpha + \beta_0 Q_{t-1} + \varepsilon_t \quad (3.9)$$

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In equation (3.6), the null hypothesis of unit root and hence, non-stationarity($\beta = 0$) is tested against the alternative hypothesis of no unit root implying stationarity($\beta < 0$).

The decision rule is to reject the null hypothesis if the estimated test statistic is higher than the absolute value of the critical values. The alternative implies non-rejection. Non-rejection implies the presence of unit root, hence non-stationarity while rejection indicates the absence of unit root implying stationarity.

3.5.2 Cointegration and error correction model

To investigate the presence of an equilibrium long-run relationship amongst the variables included in the estimable model, the study employs the Bounds test approach to cointegration within the Auto-regressive Distributed Lagged (ARDL) model. There are various reasons for employing this approach either than other cointegration techniques such as the Engle-Granger and Johansen cointegration techniques. Among, these the major reasons include, i) Irrespective of the order of integration, (thus whether I(0), I(1) or a mixture of both but not order greater than one) of the variables included in the model, the ARDL model provides consistent and concurrent results; ii) the ARDL model provides an unbiased estimation of the long-run model ; iii) it further provides authentic t-statistics though some of the regressors might be endogenous; iv) it is also very efficient in cases of relatively small samples; v) 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 vi) it corrects for endogeneity problems in the model with use of the lagged of the regressors in the model. A general specification of the ARDL model is specified as follows:

$$\Delta Q_O = \beta_1 t_2 Q_{t-1} + \beta_3 J_{t-1} + \sum_{i=1}^{k} \beta_4 \Delta Q_{t-1} + \sum_{i=1}^{k} \beta_i \Delta J_{t-1} + \varepsilon_t \quad (3.10)$$

where Q is the dependent variable; J is a vector of explanatory variables; t expresses the time trend, k represents the lag order, Δ represents the difference operator and ε represents the Gaussian white error term. Q_{t-1} and J_{t-1} represents the lags of the dependent and independent variables respectively and β_n represents the coefficient of the vector of independent regressors.

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 ($H_0 : \beta_1 = \beta_n = 0$) is verified against the alternative hypothesis of the presence of a long-run relationship, hence cointegration relationship($H_1 : \beta_1 \neq \beta_n \neq 0$) . 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.

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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. The Schwartz Information Criterion (SIC) is used as the lag length selection criterion. The ECM is specified as expressed below:

$$\Delta InQ_t = \alpha_o + \alpha_1 InQ_{t-1} + \alpha_2 InJ_{t-1} + \sum_{t=1}^{K} \beta_1 \Delta InQ_{t-1} + \sum_{t=1}^{K} \beta_2 \Delta InJ_{t-1} + \gamma ECM_{t-1} + \varepsilon_t \quad (3.11)$$

where Q represents the dependent variable, k is the optimal lag length, J represents the regressors, α_1 and α_2 represents the long run coefficient estimators, β_1 and β_2 represents the short run dynamic coefficients, γ represents the speed of adjustment parameter, ECM represents the residual obtained from the estimated co-integration model of equation.

3.5.3 Diagnostic and stability test

To ensure robustness and reliability in the parameter estimates, the study conducts some diagnostic and reliability tests. Firstly, the functional form correctness using the Ramsey's RESET test and the normality test using the skewness and kurtosis of the residuals are adopted. Further the study test for the presence or otherwise serial correlation and heteroscedasticity are examined using the Lagrange multiplier test and the regression of squared residuals on squared fitted values respectively.

CHAPTER FOUR PRESENTATION AND DISCUSSION OF RESULTS

4.1 Introduction

This chapter is devoted to the presentation and discussion of the results. Specifically, it presents discussions on the descriptive statistics of the variables, trend analysis and stationarity properties of the variables included in the model. Further, this section presents discussion on the long-and short-run estimates.

4.2 Descriptive statistics

The study investigates the descriptive statistics of the variable included in the model. The results are presented in Table 4.1.

Table 4.1 Descriptive analysis of the variables

Variable	Mean	Std. Deviation	Minimum	Maximum	Observations
LnY	1.8080	0.0326	1.7527	1.8933	44
$LnCRD$	-2.7281	0.7066	-4.1719	-1.7682	44
LnN_B	-0.3724	0.0857	-0.5988	-0.1893	44
$LnBM$	2.9933	0.2095	2.4765	3.4383	44
$LnNM$	2.6208	0.1918	2.5862	3.0871	44
$LnDC$	-1.3657	0.2252	-1.8089	-0.9340	44
$LnINF$	3.1240	0.7875	1.1086	4.8111	44
$LnGCEX$	-0.0812	0.0445	-0.2148	-0.0126	44
LnK	-1.9516	0.5993	-3.3879	-1.1466	44
$LnTO$	-0.7777	0.6832	-2.7613	0.1488	44
FDI	0.0214	0.0276	-0.0066	0.0953	44
FL	0.5909	0.4973	0.0000	1.0000	44

Source: Author

The descriptive statistics results show that, economic growth averaged 1.8080 with a standard deviation on 0.0326 and a maximum value of 1.8933 and a minimum value of 1.7527 over the period understudy. Credit to the private sector average -2.7281with a standard deviation of 0.7066 and minimum and maximum value of -0.5988 and -0.1893 respectively. The ratio of narrow money to broad money had a mean value of -0.3724

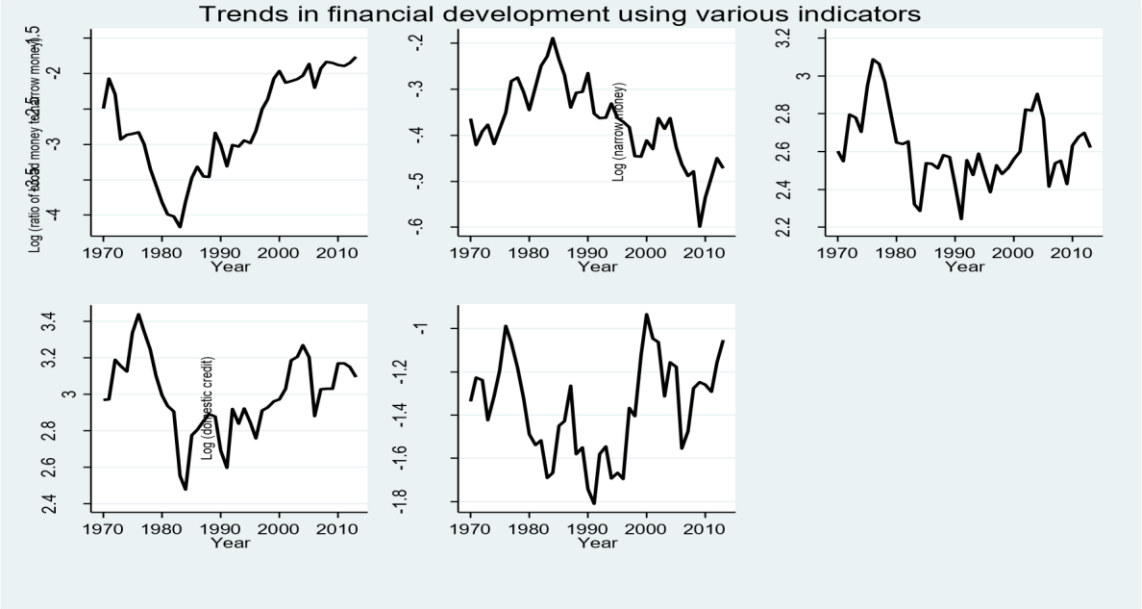
with a minimum value of -0.5988, a maximum value of -0.1893 and a standard deviation of 0.0857. Over the study period, broad money averaged 2.993 with a standard deviation of 0.2095 and fell within the ranges of 2.4765 and 3.4383. Narrow money also obtained a mean value of 2.6208, a standard deviation of 0.1918 and a maximum and minimum value of 3.0871 and 2.5862 respectively. Domestic credit averaged -1.3657 with a standard deviation of 0.2252 and minimum and maximum values of -1.8089 and -0.9340 respectively.

Furthermore, inflation also averaged 3.1240 with a standard deviation of 0.2252 and a minimum and a maximum value of 1.1086 and 4.8111 respectively. Government consumption expenditure obtained a mean value of -0.0812, a standard deviation of 0.0445, a minimum value of -0.2148 and a maximum value of -0.0126. Capital stock also obtained a mean value of -1.9516, a maximum value of -1.1466, a minimum value of -2.7613 and a standard deviation of 0.5993. Trade openness obtained a mean value of -0.7777, a standard deviation of 0.6832 and minimum and maximum values of -2.7613 and 0.1488 respectively over the period understudy. Foreign direct investment was also found to have an average of 0.0214 over the specified sample period, a standard deviation of 0.0276, a minimum value of -0.0066 and a maximum value of 0.0953. Lastly financial liberalisation obtained a mean value of 0.5909 a standard deviation of 0.4973, a minimum value of 0.0000 and a maximum value of 1.0000.

