UNIVERSITY OF CAPE COAST

THE EFFECT OF FINANCIAL DEVELOPMENT AND MONETARY POLICY ON ECONOMIC GROWTH IN GHANA

BY

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DECLARATION

Candidate's Declaration

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

Candidate's Signature: …… Date: …….

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Supervisors' Declaration

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

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ABSTRACT

The link between financial development and monetary policy has received considerable attention in many African Countries such as Ghana. This, notwithstanding, empirical evidence on the link have been mixed. The study, therefore, applied the Autoregressive Distributed Lag (ARDL) approach to investigating whether financial development influences monetary policy effectiveness on economic growth in Ghana for the period 1980 to 2016. The results revealed that monetary policy's impacts on economic growth via financial development is positive and statistically significant suggesting that financial development strengthens the effects of monetary policy on economic growth in Ghana. Further, financial development, monetary policy, foreign direct investment, remittances, capital and labour supply exerted positive and statistically significant impact on economic growth both in the short-run and the long-run. Signifying that these variables are critical in enhancing sustained economic growth and development in Ghana. However, inflation proved to be detrimental to economic growth both in the long-run and short-run. The conduct of the Granger causality test also revealed a unidirectional causality running from economic growth to financial development. It is therefore recommended that Bank of Ghana should strengthen monetary policy transmission via deliberate efforts to deepen financial sector development and improve the competitiveness of financial markets. Bank of Ghana should also build strong and resilient institutional frameworks to foster the development of financial markets so as to deepen the influence of monetary policy on market interest rates in the financial sector.

KEY WORDS

Autoregressive distributed lags

Economic growth

Financial deepening

Financial development

Monetary policy

Output

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DEDICATION

To the SENA family and the whole Zoe Lightworld Chapel International family worldwide.

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LIST OF ACRONYMS

2SLS	Two-Stage Least Squares
ADF	Augmented Dickey Fuller
AIC	Akaike Information Criteria
ARDL	Autoregressive Distributive Lag
BOG	Bank of Ghana
BRICS	Brazil, Russia, India, China, And South Africa
BT	Bounds Test
CEMAC	Central African Economic and Monetary Community
CPI	Consumer Price Index
CUSUM	Cumulative Sum
CUSUMSQ	Cumulative Sum of Squares
DCPS	Domestic Credit to The Private Sector
DFID	Department for International Development
ECM	Error Correction Model
ECT	Error Correction Term
ERP	Economic Recovery Program
FCI	Financial Condition Index
FDI	Financial Development Index
FDMP	Financial Development and Monetary Policy Interaction Term
FINSAC	Financial Sector Adjustment Credit
FINSAP	Financial Sector Adjustment Program
FINSSP	Financial Sector Strategic Plan

GDP	Gross Domestic Product
GFCF	Gross Fixed Capital Formation
GFDR	Global Financial Development Report
GMM	Generalized Method of Moments
HQC	Hannan Quinn Criterion
IFS	International Financial Statistics
IMF	International Monetary Fund
IT	Inflation Targeting
K	Capital
L	Labour
LR	Long Run
M2	Broad Money Supply
MP	Monetary Policy
MPR	Monetary Policy Rate
NBFI	Non-Bank Financial Institutions
OLS	Ordinary Least Squares
OMO	Open Market Operations
PP	Phillip Perron
PR	Policy Rate
RBC	R-Bar Squared Criterion
SAP	Structural Adjustment Program
SBC	Schwarz Bayesian Criterion
SIC	Swartz Information Criteria

SME’s	Small and Medium Size Enterprises
SR	Short Run
SVAR	Structural Vector Autoregressive Model
SVEC	Structural Vector Error Correction
TFP	Total Factor Productivity
TVAR	Threshold Vector Autoregressive Model
VAR	Vector Autoregressive Model
Y	Economic Growth/Output

CHAPTER ONE

INTRODUCTION

Background to the Study

Financial development has received considerable attention in recent times with high debates in development, financial as well as monetary economics following the global financial crises that was experienced in the year 2008. As such there is increasingly high interest in literature on the subject matter of financial development. Ghana's financial sector has seen tremendous transformations with the introduction and adoption of different programmes in the sector from the post-independence era to date. According to Mensah (2017), four phases of financial sector development can be identified in Ghana namely; the colonial era (up to 1957), the centrally controlled economy of the post-independence era (1957 to 1983), the structural adjustment, liberalization and banking reform era (1983 to 2001) and the second-generation reform era (2003 to date). For the purposes of this research, the study focuses attention on financial sector development in Ghana during the post-independence era to presents since the pre-independence era present some colonial element and Ghanaians at the time were not in the realm of affairs in running the state.

The post-independence era covered the period 1957 to 1983, this period saw some development in the financial sector including the establishment of a full-fledged central bank (Bank of Ghana) in 1957, the establishment of Ghana Commercial bank previously known as Bank of Gold Coast, which also led to a rise in competition for the already existing British banks namely the British Bank of

West Africa which later became Standard Chartered Bank in 1969 and the Colonial Bank which later became Barclays Bank in 1925. For instance, Barclays in response increased its branch network from 12 to 60 while Standard Chartered expanded its network from 15 to 44, there was also the transformation of then Ghana Industrial Corporation, previously known as Gold Coast Industrial Development Corporation into National Investment Bank in 1963 with the objective of assisting industrial, commercial, agricultural and other enterprises (Mensah, 2017).

There was also the establishment of the Agricultural Credit and Cooperative Bank in 1965 geared towards making credit available and accessible to farmers for the development of their farms and obtaining materials, equipment and other implements and warehouse facilities. The Bank for Housing and Construction was also established in 1972 to provide finance for building industry. Merchant Bank was also incorporated in the same year as a limited liability company to offer corporate and investment banking services. (Mensah, 2017). The period also saw the emergence of rural banking in 1976 with the aim of providing basic banking services to rural communities. In 1975, the National Savings and Credit Bank previously the Post Office Savings Bank was recognized and the Ghana Cooperative Bank was also established. The Social Security Bank was also established in 1977 as a bank for workers (Mensah, 2017).

Monetary policy over this period was mainly through the use of direct controls, here, direct credit system was used by the Bank of Ghana with maximum interest rates given for credit to various sectors of the economy, credit allocations were imposed and dictated with chunk of it going to state-owned enterprises (

Antwi-Asare & Addison, 2000; Bawumia, 2010; Mensah, 2017). This led to high inflation on the macroeconomic front with huge accumulations of non-performing debt. Interest rate controls and credit ceilings were also used to ensure that cheap credit was available to government-imposed priority sectors such as manufacturing (Antwi-Asare & Addison, 2000; Bawumia, 2010; Mensah, 2017). Heavy taxation of the banking sector become a major source of revenue for the government. High reserve requirements were placed on the banks. These restrictive policies created major distortions in the financial sector with the already high rate of inflation and negative real interest rates. (Antwi-Asare & Addison, 2000; Bawumia, 2010; Mensah, 2017). By 1982, Ghana presented a classic case of a financially repressed system as put forward by McKinnon (1973) and Shaw (1973).

Notwithstanding the above, the direct credit system could not promote macroeconomic advancement, in fact, by 1983, Ghana began to experience some financial disintermediation with many Ghanaians preferring to hold currency instead of making deposits at banks and there was a significant growth in informal financial arrangements which became a significant feature of the Ghanaian financial system (Antwi-Asare & Addison, 2000; Aryeetey & Gockel, 1991).

The period 1957 to early 1960's saw some reasonably high growth reaching about 4.41% in 1961 but growth began to take a downward turn by 1964. The economy experienced negative growth of -4.25% in 1966, -2.49%in 1972, -12.43% in 1975, -3.53% in 1976, -2.51% in 1979, -3.50% in 1981, -6.92% in 1982 and -4.56% for the period 1983 respectively. The negative growth can be attributed to changing government, political instability, policy changes and external shocks.

This notwithstanding, the period also saw positive growth with peaks reaching 9.7% and 8.55 in 1970 and 1978 respectively (Alagidede, Nketiah-Amponsah & Baah-Boateng, 2013; Fosu, 1997; Sakyi, 2011).

In 1983, the government with the support of the World Bank and the International Monetary Fund (IMF) introduce the Economic Recovery Program (ERP) and the Structural Adjustment Program (SAP) in 1986 with the aim to restructure the economy and reverse the trends of economic decay. Under the ERP/SAP, the economic reforms included measures to promote fiscal discipline, reforms of the trade and exchange rate system and other wide-ranging measures initiating price liberalization and deregulation of many economic activities.

The economy was gradually liberalized with price and distributional controls removed and by 1987, interest rates were duly liberalized except for savings deposit. Then the first formal financial sector reform program, the Financial Sector Adjustment Program (FINSAP) was introduced in 1987 to complement the ERP/SAP. The FINSAP was implemented under two World Bank Credits namely the Financial Sector Adjustment Credit (FINSAC 1 and 2). Under the FINSAP, the objectives of the FINSAC 1 which covered the period 1987 to 1992 includes the enhancement of soundness of banking institutions via reforms of their regulatory framework and restructuring of distressed financial institutions, deposit mobilization and credit allocation and developing money and capital markets. And by the end of FINSAC 1 period banking system was stabilized (Mensah, 2017; World Bank Project Completion Report, 1995). FINSAC 2 covered the period 1992 to 1997 and it has as its goal to consolidate the achievements of previous Credit by

continuing and completing the unfinished tasks and removing any remaining policy distortions in the financial sector and introducing additional reforms. It has as its objective to increase financial intermediation by reducing cost of intermediation, strengthening the central bank in its statutory autonomy, financial condition, and institutional capacity. Again, at the end of the FINSAC 2 period, key structural reforms were achieved (Mensah, 2017; World Bank Project Completion Report, 1997).

The Non-Bank Financial Institution (NBFI) Assistance Project commenced upon the completion of the FINSAC 1 and 2 and on the realization that the financial system of the country needed to be developed beyond the banking sector in order to promote diversification of the financial system beyond the traditional bank intermediation. It covered the period 1996 to 2002 with the aim to address the institutional gaps in the sector including those in the Bank of Ghana, capital market institutions, and contractual savings institutions. It also aims at accelerating the development of important financial sector infrastructure including the domestic payment system (Mensah, 2017).

Until 1992, the country used domestic credit as operating instrument, where money supply was set as a target and inflation as the main objective and growth as a secondary goal. From another perspective, monetary policy framework was aimed at using money supply to achieve the objectives of inflation and growth. Under this method, open market operations (OMO) were used to replace domestic credit as the operating instrument (Kwakye, 2012).

Growth of the economy during and after the IMF and World Banks' ERP and SAP programmes saw a positive response. The Ghanaian economy recovered from a low and negative growth of about 4.5% in 1983 to a positive growth of 8.6% in 1984. This positive growth trend has since continued from 1984 (Alagidede et al., 2013; Fosu, 1997; Sakyi, 2011).

In spite of the success chalked by the FINSAP and NBFI project reforms, the financial sector still faces some issues in its development agenda. Some of these issues include the presence of high inflation and interest rate environment, market volatility and uncertainty, inadequate credit information system, and lack of long-term debt market. In terms of regulatory and supervision dimension, issues include low budget and poor coordination among regulators. Institutionally, there was insufficient equipped registries of companies and document that support financial transactions and many of the laws that were governing the sector were outmoded including the Companies Code, the Exchange Control Act, the Banking Law, the Insurance Law, the financial Institutions Law, and the Bills of Exchange Art to mention but a few (Mensah, 2017).

These problems among others led to the initiation of a review of the financial sector reform which also led to the introduction of the Financial Sector Strategic Plan (FINSSP) in 2003 to promote a balanced financial system with both bank and non-bank component. That is, the FINSSP looked at the linkage between the components of the financial sector by focusing on a broad-based development of the sector. Specifically, the FINSSP has its objectives; to be the preferred source of finance for domestic companies, to promote efficient savings mobilization, to

enhance the competitiveness of Ghana's financial institutions within a regional and global setting, to ensure a longer and more facilitative regulatory regime and to achieve a diversified domestic financial sector within a competitive environment. Hence FINSSP focused not only on diversification, but on growth and globalization of the financial system.

The FINSSP was also implemented in two phases, the first phase FINSSP I covered the period 2003 to 2011. Some of the reforms in this phase include Securities and Exchange Commission Regulations (2003), Venture capital Trust Act (2004), Bank of Ghana Act (2004), Foreign Exchange Act (2006), Insurance Act (2006), Credit Reporting Act (2007), Central Securities Reporting Act (2007), National Pensions Act (2008), Non-Bank Financial Institutions Act (2008) and the Borrowers and Lenders Act (2008). Upon the completion of the FINSSP I, the FINSSP II was launched to continue with uncompleted activities initiated under FINSSP I (Ministry of Finance, 2012). Specifically, the FINSSP II focused on the development of the bond market (Mensah, 2017).

The period 2001 to 2016 saw an applaudable turn of performance on the macroeconomic front. The economy continued on its positive growth path with growth hovering between a minimum of 3.5% to 14% maximum annually. Notably, the economy grew by 6% in 2005, 6.4% in 2006 and rose to a peak of 9% and 14% in 2008 and 2011 respectively. Economic growth over the period under review can be described as fairly stable.

In terms of monetary policy over this period, until 2007, the country practiced monetary targeting, although a new framework was proposed in 2002 and

was before cabinet for approval. But under the monetary targeting framework, limited success was achieved in meeting inflation targets, coupled with the apparent weakening of the relationship between monetary aggregates and inflation. It is owing to these reasons that in 2007, the monetary authorities shifted from monetary-targeting to inflation-targeting (IT), where the central bank uses its policy rate (PR) to target inflation directly without using monetary aggregates as a means (Kwakye, 2012). According to Bawumia (2010), throughout the history of monetary policy frameworks adopted and practiced in the country since independence, the IT framework has proved to yield the best performance in terms of macroeconomic indicators. The economy is also deemed to have become more resilient to external shocks under the IT framework than under any other framework implemented aforetime (Bawumia, 2010).

Statement of Problem

Literature shows that there are many views on the transmission channels of monetary policy. These thoughts can be captured into two broad perspective based on their foundations in the Keynesian and Monetarist schools of thought on how money supply affect aggregate output. Current literature (Carranza, Galdon-Sanchez, & Gómez-Biscarri, 2010; Ma & Lin, 2016; Mishra, Montiel, & Spilimbergo, 2012) on these views on the monetary policy transmission mechanism shows that financial sector development as well as the totality of the financial structure plays an important role in understanding the effectiveness of monetary policy actions on output and prices. The practice of monetary policy depends on

financial makeup of an economy, with the financial system acting as the key medium through which monetary policy impacts on the real economy. It is therefore expected that any development that affects the structure of the financial system will have the potential to bring to bear some impacts on the transmission mechanism (Carranza et al., 2010).

Theoretically, the effects of monetary policy on output and prices operate through the financial system. According to Bernanke and Gertler (1995), the credit channel of monetary policy predicts a strong monetary transmission mechanism. It predicts higher financial frictions in the financial system, and hence increasing the effect of monetary policy on the real economy. Therefore, the degree of financial sector development is considered important in explaining the effectiveness of monetary policy (Ma & Lin, 2016). Also, the efficacy of monetary policy is deemed to crucially depend on the structure and condition of the financial system (Carranza et al., 2010; Ma & Lin, 2016; Mishra et al., 2012).

To analyze the effect of financial development on monetary policy effectiveness, Carranza et al., (2010) observed a positive link between financial development and monetary policy by conducting a study using 53 countries covering the period 1986 to 2005. They found that monetary policy has a larger impact on economies where the financial system is developed than where it's not. Mishra et al., (2012), also investigated the effects of financial development on monetary policy effectiveness vis a vis output and established a negative link between monetary policy and financial development for low income countries using monthly data covering the period 1960 to 2008. Ma and Lin (2016) also

alluded to the negative link. They observed a significant but negative correlation between monetary policy and financial development on output for 41 economies.

Although there seem to be rising interest in monetary policy in Africa and the world at large (Heintz & Ndikumana, 2011; Khan, 2011; Kasekende & Brownbridge, 2011; Ncube, 2008), empirical evidence on the effect of financial development on monetary policy effectiveness is still ambiguous. The study by Saxegaard (2006), for instance, examined the relationship between financial development and monetary policy within the context of sub-Saharan Africa with focus on excess liquidity and its effect on monetary policy effectiveness. The study found that excess liquidity weakens the impact of monetary policy in influencing output. Krause and Rioja (2006) also conducted a study to test the financial development and monetary policy link in influencing demand conditions for 37 developing countries. They established that well developed financial markets contributes significantly to the effect of monetary policy on the economy. More recently, Effiong, Esu, and Chuku (2017), also carried out an empirical investigation of the link between financial development and monetary policy via output and prices in the context of Africa. They observed a weak link between financial development and monetary policy in influencing output. Seth and Kalynaraman (2017), also conducted a cross country analysis for 119 countries and found that financial development positively influences the impact of monetary policy on output.

One reason that can be assigned for the mixed results is that most of these empirical studies on financial development and monetary policy effectiveness are

mainly cross-country analysis. While it is evident that these studies have broadened knowledge on the phenomenon of financial development, their findings cannot adequately reflect country specific experience. This is because the effects of individual economic, financial and political factors that impacts on financial development and monetary policy vary from country to country due to heterogeneity in the macroeconomic, financial and political environment among countries. Hence, it is difficult to provide country specific conclusions and policy recommendations (Effiong, Esu, & Chuku, 2017; Heintz & Ndikumana, 2011; Khan, 2011; Kasekende & Brownbridge, 2011; Ncube, 2008; Saxegaard, 2006).

Ghana like most developing countries has been augmenting it growth process with policies aimed at strengthening the effects of monetary policy on output via financial sector development. For instance, Abradu-otoo, Amoah and Bawumia (2003) analyzed the transmission mechanisms of monetary policy for Ghana for the period 1969 to 2002. They found that monetary policy has effects on output and prices in the long run. Kovanen (2011), investigated on the finance-monetary policy link by looking at interest rate pass through of monetary policy transmission for the period 2005 to 2010. He found the existence of short-term changes in prime rate to wholesale market interest rates. Quartey and Afful-Mensah (2014), also looked at the finance-monetary policy nexus by examining the trend of financial and monetary policies in Ghana. They concluded that, although monetary policy has been relatively effective in the economy over the study period, fiscal imbalance undermines monetary policy outcomes.

Regardless of these empirical facts, an inevitable question that stands out is: whether the adoption of the mix of financial sector reforms has aided monetary policy effects on economic growth? This study therefore delves into the finance-monetary policy link not just by focusing on what determines financial development or on one channel of monetary policy but by investigating the joint effects of monetary policy and financial development on economic growth in Ghana. Again, these studies use one or two measurement of financial development and this has motivated this study. As a contribution to the literature, this study uses a new measure of financial development, the financial development index, suggested by Svirydzenka, (2016) as a measure of financial sector development for Ghana instead of adopting one or two measures (domestic credit, liquid liabilities or stock market capitalization to GDP). Again, this study unlike previous studies seeks to look at the interaction effect of monetary policy on growth through financial sector development. Thus, this study investigates the joint effect of financial development and monetary policy on economic growth in Ghana.

Purpose of the Study

The main purpose of the study is to conduct an empirical investigation into the nexus between monetary policy and financial development on economic growth in Ghana.

Research Objectives

Specifically, the study seeks to:

1. Examine the joint effect of monetary policy and financial development on economic growth.
2. Establish the direction of causality between financial development and economic growth.

Research Hypotheses

1. H_0: Financial development and monetary policy do not significantly affect economic growth.

   H_1: Financial development and monetary policy significantly affect economic growth.

2. H_0: There is no causal relationship between financial development and economic growth.

   H_1: There is a causal relationship between financial development and economic growth.

Significance of Study

The relevance of the study is premised on the belief that the conduct of monetary policy is expedient and critical to the growth of the Ghanaian economy. Again, Ghana has over the last two decades, seen the proliferation of many development agenda and reforms in the financial sector such as the FINSAP I and II, NBFI, FINSSP I and II, and others like the Real Time Gross Settlement System, Central Securities Depository, Code-line Cheque Clearing, Automated Clearing House, e-zwich platform, among others (Bawumia, 2010; Quartey & Afful-

Mensah, 2014). And since the conduct of monetary policy is believed to be sorely a financial phenomenon an investigation into the effect of monetary policy and financial development on output is of vital essence since the inadequacy of such analysis can result into serious policy consequences.

The study is therefore meant amongst other things to contribute significantly to literature by empirically examining the effects of monetary policy and financial development on economic growth in Ghana and in effect, offer relevant policy recommendations and measures in guiding monetary policy implementation aimed at stimulating growth in Ghana via the financial sector. The outcome of the study will encourage policy makers to ameliorate financial sector development towards boosting monetary policy conduct. It will also help the authorities to understand the extent to which monetary policy conduct and economic growth correlates, so as to adopt more efficient policy instrument geared towards achieving sustained economic growth and development.

Delimitations

The scope of the study is to investigate the effects of the relationship between financial development and the transmission of monetary policy on economic growth in Ghana using annual time series data set for the period 1980 to 2016. In all 37 total observations will be used for the study. The study will employ the Auto-Regressive Distributed Lagged (ARDL) Model otherwise known as the bounds testing approach to cointegration developed by Pesaran and Pesaran (1997); Pesaran, Shin, and Smith (2001). Also, for the purpose of modelling the effects of

the financial development-monetary policy relationship on economic growth, the study will employ seven variables – real GDP as a proxy for economic growth or output, Financial development is measured based on the latest index, the Global Financial Index of the IMF, which is a proxy of the Financial Depth, Access, Efficiency and Stability. It is measured as a percentage of GDP, Monetary Policy measured by central banks' policy rate expressed as annual percentage, Labour is proxied by population (ages 15 to 64) percentage of total while Capital variable is proxied by the gross fixed capital formation as a percentage of GDP, Foreign Direct Investment, Private Remittances and Inflation.

Limitations

The study faced some limitations including but not limited to limited availability of annual data on some of the key variables such as monetary policy and labour force used in the study. For instance, MPR from BOG's database only spans from1990 to 2016 hence the adoption of Central bank's policy rate or discount rate as a proxy. This means that for MPR an attempt to extend the data length backwards from 1975 to 1960 or further was constraint by data availability.

Organization of Study

This study is organized into five chapters. Chapter one, the introductory chapter comprises the background to the study, problem statement, objectives of the study, hypotheses to be tested, significance and scope of the study as well as organization of the study. Chapter two presents review of relevant literature both

the theoretical and empirical studies. Chapter three captures the methodological framework and techniques adopted in conducting the study. Chapter four examines and discusses the results with reference to both theoretical and empirical literature. Chapter five, focuses on the summary of findings, conclusions and recommendations of the study.

CHAPTER TWO

LITERATURE REVIEW

Introduction

The premise of this chapter is to present a review of the relevant literature to the study. It is organized into two main sections. The first section presents theoretical literature based on conceptual issues and the theories that explain financial development, transmission of monetary policy and economic growth. The second section presents the empirical literature review.

Theoretical Review

Financial Development

Financial sector development basically is concerned with overcoming the "costs" incurred in the financial system (Levine, 2005). That is, it involves the process of reducing costs associated with the financial system of an economy such as the costs of acquiring information, enforcing contracts, and executing transactions that results into the emergence of financial contracts, intermediaries, and markets. It also entails the different types and combinations of information, transaction, and enforcement costs in conjunction with different regulatory, legal and tax systems which has led to distinct forms of contracts, intermediaries and markets across countries in different times (Cihak et al., 2012; Levine, 2005).

Roubini and Bilodeau (2008) also, defined financial developments as factors, policies, and institutions that lead to effective financial intermediation and markets, and deep and broad access to capital and financial services. This entails

institutional and business environments, financial intermediaries and markets that provide basic support for a financial system. This results in efficient risk diversification and capital allocation and outputs of the financial intermediation process, such as availability of and access to capital. These factors, policies and institutions depend on a facilitating environment, structure, size, regulations and enforcement which when absent results in financial development that cannot be well implemented, improved or sustained.

A solid and well-functioning financial sector is a powerful engine of economic growth. Since it generates domestic savings, which in turn lead to productive investments in local businesses (Garcia & Liu, 1999). Furthermore, effective banks can channel international streams of private remittances. A large body of evidence suggests that financial sector development plays a huge role in economic development (Levine et al., 2012). It promotes economic growth through capital accumulation and technological progress by increasing the savings rate, mobilizing and pooling savings, producing information about investment, facilitating and encouraging the inflows of foreign capital, as well as optimizing the allocation of capital (DFID, 2004). Literature also shows that countries with better-developed financial systems tend to grow faster over long periods of time (Levine et al., 2000).

