



**MONETARY POLICY AND ECONOMIC PERFORMANCE – EVIDENCE FROM
SELECTED AFRICAN COUNTRIES**

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**Thesis Presented for the Degree of
DOCTOR OF PHILOSOPHY
in the Graduate School of Business
UNIVERSITY OF CAPE TOWN**

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December, 2015

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DECLARATION

I, VERA OGEH FIADOR, hereby declare that the work contained in this thesis is my own original piece of work and that I have not previously, in its entirety or in part, submitted it at any university for any degree.

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ABSTRACT

The main aim of this dissertation is to broaden the understanding of the monetary policy transmission mechanism as it operates in Sub-Saharan Africa. The ultimate goal is to aid in the appropriate design and implementation of monetary policy for the attainment of developmental goals. The dissertation empirically explores four issues on the pricing, behavioural and output implications of monetary policy. The four questions that the dissertation attempts to answer in Chapters Two to Five respectively are: 1) Does the effectiveness of monetary policy transmission depend on the financial development of an economy? 2) Can monetary policy be used as a tool in easing pressure on domestic currencies in the foreign exchange market? 3) Do banks engage in excessively risky behaviour when monetary policy is expansionary? 4) Does monetary policy influence aggregate variables like private capital formation, growth and their interrelationships?

Chapter Two tests the completeness of the pass-through of the central bank policy rate to bank lending rates on one hand, and the interest rate pass-through as a function of the level of financial development on the other hand. The results show that the pass-through of central bank policy rate to bank lending rates is asymmetric for three Anglophone West African countries, namely: Gambia, Ghana and Nigeria, which are seeking to ascend onto a single monetary framework. However, there is no evidence that financial development affects the pass-through of monetary policy. These findings still prove relevant, especially with regard to the quest for effective monetary policy implementation and the ascension onto a single monetary framework by these 3 countries. The motivation for this study stemmed from policy discussions and academic debates on the premise that financial development is a key element in the pursuit of effective monetary policy implementation, focusing on the three Anglophone West African countries between 1975 and 2011. The study employs the bounds testing approach to cointegration, and the Autoregressive Distributed Lags (ARDL) by Pesaran *et al.*, (2001). The findings show significant differences in the interest rate pass-through of the 3 countries studied. Ghana and Gambia were characterised by undershooting in the response of lending rates to monetary policy changes whilst Nigeria was characterised by overshooting in bank lending rates. Financial development proved significant in some, but not in all the cases, while economic growth proved mostly insignificant in the transmission of the policy rate to bank lending rates

In Chapter Three, we show that contractionary monetary policy of high interest rates is able to correct disequilibrium in the foreign currency market in selected countries in Sub-Saharan Africa (SSA). The chapter also provides empirical evidence about the impact of macroeconomic

fundamentals on the domestic foreign exchange market. The study assesses the impact of monetary policy on foreign exchange market pressure (EMP) in developing country contexts focusing on some selected countries in SSA. EMP is the sum of exchange rate depreciation and change in foreign reserves that is required to restore equilibrium to the domestic foreign exchange market. The study was motivated by the fact that most of the SSA countries are developing economies that have negative net export positions and stand to lose significantly from consistently deteriorating foreign exchange positions. This study thus sought to measure the ability of monetary policy to significantly address currency pressures that arise from trading on the global market. The hypothesis that a tighter monetary policy stance can lend strength to a currency was tested in this study using Generalised Methods of Moments (GMM) estimation in a dynamic panel setting. Data on 20 SSA economies for which data were available for the period 1991 to 2010 are used. The study found a negative and significant relationship between monetary policy and EMP, implying that contractionary monetary policy can ease EMP. It also revealed significant relations between aggregate output, levels of public debt, the current account balance and terms of trade and EMP. The findings of the study prove relevant as regards the policy direction on exchange rate and currency management.

In Chapter Four, the study fails to confirm the presence of the risk-taking channel of monetary policy in SSA in the light of the hypothesis that expansionary monetary policy can trigger risky behaviour by banks. Contrary to this hypothesis, the findings seem to indicate that banks in SSA were more likely to engage in risky behaviour when monetary policy is contractionary, especially in an environment of rising interest rates. The study was motivated by the financial crises of 2007 – 2009, which seemed to point to excessive risk-taking by banks in periods of low interest rates and ultimately the possibility of financial and economic instability. The chapter tests the hypothesis that expansionary monetary policy increases the risk-appetite and risk-tolerance of banking institutions in Sub-Saharan Africa (SSA) and causes an increase in risk-taking behaviour. The study employed a dynamic panel model estimated using the Arellano and Bond difference Generalized Method of Moments (GMM) estimator with bank-level data on 91 banks in 12 SSA countries, spanning 1999 – 2012. Both macro-level and bank-level characteristics also proved statistically significant in determining bank risk-taking behaviour. On the whole, the findings present intricate policy implications, given SSA's need for significant capital accumulation via low interest rates to help stimulate economic growth.