4.3 Trend Analysis

In order to achieve the first objective set for the study, trends in the various proxies of financial development are plotted. This is presented in Figure 4.1.

Figure 4.1: Trend analysis for financial development using various indicators



Source: Author

As indicated earlier the study uses five indicators as proxies for financial development including, credit to the private sector, ratio of narrow money to broad money, narrow money, broad money and domestic credit. Trends in credit to the private sector, ratio of narrow money to broad money, narrow money, broad money and domestic credit are depicted in the first, second, third, fourth and fifth planes of Figure 4.1 respectively. A quick look at Figure 4.1 shows that from 1970 to 1982, the level of Ghana's financial development was very low. Specifically, credit to the private sector fell from -2.49% in 1970 to -2.85% in 1975. It further declines to -3.82% by 1980 and by 1982 it fell drastically to -4.01%. Similarly, the ratio of narrow money to broad money fell from 0.36% in 1970 to -0.38% in 1975 and further to -0.39% in 1980. However, it slightly increased by 1982 to -0.24%. Again, though in the 1970s narrow money and broad money showed increasing trends, it gradually fell as by 1982 narrow money and broad money recorded 2.65% and 2.93% respectively (see Figure 4.1). During the same period, trends show that domestic credit slightly increased in the initial periods, as from 1970 to 1976, it gradually increased from -1.33% in 1970 to -0.98% in 1976. But it continually fell to -

1.51% by 1982. Trends in the various indicators, clearly shows that over the specified sample period, the country experienced a very shallow financial system resulting from various economic imbalances the country faced at the time. The various financial sector policies implemented in the late 1960s and early 1970s failed in its aim of mobilizing resources for the economy leading repression of the financial sector. Repression in Ghana's financial sector might constitute the minimal trend performance of various financial development indicators.

Severe repression in Ghana's financial sector coupled with other economic imbalances the country faced at the time precipitated the lunch of the Economic Recovery Program (ERP) and Structural Adjustment Program in 1983 and 1986 respectively. Over time, trends show that most of the financial indicators improved substantially (see Figure 4.1). Trends in the first plane shows that credit to the private sector increased to -3.47% by 1985 to -2.94% in 1994 to -1.96% in 2000. Similarly, narrow money to broad money ratio increased gradually to -0.411% by the year 2000. Narrow money, broad money and domestic credit also increased to 2.86%, 3.26% and -0.93% in 2000 respectively. Again, except for broad money and narrow money, which lightly declined in recent periods, all other indicators have shown increasing trends. These trends may be associated with the implementation of various financial reforms such as the Financial Sector Adjustment Program (FINSAP) and Financial Sector Strategic Plan (FINSSP) in 2001 under the auspices of the ERP. Over the years, the implementation of the two major financial reforms coupled with others has resulted in a positive and significant improvement in the country's financial sector from a repressed one to a more liberalized one. For instance, the liberalisation of Ghana's financial system has led to the increase in the number of banks in the economy. Specifically, since 1988, there has been a significant increase in the number of banks in the country from 10 commercial banks to

30 commercial banks in 2016 (BoG, 2016).

4.3 Stationarity test

It is important to first test for the stationarity properties of time series variables before proceeding to any cointegration analysis because most time series variables are often fluctuate over time and therefore have the tendency of producing spurious results. The stationarity test results are presented in Table 4.2.

The ADF-test results shows that at the levels, for a model with only a constant term except for inflation and government consumption expenditure all other variables where no stationary. Specifically, at the levels with a model with only constant inflation was stationary at 1 % level of significance whereas government consumption expenditure was stationary at 5 % level of significance. Hence both variables are integrated of order zero, [I(0)]. Again, at first difference with reference to the same model (i.e. constant only) economic growth, credit to the private sector, ratio of narrow money to broad money, broad money, narrow money domestic credit, capital stock, trade openness, foreign direct investment and financial liberalisation are stationary at 1% level of significance and hence are integrated or order one, [I(1)].

Further, at the levels and for a model with both constant and trend except for inflation all other variables where non-stationary. Inflation was found to be stationary at 1% level of significance, and hence integrated of order zero, [I(0)]. At first difference all other variables were stationary at 1% level of significance and hence integrated of order one, thus [I(1)].

Table 4.2: ADF and PP stationarity test results

	ADF-Test	PP-Test

Variables	Levels		Levels	
	Constant	Constant & Trend	Constant	Constant & Trend
LnY	0.361	-1.040	0.772	-0.091
$LnCRD$	-0.672	-2.069	-0.713	-2.075
LnN_B	-1.500	-2.342	-1.409	-2.089
$LnBM$	-2.129	-2.104	-2.193	-2.167
$LnNM$	-2.591	-2.672	-2.612	-2.706
$LnDC$	-2.178	-2.232	-2.178	-2.232
$LnINF$	-3.864***	-4.699***	-3.873***	-4.758***
$LnGCEX$	-3.147**	-3.087	-3.011**	-2.920
LnK	-1.211	-2.761	-1.106	-2.761
$LnTO$	-1.561	-2.477	-1.147	-2.015
FDI	-0.602	-2.343	-0.483	-2.370
FL	-1.184	-1.764	-1.184	-1.815
	ADF-Test		**PP-Test**	
	First Difference		First Difference	
Variables	Constant	Constant & Trend	Constant	Constant & Trend
LnY	-4.104***	-5.760***	-4.116***	-6.903***
$LnCRD$	-5.982***	-6.430***	-5.986***	-6.424***
LnN_B	-6.941***	-6.982***	-7.209***	-8.680***
$LnBM$	-6.247***	-6.171***	-6.247***	-6.163***
$LnNM$	-6.778***	-6.690***	-6.777***	-6.690***
$LnDC$	-6.558***	-6.564***	-6.608***	-6.636***
$LnINF$	-	-	-	-
$LnGCEX$	-	-9.982***	-	-10.020***
LnK	-7.011***	-5.712***	-7.077***	-7.088***
$LnTO$	-4.849***	-4.803***	-4.193***	-4.096***
FDI	-6.608***	-6.708***	-6.793***	-7.979***
FL	-6.480***	-6.420***	-6.480***	-6.420***

Note: *** and ** implies rejection of the null hypothesis at 1% and 5% level of significance **Source**: Author

The PP stationarity test results are similar to the results obtained from the ADF test. For a model with only constant term expect for inflation and government consumption expenditure which were stationary at the levels, all other variables were stationary at first difference. Specifically, inflation and government consumption expenditure were stationary at the levels at 1% and 5% level of significance respectively. Hence they are both integrated of order zero, [I(0)]. On the other hand, all other variables were stationary at first difference at 1% level of significance and are thus integrated of order one, [I(0)].

With regards to a model with both constant and trend, only inflation was stationary at the level at 1% level of significance, hence integrated of order zero, [I(0)]. All other variables were stationary at first difference at 1% level of significance, hence are all integrated of order one, [I(1)].

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4.4 Cointegration test

The study further proceeds to test for a long-run relationship (cointegration) amongst the variables. The results are presented in Table 4.3.

Table 4.3: Bounds test cointegration results

		Critical Values	
	F-Statistics	**Lower**	**Upper**
Model 1	4.7165**	2.32	3.50
Model 2	3.8235**	2.45	3.53
Model 3	4.3132**	2.52	3.69
Model 4	4.0271**	2.68	3.59
Model 5	3.9833**	2.25	3.35

Note: ** implies rejection of the null hypothesis at 5% level of significance.
Source: Author

The ARDL (2, 2, 0, 1, 0, 2, 0, 0), ARDL (1, 0, 0, 0, 0, 0, 0, 0), ARDL (1, 1, 1, 1, 0, 0, 0, 0), ARDL (1, 1, 1, 1, 0, 0, 0, 0) and ARDL (1, 2, 0, 2, 0, 0, 1, 0) models were selected based on the Schwartz Bayesian Criterion (SBC) with maximum lag length 2. The bounds test results shows that for all five model there exists a long-run relationship amongst the variables at 5% level of significance. Specifically for Model 1, the computed F-statistics of 4.7165 is higher than the 5% upper and lower critical values of 3.50 and 2.32 respectively. The computed F-statistics for Model 2 of 3.8235 was larger than the upper critical value of 3.53 and lower critical value of 2.45 at 5% level of significance. For Model 3 the computed F-statistic of 4.3132 was greater than the upper and lower critical values of 3.69 and 2.52 respectively. Similarly, Model 4 obtained a computed F-statistics

of 4.0271 which was larger than its 5% upper and lower critical bound values of 3.59 and 2.68 respectively. The last model, Model 5 was no exception as it obtained an F-statistics of 3.9833, larger than it 5% upper critical bound value of
3.35 and lower critical bound value of 2.25.

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It can be concluded that in all five cases, since the computed F-statistics are greater than the respective upper and lower critical bound values; there exists a stable long-run relationship (cointegration) amongst the variables in each model.