Structure of Ghana's Financial System

Ghana's financial system is dominated by foreign-owned banks. Commercial banks account for 75 percent of the total assets of the financial system,

pension funds follow distantly with a 12 percent share, and the insurance sector is small with 4 percent (IMF, 2011). Of the 26 commercial banks operating in Ghana, 13 are subsidiaries of foreign banks and their market share is estimated at 51 percent of bank assets. The domestic component of the banking system is dominated by State-Owned Banks (SBs). The state has a controlling interest in five commercial banks, through direct and indirect shareholding by the government, the BOG, and the state-controlled pension fund—the SSNIT. The SBs account for 29 percent of banking system assets. Therefore, the interaction between sovereign and banking risks is high. In particular, the government has tended to use SBs to finance extra budgetary expenditures and the poor performance of SBs has created contingent liabilities for the government. High fiscal deficits have led to arrears that contributed to Nonperforming loans (NPLs) in banks. In addition, the conflict of interest created by the BOG 's role as a shareholder and as a regulator has undermined supervision (IMF, 2011).

Domestic financial conglomerates are increasing in importance even though they do not yet have a dominant presence. The exact scope of conglomeration in Ghana's financial sector is not fully known. However, at least nine banks, which account for 53 percent of the banking system assets, have subsidiary securities firms and, in selected cases, industrial and insurance companies. Since the banks are not yet supervised on a consolidated basis, and there is no mapping of shareholders and common directors, it is possible that affiliate companies exist, thus, allowing related party lending to occur unnoticed. These growing inter-linkages increase the potential for risks to have a system-wide impact (IMF, 2011).

The financial sector has grown rapidly, although the growth has not had the intended effect of reducing intermediation costs. There has been a tremendous growth in the total financial system assets increased over the last ten years (IMF, 2011). The growth has been underpinned by an increase in the number of players in the banking, insurance, capital markets, and microfinance sectors. However, while private sector credit increased, a significant segment of the economy continues to have limited access to finance. The competition also exerted more pressure on staff and funding costs while lending rates have remained high (IMF, 2011).

Concentration has declined in the banking sector but it remains very high in the rest of the financial industry. The market share of the five largest banks declined from 61 percent at end of 2005 to 46 percent at end of 2010, in part reflecting the licensing of several banks. In the insurance sector, the number of companies operating almost doubled. However, 5 out of 23 non-life insurance companies continue to write about 78 percent of the premiums and 5 out of 19 life insurance companies write 68 percent of the total life premiums. Similarly, in the capital markets, one company (AngloGold Ashanti) accounts for 67 percent of the stock market capitalization. The SSNIT, the main provider of pensions, accounts for over 80 percent of assets under management. Given the high degree of concentration, the stability of the industry could be impacted by developments in a small number of companies (IMF, 2011).

There are also important risks inherent in the operations of banks and in the structure of their balance sheet and the profit and loss accounts. Commercial banks

are highly exposed to credit risk, since lending accounts for the bulk of assets and it has grown in an environment of weak credit risk management and enforcement of creditor rights. In addition, banks are increasingly lending to vertically integrated firms and to their employees. The cost structure of banks also exhibits rigidities that reduce banks flexibility to respond to macroeconomic changes, resulting in high lending rates that respond slowly to changes in the policy rate. The increased reliance on information technology (IT) for service delivery has increased exposure to operational risk (IMF, 2011).

The government's dominance in economic activity, against the backdrop of weaknesses in fiscal management, further increases vulnerabilities in the banking sector. State-owned enterprises (SOEs) and many Small-and Medium Enterprises (SMEs) rely heavily on business from the government. Consequently, the government's accumulation of payment arrears to contractors and other service providers has undermined their capacity to service their bank loans and created NPLs across the industry. The team had estimated that 46 percent of the NPLs, reported at end-March 2010, were directly or indirectly linked to government arrears. The government subsequently paid off the bulk of the arrears identified at the time of the FSAP, but new arrears have since emerged, but their implications for NPLs in the banking sector is yet to be ascertained (IMF, 2011).

Monetary Policy

Monetary policy can be defined as the exercise of monetary authorities or the central banks' control over money supply to influences aggregate outcomes.

According to Quartey and Afful-Mensah (2014), monetary policy involves the use of different measures with the aim of regulating the value, supply and cost of money in consonance with the expected level of economic activity. Jhingan (2002), refers to monetary policy as the credit measures adopted by the central bank of a country. Nwankwo (1991), also defined monetary policy as one of the macroeconomic instruments with which monetary authority of a country employs in the management of their economy to attain desired objectives. In general, the conduct of any monetary policy is poised towards the achievements of objectives such as price stability, maintenance of balance of payments equilibrium, creation of employment, output growth, and sustainable development. For this study, monetary policy is aimed at sustaining high economic growth rates with corresponding low levels of inflation (price stability).

Classical view on Monetary Policy

Classical economists view on monetary policy can be traced back to the findings of Irving Fisher (1911). In his analysis on the purchasing power of money, fisher investigated the link between the total quantity of money (money supply) and the total amount expended on final goods and services produced in the economy. The classical underpinning on monetary policy can be explained via the equation of exchange developed by fisher (Mishkin, 2004). The equation of exchange states that the quantity of money multiplied by the number of times that money is spent in transaction in a given year must equal to the nominal income (Mishkin, 2004). The classical economists were of the view that the economy operates at the natural

level of GDP, hence for them, in the short run, the output variable in the equation of exchange is fixed and the velocity of circulation of money is also assumed to be constant and hence fixed. Hence, if the Central Bank is to engage in monetary expansion, this will result into an expansion of money supply in the economy and as such price level will increase in the same proportion of increase in money supply (Mishkin, 2004). Thus, expansionary monetary policy in this regard will result into inflation and a monetary contraction will result into deflation.

Keynesian view on Monetary Policy

Proponents of the Keynesian school were in contrary views to what the classical economist put forward regarding the nexus that exist between money supply and price level being direct and proportional. In his analysis, Keynes propounded the liquidity preference theory of money demand which placed emphasis on the importance of interest rates and that velocity of money is not fixed and direct but indirect through interest rates. Keynesian economists also debunked classical notion of the economy operating always at natural level of GDP, hence output in the equation of exchange is not fixed. They are of the view that a monetary policy expansion such as increases in money supply will result into increases in the supply of loanable funds made available by banks, which will also result into a fall in interest rate on loans hence people can now borrow more loans from the banking system to spend on investment projects and on other interest-sensitive consumption goods, this will cause investment and consumption spending to rise and as a result will lead to a rise in aggregate demand or output.

The Monetarist view on Monetary Policy

Monetarist thought can be viewed as a modern variant of classical macroeconomics. Monetarism was spear-headed by Milton Friedman (1956) who came out with a restatement of the quantity theory of money. Friedman postulated in his analysis that supply of money is key in influencing the well-being of the economy and attest for the necessity of an effective monetary policy in order to stabilize the economy. But the monetarists are of the view that, to achieve steady growth rate, money supply must be allowed to grow at a fixed rate instead of being allowed to be regulated and manipulated by the monetary authorities of a nation. The monetarist unlike the classical economists attested that the economy may not always be operating at full employment level of output, hence in the short run, a monetary policy expansion may result into a rise in the level of GDP via increasing aggregate demand but in the long run, the economy will be at full employment level of output, hence monetary policy expansion will only result into inflation and do not affect the real variable GDP.

Monetary Policy Transmission Mechanism

According to Samuelson and Nordhaus (2010) monetary policy transmission mechanism is the route by which monetary policy gets transmitted into the economy. In other words, it is the process through which the actions of the monetary authorities via the use of policy instruments affect or gets transmitted into the real economy. It can also be defined as the way in which monetary policy is translated into changes in output, employment, and prices (Samuelson & Nordhaus,

2010). In general, monetary policy can influence the economy through the effects that monetary policy has on interest rates, exchange rates, equity and real estate prices, bank lending and firm balance sheet (Ireland, 2008). Empirically, there exist four basic channels of how monetary policy can be transmitted in the economy. These are discussed in the following sections.

The Traditional Interest Rate Channel

The money view of monetary policy transmission mechanism is based on Keynesian thoughts and it looks at the transmission of monetary policy primarily through the traditional interest rate channel, which put forward that the conduct of monetary policy affects aggregate spending through interest rates. Here, the financial system is seen as a pass-through medium through which monetary policy is conducted or transmitted to the economy. That is, the effect of money supply on the economy are analyzed by looking at the influence it has via interest rate on aggregate output through investment demand. It is based on two assumptions, the first states that the central bank can influence the short-term interest rate hence influencing short-term real interest rates through price stickiness (Mojon, 2000; and Mishkin, 2010). The second assumption is that investment and consumption spending respond to changes in real interest rate hence the more interest elastic investment and consumption expenditures are, the higher will be the likeliness of monetary policy impacts. For instance, a fall in money supply which leads to a rise in interest rate, a decline in investment spending hence reduction in aggregate output. It must be noted however that, for the traditional interest rate channel to

work, it assumes that there are limited price flexibilities and no market imperfections. Despite the fact that Keynesian thoughts initially based their analysis of how monetary actions affects the economy as working mainly through business decisions about investment expenditure, subsequent works on monetary policy transmission mechanism gave attention to other investment decisions like consumers decision about consumer durable expenditure and expenditure on housing as investment (Mishkin, 1995; Taylor, 1995).

Exchange Rate Channel

The exchange rate channel of monetary policy transmission mechanism is based on interest rate changes. This channel of monetary policy transmission mechanism captures the international effect of domestic monetary policy, especially after financial liberalization. It works principally when the economy is operating a flexible exchange rate system and not fixed exchange rate system. The exchange rate effect works stronger the higher the degree of variability of exchange rate. For instance, given that there are flexible exchange rates, the monetary policy transmission mechanism via the exchange rate medium puts forward that, a contractionary monetary policy increases real domestic rate of interest and make domestic financial instruments or assets look relatively more attractive to investors as compared foreign assets and this results into a rise in demand for domestic currency, which also yield an appreciation of domestic currency relative to other foreign currencies. As a result of appreciation in domestic currency, goods and services produced domestically become more expensive abroad than foreign

produced goods, which leads to a fall in export and other export-oriented investments. Additively, appreciation makes imports competitive in the domestic economy and hence net export falls leading to a decline in aggregate spending and aggregate demand will also fall (Bryant et al., 1993; Mishkin, 1995; Taylor, 1995).

Asset Price Channel

Monetary transmission through the asset price channel asserts that changes resulting from the monetary policy stance of an economy affects asset prices particularly, prices of equity or the value of collateral which in turn induces changes in consumption and investment via the wealth effect and the implications it has on the cost of financing investments. One variant of the asset price channel is the Tobin's q theory of investment developed by economist James Tobin (1969), and it provides a channel through which monetary policy effects on the real economy can be explain through its effects on the valuation of equities. In his analysis, Tobin (1969) defined q as the market value of firms divided by the replacement cost of capital. A high q according to Tobin means that the market price of firms is high relative to the cost of replacement of capital, and new plant and equipment capital are also cheap relative to the market value of firms. This means that firms can issue stocks and get higher prices for their stock relative to the cost they incur for the facilities and equipment they are purchasing; hence investment spending will rise since firms can now buy a lot of new investment goods with only a small amount from the stock issued. For instance, monetary policy expansion yields low interest rate. This diverts investors' attention to the stock market, increase in demand for

shares, increase share prices and therefore the market value of firms and the value of q. This leads to an increase in investment spending resulting into higher output by firms hence increasing aggregate demand and output.

Another perspective of the asset price channel is the wealth effects on consumption forwarded by Franco Modigliani (1971). According to his life-cycle model, consumption spending is determined by the lifetime resources of consumers, which comprise human capital, real capital and financial wealth. Financial wealth is postulated to have a major component called stocks and it is this stock that affects consumers resources. For instance, a monetary contraction in an economy, leads to a fall in the price of stock, a decrease in the value of financial wealth of consumers and hence a reduction in the lifetime resources of consumers. This results in a fall in consumption and a decline in aggregate demand and hence output (Mishkin, 1995; Modigliani, 1971).

The Credit Channel

The credit view postulates that interest rate effects of monetary policy on expenditures on durable assets are not captured due to the presence of asymmetric information in financial markets (Bernanke & Gertler, 1995; Mishkin, 1995). The credit channel, proposes that two types of monetary transmission channels arise as a result of information problems in credit markets: firstly, there are those that operate through effects on bank lending referred to as bank lending channel. This traces the effects of monetary policy on the supply of banks loanable funds. It states that banks are the sole source of credit to borrowers and that there are no perfect

substitutes. As a result, changes in money supply affect banks reserve and deposit, which in turn affect their ability to make loans. Since borrowers depend on banks for loans to finance their project, this affects investment and hence aggregate output (Bernanke, 1993; Bernanke & Gertler, 1995; Cecchetti, 1995; Hubbard, 1995; Mishkin, 1995, 2010).

The second variant is the balance sheet channel, which is premise on how monetary policy changes affects the financial position of borrowers in terms of their net worth, cash flow and debt collateral. It looks at the role the financial position of private agents performs in the transmission mechanism of monetary policy. It arises because the shifts in policy affect not only market interest rates but also, the financial position of private economic agents because changes in interest rates affect bank balance sheets, cash flows and the net worth of companies and consumers. Higher interest rates result in reduced cash flow, reduced net worth, drop in loans, and decline in aggregate demand. The argument here is that official interest rates affect the market value and the income flows of some categories of financial instruments and these resultant changes in wealth and interest income have an effect on micro and aggregate expenditure, output, prices and the profitability of economic agents because they directly affect the balance sheet items of the accounts of companies. The balance sheet channel shows how monetary policy affects the credit portfolio of financial intermediaries as well as other economic agents. For instance, a contractionary monetary policy such as sale of treasury instruments affects banks' ability to grant loans, leading to credit rationing. By implication, this affects credit availability to borrowers, especially small-scale

borrowers with less sophistication and collateral to back-up their loan demand. Also, low credit leads to an increase in interest rates thereby raising the cost of credit to borrowers and a fall in investment hence causing aggregate output to fall. (Bernanke, 1993; Bernanke & Gertler, 1995; Cecchetti, 1995; Hubbard, 1995).

Economic Growth

Since the time of Adam Smith in the eighteenth century, economists have been trying to understand why and how poor countries become rich and rich countries become richer, hence there are numerous of theories that has been put forward to explain growth but for the purposes of this research objective, a brief review of some of these growth theories is reviewed in the following sections to help enlighten the financial development and monetary policy to growth path.

The Harrod-Domar Growth Model

The Harrod-Domar growth model also sometimes referred to in economic literature as the Harrod-Domar Keynesian theory of growth or simply, Harrod-Domar Growth Model was developed by Harrod (1939) and Domar (1946). The theory is based on the active role of money, the principles of effective demand and on the saving function respectively, the transition of saving to investment and multiplication effect. In their analysis, Harrod (1939) started with the accelerator principle and Domar (1946) started with the multiplication effect. Despite the different approaches, they came to the same conclusion that the rate of growth is determined jointly by the national savings ratio and national capital output ratio.

Harrod-Domar argued that the growth of an economy is a reflection of the economy's aggregate savings and capital-output ratio levels. The model postulates increased investments raises aggregate national income which have the overall effect of raising the level of output, and for that matter growth (Hochstein, 2006). However, this can be achieved when economies attract more investments, accumulate sufficient capital to augment domestic investments (Chenery & Strout, 1966).

Theoretically speaking, the Harrod-Domar model has been criticized for not defining the mechanism used to establish equilibrium in the economy hence, the equilibrium is unstable since it requires the equalization of warranted and natural growth rates. Again, although it is based on a Leontief type production function with constant coefficient, it does not consider the substitutability of capital and labour. These weaknesses among others have made economists to pay less attention to the Harrord-Domar growth model in favour of growth models that are less rigid and empirically more applicable (Domar, 1946; Harrod, 1939; Maier, et al., 2007).

The Neo-classical Growth Model

The neoclassical theory of growth was developed during the 1950s and 1960s. Some of the main proponents of the neoclassical growth theory are Ramsey (1928), Solow (1956) and Koopmans (1965). It was developed due to the shortcomings of the Harrod-Domar model by Solow (1956) and Swan (1956), which is popularly referred to as the Solow-Swan growth model or just Solow model. The model tries to explain output determination using the reciprocal

interaction of capital, labour, and technology. They used production functions that exhibit constant returns to scale, diminishing returns to each input, and positive substitutability to inputs. The production function is assumed to be a function of capital, labour, and technology. By assuming a constant rate of saving, the model predicts that growth in the long-run is a function of only technical change and not of saving or investment. Saving will have effect on the level of income but not on its growth rate. This forecast infers that in the absence of continuous improvement in technology, per capita growth will eventually be terminated.

Solow (1956) essentially argues that when production takes place under usually neoclassical conditions of variable proportions and constant returns to scale, there will be no opposition between natural and unwarranted rates of growth. This is because the economy will self-adjust to the given rate of growth of labour force and eventually approximate a state of steady proportional expansion. To differentiate his model from the Harrod-Domar model and its fixed capital-output ratio, Solow defined a production function that permits factors to be continuously substituted for each other. Such continuous substitution means that the marginal product of each factor is variable, depending on how much of the factor is already used in production and how many other factors it is combined with (Van den Berg, 2012).

Solow furthermore assumed that each factor of production is subject to diminishing returns. That is, as equal increments of one factor are added to a fixed amount of the other factors of production, output increases, but it increases by ever-smaller amounts. Solow's aim was to show that the Harrod-Domar model was

wrong in concluding that a constant rate of saving and investment could bring everlasting economic growth. Solow proved that, with diminishing returns, the continuous investment could not, by itself, generate permanent economic growth as postulated by the Harrod-Domar model because diminishing returns would eventually cause the gains in output from investment to approach zero. Solow's model thus clashed with what many development economists were advising policymakers to do in order to increase economic growth, which was to increase saving and investment any way possible (Van den Berg, 2012).

The next conclusion of the model concern convergence. If two countries indicate the same population growth rate, the same savings rate and work with the same production function, they finally reach the same level of output. These theories prove that small countries are small because they hold less capital. If the countries hold different savings rate, they reach different output levels in the steady state. In case their technological progress rate and population growth rate identical, their output rates will be the same in steady state. In other words, the Solow model implies that if a country's national saving rate rises, growth will temporarily rise above its long-run rate as the economy shifts to its new equilibrium. However, long-run equilibrium growth is independent of the savings or the population growth rate (Dornbusch & Fischer, 1994).

Though the neoclassical growth model is intuitively plausible, it has at least two drawbacks. First, it does not explain what determines technological change because it is completely independent of the decision of economic agents. Secondly, the theory fails to explain large difference in residual across countries with similar

technologies, hence the emergence of the endogenous growth model. But, despite its drawbacks, a great deal of modern theoretical and empirical work on economic growth is based on the neoclassical growth model.

The Endogenous Growth Model

The empirical and policy problem associated with the Solow model such as the non-convergence of economic growth in a long-term development in the world and the declining rate of average productivity of labour in the markets of advanced economies during the 1960's and 1970's led to the emergence of new models which attempt to endogenize the growth process. The endogenous growth model can be attributed to proponents such as Romer (1986), Lucas (1988), Grossman and Helpman (1990), Rebelo (1991) and Jones (1995). Generally, the endogenous growth model explains how economies increase growth through economies of scales, technological progress and increasing returns to scales. It considers, natural resources utilization, progress in technological advancement to be critical for economic growth (Hamid & Pichler, 2011). Primarily, it considers policy measures such as subsidies for research and development, education, investment in human capital, knowledge and innovation as the significant contributors for long-run economic growth and development. In addition, it deems development in human capital through training and education to be another form of fixed capital together with machineries and buildings (Petrakos et al. 2007).

Endogenous growth theories also assert that, as the economy becomes open it encourages technology inflows and ideas from other nations and this causes

economies to experience rapid growth rates. Again, since the private sector might not invest at optimal, the theory highlights government intervention and policy to stimulate investment in research and development. Particularly, it advocates for government intervention in the tax system, where there are tax incentives for research and development and the development of new technologies, intellectual property rights and their protection, law eligibility, the infrastructural development, the human capital investment support, foreign trade regulation and so on. The works of Barro and Sala-i-Martin (1995), Obstfeld and Rogoff (1996) attest to this postulate.

The Finance-Led Growth Hypothesis

The finance-led growth or the supply leading hypothesis was put forward by Patrick (1966) as one of the two-sided possibilities of the relationship between financial sector development and economic growth. The supply-leading hypothesis was a built up of the work of Schumpeter (1912) and further supported by the Keynesian growth models and McKinnon (1973) and Shaw (1973) models. In general, the supply-leading hypothesis performs two core 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) observed that, economies can stimulate their growth pattern by investing in various innovative ventures in the financial sector. Empirically, the supply-leading hypothesis posit that for an economy to attain sustainable levels of growth and development, it must

first develop its financial sector (Choe & Moosa, 1999; Levine, 1997; Levine et al., 2000; Schumpeter, 1912). In other words, financial development leads to economic growth. That is, the existence of effective and efficient financial system in terms of channeling scarce resources from abundant sectors to other sectors in need of it would aid in the allocation of financial resources efficiently hence leading to the progress of various macroeconomic indicators such as economic growth.

The Growth-Led Finance Hypothesis

The growth-led finance or the demand following hypothesis can also be attributed to the work of Patrick (1966) on the relationship between financial sector development and economic growth. The demand-following hypothesis argues that economic growth leads to financial development. Specifically, it points to the fact that as the economy expands and grows, it creates automatic development and demand in various sectors of the economy including the financial sector. In light of this, the financial sector in response to the growth of the economy expands, the establishment of various financial institutions, expansion of financial assets and liabilities and other related financial services. Empirical studies by Demetriades and Hussein (1996), Odhiambo, (2008), Liang and Teng (2006), Zang and Kim (2007) and Odhiambo (2010) among others, have supported the demand following hypothesis.

The McKinnon and Shaw Hypothesis

McKinnon and Shaw (1973) propounded financial sector liberalization hypothesis which put forward that the level of financial liberalization in a financially repressed economy, specifically, in developing countries, enhance savings which leads to a rise in supply of credit and in effect induce capital accumulation, increase investment which also induces economic growth. McKinnon and Shaw argued that stringent regulations and controls such as deposit interest rate ceiling, minimum or maximum lending rates and restrictions on lending quantity in financial markets result in repression of the sector. These regulations result into interest rates rise which causes a decline in domestic investment and savings and in turn, impedes economic growth and development. Hence, they advocated for financial liberalization where there are high and positive real interest rates to help induce savings, which will also increase the supply of credit to firms hence enabling them to pursue positive net present value projects. Resultantly, capital formation increases and investment spending also rise, hence leading to economic growth. This gives clear indications that activities of the financial market significantly influence the economic growth of an economy.

Empirical Review

Krause and Rioja (2006) adopted the Generalized Method of Moments (GMM) estimation to test the financial development and monetary policy link for 37 industrialized and developing countries for the period 1985 to 1998. They employed three indicators; private credit, liquid liabilities, and a financial aggregate

index made up of banking and stock market measures to capture financial development. They concluded that more developed financial markets significantly contribute to more efficient monetary policy implication in an economy.

Saxegaard (2006) examined how excess liquidity affects monetary policy effectiveness in sub-Sahara Africa with focus on the Central African Economic and Monetary Community (CEMAC) region including Nigeria and Uganda covering the time period 1990 to 2004. The author employed a Non-Linear Structural Vector Autoregressive model specifically the Threshold Vector Autoregressive (TVAR) model. Results for Nigeria, and Uganda, showed that, involuntary excess liquidity weakens the transmission of a shock to monetary policy to Consumer Price Index (CPI) inflation. For the CEMAC region, the analysis revealed that monetary policy transmission mechanism was weak in the two regimes considered, which is attributed to the fact that involuntary excess liquidity was relatively high across the whole sample space. The study concluded that excess liquidity weakens the monetary policy transmission mechanism and the ability of monetary authorities to influence demand conditions in the economy.

Carranza, Galdon-Sanchez and Gomez-Biscarri (2010), adopted overall size and depth of financial intermediaries, level of activity in the stock market and relative size of the central bank to capture financial development and analyze the link between financial development and monetary policy for 53 countries covering the period 1986 to 2005. They used a Non-hierarchical Cluster Analysis, Dynamic Panel and VARIMAX as estimations and found that monetary policy has a larger

impact on the economies under review when the financial system is developed and the impact is even greater for economies with small central banks.

Misati, Lucas and Anne (2010), examined the link for Kenya by looking at the effect of financial innovation on monetary policy transmission with focus on the interest rate channel through which the central bank implements monetary policy. They employed Two Stage Least Squares (2SLS) and monthly data covering the period 1996 to 2007. They found that financial innovation dampens the interest rate channel of monetary transmission mechanism. Conclusively, they postulated that financial innovation poses complex challenges to monetary policy conduct which would require monetary authorities to constantly revise policy and instruments, targeting frameworks and operating procedures to enhance monetary policy effectiveness.

Employing monthly data, Singh (2011), examined the pass-through effect, as well as the asymmetric response of policy interest rates to financial markets in India for the period March 2001 to October 2011. The author adopted the framework of distributed lag model and found that short end of the financial market displays a significantly high instantaneous pass-through in response to changes in the monetary policy rates. Findings also revealed that, the prevailing liquidity conditions in financial markets also play an important role in conditioning the pass-through of policy rate changes to short end of the financial market. However, bank deposit and lending rates exhibited relatively longer lags in transmission. Significant asymmetry of transmission of policy rate changes during the surplus

and deficit liquidity conditions, particularly at short end of financial markets was also found via using Vector Autoregressive (VAR) model.

Batuo and Mlambo (2012), examined for 53 African countries covering the period 1985 to 2010, on the financial development and monetary policy link. They adopted Treatment Effect, Two Step Method and Panel Probit Method as estimations and the results showed that banking crises have negative impact on the economy and financial liberalization tend to reduce banking crises hence the more the economy is liberalized the positive impact it has on growth.

Safdar and Khan (2013), also analyzed the financial development and monetary policy link by using the interest rate channel for Pakistan. They employed Ordinary Least Squares (OLS) as estimation and quarterly data covering the period 1981 to 2010 and found that interest rate channel of monetary policy transmission mechanism dampens output and hence financial innovation has implications for output and monetary policy.

Ray and Prabu (2013), conducted a study in India to find out the financial development and monetary policy transmission link across financial markets covering the period 2005 to 2012. They employed a Structural Vector Autoregressive (SVAR) model to analyze the financial markets microstructure and monetary policy transmission viz money, bonds, forex and stock market. They found that the transmission of monetary policy to money market is efficient but its effects on bond and forex market are on expected lines and monetary policy impact on stock market is limited. They concluded therefore that the nature of monetary policy transmission varies depending on the extent of liquidity.

Testing on the link in Bangladesh, Bristy (2014), examined whether the level of financial development has impacts on exchange rate volatility and economic growth. The author adopted the Ordinary Least Squares estimation technique to test for the link, including the interaction between financial development and exchange rate volatility. Findings showed that due to poor development of the financial sector, growth in Bangladesh is adversely affected by exchange rate variability. Again, due to low level of financial development, anticipation of exchange rate fluctuations discourages innovation, hence lowering the growth.

Menyah, Nazlioglu, and Wolde-Rufael (2014), examined the causal relationship between financial development, international trade and economic growth for 21 African countries for the period 1995 to 2005. They applied panel bootstrapped approach to Granger causality using a financial development index based on four different financial development indicators. They found that financial development leads to economic growth and trade openness also result into the growth of the economy but concluded that their impact was not so significant.

Angelopoulou, Balfoussia, and Gibson (2014), used principal component analysis to investigate the financial development and monetary policy relationship for the European Union Area for the period 2003 to 2011. They employed financial condition index (FCI), interest rate, interest rate spread and credit quantity as measures and found that financial condition index impact differs across the European Union Area after the Global financial crises.

Fiador (2015) analyzed the link between monetary policy and financial development for three Anglophone West African countries, namely, Ghana, Gambia and Nigeria for the period 1975 to 2011. The author adopted Autoregressive Distributed Lags (ARDL) approach and found by employing credit to the private sector to GDP ratio as a measure for financial development. The study revealed that monetary policy transmission in the countries investigated was ineffective. The findings show that there exist significant differences in interest rates pass-through of the three countries. Ghana and Gambia on one hand showed evidence of undershooting of lending rates to monetary policy changes but Nigeria exhibited overshooting of lending rates. The author concluded that financial development proved significant in some cases and economic growth also proved insignificant in the transmission of the policy rate to bank lending rates.

Ma and Lin (2016) used panel quarterly data for 41 economies for the period 2005 to 2011 to carry out an analysis of the relationship between financial development and the effectiveness of monetary policy. They employed Pooled Least Squares, Fixed Effect, and Random Effect estimation and found that the effect of monetary policy on output and inflation are significant but negatively correlated with financial development. They concluded therefore that, the effectiveness of monetary policy falls with improvement in the financial system.

Jawadi, Mallick, and Sousa (2016), also carried out a study using Panel Vector Autoregressive (VAR) approach to examine the effect that financial development has on fiscal and monetary policies for the BRICS countries (that is, Brazil, Russia, India, China and south Africa) covering the period 1990 to 2012.

They used variables such as interest rates, central bank rate and broad money supply (M2) and found that unexpected rise in central bank's rate in BRICS economies inversely affects the spillover between fiscal and monetary policies.

Effiong, Esu, and Chuku (2017), also investigated whether financial development influences the effectiveness of monetary policy on output and inflation in Africa for the period 1990 to 2015 using a panel of 39 countries. They applied panel data techniques such as Pooled Least Squares, Fixed Effects, Random Effects and Generalized Method of moments (GMM) as estimations and found a weak relationship between financial development and monetary policy effectiveness in Africa. The result also shows that, there exist no statistical evidence of the link for output growth but there exists a negative link in the case of inflation on contemporaneous levels.

Seth and Kalyanaraman (2017) using a panel of 119 countries carried a cross-country analysis for the period 1997 to 2014 to investigate the effects of financial development on the transmission of monetary policy vis a vis output and bank liquidity. They adopted Bank deposits to GDP, Stock Market Capitalization to GDP, and Central Bank Assets to GDP as variables to capture financial development. They found that financial development positively impacts on output, and negatively affects bank liquidity. They also concluded that financial development heightens the effect of bank liquidity on output.

Loganathan, Ismail, Streimikiene, Hassan, Zavadskas, and Mardani (2017) explored the dynamic linkage between financial development, inflation and economic growth on tax revenue condition for Malaysia for the period 1970 to

2015. They employed the Maki's cointegration test with various structural breaks, bootstrap rolling window causality applications and the Lind and Mehlum (2010) estimation to capture the U-shape condition of tax-led-growth. Findings from quadratic estimates indicated an inverted U-shape effect between economic growth towards the tax revenue. In terms of causality analysis, they found that, there is unidirectional causality running from taxation to financial development and inflation; and a unidirectional causality running from GDP to taxation. Furthermore, results from the bootstrap rolling window causality also showed numerous sup-period predictive powers of causalities running between taxation, financial development, inflation and economic growth.

Akinsola (2017), also examined the impacts of financial development on monetary policy in Africa for the period 1980 to 2016. Using dynamic panel data analysis as an estimation technique, and liquid liabilities to GDP ratio and domestic credit to private sector to GDP ratio as measures for financial sector development, the study found out that there exists a positive correlation between financial deepening and monetary policy vis a vis lending interest rate, output gap and inflation rate in Africa. However, banking crisis dummy which was used to capture financial crises was found to be negative and significant.

Abradu-Otoo, Amoah, and Bawumia (2003), conducted an investigation into the monetary transmission mechanism in Ghana. The study adopted a Structural Vector Error Correction (S-VEC) analysis for the periods of 1969:4 to 2002:4 and M2+ money supply as a shock variable. They found evidence of the monetary policy instruments having effects on inflation and output in the long run.

The study also showed that the exchange rate channel remains the main medium through which monetary policy acts in Ghana.

Acheampong (2005), adopted the error correction model (ECM) to investigate the interest rate channel of monetary policy transmission by analyzing the impact and long-run adjustments of lending rate and deposit rate to changes in the money market rate. The study employed monthly data covering the period 1994 to 2004 and found that interest rates in Ghana responds sluggishly to changes in money market rates. It further noted that policy shift has some impacts on lending rate decisions of banks but no significant effect on borrowing rate.

Quartey and Prah (2008), investigated the finance-growth causal link in Ghana. They found some support for the notion that growth of the economy drives enhancement in the financial sector, by proxying growth of broad money as a percentage of GDP for financial development. They, on the contrary, found no support for the finance driving economic performance with growth in domestic credit as a percentage of GDP, credit to private sector as a percentage of GDP, and credit to private sector as a percentage of domestic credit ratio as financial development indices. They also concluded on no statistical support for the stages of development hypothesis in Ghana.

Kovanen (2011), analyzed the interest rate pass through of monetary policy transmission using data spanning over the period 2005 to 2010. The study employed variables like interbank interest rate, prime rate, wholesale market interest rate, treasury bill rate, retail deposit interest rates and lending rates. It employed vector Autoregressive model (VAR) for estimation and found that there is a relatively

strong short-term response from changes in the prime rate to the wholesale market interest rates (interbank and treasury bill). The long-term responses in the wholesale interbank market interest rate are protracted, weakening the effectiveness of Bank of Ghana's monetary policy implementation. Significant deviations from the policy rate suggest that the prime rate may not always provide an accurate indication of the monetary authorities' policy stance. This has implications for monetary policy effectiveness and central bank's ability to communicate its policies to the public.

Again, Adu, Marbuah, and Mensah. (2013), assessed the connection between financial sector improvement and growth of the economy from 1961 to 2010. Using eight various indices for the evolution of the finance and applying ARDL approach, they demonstrated that the impact of enhancement of the financial sector is contingent on the indicator used. For instance, while credit to private sector (%GDP) or credit to private sector as a percent of overall credit as measures for the evolution of the financial sector showed a significant positive impact on growth, broad money (%GDP) indicated a significant negative effect on growth.

Alhassan (2014), also examined the responses of real GDP and inflation to monetary policy instruments shocks in Ghana using a multivariate modeling technique of the Vector Autoregressive model (VAR). The study employed variables like real GDP, price level, broad money supply (M2), real lending rate, real effective exchange rate and domestic credit for the period 1980-2012. The study found that the potency of monetary policy in influencing real GDP and inflation is limited, as important channels of monetary transmission are not fully functional. The lending rate channel, credit channel, and the exchange rate channel

were found weak. It further concluded that there exists lack of unequivocal evidence in support of the conventional channel of monetary policy transmission mechanism.

Lastly, a recent work by Ofori-Abebrese, Pickson, and Diabah (2017), examined the finance-growth nexus by using ARDL approach and Granger causality test to investigate the relationship and the causal direction between financial development and economic growth in Ghana for the period 1970-2013. They revealed that the amount of credit from domestic sources to the private sector maintained a positively significant link with the growth of the Ghanaian economy whereas domestic deposit was not the case. Also, the results established that there is a dependence of the Ghanaian economy to the changes in domestic credit to private sector and there exists a uni-directional causality running from the variations in economic growth to the domestic deposit in Ghana.

Conclusion

This chapter reviewed relevant literature (both theoretical and empirical) on the effects of financial development and monetary policy on economic growth in Ghana. Theoretically, it focused on concepts and theories that underpins financial development and monetary policy such as the classical theory, Keynesian theory, Monetarist theory, as well as theories of monetary policy transmission mechanism like the interest rate channel, exchange rate channel, asset price channel, and the credit channel. It further looked at theories of economic growth such as the Harrod-Domar model, Neo-classical model, Endogenous model, Finance-led growth

hypothesis, Growth-led finance hypothesis and the McKinnon and Shaw hypothesis. A synthesis of the empirical literature reviewed revealed that studies done in the field are mostly centered on the interest rate channel of monetary policy transmission. For instance, Abradu-Otoo et al., (2003), looked at the interest rate channel using S-VEC for the period 1960 to 2002; Acheampong (2005), also studied the interest rate channel using ECM coving the period 1994 to 2004 and Kovanen, (2011) used VAR to conduct similar analysis for the time 2005 to 2010. However, this study seeks not only to extend the study period from 1980 to 2016 but will also take into account the joint effect of financial development and monetary policy on output in Ghana using the Autoregressive Distributed Lag (ARDL) approach.

CHAPTER THREE

RESEARCH METHODS

Introduction

This chapter presents the methodology for the study. It discusses the method, data and estimation technique used in achieving the objectives of the study. It is structured into five sections. The first section presents the research design used for the study. The second section details the theoretical framework that was used in the study. The third section presents the empirical model specification of the effects of the link between financial development and monetary policy on GDP. The fourth section presents the measurement of relevant variables used in the model together with the expected sign from each of the variables as well as the data sources. The last section explains the estimation techniques and the tools for data analysis.

Research design

The research design adopted in this study for the data analysis follows the quantitative approach. This study finds its bearing in the context and assumptions of the positivist philosophy which support the application of quantitative methodology. The positivist philosophy assumes that objective knowledge systematically pursued by researchers is based on general causal laws. They use validity, reliability, objectivity, precision and generalizability to judge the rigor of quantitative studies as they intend to describe, predict and verify empirical relationships in relatively controlled settings. Additively, the positivist philosophy assumes that knowledge is objective, hence leading researchers to be strictly neutral

and take detached positions towards the phenomenon they are investigating and it rids the study of any form of personal biases from the researcher. Specifically, since the objective of the study is explanatory in nature, that is to examine the effects of monetary policy and financial development on GDP, the study employed the explanatory research under the quantitative approach.

Data type and sources

The study employed annual time series data covering the period 1980 to 2016 to investigate the effects of monetary policy and financial development on economic growth in Ghana. All data series, with the exception of Financial development and Monetary policy proxied by central banks policy rate, is taken from World Bank Development Indicators (2017). Data on Financial Development was obtained from the International Monetary Fund (IMF) data and Monetary Policy was sourced from the International Monetary Fund (IMF) International Financial Statistics (2018) database.

Model specification

The study adopted the neoclassical growth model which maintains that growth can arise when capital and labour are augmented by additional inputs in the production function. The Solow growth model explains economic growth as resulting from the combination of capital (K) and labour (L), that is:

$$Y_t = f(K_t, L_t) \quad (1)$$

Equation (1) gives rise to the question of how much of the increase in output can be attributed exclusively to changes in capital and labour. This is because, it is possible for other factors, other than labour and capital to influence output. To resolve this problem, Solow (1956) disintegrates increase in output into three components: physical capital accumulation, growth of labour force and growth of total factor productivity (TFP). The growth of TFP captures the increase in output that is not accounted for by an increase in physical inputs (that is, in labour and capital) in the model. Thus, the TFP can be interpreted as the effect of exogenous technological progress that can also be reflected in increasing productive efficiency. To account for this, Solow employed the Cobb-Douglas production function expressed in equation (2) below:

$$Y_t = f(A_t, K_t, L_t, \ell) \tag{2}$$

Where Y_t is output or real GDP at time t, A_t is total factor productivity (TFP) at time t, K_t is capital stock at time t, L_t is labour stock at time t and ℓ represents the naperian "e". Applying the Cobb-Douglas production function, Solow stated the equation as:

$$Y_t = A_t K_t^{\alpha} L_t^{\delta} \ell \tag{3}$$

It is important to note that A is not fixed but varies with different production functions based on the factors being studied.

Following Uhlig (2005); Krause and Rioja (2006); Sakyi (2011); Ayibor (2012); Asiedu (2013); Adu et al. (2013); Fiador (2015); Ma and Lin (2016); Effiong et al. (2017); Seth and Kalyanaraman (2017) and Ofori-Abebrese et al. (2017) , a growth

equation for Ghana is estimated employing other macroeconomic variables as explanatory variables which enters into equation (3) via the TFP (A) specified as:

$$A_t = f(FD_t, MP_t, FDMP_t, FDI_t, RI_t, INF_t) \quad (4)$$

Where *FD* represents Financial Development, *MP* is Monetary Policy, *FDMP* denotes Financial Development and Monetary policy interaction, FDI represents Foreign Direct Investment, RI represent Private remittances and INF connotes Inflation. By implication TFP can be written as:

$$A_t = FD_t^{\beta_1}, MP_t^{\beta_2}, FDMP_t^{\beta_3}, FDI_t^{\beta_4}, RI_t^{\beta_5}, INF_t^{\beta_6} \quad (5)$$

Now, substituting equation (5) into equation (3) gives:

$$Y_t = \eta FD_t^{\beta_1}, MP_t^{\beta_2}, FDMP_t^{\beta_3}, FDI_t^{\beta_4}, RI_t^{\beta_5}, INF_t^{\beta_6}, K_t^{\alpha}, L_t^{\delta}, \ell \quad (6)$$

In accordance with literature and reference to objectives of the study, the study applied logarithm to equation (6) and estimated a log-linear model of the form:

$$lnY_t = ln\eta + \beta_1 lnFD_t + \beta_2 lnMP_t + \beta_3 lnFDMP_t + \beta_4 lnFDI_t + \beta_5 lnRI_t + \beta_6 lnINF_t + \alpha lnK_t + \delta lnL_t + \varepsilon_t ln\ell \quad (7)$$

Now, setting $ln\eta = \beta_0$, $\alpha = \beta_7$, $\delta = \beta_8$, and $ln\ell = 1$, equation (7) therefore can be written as:

$$lnY_t = \beta_0 + \beta_1 lnFD_t + \beta_2 lnMP_t + \beta_3 lnFDMP_t + \beta_4 lnFDI_t + \beta_5 lnRI_t + \beta_6 lnINF_t + \beta_7 lnK_t + \beta_8 lnL_t + \varepsilon_t \quad (8)$$

Where the coefficients β_1, β_2, β_3, β_4, β_5, β_6, β_7 and β_8 are the parameters of the respective variables, β_0 is the constant term (drift), t denotes time, ln is the log operator and ε is the error term. All the economic variables in the model have their values in logs. The choice to use a log-linear model stems from three reasons,

firstly, to accurately measure the percentage change in Y_t resulting from a percentage change in any of the independent variables. Secondly, the log-linear approach was used to bring values of all the variables to the same unit level for effective measurements and interpretation. Lastly, it also gives an approximate elasticity measure of the dependent variable Y_t, reducing the incident of heteroscedasticity (Gujarati & Porter, 2009).

Measurement of variables and A' priori expectations

Economic growth (Y)

Economic Growth is defined as the sustained increase in a country's real output or real gross domestic product overtime (Demetriades & Hussein, 1996). In this study, real GDP was used as a proxy for economic growth instead of GDP growth rate or GDP per capita since it is the most popular measure of economic growth and mostly used in the literature and mostly used too by the Breton Wood Institutions. In addition, this measure is preferred to other measures because, it nets out the effect of inflation on the price of the goods and service produced by adjusting inflation terms. Thus, real GDP is used as a proxy for Economic growth. Seth and Kalyanaraman (2017) employed real gross domestic product as a proxy of economic growth to investigate the effects of financial development on the transmission of monetary policy vis a vis output and bank liquidity for 119 countries. Economic growth is used as the dependent variable in the model.

Financial development (FD)

Financial development primarily has to do with increasing the efficiency of allocating financial resources and monitoring capital projects, through encouraging competition and increasing the importance of the financial system. According to Calderón and Liu (2003), financial development is the improvement in quantity, quality and efficiency of financial intermediary services.

Several indices have been adopted to measure financial development. Prime among the indicators used to measure financial development are credit to the private sector a percentage of GDP. Private credit is deemed a broader measure since it includes all financial institutions, not only deposit money banks and a comparative comprehensive measure of credit intermediaries to private sector developments. Most literature widely suggested this (Anderson, 2003; Kemal, Quayyum & Hanif, 2007; King & Levine, 1993) among others. Another proxy used for financial development is liquid liabilities measured by broad money M2 as a ratio to GDP. M2 equals currency plus bank demand deposits (M1) plus bank interest-bearing time deposits (Gillman & Harris, 2004; Levine, 1997; Kemal, Qayyum & Hanif, 2007; King & Levine, 1993; Odhiambo, 2008). It measures financial depth or size of the financial intermediaries' sector (Levine, 1997). Rousseau and Wachtel (1998) also used measures that include the assets of both banks and non-banks, such as private credit to GDP from banks and non-deposit money banks. Levine and Zervos (1998) also added measures of stock market size and liquidity to bank development measures. Last but not the least, Pesaran, Shin, & Smith, 2001) included measures of life insurance and private pension fund assets

to measure financial development. In this study, Financial development is measured based on the latest index, the Global Financial Index of the IMF, which is a proxy of the Financial Depth, Access, Efficiency and Stability and it is measured as a percentage of GDP. It is created based on nine indices that summarizes how developed financial institutions and financial markets are in terms of their depth, access, and efficiency (Svirydzenka, 2016).

Financial institutions include banks, insurance companies, mutual funds, and pension funds. Financial markets include stock and bond markets. Financial development is defined as a combination of depth (size and liquidity of markets), access (ability of individuals and companies to access financial services), and efficiency (ability of institutions to provide financial services at low cost and with sustainable revenues, and the level of activity of capital markets) (Čihák et al., 2012).

Financial institutions depth sub-index was measured by private-sector credit to GDP, pension fund assets to GDP, mutual fund assets to GDP, and insurance premiums, life and non-life to GDP. Financial institutions access was proxied by the number of bank branches and ATMs per 100,000 adults. Financial institutions efficiency sub-index captured efficiency in intermediating savings to investment, measured by the net interest margin and lending-deposit spread; operational measures like non-interest income to total income and overhead costs to total assets and profitability measures, such as return on assets and return on equity (Svirydzenka, 2016).

Financial market indicators focus on stock market and debt market development. The depth sub-index included stock market capitalization to GDP, stocks traded to GDP, the volume of international debt securities of government to GDP, total debt securities of financial corporations to GDP, and total debt securities of nonfinancial corporations to GDP. Financial market access was measured by the percentage of market capitalization outside of top 10 largest companies, the total number of financial and nonfinancial corporate issuers on the domestic and external debt market in a given year per 100,000 adults. And in terms of financial market efficiency sub-index, stock market turnover ratio was used (Svirydzenka, 2016). Accordingly, and consistent with prior research of Adu et al. (2013), a positive relationship is expected between financial development and output.

Monetary policy (MP)

Monetary policy in simple terms has to do with the use of central banks control over the supply of money to influence aggregate output. In practice, the conduct of monetary policy by a country's central bank is poised towards the achievement of economic growth, price stability, lower unemployment and to maintain a balanced balance of payment. Monetary policy has long been identified as the instrument used to control supply of money in an economy. Friedman, (1968) observed that it is used to keep inflation in check and to ensure optimal growth of output in a country. While some literature (Mankiw, 2006; Abdul, 2015; Gatawa, 2017) has used broad money supply (M2) as a proxy for monetary policy, this study used central banks' policy rate or discount rate or the base rate prevalent in the

country set by the Bank of Ghana as a proxy for monetary policy (Mankiw, 2006; Seth & Kalyanaraman, 2017). As such, a positive link is expected between monetary policy and economic growth.

Financial development and monetary policy interaction (FDMP)

Financial development and monetary policy variable have been incorporated into the model to capture the interaction between financial sector development and monetary policy. It measures the joint effects on output. The interaction term is meant to capture the extra effect of financial development while controlling for other variables. Specifically, a positive coefficient for the interaction term would suggest that with financial development the effect of monetary policy on output is stronger. As such, in line with the work of Seth and Kalyanaraman (2017), the study expects a positive relationship between the interaction term and economic growth.

Foreign direct investment (FDI)

Foreign investment capital inflows are measured by annual foreign net inflows into the country. It is the net inflows of investment from a direct investor with the purpose of acquiring a lasting management in an enterprise situated in a country other than the investors. Some authors argue FDI to positively affects growth of economies (Balasubramanyam & Salisu, 1999). However, others are of the view that FDI inflows does more harm than good in host economies (Saltz,

1992). Hence, either positive or negative link is envisaged between FDI and economic growth.