4.5 Long-run results

To achieve the second objective, the study proceeds to investigate the long-run estimates of the variables. The results for Model 1, Model 2, Model 3, Model 4 and Model 5 are presented in columns 2, 3, 4, 5, and 6 in Table 4.4 respectively.

The results show except for domestic credit all other proxies used as financial development indicators showed a positive relationship with economic growth. Specifically, in Model 1, the results show that a one percent increase in credit to the private sector causes a 0.066 percent in economic growth at 1% level of significance.

Table 4.4: Estimated long-run results

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
$LnCRD$	0.066***				
	(0.018)				
LnN_B		1.437**			
		(0.841)			
$LnBM$			0.029**		
			(0.026)		
$LnNM$				0.044**	
				(0.015)	

$LnDC$					-0.029**
					(0.019)
$LnINF$	-0.059**	-0.089**	-0.017**	-0.016**	-0.014***
	(0.004)	(0.011)	(0.008)	(0.008)	(0.003)
$LnGCEX$	-0.181**	-1.236**	-0.180**	-0.203***	-0.239***
	(0.071)	(0.159)	(0.121)	(0.121)	(0.061)
LnK	0.019**	0.237*	0.004*	0.023*	0.022*
	(0.017)	(0.204)	(0.026)	(0.016)	(0.012)
$LnTO$	0.055**	0.152*	0.029**	0.026	-0.021
	(0.024)	(0.584)	(0.022)	(0.209)	(0.009)
FDI	0.266	1.614**	0.846***	0.9180***	0.981***
	(0.015)	(0.289)	(0.228)	(0.207)	(0.103)
FL	0.025**	-0.088	-0.018	-0.009	-0.016
	(0.015)	(0.794)	(0.020)	(0.018)	(0.009)
CONSTANT	1.925***	3.3315*	1.789***	1.742***	1.910***
	(0.046)	(1.693)	(0.1133)	(0.094)	(0.031)

Note: In parenthesis are the standard errors. ***, ** and * represent significance at 1%, 5% and 10% level of significance respectively.
Source: Author

The result for Model 2 shows that a one percent increase in ratio of narrow to broad money causes a 1.437 percent increase in economic growth at 5% level of significance. Again, the Model 3 shows a one percent increase in broad money causes a 0.029 percent increase in economic growth at 5% level of significance. The results from Model 4 shows a one percent increase in narrow money cause a 0.044 percent increase in economic growth at 5% level of significance. On the contrary, result from Model 5 shows that, domestic credit is negatively related to economic growth. Specifically, a one percent increase in domestic credit leads to a 0.029 decline in economic growth at 5% level of significance. Except for Model 5, results obtained from other models confirm aprior expectations. The results obtained for Model 1, 2, 3 and 4 confirms studies by Unalmis (2002) in Turkey; Jalil and Ma (2008) in China and Pakistan. However, the result obtained in Model 5 contradicts Adu et al (2013) in Ghana but confirms Adusei

(2013) also in Ghana.

The results further show that inflation was negatively related to economic growth in the five models. This confirms aprior expectations. Specifically, in the first model a one percent increase in inflation leads to a 0.059 percent decline in economic growth at 5% level of significance. The result obtained from Model 2 also shows that a one percent increase in inflation leads to a 0.089 percent decline in economic growth at 5% level of significance. Further, results from Model 3 shows that a one percent increase in inflation causes a 0.017 percent decline in economic growth at 5% level of significance. The fourth and fifth models also show that a one percent increase in inflation causes a 0.016 percent and 0.014 percent decline in economic growth at 5% and 1% respectively. 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 aprior expectations. In Model 1, the study finds that one percent increase in government expenditure causes a 0.181 decline in economic growth at 5% level of significance. Model 2, also shows that a one percent increase in government expenditure causes a 1.236 percent decline in economic growth at 5% level of significance. Again, the results show that a one percent increase in government consumption expenditure causes a 0.180 decline in economic growth at 5% level of significance as shown in Model 3. The result from Model 4 also shows that a one percent increase in government consumption expenditure causes a 0.203 percent decline in economic growth at 1% significance level. In the same results obtained from Model 5

shows that a one percent increase in government consumption expenditure causes a 0.239 percent decline in economic growth at 1% error level. 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.

Capital stock was found to have a positive effect on economic growth in the long-run. However, except for Model 1 the effect of capital stock on economic growth in Model 2, 3, 4 and 5 was statistically weak. Results from Model 1 show that a one percent increase in capital stock leads to a 0.019 percent increase in economic growth at 5% level of significance. The results from Model 2, 3, 4 and 5 shows that one percent increase in capital stock leads to 0.237 percent, 0.004 percent, 0.023 percent and 0.022 percent increase in economic growth respectively. However, the results obtained from Model 2, 3, 4 and 5 were found to be statistically significant at 10% level of significance. Except for Model 1, other result obtained confirms aprior expectations.

Results in Model 2, 3, 4, and 5 is not surprising because as an economy acquires more intensive factors of production it is expected to insight the production capacity of the economy for both domestic and foreign consumption, hence stimulating economic growth.

The long-run results also showed that openness to trade was positively and significantly related to economic growth as in Model 1, Model 2 Model 3 and Model 4, confirming aprior expectation. The results obtained from Model 1 shows that a one percent increase in trade openness will lead to a 0.055 percent increase in economic growth by 5% level of significance. Model 2, also shows that a one percent increase in trade openness leads

to a 0.152 percent increase in economic growth at 10% level of significance level. Though the result obtained from Model 3 showed that a one percent increase in trade openness lead to a 0.026 percent increase in economic growth, its effect was statistically insignificant. Contrarily, results from Model 5, showed that a one percent increase in trade openness leads to 0.021 decline in economy growth. The effect was however insignificant.

Again, the results showed that in the long-run foreign direct investment was positively related to economic growth. This confirms the aprior expectation. Though the results from Model 1 showed that there was a positive but insignificant relationship between foreign direct investment, for all other Models the results showed that foreign direct investment was positively and significantly related to economic growth. Specifically, the results obtained from Model 2 shows that a one percent increase in foreign direct investment leads to a 1.614 percent increase in Ghana's growth patterns at 5% level of significance. Again a one percent increase in foreign direct investment was found to cause a 0.846 percent increase in economic growth at 1% level of significance.

Similarly, result from Model 4 and 5 shows that a one percent increase in foreign direct investment leads to 0.918 percent and 0.981 percent increase in economic growth respectively at 1% level of significance level.

Finally, the long-run results obtained from Model 1 showed financial liberalisation causes an improvement in economic growth, whereas in the other four models, financial liberalisation was found to impede Ghana's economic growth. Specifically, results for Model 1 shows that as the economy becomes more financially liberal, it causes a 0.025 improvement in growth patterns at 5% level of significance. However, the results obtained from Model 2, 3, 4 and 5 showed that financial liberalisation impedes growth.

In these cases the results were all statistically insignificant. This result contradicts aprior expectation and might be attributed to the fact that, compared to many developed countries, the level of financial liberalisation in the economy, is still very low.

4.6 Short-run results

The study further proceeds to investigate the short-run dynamics of the variables included in the equation 3.3. 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 for all the five models the coefficients of the ECM_{-1} is negative and statistically significant, and therefore confirms the establishment of a cointegration amongst the variables as discussed in the section 4.4. Again, the negative and significant coefficients of the ECM_{-1} show that the estimated models are stable.

Table 1.5: Estimated short-run results

ΔLnY_{-1}	0.391**
	(0.032)
$\Delta LnCRD$	0.014***
	(0.006)
$\Delta LnCRD_{-1}$	-0.016***
	(0.005)
ΔLnN_B	

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
		0.032**			
		(0.028)			
$\Delta LnBM$				0.023**	
				(0.008)	
$\Delta LnNM$				0.0167**	
			(0.007)		
$\Delta LnDC$	0.005**	-0.002**			0.030***
	(0.001)	(0.001)		0.003	(0.008)
$\Delta LnDC_{-1}$	0.024	0.027		(0.006)	
-0.025***	(0.031)	(0.390)		-0.010	
				(0.006)	(0.007)
			$\Delta LnTO_{-1}$	0.020***	$\Delta LnINF$ -
0.006***		0.005**		(0.006)	-0.006***
-0.007***		(0.006)	ΔFDI	0.104**	
		0.003		(0.078)	(0.002)
		(0.005)	ΔFL	0.010	(0.002)
(0.001)				(0.005)	
			ECM_{-1}	-0.691***	$\Delta LnGCEX$
0.036*		0.103**		(0.120)	0.029*
0.106***		(0.069)			
		-0.002	(0.028)	(0.028)	(0.033)
		(0.004)			
			0.201**	0.219***	0.228**
			(0.075)	(0.079)	(0.096)
			-0.004	-0.002	-0.008*
			(0.004)	(0.004)	(0.004)
		-0.622***	-0.537***	-0.538**	-0.498***
		(0.078)	(0.103)	(0.093)	(0.103)
F-STATS	20.051***	25.695***	18.435***	16..320***	13.621***
$\Delta LnGCEX_{-1}$					0.126***
					(0.043)
	ΔLnK0.001*			0.001	0.011*
			(0.026)	(0.006)	(0.005)
	$\Delta LnTO$0.006			0.006	-0.001
			(0.004)	(0.004)	(0.004)

Note: In parenthesis are the standard errors. *** and ** represent significance at 1% and 5% level of significance respectively.

Source: Author

The ECM_{-1} explains how the credit to the private sector, ratio of narrow money to broad money, broad money, narrow money, domestic credit, inflation, government consumption expenditure, capital stock, trade openness, foreign direct investment and financial liberalization converge to equilibrium long-run after a short-run shock in their respective models. The results obtained from all models as presented in Table 4.5 show a high speed of convergence to the long-run equilibrium after a short-run shock. Specifically, for Model 1, 2, 3, 4 and 5 equilibrium in the long-run will adjust by approximately 70%. 62%, 54%, 53% and 50% respectively each year after any shortrun shock.

The short-run result from Model 1 showed that the lagged coefficient of economic growth obtained positive impact on current values of economic growth. Specifically, in the short-run a one year lag of economic growth will stimulate economic growth in previous year by 0.391 percent at 5% level of significance. Credit to the private sector as the first proxy used to measure financial development was found to have a positive effect on economic growth in the long-run an in Model 1. A one percent increase in credit to the private sector was found to causes a 0.014 percent increase in economic growth at 1% level of significance. On the contrary the lagged coefficient of credit to the private sector showed a negative relationship with economic growth. Specifically, a one year delay in the availability of credit provided to the private sector leads to a decline in economic growth by 0.016 percent.

Again, the short-run results obtained from Model 1 showed that inflation, government consumption expenditure, capital stock, trade openness, the lagged coefficient of trade openness, foreign direct investment and financial liberalisation had a positive effect on economic growth. The result showed that s one percent increase in inflation lead to a

0.005 percent improvement in economic growth in the short-run at 5% level of significance. Similarly, the lagged coefficient of trade openness was found to cause a 0.020 percent improvement in economic growth in the short-run. However, though government consumption expenditure, capital stock, trade openness, and financial liberalisation showed a positive effect on economic growth, their effect was statistically insignificant. Trade openness was also found to have a negative and statistically insignificant effect on economic growth in the short-run as in Model 1.

Model 2 also showed that in the short-run, the ratio of narrow money to broad money (second proxy used to measure financial development) stimulates economic growth. The result showed that a one percent increase in the ratio of narrow money to broad money causes a 0.032 increase in economic growth at 5% level of significance in the short-run. Further, the results from Model 2, shows that, government consumption expenditure, capital stock, trade openness and foreign direct investment had a positive effect on economic growth. However, except for capital stock and foreign direct investment, the effect of all the other variables was statistically insignificant. The results showed that in the short-run, a unit increase foreign direct investment leads to a 0.103 percent increase in economic growth at 5% level of significance. The result also shows that a one percent increase in capital stock leads to a 0.005 percent increase in economic growth at 5% level of significance. Again, the result obtained from Model 2 showed that inflation and financial liberalisation had a negative effect on economic growth in the short-run. Specifically, the results showed that a one percent increase in inflation lead to a 0.002 decline in economic growth in the short-run at 5% level of significance.

The short-run effect of financial liberalisation as however found to be insignificant.

4.7 Diagnostic and Stability 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.

Table 4.6: Diagnostic and Stability test results

	Model 1	Model 2	Model 3	Model 4	Model 5
Serial Correlation	0.465	1.050	2.005	1.433	1.608
	(0.633)	(0.361)	(0.765)	(0.320)	(0.241)
Heteroskedasticity	0.511	0.825	0.919	1.090	1.276
	(0.905)	(0.586)	(0.534)	(0.399)	(0.283)
Normality	3.361	1.539	0.123	0.964	0.249
	(0.186)	(0.463)	(0.940)	(0.617)	(0.882)
Functional Form	1.787	1.908	2.217	1.415	1.356
	(0.637)	(0.197)	(0.146)	(0.167)	(0.254)
CUSUM	Stable	Stable	Stable	Stable	Stable
CUSUMQ	Stable	Stable	Stable	Stable	Stable

Note: In parenthesis are the computed probability values
Source: Author

The diagnostic test results shows there is absence of serial correlation and heteroskedasticity in all the models. This is because in all five cases the probability values show statistically insignificance of both tests. The diagnostic test results also show that the models have no normality issues, implying that all five models are normally distributed. The Ramsey-reset stability test results also shows that the models have no functional form issues.

CHAPTER FIVE SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter provides a summary of the findings discussed in the previous chapter, gives appropriate recommendations based on the findings and finally concludes on the entire study.

5.2 Summary

This study sought to investigate the nexus between financial development and economic growth in Ghana. It adopts cointegration techniques for its estimations. Specifically, the study employed the ARDL bound test approach to cointegration.

The study finds that for the various indicators used as proxies of financial development, except for domestic credit the other indicators exhibited a positive relationship with economic growth in the long-and short-run. Domestic credit obtained a negative relationship with economic growth in the long-run but obtained a positive effect in the short-run. However, the short-run results further revealed that both the lagged coefficients of credit to the private sector and domestic credit obtained a negative relationship with economic growth.

The results also showed that inflation caused a decline in economic growth in the longrun. Specifically, the long-run results showed that persistent rise price level was negatively related to the growth of the Ghanaian economy. The short-run results were similar to that obtained for the long-run.

Government consumption expenditure was found to have a negative relationship with economic growth in the long-run. Worded differently, the study finds that increasing levels of government consumption expenditure impedes economic growth in the longrun. Contrary to the long-run results, the short-run results showed that government consumption expenditure is positively related to economic growth. The short-run results also showed that, the lagged coefficient of government consumption expenditure was positive and significant with economic growth.

The results also showed that capital stock stimulates economic growth in the long-run. Precisely, the study finds that as capital stock is positively related to economic growth in the long-run. The short-run results obtained are quite similar to the long-run results.

Further, the study finds that trade openness had a positive and significant relationship with economic growth in the long-run. The short-run result showed that trade openness was negatively related to economic growth. The short-run result also showed that the lagged coefficient of trade openness was positive and significantly related to economic growth.

The study finds that in the long-run foreign direct investment enhances economic growth. Specifically, it was revealed that, foreign direct investment was positively influenced economic growth in the long-run. The short-run results were similar to the long-run result. Specifically, the short-run result showed that foreign direct investment is positively related with economic growth.

Finally, the results showed that financial liberalisation is negatively related to economic growth. The short-run results were similar to the long-run.

5.3 Recommendation

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.

5.4 Conclusion

This study aimed to investigate the relationship between financial development and economic growth in Ghana over a period spanning from 1970 to 2013. Precisely, the study analysed the trends in selected financial development indicators over the period. Again, long-and 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 finds evidence of both long-run relationship and short-run dynamics amongst the various financial development indicators and economic growth. Precisely, the results showed that credit to the private sector, ratio of narrow money to broad money, narrow money, broad money and domestic credit influenced economic growth in the long-and short-run. Again, inflation and government consumption expenditure were found to impede economic growth in the long-run and short-run. Contrarily, capital stock, trade openness and FDI were found to stimulate economic in the long-and shortrun. Financial sector liberalisation was negative but insignificantly related to economic growth.

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REFERENCES

Abida, Z., Sghaier, I. M., and Zghidi, N. (2015). Financial Development and Economic Growth: Evidence from North African Countries. *Economic Alternatives*, (2), 17-33.

Adeniyi, O., Omisakin, O., Egwaikhide, F. O., and Oyinlola, A. (2012). Foreign Direct Investment, Economic Growth and Financial sector development in small open developing economies. *Economic Analysis and Policy*, 42(1).

Adu, G., Marbuah, G., and Mensah, T. J. (2013).Financial development and economic growth in Ghana: Does the measure of financial development matter? *Review of Development Finance3, 192-203.*

Adusei, M., (2013). Financial Development and Economic Growth: Evidence from Ghana. *The International Journal of Business and Finance Research. Vol 1 No. 2. Pp 61-76.*

Akinlo, A. E. and Egbetunde, T. (2010). Financial development and Economic growth: The Evidence of 10 Sub – Saharan African Countries Revisited. *The Review of Finance and Banking*, 2 (1), 017 – 028.

Araç, A. and Özcan, S. K. (2014). The Causality between Financial Development and Economic Growth: The Case of Turkey. *Journal of Economic Cooperation and Development*, 35(3), 171 – 198.