Remittances (RI)

This is broadly defined as 'personal monetary transfers that migrant workers make to their relatives back in their country of origin (IOM, 2009). It can be in the form of; migrants' salaries and wages earned in the host countries transferred to the home country. Remittances are more effective in raising private investment in the recipient countries. It can also increase private investments by alleviating credit constraints in the private sector. Singh et al, (2009) indicated that remittances could enhance private investment by minimizing the volatility of consumption. With reference to Singh et al, (2009) and Owusu (2015), a positive relationship is expected between private remittances and economic growth.

Inflation (INF)

Inflation is defined as the persistent and appreciable increase in the general price level. Usually, high rate of inflation in a country can reduce the return on investment and cause macroeconomic instability. If the general price level increases, cost of borrowing (interest rate) increases, reducing the level of investment in the economy. With reduced investment, the level of output of the economy (growth) is also reduced. However, under stabilize inflation or low level of inflation there is significant economic growth, therefore not only is inflation a decreasing function of growth but can be a leading indicator for growth. Under high

inflation rate growth of an economy is obscured but favorable under stabilize inflation or policy control inflation. (Barro, 1995; Bruno & Easterly, 1998; Frimpong & Oteng-Abayie, 2010; Gosh, 2000; Ocran, 2007; Quartey, 2010, & Sowa & Kwakye, 1994). Consequently, a positive or negative link is expected between inflation and output.

Gross fixed capital formation (K)

Gross fixed capital formation (K) formerly gross domestic fixed investment includes plants, machinery and equipment. It also includes the construction of roads, railways, and others such as schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings and all these are necessary for economic growth. The variable is used as a proxy for capital stock. Gross fixed capital formation as a proxy for capital has been used in several other studies such as Balasubramanyam, Salisu, and Sapsford (1996), Kohpaiboon (2006), Mansouri (2005), Njindan Iyke & Takumah, (2015). Gross fixed capital formation as a percentage of GDP (a proxy for capital stock) is expected to positively affect real GDP growth. The higher the rate of investment the higher the growth rate of the economy, ceteris paribus. Therefore, in line with the works of Frimpong and Oteng-Abayie (2006) and Hunt (2007), a positive relationship is expected between capital and economic growth.

Labour force (L)

Labour force (Population) is chosen instead of labour force participation because it denotes the proportion of the total population aged between fifteen (15) and sixty-four (64) years and is the active and productive population in the country. Unlike the classical economist who argue of adverse growth impact of labour force due to increase population. Solow (1956) and Swan (1956) advised that labour force should be included in the growth model because of its effect on the work force and this has been proven empirically in many researches that included labour force to be a good measure of economic growth. Resultantly, following the works of Abala (2014) and Belloumi (2014) the study expects a positive relationship between labour and economic growth.

Estimation procedure

In order to examine the direction of causality between financial development, other explanatory variables, and economic growth the study applied Granger causality test within the framework of cointegration and error-correction models. The empirical procedure involves the following steps. First of all, the study investigated the time series properties of the data by using the Augmented Dickey–Fuller (ADF) and the Phillip-Perron (PP) tests. The unit roots test was used to check the stationarity property of the data. In the second step, it tested for cointegration using the autoregressive distributed lag (ARDL) procedure developed by (Pesaran, Shin, & Smith, 2001). Also, the stability and diagnostic test statistics of the ARDL model is examined to ensure the reliability and the goodness of fit of the model.

Finally, the study employed granger-causality to test for causality. The causality test is preceded by cointegration testing since the presence of cointegrated relationships have implications for the way in which causality testing is carried out.

Unit root tests

It is very important to test for the statistical properties of variables when dealing with time series data. Time series data are rarely stationary in level forms. Regression involving non-stationary time series often lead to the problem of spurious regression. This occurs when the regression results reveal a high and significant relationship among variables when in fact, no relationship exist. Moreover, Stock and Watson (1988) have also shown that the usual test statistics (t, F, DW, and R2) will not possess standard distributions if some of the variables in the model have unit roots. A time series is non-stationary if its mean, variance and autocovariances are not constant overtime or independent of time. However, a time series is stationary when its mean, variance and autocovariances are independent of time. The study employed a variety of unit roots tests. This was done to ensure reliable results of the test for stationarity due to the inherent individual weaknesses of the various techniques. The study used both the PP and the ADF tests. These tests are similar except that they differ with respect to the way they correct for autocorrelation in the residuals. The PP nonparametric test generalizes the ADF procedure, allowing for less restrictive assumptions for the time series in question. The null hypothesis to be tested is that the variable under investigation has a unit roots (non-stationary) against the alternative that the

variable under investigation has no unit roots (stationary). In each case, the lag-length is chosen using the Akaike Information Criteria (AIC) and Swartz Information Criterion (SIC) for both the ADF and PP test. The sensitivity of ADF tests to lag selection renders the PP test an important additional tool for making inferences about unit roots. The basic formulation of the ADF is specified as follows:

$$Y_t = \mu + \alpha Y_{t-1} + \gamma_t + \varepsilon_t \quad (9)$$

Now, subtracting Y_{t-1} from both side of equation (9) gives:

$$\Delta Y_t = \mu + (\alpha - 1)Y_{t-1} + \gamma_t + \varepsilon_t \quad (10)$$

Now, set $(\alpha - 1)$ to be equal to ρ gives equation (10) below:

$$\Delta Y_t = \mu + \rho Y_{t-1} + \gamma_t + \varepsilon_t \quad (11)$$

The t-test on the estimated coefficient of Y_{t-1} that is ρ provides the DF test for the presence of a unit-root. The Augmented DF (ADF) test is a modification of the DF test and involves augmenting the above equation by lagged values of the dependent variables. It is made to ensure that the error process in the estimating equation is residually uncorrelated, and also captures the possibility that Y_t is characterized by a higher order autoregressive process. Although the DF methodology is often used for unit roots tests, it suffers from a restrictive assumption that the error processes are independent and identically distributed (i.i.d). Therefore, letting $(\alpha - 1)$ to be equal to ρ and by controlling for serial correlation by adding lagged first differenced to equation (11) gives the ADF test of the form:

$$\Delta Y_t = \mu + \rho Y_{t-1} + \gamma_t + \sum_{i=1}^{p} \beta_i \Delta Y_{t-1} + \varepsilon_t \quad (12)$$

Where Y_t denotes the series at time t, Δ is the difference operator, μ, γ, and β_i are the parameters to be estimated and ε is the stochastic random disturbance term.

The ADF and the PP test the null hypothesis that a series contains unit roots (non-stationary) against the alternative hypothesis of no unit roots (stationary). That is:

$H_0: \rho = 0$ (Y_t is non-stationary)

$H_1: \rho < 0$ (Y_t is stationary)

If the rho statistic is less negative than the critical values, we fail to reject the null hypothesis and conclude that the series is non-stationary. Conversely, if the tau value or t-statistic is more negative than the critical values, the null hypothesis is rejected and the conclusion is that the series is stationary.

Tests for cointegration

Cointegration is a property possessed by some non-stationary time series data. In this concept, two variables are cointegrated when a linear combination of the two is stationary, even though each variable is non-stationary. In particular, if one considers two-time series variables, Y and Z that are non-stationary, conventionally one would expect that a linear combination of the two variables would also be non-stationary. In order to avoid the problem of non-stationary it is necessary to make use of first (or higher) differentiated data. Such differencing, however, may result in a loss of low frequency information or long-run

characteristics of the series data. However, Engle and Granger (1987) showed that, if there is an equilibrium relationship between such variables, then for this relationship to have any meaning, a linear combination of these variables, the disequilibrium error should fluctuate around zero, that is, should be stationary. Thus, two time-series integrated in the same order 'd' are said to be cointegrated if one unique linear combination of these series exists which is integrated in an order inferior to $(d - b)$ with $b \geq 1$. After establishing that variables are stationary, it is necessary to determine whether or not there is any long-term relationship between them, this means testing for cointegration.

Autoregressive distributed lag (ARDL) approach to cointegration

In order to analyze the long-run relationships as well as the dynamic interactions among the various variables of interest empirically, the autoregressive distributed lag cointegration procedure developed by (Pesaran et al., (2001) was used. Co-integration techniques such as Engel and Granger (1987) procedure, Johansen (1995) full information maximum likelihood procedure, Phillips and Hansen (1990) fully modified OLS procedure, and a very recent procedure known as the Bounds testing procedure, developed by Pesaran et al. (2001) are widely used in economic literature to empirically determine the relationship among time series variables.

The Engel-Granger method has been criticized in the literature for several shortfalls which include the following: (a) problem of normalization in systems with more than two variables, (b) small sample bias due to the exclusion of short-

run dynamics, and (c) the inability to test hypotheses concerning the estimated coefficients in the long-run relationship. Due to these weaknesses of Engel-Granger method, Johansen and Phillips-Hansen developed procedures to avoid some of these problems, however their procedures (along with the Engel-Granger method) concentrate on or require that the variables included in the model are integrated of order one (that is the variables are $I(1)$. The choice of ARDL to estimate the model was informed by the following reasons:

Firstly, the most important advantage of the Bound test procedure is that it is applicable irrespective of whether the underlying variables in the model are purely $I(0)$, purely $I(1)$ or fractionally integrated. Thus, if a model includes a mixture of $I(0)$ and $I(1)$ variables, the most appropriate econometric method to employ is the Bound test procedure. However, there is still pre-requisite that none of the explanatory variables is of $I(2)$ or higher order, that is, the ARDL procedure will, however, be inefficient in the existence of $I(2)$ or higher order series.

Secondly, The ARDL cointegration procedure is comparatively more robust and relatively more efficient in small sample data sizes as is the case in this study. This study covers the period 1980 to 2016 inclusive. Thus, the total observation for the study is 37 which is relatively small (Mah, 2000; Pattichis & Pattichis, 1999).

Thirdly, the ARDL Model applies general-to-specific modeling framework by taking sufficient number of lags to capture the data generating process. It estimates $(\rho + 1)^k$number of regressions in order to obtain an optimal lag length for each variable, where p is the maximum lag to be used, and k is the number of variables in the equation. The model is selected on the basis of different criteria like

Schwarz Bayesian Criterion (SBC), Akaike Information Criterion (AIC), R-Bar Squared Criterion (RBC) and Hannan Quinn Criterion (HQC).

Furthermore, traditional co-integration methods may also experience the problems of endogeneity, whereas the ARDL method can distinguish between dependent and explanatory variables and eradicate the problems that may arise due to the presence of autocorrelation and endogeneity. ARDL co-integration estimates short-run (SR) and long-run (LR) relationship simultaneously and provide unbiased and efficient estimates. The appropriateness of utilizing ARDL model is that the model is based on a single equation framework. The ARDL model takes sufficient numbers of lags and direct the data generating process in a general to specific modeling framework (Harvey, 1981). Unlike further multivariate co-integration techniques such as Johansen and Juselius (1990), ARDL model permits the co-integration relationship to be estimated by OLS once the lag order of the model is identified. Error Correction Model (ECM) can also be drawn from by ARDL approach (Yildirim & Sezgin, 2003). This ECM allows drawing outcome for LR estimates while other traditional co-integration techniques do not provide such types of inferences. "ECM joins together SR adjustments with LR equilibrium without losing LR information" (Pesaran & Shin, 1998).

The choice of the testing procedure essentially draws on the order of integration of the variables. In this study, a combination of $I(0)$ and $I(1)$ variables were used and this indicated that the appropriate procedure is the bounds test (BT) approach to co-integration Thus, with a heterogeneous order of integration of the variables implies that, it is inappropriate to use the Engel-Granger, the Johansen, or

the Phillips-Hansen procedures to analyze the long-run and the short-run behavior of financial development and monetary policy. The most relevant testing procedure is the BT procedure. To this end, the study applied ARDL technique over other co-integration techniques based on the characteristics of the data to analyze the joint effect of financial development and monetary policy on growth.

Bounds testing / ARDL procedure

According to Pesaran and Pesaran (1997), the ARDL approach requires the following two steps. In the first step, the existence of any long-term relationship among the variables of interest is determined using F-test. The second step of the analysis requires an estimation of the coefficients of the long-run relationship and determine their values, followed by the estimation of the short-run parameters of the variables with the error correction representation of the ARDL model. By applying the ECM version of ARDL, the speed of adjustment to equilibrium will be determined.

In order to implement the bounds test procedure for cointegration, the following restricted (conditional) version of the ARDL model is estimated to test the long-run relationship among the variables of interest. This framework is implemented by modelling equation (8) as a conditional ARDL, given as:

$$\Delta lnY_t = \beta_0 + \alpha lnY_{t-1} + \beta_1 lnFD_{t-1} + \beta_2 lnMP_{t-1} + \beta_3 lnFDMP_{t-1} + \beta_4 lnFDI_{t-1} + \beta_5 lnRI_{t-1} + \beta_6 lnINF_{t-1} + \beta_7 lnK_{t-1} + \beta_8 lnL_{t-1} + \sum_{i=0}^{\rho} \gamma \Delta lnY_{t-i} + \sum_{i=0}^{\rho} \varphi_{1i} \Delta lnFD_{t-i} + \sum_{i=0}^{\rho} \varphi_{2i} \Delta lnMP_{t-i} + \sum_{i=0}^{\rho} \varphi_{3i} \Delta lnFDMP_{t-i} + \sum_{i=0}^{\rho} \varphi_{4i} \Delta lnFDI_{t-i} + \sum_{i=0}^{\rho} \varphi_{5i} \Delta lnRI_{t-i} + \sum_{i=0}^{\rho} \varphi_{6i} \Delta lnINF_{t-i} + \sum_{i=0}^{\rho} \varphi_{7i} \Delta lnK_{t-i} + \sum_{i=0}^{\rho} \varphi_{8i} \Delta lnL_{t-i} + \varepsilon_t \quad (13)$$

Where Δ is the first difference operator, ρ is the lag order selected by Schwarz Bayesian Criterion (SBC), the parameters α and β_i denote the long run parameters and γ and φ_{ji} are the short-run parameters of the model to be estimated through the error correction framework in the ARDL model, β_0 is the constant term (drift) while ε_t is a white noise error term which is $\sim N(0, \delta^2)$.

The first step in the ARDL approach is to estimate equation (13) by applying OLS. The computed F-test (Wald test) is then used to test the existence of long-run relationship among the variables. This is done by restricting the coefficients of the lagged level variables to zero. The null hypothesis of no long-run relationship among the variables in equation (13) is tested against the alternative hypothesis of the presence of long-run relationship among the variables denoted by:

$F_{LY}(LY|LFD, LMP, LFDMP, LFDI, LRI, LINF, LK, LL)$

The hypothesis tested is specified as:

$H_0: \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = \beta_7 = \beta_8 = 0$

$H_1: \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq \beta_6 \neq \beta_7 \neq \beta_8 \neq 0$

Given that the asymptotic distribution of F-statistics is non-standard without considering the independent variables being $I(0)$ or $I(1)$, Pesaran et al., (2001) generated and presented the appropriate critical values according to the number of independent variables in the model of presence or absence of constant term or time trend in the model. Therefore, the calculated F-statistics is compared with two sets of critical values developed on the basis that the independent variables are $I(d)$ (where $0 \leq d \leq 1$). The lower critical bound assumes that all variables are $I(0)$ whereas the upper critical bound assumes the variables are $I(1)$. If the calculated F-statistics exceeds the upper critical value, then null hypothesis of no cointegration is rejected irrespective of whether the variables are $I(0)$ or $I(1)$. This implies that there is a long-run relationship among the variables. Conversely, if the F-statistics falls below the lower bound then the null hypothesis of no cointegration cannot be rejected. If the F-statistics lies within the lower critical and upper critical bounds, the test is inconclusive (Pesaran & Pesaran, 1997). However, when all the variables are integrated of order zero, $I(0)$ then the null hypothesis of no cointegration is rejected implying that there exists long-run relationship among the variables, otherwise they are not cointegrated.

In order to choose optimal lag length for each variable, the ARDL methodology estimates $(m+1)^{k+1}$ number of regressions. Where, m is the maximum number of lags and k is the number of variables in the equation. The

orders of the lags of the ARDL models are selected using one of the following four (4) information criteria: Schwarz-Bayesian Criterion (SBC), Akaike's Information Criterion (AIC), the $\bar{R}^2$criterion or the Hannan and Quinn (HQ) criterion. The SBC uses the smallest possible lag length and is therefore described as the parsimonious model.

Long-run and short-run dynamics

Once cointegration has been established from the ARDL model, the next step is to estimate the following $ARDL(P, q^1, q^2, q^3, q^4, q^5, q^6, q^7, q^8)$ model in order to obtain the long run coefficients.

$$lnY_t = \mu_0 + \sum_{i=0}^{\rho} \sigma_1 lnY_{t-i} + \sum_{i=0}^{q^1} \sigma_2 lnFD_{t-i} + \sum_{i=0}^{q^2} \sigma_3 lnMP_{t-i} + \sum_{i=0}^{q3} \sigma_4 lnFDMP_{t-i} + \sum_{i=0}^{q^4} \sigma_5 lnFDI_{t-i} + \sum_{i=0}^{q^5} \sigma_6 lnRI_{t-i} + \sum_{i=0}^{q^6} \sigma_7 lnINF_{t-i} + \sum_{i=0}^{q^7} \sigma_8 lnK_{t-i} + \sum_{i=0}^{q^8} \sigma_9 lnL_{t-i} + \varepsilon_t \quad (14)$$

Equation (14) is then followed by the estimation of the short-run parameters of the variables with error correction representation of the ARDL model. By applying the error correction version of ARDL, the speed of adjustment to equilibrium is determined. When there exists long-run relationship among the variables, then the unrestricted ARDL error correction representation is estimated as:

$$\Delta lnY_t = \theta_0 + \sum_{i=0}^{\rho} \lambda_{1i} lnY_{t-i} + \sum_{i=0}^{q^1} \lambda_{2i} \Delta lnFD_{t-i} + \sum_{i=0}^{q^2} \lambda_{3i} \Delta lnMP_{t-i}$$
$$+ \sum_{i=0}^{q^3} \lambda_{4i} \Delta lnFDMP_{t-i} + \sum_{i=0}^{q^4} \lambda_{5i} \Delta lnFDI_{t-i} + \sum_{i=0}^{q^5} \lambda_{6i} \Delta lnRI_{t-i}$$
$$+ \sum_{i=0}^{q^6} \lambda_{7i} \Delta lnINF_{t-i} + \sum_{i=0}^{q^7} \lambda_{8i} \Delta lnK_{t-i} + \sum_{i=0}^{q^8} \lambda_{9i} \Delta lnL_{t-i} + \tau ECT_{t-1}$$
$$+ \varepsilon_t \quad (15)$$

Where the coefficients are the short-run dynamics, while τ is the speed of adjustment to long-run equilibrium following a shock to the system and ECT_{t-1} is the error-correction term or the residuals obtained from equation (14). The residuals from the cointegration equation lagged one (1) period may be defined as:

$$ECT_t = lnY_t - \theta_0 - \sum_{i=0}^{\rho} \lambda_{1i} \Delta lnY_{t-i} - \sum_{i=0}^{q^1} \lambda_{2i} \Delta lnFD_{t-i} - \sum_{i=0}^{q^2} \lambda_{3i} \Delta lnMP_{t-i}$$
$$- \sum_{i=0}^{q^3} \lambda_{4i} \Delta lnFDMP_{t-i} - \sum_{i=0}^{q^4} \lambda_{5i} \Delta lnFDI_{t-i} - \sum_{i=0}^{q^5} \lambda_{6i} \Delta lnRI_{t-i}$$
$$- \sum_{i=0}^{q^6} \lambda_{7i} \Delta lnINF_{t-i} - \sum_{i=0}^{q^7} \lambda_{8i} \Delta lnK_{t-i} - \sum_{i=0}^{q^8} \lambda_{9i} \Delta lnL_{t-i} \quad (16)$$

Accordingly, Engel and Granger (1987) argued that when variables are cointegrated, their dynamic relationship can be specified by an error correction representation in which an error correction term (ECT) computed from the long-run equation must be incorporated in order to capture both the short-run and long-run relationships. The error correction term indicates the speed of adjustment to

long-run equilibrium in the dynamic model. In order words, its magnitude shows how quick the variables converge to equilibrium when they are disturbed. It is expected to be statistically significant with a negative sign. The negative sign implies that any shock that occurs in the short-run will be corrected in the long-run. The larger the coefficient of the error correction term in absolute terms, the faster the convergence to equilibrium.

To ensure the goodness of fit of model, the diagnostic and stability tests are also conducted. The diagnostic test examines the serial correlation, functional form, normality and heteroscedasticity associated with the selected model. Pesaran and Pesaran (1997) suggested that conducting stability test is of great importance. This technique is also known as cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ). The CUSUM and CUSUMSQ statistics are updated recursively and plotted against the break points. If the plots of CUSUM and CUSUMSQ statistics stay within the critical bounds of five percent level of significance, the null hypothesis of stable coefficients in the given regression cannot be rejected.

Test for granger causality

The study of causal relationships among economic variables has been one of the main objectives of empirical econometrics. Granger causality is a term for a specific notion of causality in time-series analysis. A variable X Granger-causes Y if Y can be better predicted using the histories of both X and Y than it can using the history of Y alone. Granger causality is thus, a powerful tool, in that, it allows one

to test for things that one might otherwise assume away or otherwise take for granted. One of the implications of Granger representation theorem is that if non-stationary series are cointegrated, then one of the series must granger cause the other (Gujarati, 2001). Once economically meaningful cointegrating vectors are identified, the study proceeds to test for causality by regressing each variable on lagged values of itself and the other. To test the direction of causality between Y and X, Granger causality test has been employed. The specification of the models is given as:

$$\Delta Y_t = \gamma_0 + \sum_{i=1}^{n} \phi_i \Delta Y_{t-i} + \sum_{j=1}^{m} \varpi_j \Delta X_{t-j} + \upsilon_t \quad (17)$$

$$\Delta X_t = \pi_0 + \sum_{j=1}^{m} \eta_j \Delta X_{t-j} + \sum_{i=1}^{n} \psi_i \Delta Y_{t-i} + \nu_t \quad (18)$$

Where, υ_t and ν_t are mutually uncorrelated white noise error terms such that $(t \neq t')$ for all t and $t'(t \neq t')$, ΔY and ΔX are the non-stationary dependent and independent variables, whiles n and m are the optimal lag order.

In equations (17) and (18), lag lengths m and n are determined so as to minimize both Akaike ‘s Information Criterion (AIC) and Schwartz-Bayesian Criterion (SBC). For equation (17), Y is regressed only on its lagged variables of various lag length without including X ant then select $n = n*$ where both AIC and SBC are minimized. The next step is to fix the value of m at $m*$ and keep on adding the lagged variables of X until the lag length is obtained where AIC and SBC are again minimized. Then, the overall optimal lag length in equation (17) will be $(n* m*)$. If the value of m based on AIC is different from that based on SBC, then for

each of two different lags, the lagged variables of X are added and the overall optimal lag length is determined where AIC and SBC are minimized.

For equation (18), X is regressed only on its lagged variables of various lag length without including Y and then select $m = m*$ where both AIC and SBC are minimized. The next step is to fix the value of n at $n*$ and keep on adding the lagged variables of Y until the lag length is obtained, where AIC and SBC are again minimized. Then, the overall optimal lag length in equation (17) becomes ($m * n *$). If the value of n based on AIC is different from that SBC, then for each of two different lags, the lagged variables of Y are added and the overall optimal lag length is determined where AIC and SBC are minimized.

To find out whether the independent variable (X) granger-causes the dependent variable (Y) in equation (17), the joint significance of the lagged dynamic terms is examined by testing the null hypothesis that the independent variable (X) does not granger-cause the dependent variable (Y), against the alterative hypothesis that the independent variable (X) granger-cause the dependent variable (Y). This is given as:

$H_0: \varpi_1 = \varpi_2 = \varpi_3 \ldots = \varpi_m = 0$

$H_1: \varpi_1 \neq \varpi_2 \neq \varpi_3 \ldots \neq \varpi_m \neq 0$

Similarly, to find out whether the independent variable (Y) granger-cause the dependent variable (X) in equation (18), the joint significance of the lagged dynamic term is examined by testing the null hypothesis that the independent variable (Y) does not granger-cause the dependent variable (X), against the

alterative hypothesis that independent variable (Y) granger-cause the dependent variable(X). This is given as:

$H_0: \psi_1 = \psi_2 = \psi_3 \ldots = \psi_n = 0$

$H_1: \psi_1 \neq \psi_2 \neq \psi_3 \ldots \neq \psi_n \neq 0$

Using the standard F-test or Wald statistic, four possibilities exist: First, rejection of the null hypothesis in equation (17) but failing to reject the null in equation (18) at the same time implies unidirectional causality from X to Y. Second, a rejection of the null hypothesis in equation (18) but at the same time failing to reject the null in equation (17) implies unidirectional causality running from Y to X. Third, simultaneous rejection of the two null hypotheses indicates bi-directional causality. Finally, simultaneous failure to reject the two null hypotheses indicates independence or no causality between the variables of interest.

Data processing and analysis

This study employed both descriptive and quantitative analysis. Charts such as graphs and tables were presented to aid in the descriptive analysis. Unit root tests was carried out on all variables using Augmented Dickey–Fuller (ADF) and Phillip-Perron test to ascertain their order of integration in order to avoid the problem of spurious regression. Furthermore, the study adopted the Autoregressive Distributed Lag (ARDL) econometric methodology for cointegration to obtain both the short and long run parameters of the main variables involved and also Granger causality test was conducted to determine the direction of causality between the dependent

variable and the independent variables of interest. All estimations were carried out using E-views 10 package.

Conclusion

This chapter developed and presented the methodological framework suitable for conducting the study. The model was developed from the theoretical formulations of the Neoclassical production function. Annual time series data on real GDP (Economic Growth), Financial Development, Monetary Policy (Central Bank's Policy Rate), Foreign Direct Investment, Remittances, Inflation, Gross Fixed Capital Formation (Capital), and Labour Force from 1980 to 2016 was employed for the study.

Stationarity test was conducted using Augmented Dickey–Fuller (ADF) and Phillip-Perron (PP). Moreover, Autoregressive Distributed Lag (ARDL) econometric methodology was used to examine the long-run and short-run dynamics among the variables. Finally, the chapter highlighted on the Granger-causality technique to determine the direction of causality between the variables of interest.

CHAPTER FOUR

RESULTS AND DISCUSSION

Introduction

This chapter presents a detailed analysis and discussion of the results of the study. The chapter is structured into four main sessions. The first session presents the descriptive statistics of the relevant variables. The second session presents and discuss the results of both Augmented Dickey Fuller (ADF) and Philip Perron (PP) tests for stationarity. The third session presents the test of co-integration using Autoregressive Distributed Lag Approach. The last section presents the results and discussion on the Granger-causality test.

Descriptive statistics

In this section, an analysis of the descriptive statistics is carried out. Table 1 presents the descriptive statistics of the relevant variables involved. It provides the statistical characteristics of all the data used in the study. In measuring the central tendencies, the study adopted the mean and variances where as the standard deviation was used to account for the dispersion of the variables about the mean.

Table 1-*Summary Statistics*

	LNY	FD	MP	FDMP	FDI	RI	INF	K	L
Mean	10.26	0.10	23.38	2.39	3.06	1.36	27.94	18.61	54.93
Maximum	10.68	0.1	45.00	4.54	9.52	13.27	122.9	30.93	57.82
Minimum	9.92	0.08	10.50	0.83	0.05	0.01	8.73	3.53	51.68
Std. Dev.	0.23	0.01	9.38	0.99	3.28	2.69	25.46	7.74	2.04
Skewness	0.36	0.08	0.89	0.63	0.84	2.93	2.62	-0.54	-0.08
Kurtosis	1.98	2.94	3.08	2.58	2.12	11.96	9.86	2.16	1.63
Jarque-Bera	2.38	0.05	4.85	2.71	5.59	176.6	114.9	2.92	2.94
Probability	0.30	0.98	0.09	0.26	0.06	0.00	0.00	0.23	0.23
Observations	37	37	37	37	37	37	37	37	37

Source: Authors' own construct using E-views 10 Package.

From Table 1, it can be seen that time series data spanning over a 37-year period was employed for this analysis and it was found that all the variables have positive values (means). The mean of log of real GDP for instance, averaged 10.26. This means that on the average, real GDP grows about 10.26%. Financial development over the period also averaged around 0.10. This means that, financial development accounts for about 0.10% of real GDP. Monetary policy also averaged 23.38 indicating that monetary policy outcomes accounts for about 23.38% of real GDP. The mean of the monetary policy and financial development interaction averaged around 2.39. This show that about 2.39% of real GDP can be accounted for via the impact of monetary policy through financial sector development. Foreign direct investment also recorded a mean of 3.06, which implies that on the

average FDI accounts for 3.06% of real GDP. Remittances (RI) averaged 1.36. This shows that on the average, 1.36% of real GDP per capita can be attributed to the inflow of remittances in the economy. Inflation also averaged 27.94, indicating that on the average, inflation to real GPD is about 27.94%. Capital (K) recorded a mean value of 18.61 indicating that about 18.61% of real GDP can be attributed to the level of investment in the economy. Finally, Labour (L) on the other hand averaged around 54.93. This implies that, averagely, 54.93% of the population are in the labour force

A careful observation of the standard deviations also shows that there exist minimal deviations of the variables from their respective means. This gives indications of slow fluctuations of the variables over the study period. Specifically, with the exception of monetary policy, financial development interaction term, and Labour, all variables seem to be closely dispersed about their mean values. In addition, an analysis of the Jarque-Bera test for normality shows that all variables seem to be normally distributed with the exception of monetary policy (MP), Foreign direct investment (FDI), Remittances (RI) and Inflation (INF) at the standard 5% error level. This can be seen from the probability values presented by Table 1. Further, with the exception of Capital (K) and Labour (L) which are negatively skewed, an examination of the table revealed that all variables were positively skewed. Again, the value of the kurtosis of the variables further confirms that the variables are skewed with kurtosis value ranging from 1.63 to 11.96.

Stationarity test

Although the bounds test (ARDL) approach to cointegration does not necessitate the pretesting of the variables for unit roots, it is however vital to perform this test to verify that the variables are not integrated of an order higher than one. The aim is to ascertain the absence or otherwise of $I(2)$ variables to extricate the result from spurious regression. Due to the aforementioned reason, before applying Autoregressive Distributed Lags approach to cointegration and Granger-causality test, unit root test was conducted in order to investigate the stationarity properties of the data. As a result, all the variables were examined by first inspecting their trends graphically (Appendices A and B). The time series plots in Appendices A and B, provide some idea about whether the trend is stationary or not. It can be observed that all the variables are non-stationary in levels (Appendix A). However, the plots of all the variables in their first differences show that the variables are stationary (Appendix B).

Notwithstanding this, the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests were applied to all variables in levels and in first difference in order to formally establish their order of integration.

The results of ADF test for unit root with intercept and trend in the model for all the variables are presented in Table 2. The null hypothesis is that the series is non-stationary or contains a unit root. The rejection of the null hypothesis for the test is based on the MacKinnon (1991) critical values as well as the probability values.

Table 2-*Results of Unit Root Test: ADF Test*

	ADF Test		PP Test	
Variable	Constant & Trend	Constant & Trend	Constant & Trend	Constant & Trend
	Levels	1st Difference	Levels	1st Difference
LNY	-2.7818	-3.4673***	-3.1872*	-3.1288
FD	-3.7899**	-6.1317***	-3.6444**	-14.2447***
MP	-1.9079	-6.5430***	-1.9629	-6.5107***
$FDMP$	-1.7297	-5.2902***	-1.8149	-5.2902***
FDI	-2.3127	-4.9725***	-2.4109	-5.0018***
RI	1.4717	-3.8365**	-2.7444	-8.9766***
INF	-6.4004***	-4.7646***	-6.3952***	-28.6219***
K	-2.4896	-7.1120***	-2.3741	-18.3239***
L	-0.0856	0.9663**	-0.0517	-2.7858**

Note: ***, ** and * indicates the rejection of the null hypothesis of non-stationary at 1%, 5% and 10% level of significance.

Source: Authors' own construct using E-views 10 Package.

From the unit root test results presented in Table 2, the null hypothesis of the presence of unit root in the variables at their levels can be rejected only for FD (financial development) and INF (inflation), since the P-values of the ADF statistic of financial development and inflation are statistically significant at 5 and 1 percent respectively. This implies that, financial development and inflation are stationary at levels indicating that the variables are integrated of order zero $I(0)$. However, the null hypothesis of the presence of unit root for the rest of the variables cannot

be rejected at levels since the P-values of the ADF statistics for these variables are not statistically significant at any of the three conventional levels of significance. Nevertheless, at first difference of the variables that were not stationary at levels they all become stationary at 5 and 1 percent levels of significance. As such, the null hypothesis of the presence of unit root (non-stationary) is rejected since the P-values of the ADF statistic are statistically significant at 5 and 1 percent levels for all first differenced estimates.

To further confirm the stationary properties of the variables, the PP test was also conducted. The results of the PP test for unit root with both intercept and trend at levels and first difference in the model for all the variables are also presented in Table 2.

The unit roots test results in Tables 2 shows that variables are non-stationary at levels since P-values of the PP statistics are not statistically significant at any of the conventional levels of significance except for LNY (log of economic growth), FD (financial development) and INF (inflation) at 10 percent, 5 and 1 percent significance levels respectively. Hence the null hypothesis of the presence of unit root in the variables at their levels can only be rejected for economic growth, financial development and inflation, since the P-value of the PP statistics for these variables are statistically significant at 10, 5, and 1 percent significant levels. This implies that, economic growth, financial development and inflation are stationary at levels indicating that the variables are integrated of order zero denoted by $I(0)$. However, at first difference, all the variables become stationary. This is because the

null hypothesis of the presence of unit root (non-stationary) is rejected at 10, 5 and 1 percent significant levels for all the variables.

In line with the ADF test, the PP- test for unit roots, it is therefore obvious that the series is a mixture of variables integrated of order zero $I(0)$ and order one $I(1)$. Since the test results have confirmed the absence of $I(2)$variables, ARDL methodology is now used for the estimation. The subsequent sections discuss the cointegration results, and long-run and short-run results as well as Granger causality test results.

Test for long-run relationship

The first step of the ARDL analysis to cointegration requires testing the presence of long-run relationships in equation (8) using equation (13) by employing the bounds test for cointegration. With the null hypothesis of no long-run relations between the predictor and outcome variables, the bound testing approach was employed to specify the existence of cointegration among the dependent and explanatory variables. That is, the test provided an F-statistics which confirmed the joint significance of all explanatory variables on the dependent variable. Thus, it provides clarity regarding whether the coefficients of respective variables are equal to zero or not, jointly.

Table 3 reports the results of bounds test for economic growth and its explanatory variables when log of real gross domestic product (Y, economic growth) was normalized (that is, considered as a dependent variable) in the ARDL-OLS regressions.

Table 3-*Results of Bounds Test for existence of Cointegration*

	90% level		95% level		99% level	
	$I(0)$	$I(1)$	$I(0)$	$I(1)$	$I(0)$	$I(1)$
K = 8	1.85	2.85	2.11	3.15	2.62	3.77
Dependent Variable						F-Statistic
$F_{LY}(LY\|FD, MP, FDMP, FDI, RI, INF\ K, L)$						16.2851***

Note: Critical values were obtained from Pesaran and Pesaran (2010), Apendix B, Case II, Statistical Table; *** denotes statistical significance at 1% level and K is the number of regressors.

Source: Authors' own construct using E-views 10 Package.

From Table 3, the joint null hypothesis of lagged level variables (that is addition test) of the coefficients being zero (no cointegration) is rejected at 1 percent significance level when log of economic growth (Y) is used as dependent variable. This is because the computed F-statistic is 16.2851 and it exceeds the upper bound critical value of 3.77 at 99% level. This implies that there exists a long-run relationship between economic growth and its explanatory variables hence the null hypothesis of no cointegration among the variables is rejected.

These results indicate that there is a unique cointegration relationship among the variables when economic growth is normalized. Having established the existence of long-run relationship between economic growth and its explanatory variables, it indicates that an error correction mechanism exists; hence, the long-run and short-run estimates of the ARDL models in equations (14) and (15) were estimated to obtain the long run and short-run coefficients and their standard errors.

Estimated long run results

From the results of the cointegration analysis, the long run relationship among the variables were estimated employing the ARDL framework and the results are presented in Table 4. The long-run ARDL model was estimated based on the Schwarz Bayesian Criterion (SBC) since SBC produce parsimonious estimates. Estimation was done with a lag length of two given the annual nature of the data set.

Table 4-*Estimated Long-Run Coefficients using the ARDL Approach*

ARDL (1, 2, 2, 2, 0, 2, 0, 2, 2) selected based on SBC			Dependent Variable: LNY	
Variable	Coefficient	Standard Error	T-Ratio	Probability
FD	0.3620	0.1243	2.9115	[0.0121] ***
MP	0.0168	0.0053	3.1656	[0.0074] ***
FDMP	0.0173	0.0053	3.2601	[0.0062] ***
FDI	0.0140	0.0011	12.4007	[0.0000] ***
RI	0.0215	0.0023	9.3628	[0.0000] ***
INF	-0.0005	8.60E-05	-5.4876	[0.0001] ***
K	0.0036	0.0011	3.3000	[0.0057] ***
L	0.0655	0.0056	11.6336	[0.0000] ***
C	6.2353	0.3241	19.2361	[0.0000] ***

Note: *** denotes significance level at 1%

Source: Authors' own construct using E-views 10 Package.

As can be observed in Table 4, the results showed that the coefficient of financial development measured by financial development index is positive and

statistically significant at 1percent level of significance. This shows that given that financial development grows by 1 unit in Ghana, economic growth (real gross domestic product) increases by about 36 percent. This indicates that increasing financial sector development has the potential of increasing real gross domestic product in Ghana at the aggregated level over the study period. This can be argued that as the financial sector develops, it leads to credit being available to the private sector which in effect increase investment leading to rise in the rate of growth of the economy. This positive effect of financial development on economic growth lends support from the works of Levine et al (2000), Adu et al. (2013), Ofori-Abebrese et al. (2017), and Seth and Kalyanaraman (2017) who found that financial development has significantly positive effects on the growth of an economy.

The result also shows that the coefficient of monetary policy measured by central banks' policy rate had the expected positive sign and is statistically significant at 1 percent level of significance. This suggests that, a unit rise in monetary policy results in about 1.68 percent increase in real GDP. This coincides with the findings of Akinsola (2017) and Seth and Kalyanaraman (2017) that in a financially developed system, the conduct of monetary policy is more effective in influencing output outcomes.

Moreover, the coefficient of the interaction term capturing the interaction effect between financial development and monetary policy on economic growth, consistent with the a priori expectation is positive and statistically significant at 1 percent level of significance. This means that with a financially developed economy, a unit increase in central bank's policy rate will improve economic

growth by 1.73 percent in the economy. Inferring from the net effect computation as shown in appendix D, financial development and monetary policy interaction is statistically significant with net effect coefficient of 0.0186. This implies that with the financial sector well developed, a one unit increase in policy rate contributes to economic growth by 1.86 percent in the long run ceteris paribus.

Since the interaction term is meant to capture the extra effect of financial development while controlling for other variables, a positive coefficient suggests that monetary policy has strong impact on economic growth in a financially developed economy. This positive joint effect between financial development and monetary policy on economic growth is in accordance with the works of Effiong et al. (2017) and Seth and Kalyanaraman (2017) who found that financial development heightens the growth effect of monetary policy but contrary to the works of Misati et al. (2010), Mishra et al. (2012) and Ma and Lin (2016).

FDI inflows has a significantly positive effect on economic growth. With a positive coefficient of 0.0140, it measures the dynamic response of output from changes in inflows of FDI. This suggest that a unit increase in FDI inflows causes an approximate 1.4% rise in real GDP growth in the long-run. This result contravenes previous studies from Saltz (1992), Saqib *et al*. (2013), Nunnenkamp and Spatz (2003) and Nath (2004) who argued that FDI inflows tend to be negative in the presence of trade. The result is however consistent with the result of Asafu-Adjaye (2005) and Balasubramanyam and Salisu, (1999).

Moreover, private remittances also met the expected sign as postulated by the study and it is positive and statistically insignificant at 1 percent level of

significance. Thus, if the rate at which private remittances flow into the economy increases by a unit, real GDP (economic growth) will increase by approximately 2.15 percent in the long-run. Hence remittances have a positive effect on economic growth in Ghana. This finding is in line with the work of Owusu (2015).

Furthermore, inflation was depicted in theoretical context to be negatively impacting growth in the long-run. With a negative coefficient of -0.0005 significant at 1 percent level, it implies that in the long-run a unit increase in general price level causes an approximately 0.05 percent fall in real GDP growth, all things been equal. Thus, economic growth response to changes in inflation is negative in the long-run. Studies by Sowa and Kwakye (1994), Ocran (2007), Frimpong and Oteng-Abayie (2010), and Quartey, (2010) attest to this negative impact of inflation on economic growth.

The study revealed that capital measured by gross fixed capital formation as a percentage of GDP was found to be positive as expected and statistically significant at 10 percent. With a coefficient of 0.0036, it implies that a unit increase in capital results in approximately 0.36 percent rise in economic growth. This corroborates the findings of Mankiw et al. (2008), who observed a positive and significant relationship between capital and economic growth.

Finally, Labour proxied by population (ages 15 to 64 years) was observed to possess a positive coefficient in confirmation of the a' priori expectation and statistically significant at 1 percent level of significance. This implies that 1 unit rise in population (ages 15-64) leads to approximately 6.55 percentage rise in the growth of the economy. Intuitively, higher human resource suggests high level of

productivity and since economic growth positively responds to labour supply, an increase in labour supply increases growth outcomes all things held constant in the long-run. This agrees with the works of Abala (2014), Belloumi (2014) and Oppong, (2017) who observed that labour force positively affects economic growth.

Estimated short run results

Following the establishment of the long-run relationship between real GDP (economic growth) and the independent variables by estimating the long-run co-integration model, the next step in ARDL approach to co-integration is to model the short-run dynamic relationship among the variables within the ARDL framework. The short run model includes the level and lags of each variable. Thus, the lagged values of all variables (a linear combination is denoted by the error-correction term, ECM_{t-1}) is retained in the ARDL model.

Table 5 reports the results of the estimated error-correction model of economic growth in Ghana. The estimated model was selected based on the SBC since SBC produce parsimonious results.

Table 5-*Estimated Short-Run Error Correction Model using the ARDL Approach*

ARDL (1, 2, 2, 2, 0, 2, 0, 2, 2)selected based on SBC Dependent Variable: LNY				
Variable	Coefficient	Standard Error	T-Ratio	Probability
D(FD)	0.2161	0.0290	7.4399	[0.0000] ***
D(FD(-1))	-0.1728	0.0312	-5.5445	[0.0001] ***
D(MP)	0.0113	0.0010	11.3051	[0.0000] ***
D(MP(-1)	-0.0040	0.0010	-3.9222	[0.0018] ***
D(FDMP)	0.0114	0.0011	10.6402	[0.0000] ***
D(FDMP(-1))	-0.0042	0.0011	-3.9458	[0.0017] ***
D(RI)	0.0047	0.0004	11.1527	[0.0000] ***
D(RI(-1))	-0.0071	0.0008	-9.0242	[0.0000] ***
D(K)	0.0024	0.0003	8.5787	[0.0000] ***
D(K(-1))	0.0009	0.0002	3.9432	[0.0017] ***
D(L)	-0.0451	0.0151	-2.9949	[0.0103] ***
D(L(-1))	-0.0421	0.0181	-2.3310	[0.0365] **
CointEq(-1)	-0.6797	0.0379	-16.6010	[0.0000] ***

$$ECM = LNY - (0.3620 * FD + 0.0168 * MP - 0.0173 * FDMP + 0.0140 * FDI + 0.0215 * RI - 0.0005 * INF + 0.0036 * K + 0.0655 * L + 6.2353)$$

Note: ***, ** denotes significance level at 1%, and 5% respectively.

Source: Authors' own construct using E-views 10 Package.

The result of the ARDL model as depicted in Table 5 suggest that the coefficient of financial development is positive statistically significant at 1 percent level of significance. This implies that current values of financial development are affected by previous years values of financial development in Ghana. This is expected in that previous growth and expansion in the financial sector serves as an indication of prosperity and may attract more investment leading to more growth. The result indicates that 1 unit rise in financial sector development is accompanied

by about 21.61 percent expansion in output of the Ghanaian economy. The finding is in line with what was observed in the long-run period and suggests that Ghanaian financial institutions offer relatively effective intermediary services which induce greater investment efficiency of private enterprises, thereby impacting on growth positively. This result is in line with finding in the empirical studies by Adu et al. (2013).

Consistent with the long run results, the coefficient of the current value of monetary policy is positive as oppose to the negative and statistically significant coefficient in the previous year. The coefficient of the current value of monetary policy is statistically significant at 1 percent level of significance. This implies that a unit rise in monetary policy induces economic growth to increase by approximately 1.13 percent in the short-run. This attest to the crucial role monetary policy plays in the economy's growth process.

The joint effect of financial development and monetary policy maintained its positive impact on economic growth in the short-run. While its lag coefficient was negative in the model, the current value is positive in the model. This means that given monetary policy works via the financial sector, a unit rise in financial development yields approximately 1.25 percent rise in the impact of monetary policy on output in the short run as attested to by the net effect in appendix D. The lag value for the combine effect also shows that a unit increase in the lagged value of policy rate given the existence of a financially developed economy leads to a reduction in economic growth by 1.09% in the economy. This result alludes to the findings of Seth and Kalyanaraman (2017) and Peprah, (2017).

Also consistent with the long-run, private remittances came out with a positive and statistically significant impact on output estimated at 1 percent level of significance for its current value and negative for its lagged value. The current value indicates that 1 unit rise in the inflow of remittances to private individuals results in a 0.47 percent increase in real GDP in the short run. But its lag value shows that improvement in previous years remittances by 1 unit reduces economic growth by 0.71 percent in the economy.

Contrary to the long run results, labour supply turn out to have negative but statistically significant impact on output at 1 and 5 percent level of significance for its current and previous values respectively. The current value indicates that 1 unit increase in labour supply produces approximately 4.51 percent fall in real GDP (economic growth) in the short run. Furthermore, its lag value also shows that increases in labour force in the previous year dampens economic growth by 4.21 percent all things held constant.

Capital on the other hand showed a positive and statistically significant sign in the short-run both for the current value and the lagged coefficient. This positive current value is consistent with the outcome of the long-run. Current value shows that, all things being equal, a unit rise in capital investment increases economic growth by 0.24 percent. This is further confirmed by its lagged value showing growth effects of 0.09 percent for the economy.

In addition, the coefficient of the error correction term lagged one period (ECM_{t-1}) exhibits the expected negative sign and it is highly significant at 1 percent significance level. The coefficient of the error term is around -0.68. The

significant error correction term indicates that a deviation from the long-run equilibrium subsequent to a short-run shock is corrected by about 68 percent at the end of each year. Clearly, it shows that any deviation (disequilibrium) in the short-run will take less than a year to be restored in the long-run. This represents a faster speed of adjustment to long-run equilibrium after any shock to the system in the short-run. The negative and significant coefficient of the error correction term signifies and further confirms the existence of the co-integration relationship among the dependent variable real GDP (economic growth) and its explanatory variables used in the model.

Model diagnostics and stability tests

As put forward by Hasen (1992), estimated parameters of time series data may vary over time hence it is expedient to conduct parameter tests since model misspecification may arise as a result of unstable parameters and thus leading to bias of results. As such, in order to check for the estimated variable in the ARDL model, the significance of the variables and other diagnostic test such as ad serial correlation, functional form, normality, heteroskedasticity and structural stability tests of the model are considered. Results for the model diagnostics are shown in Table 6 at appendix E.

The results of the diagnostics test show that the estimated model satisfied the Lagrangean multiplier test of residual serial correlation among the variables (See, Appendix E). This implies that, there is no evidence of autocorrelation and hence the null hypothesis of no serial correlation among the variables cannot be

rejected. Also, the estimated model passes the test for Functional Forms Misspecification using the square of the fitted values. Likewise, the model satisfied the Normality test based on the skewness and kurtosis of the residuals. Thus, the residuals are normally distributed across observation. Finally, estimated model passes the test for heteroscedasticity based on the regression of squared residuals on squared fitted values.