Aryeetey, E., Nissanke, M.,and Steel, W.F., (2000). Intervention and liberalization: changing policies and performance in the financial sector. In: Aryeetey, E., Harrigane, J., Nissanke, M. (Eds.), Economic Reforms in Ghana*: The Miracle and the Mirage. James Currey and Woeli Publishers, Oxford.*

Arestis, P. and Demetriades, P. O. (1997). Financial Development and Economic Growth: Assessing the Evidence. *The Economic Journal, 107,783-799.*

Caporale, G. M. , Howels, A. and Soliman. (2005). Endogenous Growth Models and Stock Market Development: Evidence from Four Countries. *Review of Development Economícs, 9(2), 166-176, 2005.*

Calderón, C. , L. and Liu. (2002). The Direction Of Causality Between Financial Development And Economic Growth. *Central Bank of Chile Working Papers ' 184.*

Choe, C., and Moosa, I. A. (1999). Financial system and economic growth: the Korean experience. *World Development*, *27*(6), 1069-1082.

Demetriades, P. O., and Hussein, K. A. (1996). Does financial development cause economic growth? Time-series evidence from 16 countries. *Journal of development Economics*, *51*(2), 387-411.

Dickey, D. A. and W. A. Fuller (1979). Distribution of the Estimators for Autoregressive Time Series with a Unit Root. *Journal of the American Statistical Association,* 74(366a), 427-431.

Easterly, W. (1993). How much Do Distortions Affect Growth? *Journal of Monetary Economics.32, 187-212.*

Effiong, E. (2015). Financial Development, Institutions and Economic Growth: Evidence from Sub-Saharan Africa.

Esso, L.J., (2010). Cointegrating and causal relationship between financial development and economic growth in ECOWAS countries. *Journal of Economics and International Finance 2 (3), 36–48.*

Estrada, G., Park, D., and Ramayandi, A.,(2010). Financial Development and Economic Growth in Developing Asia. *ADB Economics Working Paper Series.*

Fernandez, D. and Galetovis, A. (1994), Schumpeter Might be Right-But why? Explaining the Relation Between Finance Development and Growth. *John Hopkins University SAIS Working Paper in International Economics.*

Goldsmith, R.W., (1969). Financial Structure and Development. *Yale University Press, New Haven CN.*

Gujarati, D. N. (2004). *Basic Econometrics*. 3rd Edition. *New York, McGraw-Hill*

Gurley, J., Shaw, E., (1967). Financial Structure and Economic Development. *Economic Development and Cultural Change 34, 333--46.*

Hermes, N. and Lensink, R., (2003). Foreign Direct Investment, Financial Development and Economic Growth. *The Journal of Development Studies, Vol. 38.*

Jalil, A., and Ma, Y., (2008). Financial Development and Economic Growth: Time series Evidence from Pakistan and China. *Journal of Economic Cooperation, 29(2), 2968.*

Jung, W.S., (1986). Financial Development and Economic Growth: International Evidence. *Economic Development and Cultural Change 34, 336--46.*

Khan, A. and Senhadji, A. S. (2000). Financial Development and Economic Growth: An Overview. *International Monetary Fund, Washington, ,D.C. (IMF Working Paper 00/209).*

Khan. A., Qayyum, A., and Sheihk, S., (2005). Financial Development and Economic Growth: *The case of Pakistan. The Pakistan Development Review 44, 819-837.*

King, R.G., and R. Levine (1993a). Finance and Growth: Schumpeter Might be Right. *Quarterly Journal of Economics 108, 717-737.*
King, R.G., Levine, R., (1993b). Finance, Entrepreneurship and Growth: Theory and Evidence. *Journal of Monetary Economics 32, 513--42.*

Levine, R. (1997). Financial Development and Economic Growth: Views and Agenda. *Journal of Economic Literature 35, 688-726.*

Levine, R., Loayza, N., and Beck, T., (2000). Financial Intermediation and Growth: Causality and Causes. *Journal of Monetary Economics 46, 31—77.*

Liang, H – Y. and Reichert, A. (2006). The Relationship between Economic Growth and Banking Sector Development. *Banks and Bank Systems*, 1(2).

Liang, Q., and Jian-Zhou, T. (2006). Financial development and economic growth: Evidence from China. *China economic review, 17*(4), 395-411.

McKinnon, R. I., (1973). Money and Capital in Economic Development. *The Brookings Institution, Washington,DC.*

Neusser, K., Kugler, M., (1998). Manufacturing Growth and Financial Development: Evidence from OECD Countries. *Review of Economics and Statistics, forthcoming 1998.*

Odhiambo, N. M. (2008). Financial depth, savings and economic growth in Kenya: A dynamic causal linkage. *Economic Modelling*, *25*(4), 704-713.

Ogwumike, O. F. and Salisu (2012). Financial Development and Economic Growth in Nigeria. *Journal of Monetary and Economic Integration, Vol. 12,No. 2.*

Osinski, D., (2000). The Relationship Between Financial Development and Economic Growth in Transition Economies. *National University of Kyiv-Mohyla Academy. Master's thesis.*

Patrick, H.T., 1966. Financial development and economic growth in underdeveloped countries. *Economic Development and Cultural Change 14 (1), 174–189*.

Quartey, P., and Prah, F., (2008). Financial development and economic growth in Ghana: is there a causal link? *The African Finance Journal 10 (1), 28–54.*

Rioja, F. and Valev, N. (2004). Does One size Fit All? A Re-examination of the Finance and Growth Relationship. *Journal of Development Economics, 74,429-47*.

Ren, J., (2006). The Relationship Between Financial Development and Economic Growth in China: Theory, Empirical Evidence and Policy Implications. *The University of Leeds, Leeds University Business School. Doctoral Thesis.*

Rousseau, P., and Wachtel, P. (2001). Inflation, Financial Development and Growth in T. Negishi, . Ramachadran and K. Mino (eds) *Economic Theory, Dynamics and Markets: Essays in Honor of Ryuzo Sato, Boston, Kluwer.*
Ruiz-Arranz, M., and Giuliano, P. (2005). Remittances, financial development, and growth (No. 5-234). *International Monetary Fund.*

Saci, K, Giorgioni, G., and Holden, K (2009). Does Financial Development Affect Growth? *Applied Economics 41,1707-1707.*

Saibu, O. M., Nwosa, P. I., and Agbeluyi, A.M., (2011). Financial Development, Foreign Direct Investment and Economic Growth in Nigeria. *Journal of Emerging Trends in Economics and Management Sciences (JETEMES) 2(20):146-154.*

Samargandi, N., Fidrmuc, J. and Ghosh, S. (2013). Is the Relationship between Financial development and Economic growth Monotonic for Middle Income Countries? *Economics and Finance Working Paper Series, Working Paper No. 13 – 21.*

Schumpeter, J. A. (1911). The Theory of Economic Development. *Cambridge, MA7 Harvard University Press.*

Schmpeter, J., (1912). Theorie der Wirtschaftlichen, Entwicklung [The Theory of Economic Development], *Leipzig: Dunker and Humblot, 1912; translated by redevers Opie (Cambridge, Massachusetts: Harvard University Press, 1934).*

Sghaier, M. I. and Abida, Z. (2013). Foreign Direct Investment, Financial development and Economic growth: Empirical evidence from North African Countries. *Journal of International and Global Economic Studies*, 6 (1), 1 – 13.

Shaw, E.S., (1973). Financial Deepening in Economic Development. *Oxford University Press, London and New York.*

Solow, M. R., (1956). A contribution to the theory of economic growth. *The Quarterly Journal of Economics, Vol. 70, No. 1. Pp 65-94.*
Unalmis, D. (2002). The causality between financial development and economic growth: the case of Turkey *(No. 0203).*

World Bank, (2015). World Development Indicators. *Washington D.C*

Zang, H., & Kim, Y. C. (2007). Does financial development precede growth? Robinson and Luscas might be right. *Applied Economics Letters*, *14*(1), 15-19.

APPENDIX

MODEL 1

Dependent Variable: LNY
Method: ARDL
Date: 05/29/16 Time: 04:55
Sample (adjusted): 3 44
Included observations: 42 after adjustments
Maximum dependent lags: 2 (Automatic selection)
Model selection method: Schwarz criterion (SIC)
Dynamic regressors (2 lags, automatic): LNCRD LNINF LNGCEX LNK LNTO FDI FL
Fixed regressors: C
Number of models evalulated: 4374
Selected Model: ARDL(2, 2, 0, 1, 0, 2, 0, 0)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
		0.168160		
LNY(-1)	0.999811		5.945583	0.0000
LNY(-2)	-0.391405	0.173278	-2.258821	0.0322
LNCRD	0.004564	0.006740	0.677163	0.5041
LNCRD(-1)	0.004467	0.006424	0.695288	0.4928
LNCRD(-2)	0.016829	0.005113	3.291171	0.0028
LNINF	0.000292	0.001915	0.152395	0.8800
LNGCEX	0.024602	0.031168	0.789311	0.4368
LNGCEX(-1)	-0.095734	0.033049	-2.896765	0.0074
LNK	0.003587	0.006777	0.529359	0.6009
LNTO	-0.010160	0.006581	-1.543847	0.1343
LNTO(-1)	0.008825	0.007420	1.189358	0.2447
LNTO(-2)	-0.020524	0.006782	-3.026375	0.0054
FDI	0.104167	0.079606	1.308528	0.2017
FL	0.010049	0.005300	1.896248	0.0687
C	0.754115	0.225845	3.339076	0.0025

R-squared	0.981446	Mean dependent var	1.807105
Adjusted R-squared	0.971825	S.D. dependent var	0.033144
S.E. of regression	0.005563	Akaike info criterion	-7.272784
Sum squared resid	0.000836	Schwarz criterion	-6.652188
Log likelihood	167.7285	Hannan-Quinn criter.	-7.045311
F-statistic	20.05132	Durbin-Watson stat	2.237050
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model selection.