Lastly, from the diagnostics test in Table 6 (See, Appendix E), it can be observed that the adjusted R-squared is approximately 0.95. This suggest that about 95 percent of the variations in the dependent variable real GDP per capita (economic growth) is explained by the independent variables. Also, a Durbin-Watson statistic of approximately 2.57 which is higher than the R-squared value of 0.95 revealed that, the estimated results are not spurious.

Stability test

Pesaran and Pesaran (1997) suggests that, the test for stability of parameters using cumulative sum of recursive residuals (CUSUM) and cumulative sum of squares of recursive residuals (CUSUMSQ) plots be conducted after the model is estimated. This is done to eliminate any bias in the result of estimated model due to unstable parameters. The CUSUM and CUSUMSQ plots are depicted in Figure 1 and 2 respectively (See, Appendix E).

Figure 1 shows the plot of CUSUM for the estimated ARDL model (See, Appendix F). The null hypothesis is that the coefficient vector is the same in every period and the alternative is that it is not. The CUSUM statistics are plotted against

the critical bound of 5 percent significance level. If the plot of these statistics remains within the critical bound of 5 percent significance level, the null hypothesis that all coefficients are stable cannot be rejected. Based on figure 1, the plot suggests the absence of instability of the coefficient since the plots of all coefficients fall within the critical bounds at 5 percent significance level. Thus, all the coefficients of the estimated model are stable over the entire period of the study.

Figure 2 depicts the plot of CUSUMSQ for the estimated ARDL model (See, Appendix F). The plots suggest the absence of instability of the coefficients since the plots of all coefficients fall within the critical bounds at 5 percent significance level. Thus, all the coefficients of the estimated model are stable over the entire period of the study. In summary, the CUSUM and CUSUMSQ confirms the stability of the coefficients of economic growth and its explanatory variables in the model.

Granger causality tests

To determine the direction of causality between economic growth and financial development the Granger causality test was conducted and results are presented in Table 7.

Table 7-*Results of the Pairwise Granger Causality Tests*

Null Hypothesis	F-Statistics	Probability
FD does not Granger Cause LNY	0.0877	0.9163
LNY does not Granger Cause FD	5.9358	0.0067 ***
MP does not Granger Cause LNY	0.1684	0.8458
LNY does not Granger Cause MP	0.2382	0.7895
FDMP does not Granger Cause LNY	0.1741	0.8411
LNY does not Granger Cause FDMP	0.2667	0.7677
FDI does not Granger Cause LNY	0.7677	0.4730
LNY does not Granger Cause FDI	4.0433	0.0279**
RI does not Granger Cause LNY	1.3053	0.2861
LNY does not Granger Cause RI	2.4174	0.1063
INF does not Granger Cause LNY	1.4571	0.2489
LNY does not Granger Cause INF	14.062	0.0001 ***
K does not Granger Cause LNY	0.2901	0.7503
LNY does not Granger Cause K	1.4923	0.2411
L does not Granger Cause LNY	3.0079	0.0645 *
LNY does not Granger Cause L	1.3254	0.2808

Note: ***, **, * denote rejection of null hypothesis at 1%, 5% and 10% significance level.

Source: Authors' own Estimate using E-views 10 Package.

The Granger causality test results in Table 7 shows that the null hypothesis that real GDP does not Granger cause financial development is rejected at 1 percent significance level. This means that real GDP Granger causes financial development. But the null hypothesis that financial development does no granger cause real GDP per capita is not rejected, implying that financial development does not Granger causes real GDP per capita suggesting a unidirectional causality

between real GDP per capita and financial development. This result indicates that data on Ghana supports the Growth-led-Finance hypothesis. The unidirectional causality running from economic growth to financial development as identified in this study is not in conformity with the bounds tests result, as the Bounds test results shows a positive and statistically significant relationship between financial development and economic growth. This may be due to differences in estimation techniques involved in both the Bounds tests and the Pairwise Granger Causality test. Again, it can be attributed to the fact that although Ghana has seen some financial sector development, the financial system is still developing hence the full effect of financial development is not yet realized on economic growth. However, this finding is in consonance with the findings of Quartey and Prah (2008) but in contradiction to the findings of Ofori-Abebrese et al. (2017).

Similarly, the study suggests that the null hypothesis that foreign direct investment does not Granger cause real GDP is not rejected. However, the null hypothesis that real GDP does not Granger causes foreign direct investment is rejected at 5 percent level of significance. This means that real GDP Granger causes foreign direct investment. This suggest a unidirectional causality running from real GDP to foreign direct investment.

Moreover, the results show a rejection of the null hypothesis that real GDP does not Granger cause inflation at 1 percent level of significance. However, the null hypothesis that inflation does not granger cause real GDP is not rejected implying the lag values of inflation together with that of economic growth do not predict variations in economic growth. Hence, there exists a unidirectional causal

link between inflation and economic growth with causality running from economic growth to inflation rate.

A further analysis of the result also showed a rejection of the null hypothesis that that labour supply does not granger cause real GDP at 10 percent level of significance. However, the null hypothesis that real GDP does not Granger cause labour supply is not rejected implying that the lag values of labour supply together with that of economic growth do not predict variations in economic growth. Thus, there is a unidirectional causality from labour supply to economic growth.

Finally, the rejection of both the null hypothesis that economic growth does not Granger cause monetary policy, financial development interaction, Capital, and private remittances and vice versa implies that, there is no direction of causality between economic growth, capital, inflation, financial development interaction as well as monetary policy over the study period.

Conclusion

This chapter examined the time series properties of the data employed for estimation, presented and discussed results. Unit root test employing both the ADF and the PP techniques essentially showed that some of the series were stationary at levels while others had to be differenced once to achieve stationarity. This implied that the series are integrated of order zero $I(0)$ and order one, $I(1)$. The existence of non-stationary variables indicated the possibility of the existence of a long-run relationship among the variables, which the study confirmed using ARDL bounds test. The results showed the presence of long-run and short-run relationship

between real GDP, financial development, monetary policy, financial development and monetary policy interaction, foreign direct investment, remittances, capital, and labour. The coefficients for all the explanatory variables had the expected signs in the long-run and in the short-run except for labour supply.

The results of the dynamic ARDL model selected based on SBC shows that the error correction term (ECM_{t-1}) carried the expected negative sign and was significant at 1 percent. This further confirmed the cointegration test. The diagnostic and parameter stability tests revealed that the model satisfies the tests of serial correlation, functional form misspecification, non-normal errors and heteroscedasticity at conventional levels of significance and the graphs of the CUSUM and CUSUMSQ indicate the absence of any instability of the coefficients because the plots of these graphs are confined within the 5 percent critical bounds of parameter stability suggesting that all the coefficients of the estimated ARDL model are stable over the study period.

The Granger causality test results revealed unidirectional causality between economic growth and financial development, as well as between economic growth and foreign direct investment, inflation and labour supply. However, there is no directional causality between economic growth and monetary policy, remittances as well as capital.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

This chapter presents the summary of findings, conclusions for the entire study. It also provides policy recommendations, limitations and suggestions for further research.

Summary

The thrust of the study was to investigate the growth effects of financial development and monetary policy on output in Ghana. The following are the key findings of the study.

- Results from the ARDL regression revealed that there exist a positive and significant relationship between real GDP (economic growth) and financial development in the long-run. Consistent with the long-run, the study recorded an empirically positive and significant relationship between financial development and economic growth in the short run.
- Empirical evidence from the ARDL model also show a positive and statistically significant relationship between monetary policy of the central bank and real GDP both in the long run and the short run. This further re-echo the role of monetary policy in influencing output as a macroeconomic stabilization tool in Ghana.
- The study also found a positive and statistically significant relationship between financial development and monetary policy interaction capturing

the joint effect and real GDP (economic growth) both in the long-run and the short run. The positive coefficient of the interaction term means that with financial development, the effect of monetary policy on economic growth is heightened which further affirms that financial development and monetary policy individually are stimulants of growth. That is, for Ghana, financial development enhances the impact of monetary policy on output.

- Moreover, the study revealed that foreign direct investment as a percentage of GDP had a positive and statistically significant relationship with real GDP per (economic growth) both in the log-run and the short-run. This means that, real GDP will see significant growth in the future owing to increase in foreign investment into enterprises, corporate governance and infrastructure.
- Results also showed that private remittances had a positive and statistically significant relationship with real GDP (economic growth) both in the log-run and the short-run. This means that, remittance inflow from migrants abroad into home country are growth stimulants.
- Furthermore, the study revealed that Capital proxied by gross fixed capital formation as a percentage of GDP recorded a positive and statistically significant relationship with real GDP (economic growth) both in the short run and the long run. This implies that, real GDP will see significant growth in the future owing to increases in savings poised towards investment into infrastructure including educational facilities, health facilities, private

residential dwellings as well as commercial and industrial buildings which are deemed growth enhancing.

- In addition, labour supply proxied by population (ages 15 to 64) proportion of total was found to support a' priori expectations with a positive and statistically significant relationship with real GDP (economic growth) in the long-run. This means that labour supply has a positive impact on economic growth.
- Inflation rate in the other vein was found to be negative and statistically insignificant. This goes to buttress the assertion that higher and unstable prices are detrimental to economic booms.
- Finally, investigating the direction of causation among the variables via the Pairwise Granger Causality testing procedure revealed that there exists a unidirectional causal relationship between financial development and real GDP (economic growth), with causality running from economic growth to financial development.

Conclusions

Although there seem to be rising interest in the financial development and monetary policy link in African countries such as Ghana, empirical evidence on the link have been mixed. The study, therefore, applied the Autoregressive Distributed Lag (ARDL) approach to investigating the joint effect of financial development and monetary policy on economic growth in Ghana during the period 1980 to 2016. It was found that financial development contributes to real GDP (economic growth)

in Ghana both in the long-run and in the short-run. Monetary policy also revealed a significant benefit to economic growth. An observation of the interaction between the two variables (financial development and monetary policy) revealed that, the interaction coefficient is positive and statistically significant.

In line with empirical evidence, foreign direct investment, remittances, capital stock, and labour supply all proved to be expedient in determining economic growth in Ghana. This implies that foreign direct investment, remittances, capital stock, and labour supply are critical in the growth process of the economy. Inflation on the other hand proved to be growth inhibiting for the economy.

Additively, results from the Granger Causality test revealed a unidirectional relationship between financial development and economic growth, with the causality running from economic growth to financial development.

Policy recommendations

The study found strong evidence to support the fact that financial development acts as engine of economic growth and that economic performance can be boost in Ghana through financial sector development. In this respect, the government together with the Bank of Ghana and other stakeholders in the financial sector should deepen the financial sector by reducing information and transactional cost of doing business and maintain the implementation of financial sector reforms so as to promote economic growth. Again, the Bank of Ghana should work with other stakeholders in the financial sector to draft and implement policies such as improving institutional infrastructure for promoting access geared towards ensuring

the ready accessibility of credit for investment at moderate cost by facilitating the establishment of financial institutions to increase credit delivery to the private sector especially in rural areas which have limited access to financial services; create the enabling legal environment for efficient allocation of credit to the private sector through the adoption of reforms to strengthen creditors rights and enforce commercial contracts. In addition, policies should be designed to improve the efficiency of savings mobilization in the financial sector through the banking system accompanied by efficient allocation of resources to productive sectors of the economy.

The study also showed a positive relationship between monetary policy and real GDP. This means that central bank's policy rate has the potential to stimulate growth. Therefore, the current monetary expansion position of Bank of Ghana is deemed a step in the right direction but should be used with caution since low policy rates means lower reference rates. Considering the dual objective of Bank of Ghana, the monetary policy should be tailored to promote real sector lending while trying to achieve low and stable inflation. To achieve higher growth in the economy, banks and other financial institutions can increase the amount of fund that the make as loans by restructuring their loan pricing in responds to the policy rate changes and in line with the reference rate. This will create the needed economic environment that will encourage consumer borrowing and ultimately resulting into increases in consumer and investment spending in the economy leading to growth. Again, the lack of responsiveness of lending rates to changes in policy rates threatens the

sustainability of the inflation targeting monetary policy framework. Hence there is a need to improve on the efficacy of policy regimes like the inflation targeting.

Following the result of the study, it was found that there exist a strong positive and statistically significant relationship between the financial development and monetary policy interaction term and economic growth compared to their individual effects. Hence there is the need to strengthen monetary policy transmission via deliberate efforts to deepen the financial sector development and improve the competitiveness of our financial markets via encouraging competitive provision of financial services to customers such as low and middle-income households and small firms. Bank of Ghana should also build strong and resilient institutional frameworks to foster the development of financial markets so as to deepen the influence of monetary policy on market interest rates in the financial sector.

Government policies must also be put in place to ensure efficiency in the regulation and supervision of financial institution and by furthering the on-going private banks and non-bank financial institutions involvement in the sector to make credit available and accessible to investors and businesses to borrow to finance their businesses to boost economic growth and development through investment and private sector development.

Monetary policy conduct by the Bank of Ghana should aim at firmly anchoring inflation expectations to reduce persistence in the medium-to-long-term. To achieve this, the central bank must further commit itself to greater transparency

by improving its communications strategy and accountability to give the current monetary policy framework more credibility.

Results on the growth effects of Foreign direct investment shows that FDI enhances economic growth in the economy. Hence, government must ensure stable and sound investment climate to enhance the activities of the private sector via the improvement in systems of transportation, communication, power supply, ports and harbours to attract FDI inflows and support the activities of foreign Multi-National Corporations (MNCs). Thus, the government besides ensuring infrastructural development must reviewed legislative frameworks to ease the restrictions regarding repatriated profits by MNCs. This will encourage more foreign enterprises to significantly increase the level of investments in the country. Again, due to growing concerns regarding the activities of MNCs and it adverse impact on local enterprises, the government should review legislations regulating the activities of MNCs to minimize crowding-out effects on domestic enterprises.

Results for private remittances proved that remittances are also growth promoting. This implies that there is the need to boost the inflow private remittances into the country. The government should put in place initiatives such as lowering transfer cost, reducing risks of transfer and making available more lucrative investment opportunities. Appropriate savings services for migrants should be created to encourage the inflow of remittances by opening of repatriable foreign currency accounts, issuing of foreign currency dominated bonds and savings certificates dominated in foreign currency. The Bank of Ghana should also

license money transfer organization so that money transfer from relatives abroad becomes more easy, fast and convenient.

The negative relationship between inflation and economic growth implies that higher rates of inflation is detrimental to growth in the economy. The country must enact policies that will significantly increase the total output to ensure economic stability. Thus, real economic factors such as price stability, government wage expenditures and final consumptions must be controlled to promote GDP growth in the country without disrupting the economy's stability to eventually attracts foreign investors. Further, Monetary policies such as single digit inflation targets should be adopted to keep inflation low and stable for sustained growth. To tame inflation within growth-enhancing ranges, policy tightening through complementary mix of monetary and fiscal policies is recommended. In particular, prudent fiscal management through controlled public expenditure must be vigorously pursued while paying attention to the quality of public investments to minimize waste of financial resources in the economy.

The study also showed a positive link between capital and economic growth. This implies that real GDP can be achieved by increasing savings to raise adequate capital. To do this, the government through the central bank and other stakeholders in the banking sector should institute deposit insurance schemes to safeguard depositors to encourage savers to put money at the bank. This would help mobilize adequate capital which could be channeled to investors to produce output hence increasing growth.

Finally, a cursory look at the growth effects of labour suggest that labour supply is growth promoting. That is, higher levels of human capital development improve growth significantly. This implies that there is the need to boost the employment of more resourceful workforce into the productive sector of the economy geared towards increasing productivity and hence boosting aggregate output. Government in collaboration with industrial players must invest in formal training of labour force, information communication and technological development to increase productivity and enhance welfare growth. Together with labour, development in technology, communication and information enhance human capital that breeds competitiveness increasing productivity and growth. Additively, jobs and other employment opportunities should be created by sector ministries of the ministry of employment and labour relations to absorb resourceful labour force and to avoid waste.

Direction for Future Study

The main thrust of this study has been to examine the effects of financial development and monetary policy on economic growth. Specifically, the study focused on investigating both the long-run and the short-run relationship as well as the direction of causality among economic growth and its explanatory variables. Succeeding studies should examine the financial development and monetary policy effects on output by determining which of the transmission channels effectively impacts on output in Ghana.

REFERENCES

Abala, D. O. (2014). Foreign Direct Investment and Economic Growth: An Empirical Analysis of Kenyan Data. *DBA Africa Management Review*,*4*(1), 62-83.

Abdul, R. A. (2015). *Estimating the Responses of Real GDP and Inflation to Monetary Policy Instruments Shocks: Evidence from Ghana.* Unpublished Master's Dissertation, Department of Economics, Kwame Nkrumah University of Science and Technology.

Abradu-Otoo, P., Amoah, B. & Bawumia, M. (2003). An Investigation of the Transmission Mechanism of Monetary Policy in Ghana: A Structural Vector Error Correction Analysis. *Bank of Ghana Working Paper*. WP/BoG 2003/02.

Acheampong, K. (2005). Bank Interest Rate Channel of Monetary Policy Transmission in Ghana. *Bank of Ghana Working Paper*. WP/BOG-2005/10.

Adu, G., Marbuah, G. & Mensah, J. T. (2013). Financial Development and Economic Growth in Ghana: Does the Measure of Financial Development Matter? *Review of Development Finance, 3*(4), 192-203. https://doi.org/10.1016/j.rdf.2013.11.001

Aftab, N. Jebran, K., & Ullah, I. (2016). Impact of Interest Rate on Private Sector Credit; Evidence from Pakistan. *Jinnah Business Review 4*(1), 47-52.

Agu, O. C. (2015). Determinants of Private Investment in Nigeria an Econometric Analysis. *International Journal of Economics, Commerce and Management United Kingdom 3*(4), 1-20.

Alagidede, P., Nketiah-Amponsah, E., & Baah-Boateng, W. (2013). The Ghanaian Economy: An Overview. *Ghanaian Journal of Economics, 1*(1), 07-30.

Alhassan, A. R. (2014). *Estimating the Responses of Real GDP and Inflation to Monetary Policy Instruments Shocks: Evidence from Ghana.* Unpublished Master's Dissertation, Department of Economics, Kwame Nkrumah University of Science and Technology.

Anderson, T. W. (2003). *An Introduction to Multivariate Statistical Analysis. Wiley Series in Probability and Statistics*. New York: John Wiley & Sons.

Angelopoulou, E., Balfoussia, H. & Gibson, H. D. (2014). Building A Financial Conditions Index for The Euro Area and Selected Euro Area Countries: What Does It Tell Us About the Crisis? *Economic Modelling*, *38*(C), 392-403.

Antwi-Asare, T. O., & Addison, E. K. Y. (2000). *Financial Sector Reforms and Bank Performance in Ghana.* London UK: Overseas Development Institute.

Asafu-Adjaye, J. (2005). What has been the Impact of Foreign Direct Investment in Ghana? *Institute of Economic Affairs, 1*(9), 20-45.

Asiedu, M. K. (2013). Trade liberalization and growth: The Ghanaian experience. *Journal of Economics and Sustainable Development*, *4*(5), 125-135.

Ayibor, R. E. (2012). *Trade liberalisation and Economic Growth in Ghana* Unpublished Master's Dissertation, Department of Economics, University of Cape Coast.

Balasubramanyam, V. N., & Salisu, M. (1999). Foreign Direct Investment as an Engine of Growth. *Journal of International Trade and Economic Development, 8*(1), 1-83.

Balasubramanyam, V. N., Salisu, M., & Sapsford, D. (1996). Foreign direct investment and growth in EP and IS countries. *The Economic Journal, 106*(434), 92-105.

Bannerjee, A., Dolado, J., & Mestre, R. (1998). Error-correction mechanism tests for cointegration in single equation framework. *Journal of time Series Analysis, 19*(3), 267-283.

Barro, R & Sala-i-Martin, X. (1995). *Economic Growth*. MA: MIT Press.

Batuo, M. & Mlambo, K. (2012). *Financial Liberalisation, Banking Crises and Economic Growth in African Countries*. Germany: University Library of Munich.

Bawumia, M. (2010). *Monetary Policy and Financial Sector Reform in Africa: Ghana's Experience*. Accra: Combert Impressions Ghana Ltd.

Bean, C., Larsen, J., & Nikolov, K. (2002). Financial frictions and the Monetary Transmission Mechanism: Theory, Evidence and Policy implications. *ECB Working Paper* No. 113, European Central Bank.

Beck, T., Colciago, A., & Pfajfar, D. (2014). The Role of Financial Intermediaries in monetary policy transmission. *Journal of Economic Dynamics and Control, 43*(C),1-11.

Belloumi, M. (2014). The Relationship Between Trade, FDI and Economic Growth in Tunisia: An Application of the Autoregressive Distributed Lag Model. *Economic Systems 38*(2), 269-287.

Bernanke, B. S. & Gertler, M. (1995). Inside the Black Box: The Credit Channel of Monetary Policy Transmission. *Journal of Economic Perspectives, 9*(4),27-48.

Bristy, H. J. (2014). Impact of Financial Development on Exchange Rate Volatility and Long-Run Growth Relationship of Bangladesh. *International Journal of Economics and Financial Issues 4*(2), 258-263.

Calderon, C., & Liu, L. (2003). The Direction of Causality Between Financial Development and Economic Growth. *Journal of Development Economics 72*(1), 321-334.

Carranza, L., Galdon-Sanchez, J. E., & Gomez-Biscarri, J. (2010). Understanding the relationship between financial development and monetary policy. *Review of International Economics, 18*(5), 849-864.

Cecchetti, S. (1999). Legal structure, financial structure and monetary policy transmission. *Federal Reserve Bank of New York Economic Policy Review*, 5(2), 9-28.

Chenery, H. B., & Strout, A. M. (1966). Foreign Assistance and Economic Development. *The American Economic Review, 56(4),* 679-733.

Choe, C., & Moosa, I. A. (1999). Financial System and Economic Growth: The Korean Experience. *World Development, 27*(6), 1069-1082.

Cihak, M., Demirgüç-Kunt, A., Feyen, E., & Levine, R. (2012). Benchmarking Financial Systems around the World. *World Bank Policy Research Working Papers* WPS6175, (6175), 1-58.

Demetriades, P. O., & Hussein, K. (1996). Does Financial Development Cause Economic Growth? Time-Series Evidence from 16 countries. *Journal of Development Economics, 51*(2), 387-411.

DFID (2004). *Financial sector development: A pre-requisite for growth and povertyreduction?* London Department for International Development (DFID), Policy Division.

Domer, E. D. (1946). Capital Expansion, Rate of Growth, and Employment. *Econometric, 14*(2), 137-147.

Dornbusch, R., & Fischer, S. (1993). Moderate Inflation. *World Bank Economic Observer, 7*(I), 1-44

Dornbusch, R., & Fischer, S. (1994). *Macroeconomics*. McGraw-Hill Inc. Economy Braces for Rough Patch. (2011, Oct 7). The Daily Star, p.1.

Dornbusch, R., Fischer, S. & Kearney, C. (1996). *Macroeconomics*. New York: McGraw-Hill Companies, Inc.

Effiong, E., Esu, G., & Chuku, C. (2017). Financial Development and Monetary Policy Effectiveness in Africa. *MPRA Paper No. 79732*. From https://mpra.ub.uni-muenchen.de/79732/

Engel, R. F., & Granger, C. W. (1987). Co-integration and Error Correction Representation, Estimation and Testing. *Econometrica, 55*(2), 251-276.

Fosu, A. K., Kenya, M. S., & Ndungu, N. S. (2003). Economic Reforms and Restructuring in Sub Sahara Africa: An Overview. *Journal of African Economies, 12*(1), 110-111.

Friedman M. (1956). *The Quantity Theory of Money: A restatement, in M. Friedman, editor, Studies in the Quantity Theory of Money*. Chicago: University of Chicago Press.

Friedman, M. (1968). The Role of Monetary Policy. *The American Economic Review, 58*(1), 269-295.

Frimpong, J. M. & Oteng-Abayie, E. F. (2010). When is inflation harmful? Estimating the threshold effect for Ghana. *American Journal of Economics and Business Administration, 2*(3), 232-239.

Gatawa, N. M, Akinola, A & Olarinde, M. O. (2017). Impact of Money Supply and Inflation on Economic Growth in Nigeria. *IOSR Journal of Economics and Finance. 8*(3), 26-37

Gillman, M., & Harris, M. (2004). Inflation, Financial Development and Endogenous Growth. *Working Paper*, 24-04, Monesh University.