ARDL Bounds Test
Date: 05/29/16 Time: 04:56
Sample: 3 44
Included observations: 42
Null Hypothesis: No long-run relationships exist

Test Statistic	Value	K
F-statistic	4.716512	7

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.03	3.13
5%	2.32	3.5
2.5% 2.6	3.84	1% 2.96 4.26

ARDL Cointegrating And Long Run Form
Dependent Variable: LNY
Selected Model: ARDL(2, 2, 0, 1, 0, 2, 0, 0)
Date: 05/29/16 Time: 04:57

Sample: 1 45
Included observations: 42

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
		0.173278		
D(LNY(-1))	0.391405		2.258821	0.0322
D(LNCRD)	0.014564	0.006740	0.677163	0.0041
D(LNCRD(-1))	-0.016829	0.005113	-3.291171	0.0028
D(LNINF)	0.005292	0.001915	0.152395	0.0500
D(LNGCEX)	0.024602	0.031168	0.789311	0.4368
D(LNK)	0.003587	0.006777	0.529359	0.6009
D(LNTO)	-0.010160	0.006581	-1.543847	0.1343
D(LNTO(-1))	0.020524	0.006782	3.026375	0.0054
D(FDI)	0.104167	0.079606	1.308528	0.0017
D(FL)	0.010049	0.005300	1.896248	0.0687
CointEq(-1)	-0.691594	0.120358	-3.253581	0.0031

Cointeq = LNY - (0.0660*LNCRD + 0.0007* LNINF -0.1816*LNGCEX
+
0.0092*LNK -0.0558*LNTO + 0.2660*FDI + 0.0257*FL + 1.9258)

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
		0.018043		
LNCRD	0.066038		3.659981	0.0011
LNINF	-0.059745	0.004902	0.152048	0.0388
LNGCEX	-0.181649	0.071668	-2.534589	0.0174
LNK	0.019161	0.017694	0.517743	0.0489
LNTO	0.055821	0.024134	-2.312963	0.0286
FDI	0.266008	0.174481	1.524571	0.1390
FL	0.025663	0.015819	1.622246	0.0364
C	1.925758	0.046666	41.266757	0.0000

MODEL 2

Dependent Variable: LNY
Method: ARDL
Date: 05/29/16 Time: 04:57
Sample (adjusted): 2 44
Included observations: 43 after adjustments
Maximum dependent lags: 2 (Automatic selection)
Model selection method: Schwarz criterion (SIC)

Dynamic regressors (2 lags, automatic): LNN_B LNINF LNGCEX LNK LNTO FDI FL
Fixed regressors: C
Number of models evalulated: 4374
Selected Model: ARDL(1, 0, 0, 0, 0, 0, 0, 0)
Note: final equation sample is larger than selection sample

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
		0.078235		
LNY(-1)	0.977501		12.49446	0.0000
LNN_B	0.032345	0.028989	1.115761	0.2723
LNINF	-0.002024	0.001795	-1.128052	0.2672
LNGCEX	0.027830	0.032014	0.869293	0.3908
LNK	0.005349	0.006756	0.791796	0.4340
LNTO	0.003429	0.005306	0.646297	0.5224
FDI	0.103828	0.069286	1.498553	0.1432
FL	-0.002001	0.004302	-0.465022	0.6449
C	0.074956	0.134796	0.556072	0.5818

R-squared	0.967294	Mean dependent var	1.807658
Adjusted R-squared	0.959598	S.D. dependent var	0.032947
S.E. of regression	0.006622	Akaike info criterion	-7.012973
Sum squared resid	0.001491	Schwarz criterion	-6.644350
Log likelihood	159.7789	Hannan-Quinn criter.	-6.877037
F-statistic	25.69511	Durbin-Watson stat	2.367101
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model selection.

ARDL Bounds Test
Date: 05/29/16 Time: 04:58
Sample: 2 44
Included observations: 43
Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	3.823563	7

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.13	3.03
5%	2.45	3.53
2.5%	2.6	3.84

1%	2.96	4.26

ARDL Cointegrating And Long Run Form
Dependent Variable: LNY
Selected Model: ARDL(1, 0, 0, 0, 0, 0, 0, 0)
Date: 05/29/16 Time: 04:58
Sample: 1 45
Included observations: 43

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
		0.028989		
D(LNN_B)	0.032345		1.115761	0.0223
D(LNINF)	-0.002024	0.001795	-1.128052	0.0372
D(LNGCEX)	0.027830	0.032014	0.869293	0.3908
D(LNK)	0.005349	0.006756	0.791796	0.0340
D(LNTO)	0.003429	0.005306	0.646297	0.5224
D(FDI)	0.103828	0.069286	1.498553	0.0432
D(FL)	-0.002001	0.004302	-0.465022	0.6449
CointEq(-1)	-0.622499	0.078235	-0.287584	0.0054

Cointeq = LNY - (1.4376*LNN_B -0.0900*LNINF + 1.2369* LNGCEX
+
0.2378*LNK + 0.1524*LNTO + 4.6148*FDI -0.0889*FL + 3.3315)

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
		0.841258		
LNN_B	1.437608		0.246113	0.0371
LNINF	-0.089976	0.011250	-0.289080	0.0443
LNGCEX	-1.236936	0.159208	0.239753	0.0120
LNK	0.237761	0.204389	0.265836	0.0920
LNTO	0.152421	0.584254	0.260881	0.0958
FDI	1.614789	0.289335	0.301831	0.0456
FL	-0.088925	0.339230	-0.262136	0.7948
C	3.331534	5.693285	0.585169	0.5623

MODEL 3

Dependent Variable: LNY
Method: ARDL

Date: 05/29/16 Time: 04:59
Sample (adjusted): 2 44
Included observations: 43 after adjustments
Maximum dependent lags: 2 (Automatic selection)
Model selection method: Schwarz criterion (SIC)
Dynamic regressors (2 lags, automatic): LNBM LNINF LNGCEX LNK LNTO FDI FL
Fixed regressors: C
Number of models evalulated: 4374
Selected Model: ARDL(1, 1, 1, 1, 0, 0, 0, 0)
Note: final equation sample is larger than selection sample

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LNY(-1)	0.762011	0.103526	7.360552	0.0000
LNBM	-0.023414	0.008847	-2.646381	0.0127
LNBM(-1)	0.030500	0.010354	2.945705	0.0061
LNINF	-0.006892	0.002286	-3.015226	0.0051
LNINF(-1)	0.002804	0.001716	1.634242	0.1123
LNGCEX	0.036376	0.028691	1.267884	0.2143
LNGCEX(-1)	-0.079340	0.031936	-2.484375	0.0186
LNK	0.001182	0.006139	0.192613	0.8485
LNTO	0.006987	0.004789	1.458973	0.1546
FDI	0.201500	0.075515	2.668346	0.0120
FL	-0.004388	0.004278	-1.025723	0.3130
C	0.425957	0.168381	2.529724	0.0167

R-squared	0.976758	Mean dependent var	1.807658
Adjusted R-squared	0.968511	S.D. dependent var	0.032947
S.E. of regression	0.005846	Akaike info criterion	-7.215035
Sum squared resid	0.001060	Schwarz criterion	-6.723538
Log likelihood	167.1233	Hannan-Quinn criter.	-7.033786
F-statistic	18.43551	Durbin-Watson stat	2.289968
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model selection.