Grossman, G., & Helpman, E. (1991). Quality Ladders in the Theory of Economic Growth. *Review of Economic Studies*; *58*(1), 43-61.

Gujarati, D. N. (2004). *Basic Econometrics*. New York: McGraw-Hill Companies.

Hamid, A., & Pichler, H. J. (2011). Macro Determinants of Growth and Productivity in the Context of Endogenous Growth Theory.

Interdisciplinary Journal of Contemporary Research Business, 3(2), 1850-1870.

Hansen, B. E. (1992). Tests for parameter stability in regressions with I (1) processes. *Journal of Business and Economic Statistics*, *10*(3), 321-335.

Harrod, R. (1939). An Essay in Dynamic Theory. *Economic Journal, 49*(193), 14-33.

Harvey, A. C. (1981). *Time Series Models*. Philip Allan and Humanities Press. Oxford.

Heintz, J. & Ndikumana, L. (2011). Is there a case for formal inflation targeting in Sub-Saharan Africa? *Journal of African Economies*, *20*(2), 67-103.

Hochstein, A. (2006). Harrod-Domar Growth and Production Possibility Curve. *International Advances in Economic Research*, *12*(3), 427-427.

Hubbard, G. (1995). Is There a Credit Channel for Monetary Policy? *FRB of St Louis Review 77* (3), 63-77

Hubbard, R. G., Kashyap, A. K. & Whited, T. M. (1995). International Finance and Firm Investment, *Journal of Money Credit and Banking, 27*(3), 683-701

Hunt, S. D. (2007). Economic Growth: Should policy focus on investment or dynamic competition? *European Business Review*, *19*(2), 279–291.

International Monetary Fund (IMF). (2011). *Ghana: Financial system stability assessment update*. (IMF Country Report 11/131), Washington, D.C.

International Organization for Migration (IOM). (2009). *The MIDA Experience and Beyond. Operationalizing Migration for Development Across Regions.*

IOM,Geneva.http://publications.iom.int/bookstore/index.php?mainpage=roduct_info&products_id=56

Ireland, P. N. (2008). The Monetary Transmission Mechanism. *Federal Reserve Bank of Boston Working Paper* No. 06-1. Palgrave Macmillan, Ltd.

Jawadi, F., Mallick, S. K. & Sousa, R. M. (2016). Fiscal and Monetary Policies in the BRICS: A Panel VAR Approach. *Economic Modelling, 58*(C), 533-542.

Jhingan, M. L. (2000). *Monetary and banking international trade.* New Delhi: Hamsphire Vrinda Publications Ltd.

Jhingan, M. L. (2002). *The Economics of Development and Planning.* Vrinda Edu. Books. 34th Revised Edn.

Johansen, S. (1995). *Likelihood-based Inference in Cointegrated Vector Autoregressive Models*. Oxford University Press.

Johansen, S., & Juselius, K. (1990). Maximum likelihood estimation and inference on cointegration with applications to the demand for money. *Oxford Bulletin of Economics and Statistics, 52*(2), 169-210.

Jones, G. (1996). *The Evolution of International Business: An Introduction.* New York.

Kaputo, C. C. (2011). *Macroeconomic Policy and Domestic Private Investment: The Case of Zambia.* Unpublished Master's Dissertation, Department of Economics, University of Zambia.

Kasekende, L. & Brownbridge, M. (2011). Post-crisis monetary policy frameworks in Sub Saharan Africa. *African Development Review, 23*(2), 190-201.

Kemal, A. R., Quayyum, A., & Hanif, M. N. (2007). Financial Development and Economic Growth: evidence from a heterogeneous panel of High-Income Countries. *Lahore Journal of Economics, 12*(1), 1-34.

Keynes, J. M. (1936). *The General Theory of Employment Interest and Money*. London: Macmillan.

Khan, M. S. (2011). The design and effects of monetary policy in Sub-Saharan African countries. *Journal of African Economies*, *20*(2), 16-35.

King, R. G., & Levine, R. (1993). Finance and Growth. *Journal of Economics*, *108*(3), 717-737.

Kohpaiboon, A. (2006). Foreign direct investment and technology spillover: A cross-industry analysis of Thai manufacturing. *World Development*, *34*(3), 541-556.

Koopmans, T. C. (1965). *On the Concept of Optimal Economic Growth. The Econometric Approach to Development Planning*. 225-287, North-Holland, Amsterdam.

Kovanen, A. (2011). Monetary Policy Transmission in Ghana: Does the Interest Rate Channel Work? *IMF Working Papers*, 11(275), 1-32. https://doi.org/10.5089/9781463925314.001

Krause, S., & Rioja, F. (2006). Financial Development and Monetary Policy Efficiency. *Emory Economics*, 613. Retrieved from https://doi.org/DOI

Kwakye, J. K. (2012). *Key Issues in The Choice of An Appropriate Monetary Policy Framework for Ghana.* The Institute of Economic Affairs, Ghana.

No.32 *Institute of Economic Affairs Monograph*. Accessed from www.ieagh.org.

Levine, R. (1997). Financial Development and Economic Growth: Views and Agenda. *Journal of Economic literature*, *35*(2), 688-726.

Levine, R. (2005). *Chapter 12 Finance and Growth: Theory and Evidence*. Handbook of Economic Growth, 1(SUPPL. PART A), 865-934. https://doi.org/10.1016/S1574-0684(05)01012-9

Levine, R., & Zervos, S. (1998). Stock Markets, Banks and Economic Growth. *American Economic review*, *88*(3), 537-538

Liang, Q., & Teng, J. Z. (2006). Financial Development and Economic Growth: Evidence from China. *China Economic Review*, *17*(4), 395-411.

Loganathan, N., Ismail, S., Streimikiene, D., Hassan, A. A. G., Zavadskas, E. K., & Mardani, A. (2017). Tax Reform, Inflation, Financial Development and Economic Growth in Malaysia. *Romanian Journal of Economic Forecasting*, *20*(4), 152-165.

Lucas, R. E. (1988). On the Mechanics of economic development. *Journal of Monetary Economics*, *22*(1), 3-42.

Ma, Y., & Lin, X. (2016). Financial development and the effectiveness of monetary policy. *Journal of Banking and Finance*, *68*(C), 1-11. https://doi.org/10.1016/j.jbankfin.2016.03.002

MacKinnon, J. G. (1991). Critical Values for Cointegration Tests. In R. F. Engle & C. W. J. Granger (Eds.), *Long-run Economic Relationships: Readings in Cointegration* (267-276). Oxford University Press, Oxford.

Mah, J. S. (2000). An Empirical Examination of The Disaggregated Import Demand of Korea The Case of Information Technology Products. *Journal of Asian Economics*, 11(2), 237-244.

Maier, G., & Becker, J. (2007). The External Debt Crisis and Its Impact on Economic Growth and Investment in Sub-Saharan Africa: A Regression Econometric Approach ECOWAS Countries. Published online by epub (http;//epub.wuwien.ac.at).

Mankiw, N. G. & Scarth, W. (2008). *Macroeconomics.* Third Canadian Edition, New York: Worth Publishers.

Mankiw, N. G. (2006). *Macroeconomics*. 5th Ed. New York: Thompson Southern-Western Publishers.

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

Mensah, S. (2017). Banking and Capital Markets: The Evolution of Ghana's Financial Sector and Future Prospects. In E. Aryeetey & R. Kanbur, (Eds), Ghana at Sixty. (117-136). UK: Oxford University Press.

Menyah, K., Nazlioglu, S., & Wolde-Rufael, Y. (2014). Financial development, trade openness and economic growth in African countries: New insights from a panel causality approach. *Economic Modelling*, *37*(C), 386-394. https://doi.org/10.1016/j.econmod.2013.11.044

Misati, R. N., Lucas, N., Anne, K., & Shem, O. (2010). Financial Innovation and Monetary Policy Transmission in Kenya. *International Research Journal of Finance and Economics*, *50*(1), 123-136

Mishkin, F. (1996). The Channels of Monetary Transmission: Lessons for Monetary Policy. *NBER Working Paper* 5464. National Bureau of Economic Research, Inc. Massachusetts.

Mishkin, F. (2009). Is Monetary Policy Effective During Financial Crises? *NBER Working Paper*. 14678.

Mishkin, F. S. (1995). Symposium on the Monetary Transmission Mechanism. *The Journal of Economic Perspectives, 9*(4), 3-10.

Mishkin, F. S. (2004). Can Central Bank Transparency Go Too Far*? National Bureau of Economic Research Paper*. No. w10829.

Mishkin, F. S. (2004). *The Economics of Money, Banking and Financial Markets*. 7th Ed. New York: Addison-Wesley.

Mishra, P. & Montiel, P. (2013). How effective is monetary transmission in low incomecountries? A survey of the empirical evidence. *Economic Systems, 37*(2),187-216.

Mishra, P., Montiel, P. J., & Spilimbergo, A. (2012). Monetary transmission in low-income countries: effectiveness and policy implications. *IMF Economic Review, 60*(2),270-302.

Modigliani, F. (1960). Long Run Implications of Alternative Fiscal Policies and the Burden of the National Debt. *Economic Journal, 70*(1), 730-755.

Modigliani, F. (1971). *Monetary Policy and Consumption.* In: Federal Reserve Bank of Boston, Consumer Spending and Monetary Policy: The Linkages. Conference Series No. 5 (Boston), 9-84

Mojon, B. (2000). Financial Structure and The Interest Rate Channel of ECB Monetary Policy. *European Central Bank Working Paper*, No. 40. Frankfurt, European Central Bank.

Nath, H., & Al Mamun, K. (2004). Trade Liberalization, Growth and Inequality in Bangladesh: An Empirical Analysis. In *This paper was presented at the 41st Annual Conference of the Missouri Valley Economic Association held in October*. Retrieved from http://www.shsu.edu/~eco_hkn/hiranya_wip3.pdf

Ncube, M. (2008). Financial Systems and Monetary Policy in Africa. *African Economic Research Consortium*, Nairobi.

Njindan Iyke, B., & Takumah, W. (2015). *The Links between Economic Growth and Tax Revenue in Ghana: An Empirical Investigation.* Retrieved from https://mpra.ub.unimuenchen.de/67281/

Nunnenkamp, P. (2002). Determinants of FDI in Developing Countries: Has Globalization Changed the Rules of Game? *Kiel Working Paper No. 1122*.

Nunnenkamp, P., & Spatz, J. (2003). FDI and Economic Growth in Developing Economies: how relevant are host-economy and industry characteristics? *Kiel Institute for World Economics Working Paper No. 1176*, 1-38.

Nwankwo G. O. (1980). The Machinery of Government that Formulates and Executed Monetary Policy. *CBN Bullion 5*(1), 2-10.

Nwankwo, G. O. (1991). *The Money and Capital Market in Nigeria*. London: Macmillan.

Obstfeld, M., & Rogoff, K. (1996). Exchange Rate Dynamics Redux. *NBER working paper* 4693, National Bureau of Economic Research.

Ocran, M. K. (2007). A Modeling of Ghana's Inflation Experience: 1960-2003. *AERC Research Paper* No.169. African Economic Research Consortium, Nairobi.

Odhiambo, N. M. (2008). Financial Development in Kenya: A Dynamic Test of the Finance-led Growth Hypothesis *Economic Issues, 13*(2), 21-36.

Odhiambo, N. M. (2008). Interest Rate Deregulation in Developing Countries: Some Controversies, *Africa Growth Agenda*, *5*(2), 1-10.

Odhiambo, N. M. (2009). Interest Rate Reforms, Financial Deepening and Economic Growth in Kenya: An Empirical Investigation. *The Journal of Developing Areas, 43*(1), 295-313.

Odhiambo, N. M. (2010). Stock Market Development and Economic Growth in South Africa: An ARDL–Bounds Testing Approach. *World Business Institute*, Asia-Pacific Business Research Conference, 2010.

Ofori-Abebrese, G., Pickson, R. B. & Diabah, B. T. (2017). Financial Development and Economic Growth: Additional Evidence from Ghana. *Modern Economy*, 8, 282-297. https://doi.org/10.4236/me.2017.82020

Olweny, T., & Chiluwe, M. (2012). The Effect of Monetary Policy on Private Sector Investment in Kenya. *Journal of Applied Finance & Banking*, 2(2), 239-287

Oppong, G. A (2017). *The Impact of Foreign Direct Investment Inflows on Economic Growth in Ghana: An Empirical Analysis*. Unpublished Master's Dissertation, Department of Economics, Kwame Nkrumah University of Science and Technology.

Patrick, H. T. (1966). Financial Development and Economic Growth in Underdeveloped Countries. *Economic Development and Cultural Change, 14*(2), 174-189.

Pattichis, C. S., & Pattichis, M. S. (1999). Time-scale analysis of motor unit action potentials. *IEEE Transactions on Biomedical Engineering, 46*(11), 1320-1329.

Peek, J. & Rosengren, E. S. (2013). The Role of Banks in the Transmission of Monetary Policy. *Public Policy Discussion Papers* No. 13-5, Federal Bank of Boston.

Perron, P. (1997). Further Evidence on Breaking Trend Functions in Macroeconomic Variables. *Journal of Econometrics, 80*(2), 355-385.

Pesaran, M. H., & Pesaran, B. (1997). *Working with Microfit 4.0: interactive econometric analysis*. New York: Oxford University Press.

Pesaran, M. H., & Shin, Y. (1998). An autoregressive distributed-lag modelling approach to cointegration analysis. *Econometric Society Monographs*, 31, 371-413.

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics, 16*(3), 289-326.

Petrakos, G., Arvanitidis, P., & Pavles, S. (2007). Determinants of Economic Growth: The Experts' View. *Discussion Paper Series, 13(10)*, 245-276.

Phillips, P. & Perron, P. (1988). Testing for A Unit Root in Time Series Regression. *Biometrika, 75*(2), 335-346.

Phillips, P., & Hansen, B. (1990). Statistical Inference in Instrumental Variables Regressions with I(1) processes. *Review of Economic Studies, 57*(1), 99-125.

Quartey, P. & Afful-Mensah, G. (2014). Financial and Monetary Policies in Ghana: A Review of Recent Trends. *Review of Development Finance, 4*(2), 115-125. https://doi.org/10.1016/j.rdf.2014.07.001

Quartey, P. & Prah, F. (2008). Financial Development and Economic Growth in Ghana: Is There a Causal Link? *The African Finance Journal, 10*(1), 28-54.

Quartey, P. (2010). Price Stability and the Growth Maximizing rate of inflation for Ghana, *Business and Economic Journal, 1*(1), 180-194.

Ralph Bryant, R., Hooper, P., & Mann, C. (1993). *Evaluating Policy Regimes: New Empirical Research in Empirical Macroeconomics.* Washington, D.C.: Brookings Institution.

Ramsey, F. (1928). A Mathematical Theory of Saving. *Economic Journal, 38*(2), 543-559.

Ray, P., & Prabu, E. (2013). Financial Development and Monetary Policy Transmission Across Financial Markets: What Do Daily Data tell for India? *RBI Working Paper Series*, WPS (DEPR), 04/2013.

Rebelo, S. (1991). Long Run Policy Analysis and Long Run Growth. *Journal of Political Economy, 99*(3), 500-521.

Romer, P. M. (1986). Increasing returns and Long-Run Growth. *Journal of Political Economy, 94*(5), 2-37

Rousseau, P. L., & Wachtel, P. (1998). Equity Markets and Growth: Cross-Country Evidence on Timing and Outcomes. *Journal of Banking & Finance, 24*(12), 49-55.

Safdar, S., & Khan, A. (2013). Financial innovation and monetary policy transmission mechanism in Pakistan. *International Journal of Development and Sustainability*, *2*(1), 390-397. Retrieved from http://isdsnet.com/ijds-v2n1-27.pdf

Sakyi, D. (2011). Trade openness, foreign aid and economic growth in post liberalisation Ghana: An application of ARDL bounds test. *Journal of Economics and International Finance*, *3*(3), 146-156.

Saltz, S. (1992). The Negative Correlation Between Foreign Direct Investment and Economic Growth in the Third World: Theory and Evidence. *Rivista Internazionale di Scienze Economichee Commerciali*, *39*(1),617-633.

Saqib, N., Masnoon, M., & Rafique. (2013). Impact of FDI on Economic Growth of Pakistan. *Advances in Management and Applied Economics*, *3*(1), 35-45.

Saxegaard, M. (2006). Excess liquidity and effectiveness of monetary policy: evidence from Sub Saharan Africa. *IMF Working Paper* No. 06/115, Washington, DC.

Schumpeter, J. A. (1911). *The Theory of Economic Development*. Harvard University Press, Cambridge MA World Bank (1989), World Development Report, New York, Oxford University Press.

Schumpeter, J. A. (1912). *The Theory of Economic Development*. Cambridge, MA: Harvard University Press

Seth, R., & Kalyanaraman, V. (2017). Effect of Financial Development on the Transmission of Monetary Policy. *Theoretical Economics Letters*, *7*(4), 795-813. https://doi.org/10.4236/tel.2017.74058

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

Singh, B. (2011). *How Asymmetric is Monetary Policy Transmission to Financial Markets in India*. Paper presented at First Research Conference, Reserve Bank of India, November 25, 2011.

Singh, S., Razi, A. Endut, N. & Ramlee, H. (2008). Impact of Financial Market Developments on the Monetary Transmission Mechanism. *Bank of International Settlement,* 39, 49-99.

Smets, F. (2013). Financial Stability and Monetary Policy: How Closely Interlinked? *International Journal of Central Banking*, *44*(3), 121-160.

Solow, R.M. (1956). A Contribution to the Theory of Economic Growth, Quarterly *Journal of Economics, 70*(1), 65-94.

Sowa, N. K. & Kwakye, J. K. (1994). Is Ghana's inflation a monetary phenomenon? *Economics Bulletin. Ghana*, 22, 1105-1117.

Stock, J. H. & Watson, M. W. (1993). A Simple Estimator of Cointegrating Vectors in Higher Order Integrated Systems. *Econometrica*, *61*(4), 783-820.

Stock, J. H., & Watson, M.W. (1988). Testing for Common Trends. *Journal of the American Statistical Association, 83*(10), 97-107.

Stock, J. H., & Watson, M.W. (2001). Vector Autoregressions. *Journal of Economic Perspectives, 15*(4), 101-115.

Svirydzenka, K. (2016). Introducing a New Broad-based Index of Financial Development. *IMF Working Paper*, (January), 1-43.

Swan, T. (1956). Economic Growth and Capital Accumulation. *Journal of Economic Record*, *32*(4), 334-62.

Tang, H. C. (2006). The Relative Importance of Monetary Policy Transmission Channels in Malaysia. *Centre for Applied Macroeconomic Analysis Working Paper*. 23/2006. Canberra: Australian National University.

Taylor, J. (1995). The Monetary Transmission Mechanism: An Empirical Framework. *Journal of Economic Perspectives, 9*(4) 11-26.

Taylor, J. B. (1993). *Macroeconomic Policy in a World Economy: From Econometric Design to Practical Operation*. New York: Norton.

Tobin, J. (1965). Money and Economic Growth. *Econometrica*, *33*(4), 671-684.

Tobin, J. (1969). A General Equilibrium Approach to Monetary Theory. *Journal of Money Credit and Banking*, *1*(1), 15-29.

Uhlig, H. (2005). What Are the Effects of Monetary Policy on Output? Results from an Agnostic Identification Procedure. *Journal of Monetary Economics*, *52*(2), 381-419. https://doi.org/10.1016/j.jmoneco.2004.05.007

Van den Berg, H. (2012). *Economic Growth and Development*. World Scientific Pub. Retrieved from http://tyke.epage.au.edu.tw/ezfiles/72/1072/attach/53/a_48464_7326813_98555.pf

Wrightsman, D. (1976). *An Introduction to Monetary Theory and Policy*. New York: The Free Press.

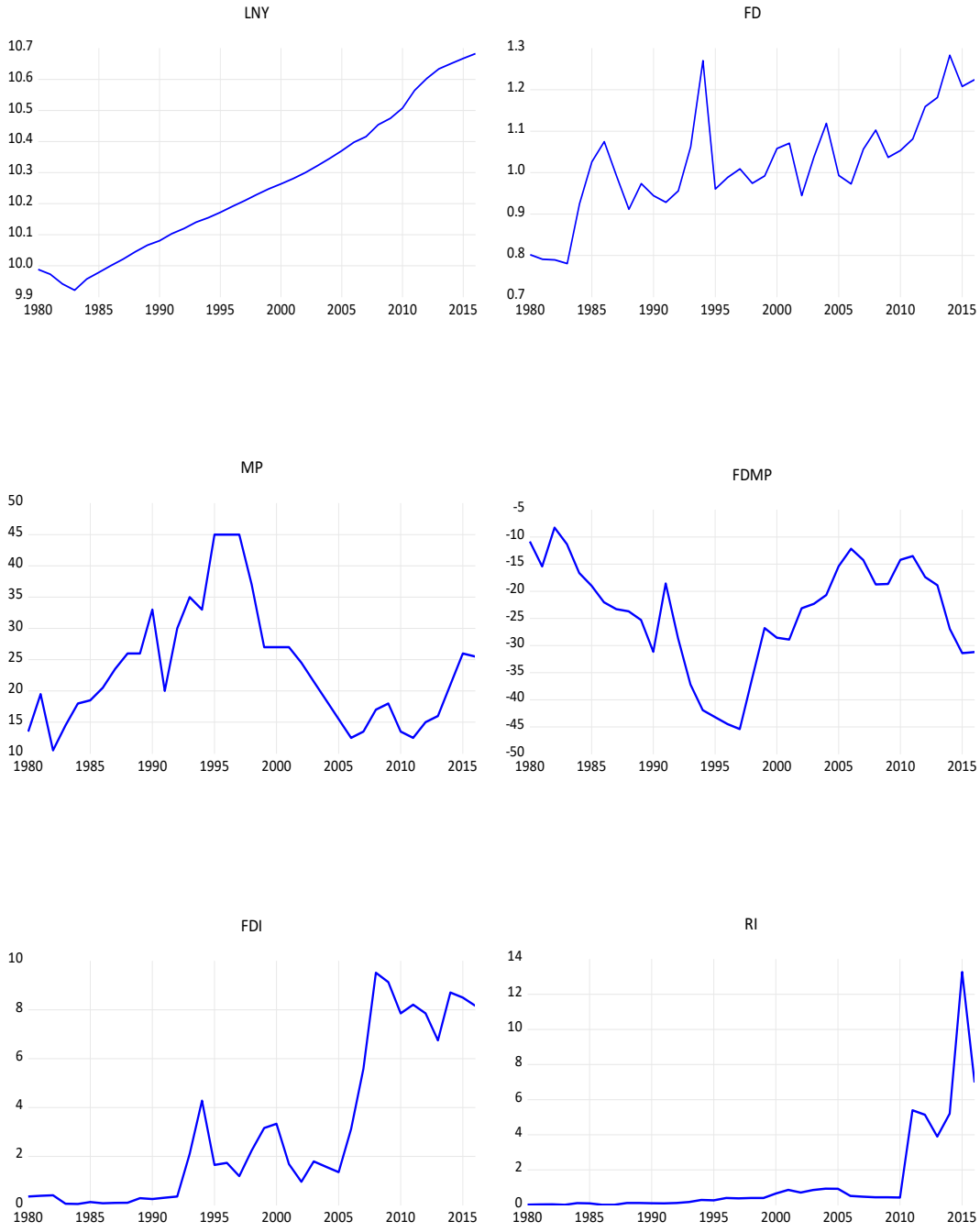
Yildirim, J., & Sezgin, S. (2003). Introduction: Symposium on Defence Economics. *Defence and Peace Economics, 14*(2), 105-106.

Zang H. & Kim Y. C. (2007). Does Financial Development Precede Growth? Robinson and Lucas Might Be Right. *Applied Economics Letters*, *14*(1), 15-19.

APPENDICES

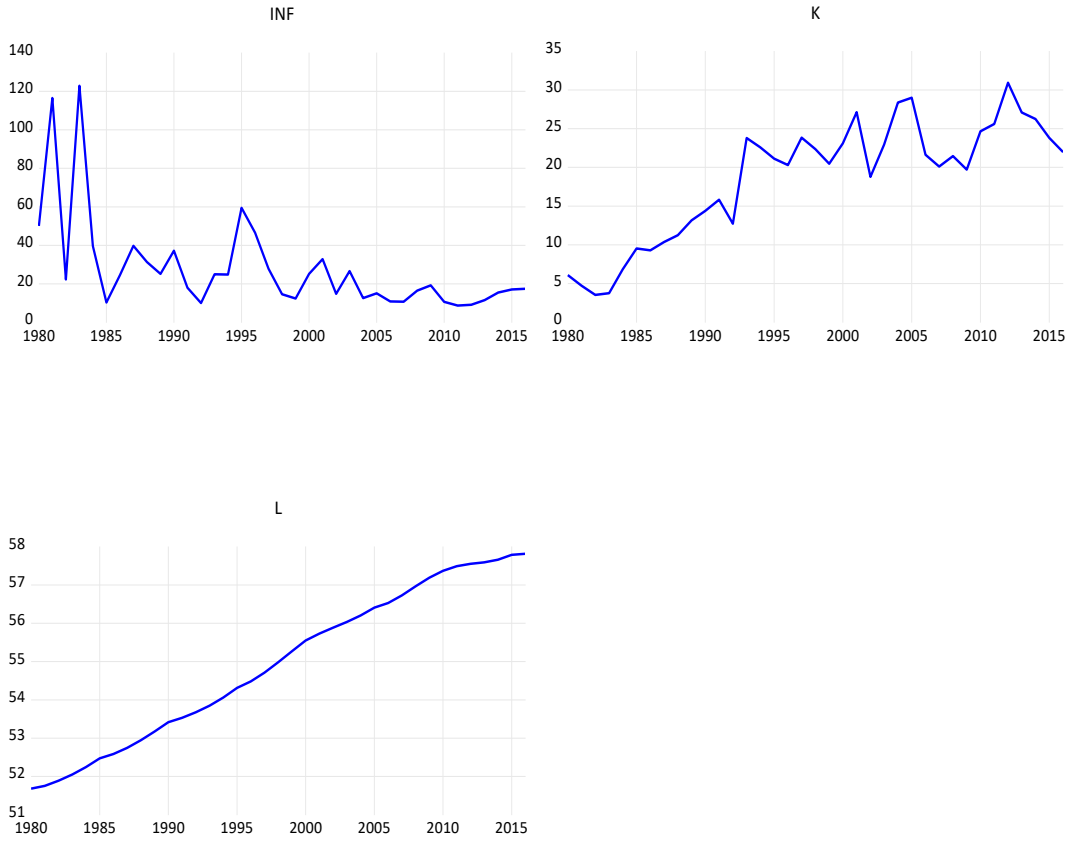
APPENDIX A-1

Plot of Variables in Levels



Source: Authors' own construct using E-views 10 Package.

APPENDIX A-2



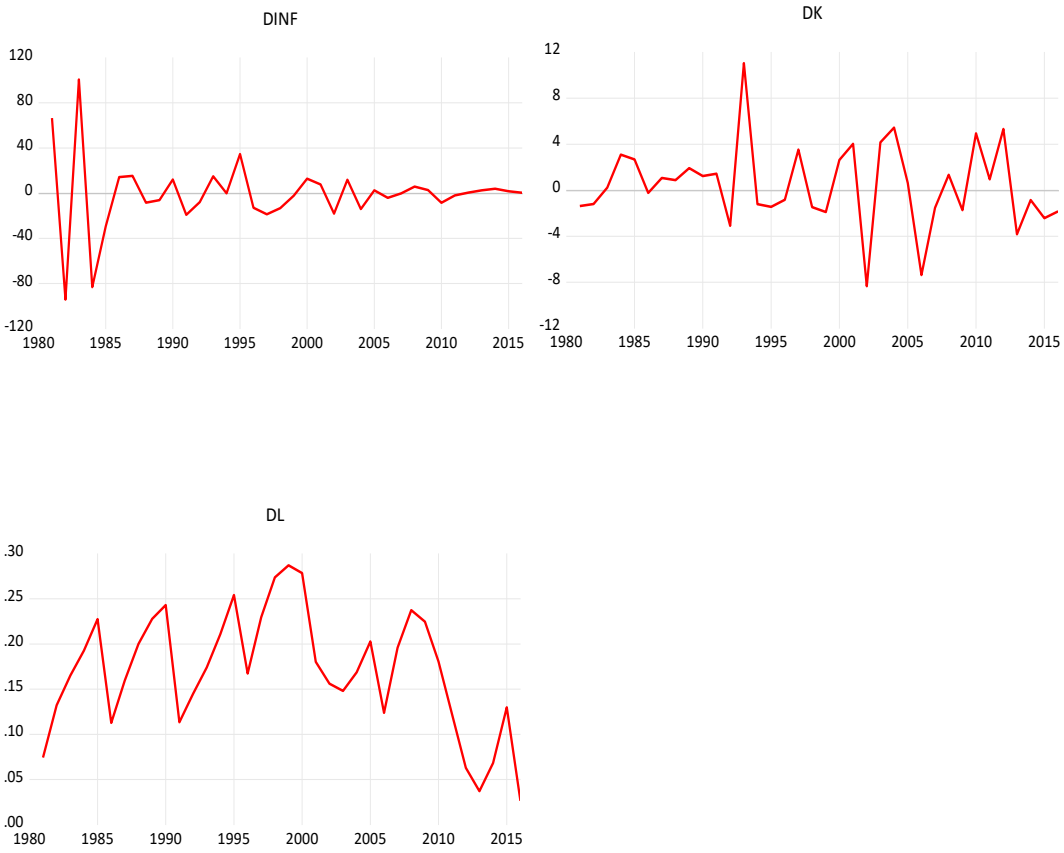
Source: Authors' own construct using E-views 10 Package.

APPENDIX B-1

Plot of Variables in First Difference

Source: Authors' own construct using E-views 10 Package.

APPENDIX B-2



Source: Authors' own construct using E-views 10 Package.

APPENDIX C-1

Results of ARDL Bounds Approach to Cointegration

ARDL Long Run Form and Bounds Test
Dependent Variable: D(LNY)
Selected Model: ARDL(1, 2, 2, 2, 0, 2, 0, 2, 2)
Case 2: Restricted Constant and No Trend
Date: 05/10/18 Time: 20:12
Sample: 1980 2016
Included observations: 35

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.926578	0.744356	5.275132	0.0002
LNY(-1)*	-0.629732	0.112356	-5.604786	0.0001
FD(-1)	0.227938	0.062485	3.647857	0.0029
MP(-1)	0.010597	0.002748	3.856766	0.0020
FDMP(-1)	0.010915	0.002780	3.926892	0.0017
FDI**	0.008830	0.001720	5.134213	0.0002
RI(-1)	0.013564	0.003045	4.454164	0.0006
INF**	-0.000297	8.38E-05	-3.547643	0.0036
K(-1)	0.002259	0.000752	3.003525	0.0102
L(-1)	0.041251	0.008291	4.975221	0.0003
D(FD)	0.216072	0.055421	3.898712	0.0018
D(FD(-1))	-0.172799	0.047083	-3.670064	0.0028
D(MP)	0.011342	0.001668	6.799170	0.0000
D(MP(-1))	-0.003959	0.001636	-2.419077	0.0310
D(FDMP)	0.011350	0.001801	6.300286	0.0000
D(FDMP(-1))	-0.004220	0.001788	-2.360350	0.0346
D(RI)	0.004721	0.000855	5.520819	0.0001
D(RI(-1))	-0.007077	0.002238	-3.162548	0.0075
D(K)	0.002306	0.000570	4.042870	0.0014
D(K(-1))	0.000947	0.000418	2.266306	0.0411
D(L)	-0.045142	0.029282	-1.541635	0.1471
D(L(-1))	-0.042095	0.029376	-1.432995	0.1755

* p-value incompatible with t-Bounds distribution.
** Variable interpreted as Z = Z(-1) + D(Z).

APPENDIX C-2

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FD	0.361960	0.124322	2.911461	0.0121
MP	0.016828	0.005316	3.165622	0.0074
FDMP	0.017333	0.005317	3.260109	0.0062
FDI	0.014023	0.001131	12.40068	0.0000
RI	0.021540	0.002301	9.362789	0.0000
INF	-0.000472	8.60E-05	-5.487552	0.0001
K	0.003587	0.001087	3.300034	0.0057
L	0.065506	0.005631	11.63359	0.0000
C	6.235312	0.324146	19.23613	0.0000

EC = LNY - (0.3620*FD + 0.0168*MP + 0.0173*FDMP + 0.0140*FDI + 0.0215 *RI -0.0005*INF + 0.0036*K + 0.0655*L + 6.2353)

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	16.28514	10%	1.85	2.85
K	8	5%	2.11	3.15
		2.5%	2.33	3.42
		1%	2.62	3.77

APPENDIX C-3

ARDL Error Correction Regression
Dependent Variable: D(LNY)
Selected Model: ARDL(1, 2, 2, 2, 0, 2, 0, 2, 2)
Case 2: Restricted Constant and No Trend
Date: 05/10/18 Time: 20:15
Sample: 1980 2016
Included observations: 35

ECM Regression
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(FD)	0.216072	0.029042	7.439877	0.0000
D(FD(-1))	-0.172799	0.031166	-5.544526	0.0001
D(MP)	0.011342	0.001003	11.30511	0.0000
D(MP(-1))	-0.003959	0.001009	-3.922240	0.0018
D(FDMP)	0.011350	0.001067	10.64022	0.0000
D(FDMP(-1))	-0.004220	0.001070	-3.945820	0.0017
D(RI)	0.004721	0.000423	11.15266	0.0000
D(RI(-1))	-0.007077	0.000784	-9.024188	0.0000
D(K)	0.002306	0.000269	8.578754	0.0000
D(K(-1))	0.000947	0.000240	3.943166	0.0017
D(L)	-0.045142	0.015073	-2.994922	0.0103
D(L(-1))	-0.042095	0.018059	-2.330950	0.0365
CointEq(-1)*	-0.629732	0.037933	-16.60104	0.0000

APPENDIX C-4

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 2 lags

F-statistic	1.514613	Prob. F(2,11)	0.2624
Obs*R-squared	7.557287	Prob. Chi-Square(2)	0.0229

Test Equation:
Dependent Variable: RESID
Method: ARDL
Date: 05/10/18 Time: 20:17
Sample: 1982 2016
Included observations: 35
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNY(-1)	0.010890	0.109252	0.099680	0.9224
FD	0.050128	0.060660	0.826379	0.4262
FD(-1)	-0.013926	0.060829	-0.228944	0.8231
FD(-2)	0.006119	0.045990	0.133041	0.8966
MP	0.001930	0.001957	0.986084	0.3453
MP(-1)	-0.000165	0.002072	-0.079593	0.9380
MP(-2)	0.000481	0.001607	0.299398	0.7702
FDMP	0.002083	0.002118	0.983722	0.3464
FDMP(-1)	-0.000375	0.002144	-0.174947	0.8643
FDMP(-2)	0.000560	0.001765	0.317211	0.7570
FDI	0.000456	0.001717	0.265263	0.7957
RI	0.000266	0.000840	0.317074	0.7571
RI(-1)	0.000270	0.001043	0.259260	0.8002
RI(-2)	-0.001100	0.002252	-0.488436	0.6348
INF	-1.52E-06	8.08E-05	-0.018850	0.9853
K	-8.88E-05	0.000553	-0.160489	0.8754
K(-1)	0.000216	0.000449	0.480201	0.6405
K(-2)	0.000235	0.000426	0.551600	0.5923
L	-0.010042	0.028990	-0.346398	0.7356
L(-1)	0.006795	0.043186	0.157343	0.8778
L(-2)	-4.51E-05	0.028777	-0.001566	0.9988
C	0.021444	0.724295	0.029606	0.9769
RESID(-1)	-0.658098	0.381484	-1.725098	0.1125
RESID(-2)	-0.400754	0.376531	-1.064331	0.3100

R-squared	0.215922	Mean dependent var	-9.77E-16
Adjusted R-squared	-1.423512	S.D. dependent var	0.003229
S.E. of regression	0.005027	Akaike info criterion	-7.534019
Sum squared resid	0.000278	Schwarz criterion	-6.467494
Log likelihood	155.8453	Hannan-Quinn criter.	-7.165855
F-statistic	0.131705	Durbin-Watson stat	1.830987
Prob(F-statistic)	0.999976		

APPENDIX C-5

Heteroskedasticity Test: Breusch-Pagan-Godfrey
Null hypothesis: Homoskedasticity

F-statistic	0.871273	Prob. F(21,13)	0.6228
Obs*R-squared	20.46174	Prob. Chi-Square(21)	0.4922
Scaled explained SS	3.083285	Prob. Chi-Square(21)	1.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 05/10/18 Time: 20:18
Sample: 1982 2016
Included observations: 35
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000453	0.002061	0.219666	0.8295
LNY(-1)	-0.000156	0.000288	-0.541596	0.5973
FD	-3.28E-05	0.000151	-0.218069	0.8308
FD(-1)	-7.48E-05	9.00E-05	-0.831048	0.4209
FD(-2)	0.000131	0.000105	1.248819	0.2338
MP	2.55E-06	3.47E-06	0.735601	0.4750
MP(-1)	-9.77E-07	4.19E-06	-0.233127	0.8193
MP(-2)	5.42E-06	4.53E-06	1.196606	0.2528
FDMP	2.23E-06	3.91E-06	0.569237	0.5789
FDMP(-1)	-1.55E-06	3.73E-06	-0.415357	0.6847
FDMP(-2)	5.27E-06	4.97E-06	1.061028	0.3080
FDI	5.46E-08	4.76E-06	0.011475	0.9910
RI	1.58E-06	2.35E-06	0.669278	0.5150
RI(-1)	2.94E-07	2.23E-06	0.131693	0.8972
RI(-2)	3.59E-06	4.90E-06	0.733161	0.4765
INF	-8.12E-08	2.61E-07	-0.310760	0.7609
K	1.66E-06	2.14E-06	0.776100	0.4516
K(-1)	2.67E-08	1.16E-06	0.023037	0.9820
K(-2)	-2.31E-06	9.05E-07	-2.555017	0.0240
L	5.65E-05	9.07E-05	0.622936	0.5441
L(-1)	-0.000142	0.000148	-0.964945	0.3522
L(-2)	0.000106	0.000113	0.938320	0.3652

R-squared	0.584621	Mean dependent var	1.01E-05
Adjusted R-squared	-0.086375	S.D. dependent var	1.52E-05
S.E. of regression	1.58E-05	Akaike info criterion	-19.00232
Sum squared resid	3.26E-09	Schwarz criterion	-18.02467
Log likelihood	354.5405	Hannan-Quinn criter.	-18.66483
F-statistic	0.871273	Durbin-Watson stat	1.879170
Prob(F-statistic)	0.622790		

APPENDIX C-6

Ramsey RESET Test
Equation: UNTITLED
Specification: LNY LNY(-1) FD FD(-1) FD(-2) MP MP(-1) MP(-2) FDMP FDMP(-1) FDMP(-2) FDI RI RI(-1) RI(-2) INF K K(-1) K(-2) L L(-1) L(-2) C
Omitted Variables: Squares of fitted values

	Value	Df	Probability
t-statistic	1.494477	12	0.1609
F-statistic	2.233461	(1, 12)	0.1609
Likelihood ratio	5.974115	1	0.0145

F-test summary:

	Sum of Sq.	Df	Mean Squares
Test SSR	5.56E-05	1	5.56E-05
Restricted SSR	0.000355	13	2.73E-05
Unrestricted SSR	0.000299	12	2.49E-05

LR test summary:

	Value
Restricted LogL	151.5885
Unrestricted LogL	154.5756

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNY(-1)	-1.026933	0.968619	-1.060203	0.3099
FD	-0.585133	0.570683	-1.025322	0.3254
FD(-1)	0.421948	0.419435	1.005992	0.3343
FD(-2)	-0.411994	0.399224	-1.031988	0.3224
MP	-0.029922	0.028500	-1.049888	0.3145
MP(-1)	0.012405	0.012122	1.023326	0.3263
MP(-2)	-0.009122	0.009082	-1.004402	0.3350
FDMP	-0.030187	0.028826	-1.047226	0.3156
FDMP(-1)	0.012326	0.012272	1.004434	0.3350
FDMP(-2)	-0.009793	0.009825	-0.996789	0.3385
FDI	-0.022546	0.020580	-1.095531	0.2948
RI	-0.012726	0.011769	-1.081397	0.3008
RI(-1)	-0.004735	0.003998	-1.184152	0.2593
RI(-2)	-0.018775	0.017179	-1.092926	0.2959
INF	0.000684	0.000645	1.060986	0.3096
K	-0.005683	0.005154	-1.102707	0.2918
K(-1)	-0.002197	0.002212	-0.993042	0.3403
K(-2)	0.002717	0.002529	1.074111	0.3039
L	0.123018	0.112383	1.094631	0.2952
L(-1)	-0.111683	0.120395	-0.927639	0.3719
L(-2)	-0.105703	0.089685	-1.178596	0.2614
C	8.599349	3.406237	2.524589	0.0267
FITTED^2	0.171345	0.113658	1.507555	0.1575

APPENDIX C-7

R-squared	0.999831	Mean dependent var	10.27192
Adjusted R-squared	0.999521	S.D. dependent var	0.228050
S.E. of regression	0.004991	Akaike info criterion	-7.518603
Sum squared resid	0.000299	Schwarz criterion	-6.496517
Log likelihood	154.5756	Hannan-Quinn criter.	-7.165779
F-statistic	3226.319	Durbin-Watson stat	2.370966
Prob(F-statistic)	0.000000	Wald F-statistic	29586.53
Prob(Wald F-statistic)	0.000000		

APPENDIX D

Net Effect Calculations

Long-run net effect

$$LN(Y) = 0.3620(FD) + 0.0168(MP) + 0.0173(FDMP)$$

$$\frac{dGDPG}{dMP} = 0.0168 + 0.0173(FD)$$
$$= 0.0168 + 0.0173(0.102)$$
$$= 0.0168 + 0.0018$$
$$= 0.0186$$
$$= 1.86\%$$

Testing for the significance of the interaction

$H_0: FDMP = 0$

$Prob. > F = 0.0129 ***$

Short-run net effect

$$LN(Y) = 0.2161(FD) + 0.0113(MP) + 0.0114(FDMP)$$

$$\frac{dGDPG}{dMP} = 0.0113 + 0.0114(FD)$$
$$= 0.0113 + 0.0114(0.102)$$
$$= 0.0113 + 0.0012$$
$$= 0.0125$$
$$= 1.25\%$$

For $FDMP_{t-1}$

$$LN(Y) = 0.2161(FD) + 0.0113(MP) + (-0.0042(FDMP))$$

$$\frac{dGDPG}{dMP} = 0.0113 - 0.0042(FD)$$
$$= 0.0113 - 0.0042(0.102)$$
$$= 0.0113 - 0.0004284$$
$$= 0.0109$$
$$= 1.09\%$$

Source: Authors' own construct using E-views 10 Package.

APPENDIX E

Model Diagnostics and Goodness of Fit

Table 6: Model Diagnostics and Goodness of Fit

R-Squared	0.9501	R-Bar-Squared	0.9229
S.E. of Regression	0.0052	F-stat. F (8, 35) 16.2851	[0.0000]
Mean of Dependent Variable	10.272	S.D. of Dependent Variable	0.2281
Residual Sum of Squares	0.0004	Equation Log-likelihood	151.59
Akaike Info. Criterion	-7.4051	Schwarz Bayesian Criterion	-6.4274
DW-statistic	2.5744		

Diagnostics	Test Statistics
$X^2_{Auto}(2)$	1.5146 [0.2624]
$X^2_{Reset}(1)$	2.2335 [0.1609]
$X^2_{Norm}(1)$	0.2773 [0.8705]
$X^2_{White}(21)$	0.8713 [0.6228]

Note: X2 Auto, X2 Reset, X2 Norm, and X2 White are Lagrange multiplier statistics for test of serial correlation, functional form misspecification, non-normal errors and with degree of freedom in parentheses ( ). Value in parentheses [ ] are probability values.

Source: Authors' own construct using E-views 10 Package.

APPENDIX F

Stability Test

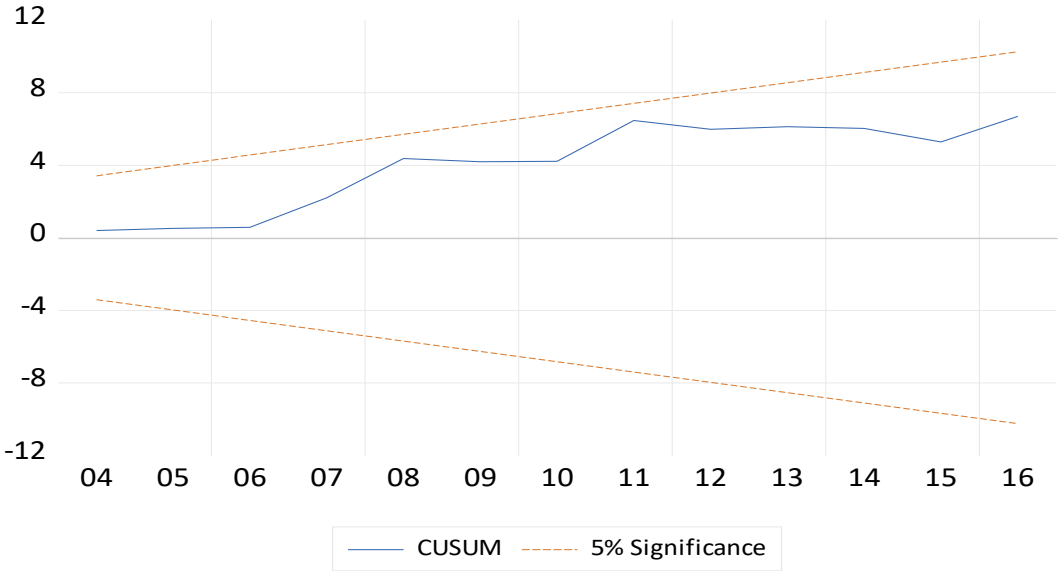


Figure 1: Plot of Cumulative Sum of Recursive Residuals

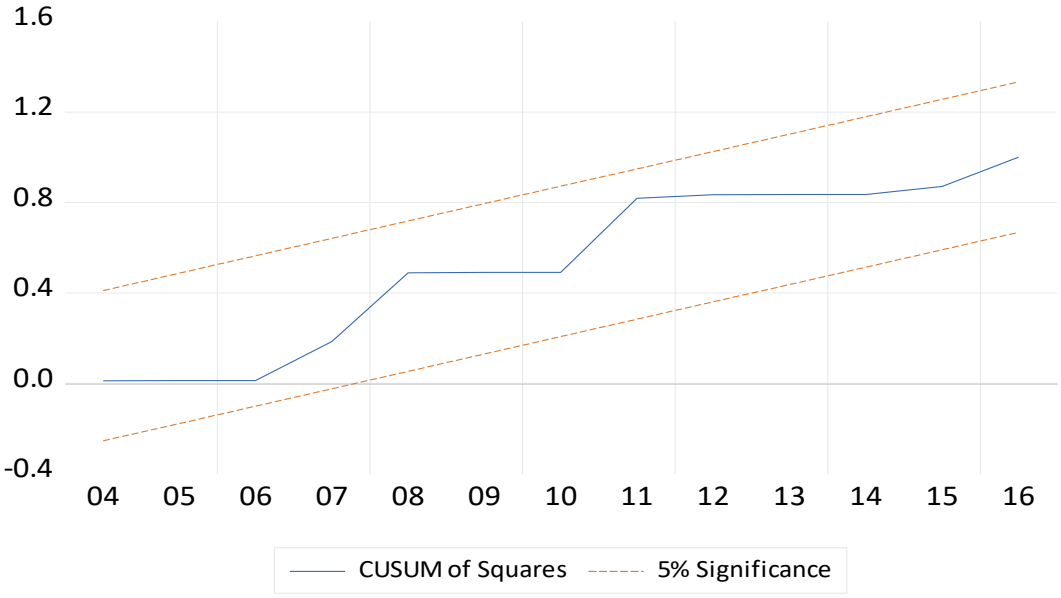


Figure 2: Plot of Cumulative Sum of Squares of Recursive Residuals

Note: the variable on the vertical axis is residuals while the variable on the horizontal axis is years.

Source: Authors' own construct using E-views 10 Package.