ARDL Bounds Test
Date: 05/29/16 Time: 05:00
Sample: 2 44
Included observations: 43
Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	4.313292	7

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.02	3.18
5%	2.52	3.69
2.5%	2.6	3.84
1%	2.96	4.26

KNUST

ARDL Cointegrating And Long Run Form
Dependent Variable: LNY
Selected Model: ARDL(1, 1, 1, 1, 0, 0, 0, 0)
Date: 05/29/16 Time: 05:00
Sample: 1 45
Included observations: 43

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
		0.008847	-2.646381	
D(LNBM)	0.023414			0.0127
D(LNINF)	-0.006892	0.002286	-3.015226	0.0051
D(LNGCEX)	0.036376	0.028691	1.267884	0.0743
D(LNK)	0.001182	0.006139	0.192613	0.0685
D(LNTO)	0.006987	0.004789	1.458973	0.1546
D(FDI)	0.201500	0.075515	2.668346	0.0120
D(FL)	-0.004388	0.004278	-1.025723	0.3130
CointEq(-1)	-0.537989	0.103526	-2.298825	0.0104

Cointeq = LNY - (0.0298*LNBM -0.0172*LNINF -0.1805*LNGCEX + 0.0050 *LNK + 0.0294*LNTO + 0.8467*FDI -0.0184*FL + 1.7898)

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
		0.026799		
LNBM	0.029776		1.111116	0.0251
LNINF	-0.017177	0.008062	-2.130695	0.0412
LNGCEX	-0.180529	0.121641	-1.484121	0.0479
LNK	0.004968	0.016361	0.188472	0.0507

LNTO	0.029358	0.022790	1.288188	0.0472
FDI	0.846676	0.228082	3.712155	0.0008
FL	-0.018439	0.020431	-0.902477	0.3738
C	1.789816	0.113391	15.784405	0.0000

KNUST

MODEL 4

Dependent Variable: LNY
Method: ARDL
Date: 05/29/16 Time: 05:00
Sample (adjusted): 2 44
Included observations: 43 after adjustments
Maximum dependent lags: 2 (Automatic selection)
Model selection method: Schwarz criterion (SIC)
Dynamic regressors (2 lags, automatic): LNNM LNINF LNGCEX LNK LNTO FDI FL
Fixed regressors: C
Number of models evalulated: 4374
Selected Model: ARDL(1, 1, 1, 1, 0, 0, 0, 0)
Note: final equation sample is larger than selection sample

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Variable	Coefficient	Std. Error	t-Statistic	Prob.*
		0.093233		
LNY(-1)	0.761027		8.162681	0.0000
LNNM	-0.016782	0.007803	-2.150637	0.0394
LNNM(-1)	0.027379	0.009398	2.913148	0.0066
LNINF	-0.006477	0.002197	-2.947858	0.0060
LNINF(-1)	0.002512	0.001736	1.446869	0.1580
LNGCEX	0.029578	0.028830	1.025951	0.3129
LNGCEX(-1)	-0.078311	0.031903	-2.454688	0.0199
LNK	0.000233	0.006256	0.037262	0.9705
LNTO	0.006445	0.004765	1.352468	0.1860
FDI	0.219397	0.079225	2.769287	0.0094
FL	-0.002357	0.004272	-0.551634	0.5852
C	0.416344	0.152902	2.722948	0.0105

R-squared	0.976345	Mean dependent var	1.807658
Adjusted R-squared	0.967952	S.D. dependent var	0.032947
S.E. of regression	0.005898	Akaike info criterion	-7.197445
Sum squared resid	0.001078	Schwarz criterion	-6.705947
Log likelihood	166.7451	Hannan-Quinn criter.	-7.016196
F-statistic	16.32059	Durbin-Watson stat	2.252696
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model selection.

ARDL Bounds Test
Date: 05/29/16 Time: 05:01
Sample: 2 44
Included observations: 43
Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	4.027111	7

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.15	3.07
5%	2.68	3.59
2.5%	2.6	3.84
1%	2.96	4.26

ARDL Cointegrating And Long Run Form
Dependent Variable: LNY
Selected Model: ARDL(1, 1, 1, 1, 0, 0, 0, 0)

Date: 05/29/16 Time: 05:01
Sample: 1 45
Included observations: 43

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
		0.007803	-2.150637	
D(LNNM)	0.016782			0.0394
D(LNINF)	-0.006477	0.002197	-2.947858	0.0060
D(LNGCEX)	0.029578	0.028830	1.025951	0.0529
D(LNK)	0.001233	0.006256	0.037262	0.9705
D(LNTO)	0.006445	0.004765	1.352468	0.1860
D(FDI)	0.219397	0.079225	2.769287	0.0094
D(FL)	-0.002357	0.004272	-0.551634	0.5852
CointEq(-1)	-0.538973	0.093233	-2.563189	0.0154

Cointeq = LNY - (0.0443*LNNM -0.0166*LNINF -0.2039*LNGCEX + 0.0010 *LNK + 0.0270*LNTO + 0.9181*FDI -0.0099*FL + 1.7422)

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNNM	0.044344	0.026580	1.668339	0.1053
LNINF	-0.016589	0.008117	-2.043774	0.0496
LNGCEX	-0.203930	0.121761	-1.674838	0.0040
LNK	0.023975	0.026278	0.037122	0.0706
LNTO	0.026970	0.021021	1.282963	0.2090
FDI	0.918084	0.207473	4.425082	0.0001
FL	-0.009861	0.018746	-0.526046	0.6026
C	1.742224	0.094012	18.532001	0.0000

MODEL 5

Dependent Variable: LNY
Method: ARDL
Date: 05/29/16 Time: 05:08
Sample (adjusted): 3 44
Included observations: 42 after adjustments
Maximum dependent lags: 2 (Automatic selection)
Model selection method: Schwarz criterion (SIC)
Dynamic regressors (2 lags, automatic): LNDC LNINF LNGCEX LNK LNTO FDI FL
Fixed regressors: C

Number of models evalulated: 4374

Selected Model: ARDL(1, 2, 0, 2, 0, 0, 1, 0)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
		0.103922		
LNY(-1)	0.501525		4.825961	0.0000
LNDC	-0.030731	0.008636	-3.558633	0.0014
LNDC(-1)	0.019666	0.009005	2.183801	0.0375
LNDC(-2)	0.025537	0.007418	3.442792	0.0018
LNINF	-0.007308	0.001916	-3.815156	0.0007
LNGCEX	0.100662	0.033154	3.036196	0.0051
LNGCEX(-1)	-0.093807	0.033821	-2.773621	0.0098
LNGCEX(-2)	-0.126456	0.043608	-2.899847	0.0072
LNK	0.011307	0.005954	1.899226	0.0679
LNTO	-0.000675	0.004519	-0.149379	0.8823
FDI	0.228321	0.096831	2.357933	0.0256
FDI(-1)	0.260961	0.098214	2.657065	0.0129
FL	-0.008144	0.004535	-1.795851	0.0833
C	0.952291	0.193778	4.914332	0.0000

R-squared	0.984019	Mean dependent var	1.807105
Adjusted R-squared	0.976599	S.D. dependent var	0.033144
S.E. of regression	0.005070	Akaike info criterion	-7.469687
Sum squared resid	0.000720	Schwarz criterion	-6.890464
Log likelihood	170.8634	Hannan-Quinn criter.	-7.257379
F-statistic	13.62189	Durbin-Watson stat	2.382064
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model selection.

ARDL Bounds Test
Date: 05/29/16 Time: 05:09
Sample: 3 44
Included observations: 42
Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	3.983397	7

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.30	3.31
5%	2.25	3.35
2.5%	2.6	3.84
1%	2.96	4.26

ARDL Cointegrating And Long Run Form
Dependent Variable: LNY
Selected Model: ARDL(1, 2, 0, 2, 0, 0, 1, 0)
Date: 05/29/16 Time: 05:09
Sample: 1 45
Included observations: 42

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Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
		0.008636	-3.558633	
D(LNDC)	0.030731			0.0014
D(LNDC(-1))	-0.025537	0.007418	-3.442792	0.0018
D(LNINF)	-0.007308	0.001916	-3.815156	0.0007
D(LNGCEX)	0.100662	0.033154	3.036196	0.0051
D(LNGCEX(-1))	0.126456	0.043608	2.899847	0.0072
D(LNK)	0.011307	0.005954	1.899226	0.0679
D(LNTO)	-0.000675	0.004519	-0.149379	0.8823
D(FDI)	0.228321	0.096831	2.357933	0.0256
D(FL)	-0.008144	0.004535	-1.795851	0.0833
CointEq(-1)	-0.498475	0.103922	-4.796609	0.0000

Cointeq = LNY - (0.0290*LNDC -0.0147*LNINF -0.2399*LNGCEX + 0.0227 *LNK -0.0014*LNTO + 0.9816*FDI -0.0163*FL + 1.9104)

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNDC	0.029032	0.011710	2.479247	0.0195
LNINF	-0.014661	0.003105	-4.721793	0.0001
LNGCEX	-0.239932	0.061176	-3.922017	0.0005
LNK	0.022684	0.012667	1.790877	0.0841
LNTO	-0.021354	0.009034	-0.149906	0.8819
FDI	0.981558	0.103308	9.501238	0.0000
FL	-0.016337	0.009612	-1.699664	0.1003
C	1.910410	0.031526	60.597312	0.0000

DIAGNOSTIC TESTS MODEL 1

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.465549	Prob. F(2,25)	0.6331
Obs*R-squared	1.508077	Prob. Chi-Square(2)	0.4705

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.511729	Prob. F(14,27)	0.9053
Obs*R-squared	8.807367	Prob. Chi-Square(14)	0.8432
Scaled explained SS	6.553621	Prob. Chi-Square(14)	0.9506

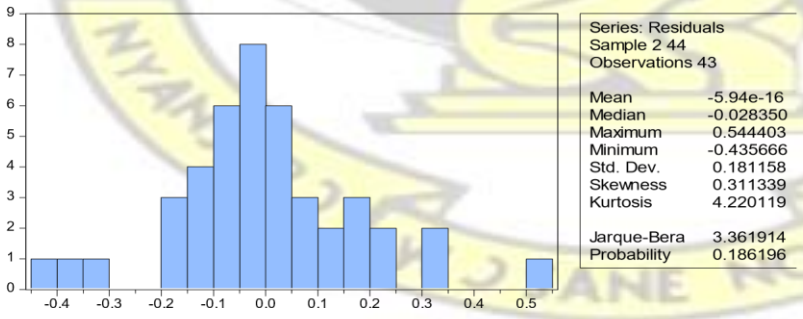
Ramsey RESET Test
Equation: UNTITLED
Specification: LNY LNY(-1) LNY(-2) LNCRD LNCRD(-1) LNCRD(-2) LNINF LNGCEX LNGCEX(-1) LNK LNTO LNTO(-1) LNTO(-2) FDI FL C

Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	1.188055	26	0.5378
F-statistic	1.787584	(1, 26)	0.6378

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.000130	1	0.000130
Restricted SSR	0.000836	27	3.10E-05
Unrestricted SSR	0.000706	26	2.71E-05



MODEL 2

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.050687	Prob. F(2,32)	0.3615
Obs*R-squared	2.649719	Prob. Chi-Square(2)	0.2658

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.825540	Prob. F(8,34)	0.5861
Obs*R-squared	6.993977	Prob. Chi-Square(8)	0.5373
Scaled explained SS	16.27649	Prob. Chi-Square(8)	0.5386

Ramsey RESET Test

Equation: UNTITLEDRamsey RESET Test

Specification: LNY LNY(Equation: UNTITLED -1) LNN_B LNINF LNGCEX LNK LNTO FDI FL C

Omitted Variables: Squares of fitted valuesSpecification: LNY LNY(-1) LNN_B LNINF LNGCEX LNK LNTO FDI FL C

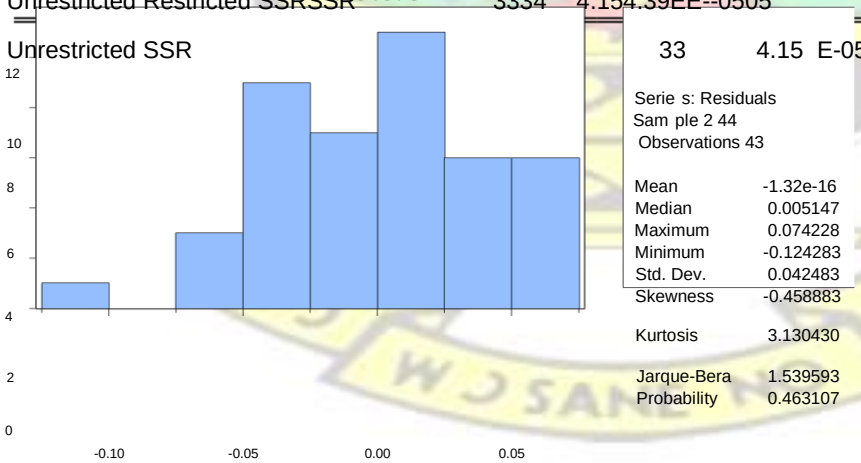
Omitted Variables: Squares of fitted valu es

Value	df	Probability	t-statistic	1.705454Value	33df
Probability 0.1075					
Ft--statisticstatistic	1.9085731.705454	(1, 3333)	0.19750.0975		
F-statistic	2.908573	(1, 33)	0.0975		

F-test summary:

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.001491	df1	0.000121Squares
Restricted SSRTest SSR	0.001491	34 1	4.390.000121E-05
Unrestricted Restricted SSRSSR	0.001370	3334	4.154.39EE--0505
Unrestricted SSR	0.001370	33	4.15 E-05



MODEL 3

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	2.005255	Prob. F(2,29)	0.7651
Obs*R-squared	7.382124	Prob. Chi-Square(2)	0.5249

Heteroskedasticity Test: Breusch-Pagan-Godfrey

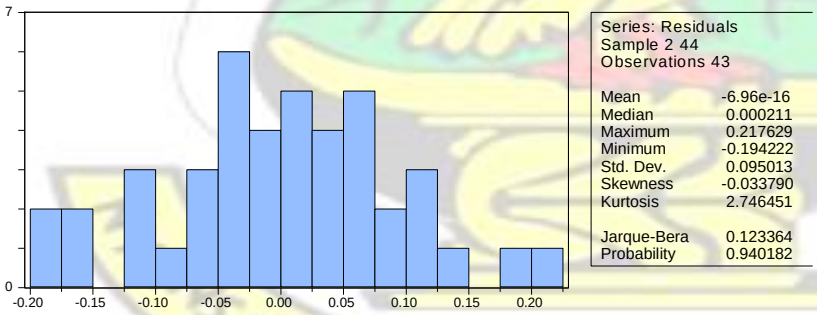
F-statistic	0.919093	Prob. F(11,31)	0.5347
Obs*R-squared	10.57482	Prob. Chi-Square(11)	0.4795
Scaled explained SS	10.86773	Prob. Chi-Square(11)	0.4544

Ramsey RESET Test
Equation: UNTITLED
Specification: LNY LNY(-1) LNBM LNBM(-1) LNINF LNINF(-1) LNGCEX LNGCEX(-1) LNK LNTO FDI FL C
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	1.489135	30	0.1469
F-statistic	2.217524	(1, 30)	0.1469

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	7.29E-05	1	7.29E-05
Restricted SSR	0.001060	31	3.42E-05
Unrestricted SSR	0.000987	30	3.29E-05



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MODEL 4

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.433896	Prob. F(2,29)	0.3209
Obs*R-squared	2.069645	Prob. Chi-Square(2)	0.6965

Heteroskedasticity Test: Bre sch-Pagan-Godfrey

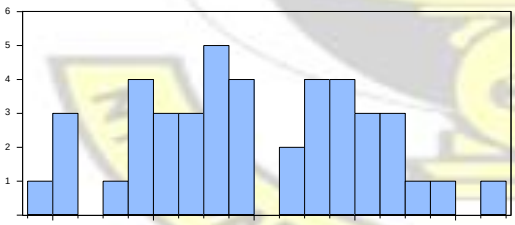
F-statistic	1.090985	Prob. F(11,31)	0.3999
Obs*R-squared	12.00060	Prob. Chi-Square(11)	0.3636
Scaled explained SS	12.13472	Prob. Chi-Square(11)	0.3536

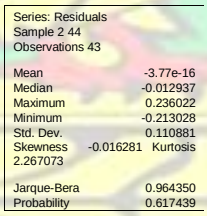
Ramsey RESET Test
Equation: UNTITLED
Specification: LNY LNY(-1) LNNM LNNM(-1) LNINF LNINF(-1) LNGCEX LNGCEX(-1) LNK LNTO FDI FL C
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	1.415850	30	0.1671
F-statistic	2.004632	(1, 30)	0.1671

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	6.75E-05	1	6.75E-05
Restricted SSR	0.001078	31	3.48E-05
Unrestricted SSR	0.001011	30	3.37E-05





MODEL 5

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.608855	Prob. F(2,26)	0.2414
Obs*R-squared	3.125970	Prob. Chi-Square(2)	0.9104

Heteroskedasticity Test: Breusch-Pagan-Godfrey

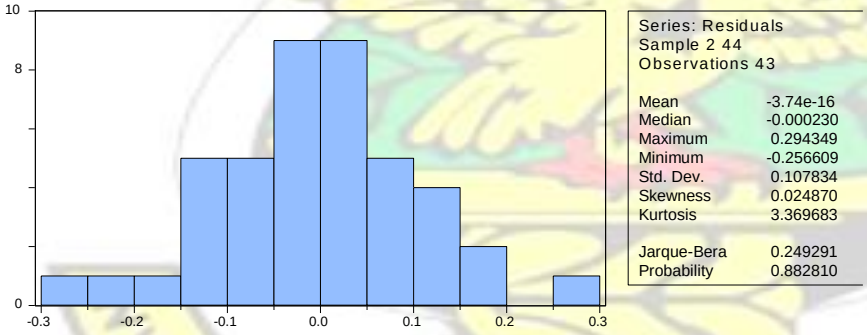
F-statistic	1.276279	Prob. F(13,28)	0.2834
Obs*R-squared	15.62733	Prob. Chi-Square(13)	0.2698
Scaled explained SS	13.13069	Prob. Chi-Square(13)	0.4378

Ramsey RESET Test
Equation: UNTITLED
Specification: LNY LNY(-1) LNDC LNDC(-1) LNDC(-2) LNINF LNGCEX LNGCEX(-1) LNGCEX(-2) LNK LNTO FDI FDI(-1) FL C
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	1.164768	27	0.2543
F-statistic	1.356685	(1, 27)	0.2543

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	3.44E-05	1	3.44E-05
Restricted SSR	0.000720	28	2.57E-05
Unrestricted SSR	0.000685	27	2.54E-05



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