In the last chapter, Chapter Five, we show that monetary policy and private capital accumulation are relevant drivers of growth. We, however, fail to establish a statistically significant relationship between monetary policy rate and private capital accumulation for the selected sample countries in SSA. The study employed data on 9 countries in SSA for the period 1999 – 2011 to test the relationship between the central bank monetary policy rate, economic output and private capital formation for Sub-Saharan Africa. The approach was the system Generalized Method of Moments (GMM) estimation in a dynamic panel setting. The results of the study provide empirical evidence to support the traditional view of a long-run positive relationship between capital accumulation and economic growth. The findings also reveal an uncharacteristic positive effect of contractionary monetary policy on growth, contradicting the conventional argument that contractionary monetary policy hinders growth. Private capital formation, on the other hand, is unaffected by monetary policy changes while the stock market proves insignificant in terms of its influence on private capital formation and economic growth. The share of foreign trade in GDP shows ambiguity: being positively significant for private capital but negatively significant for growth. The findings of this chapter hold complex policy implications for SSA.

Overall, this thesis argues that monetary policy is relevant in the pursuit of growth and development. The effectiveness in design and implementation, however, are conditioned by the presence of other facilitating macro and micro factors.

DEDICATION

Giving all glory to God, I dedicate this thesis to my husband, Daniel and our three girls:
Lorraine, Norelle and Clare-Shan.

ACKNOWLEDGEMENTS

Thanks be to God Almighty, a phase in my life that seemed like it would never end, finally has. My heartfelt appreciation goes to my supervisor Professor Nicholas Biekpe. Having come to know you, I have found both a mentor and a father. Your comments have always had a way of bringing out the best in me. I am and will be forever grateful to you for taking me on as your student.

To my loving husband, Daniel Lassey Fiador, I owe you a world of gratitude. You believed in me and always gave me the push to fly higher. I have said it time and again, if I had to marry all over again, I would still choose you. I also acknowledge my senior colleagues, especially Josh and Charles – your feedback and constant tabs on my progress were invaluable. May the good Lord replenish all you expended on my behalf. To Dr. Simon K. Harvey, you gave real meaning to the saying ‘You do not know what you can do until you are pushed’. Thank you for pushing me, God bless you. Mrs. Eme Umoeke Fiawoyife, unknowingly, you set me on the path of academia, thank you and God richly bless you.

Special mention to my girls for allowing me to take away their ‘mummy-time’ ever so often; to my parents for laying the foundation blocks; to Auntie Caroline Kitcher, for setting the pace; to Godwin Niikoi Kotey (may his soul rest in peace) for lighting the PhD flame in the family but not living to finish his or see the fire blazing; and to my siblings for filling in for me whenever I had to be away. To Willie Insaidoo and Emmanuel Abbey, thank you for demystifying the econometrics.

I also wish to acknowledge the University of Ghana Business School and the Ghana Education Trust Fund for financing my studies.

In fact, so many were the helping hands that I cannot mention them all, but to all who contributed to this PhD reality, I pray that the good Lord bless you now and always. Thank you all.

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CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Endogenous growth theory argues that economic growth is facilitated by fixed capital accumulation (Barro, 1991). Fixed capital accumulation, which is believed to stimulate productivity, is also facilitated by a developed and efficient financial system. A financial system is well-developed if it is resilient and able to withstand asset price fluctuations that result from substantial increases in uncertainty and demand and supply conditions. The finance-growth nexus, which is the main thrust of this study, is premised on the ideology that well-developed financial systems are able to churn out various products to meet the demands of the productive sector. In other words, a developed financial system is one that facilitates productivity and ultimately increases aggregate output. This presupposes that an efficient financial system that facilitates capital accumulation is likely to promote economic growth. Such a clear consensus is, however, empirically lacking and so the debate about the role of financial factors in the pursuit of economic development still rages on

In managing financial systems, the key policy tool is monetary policy. This suggests that the efficiency and stability of the financial system, together with capital accumulation, are outcomes of the monetary policy stance and its effects within an economy. For instance, on the issue of the volume of credit that can be accessed by the productive sector of the economy or supplied by the financial markets, a key determinant is the cost of the funds. The cost of funds is also usually a function of the monetary policy stance within the economy. Mishkin (2007) argues about the importance of monetary policy for the financial stability and health of any economy. A discussion about an efficient and developed financial system that can promote growth will therefore be incomplete without investigating the role of monetary policy. While this conceptual link between monetary policy, capital accumulation and economic growth seems obvious, the transmission dynamics between financial factors such as monetary policy and the real economy is still plagued with a lot of empirical and ideological issues.

Over the years, many developing countries, Sub-Saharan African countries included, have been faced with a myriad of problems in their pursuit of sustainable levels of growth and development. Most of these problems have revolved around price instability, deteriorating

currencies, deteriorating current account positions with its attendant decreases in foreign reserves, just to mention a few. In the 1980s and 1990s, the governments in Sub-Saharan Africa embarked on various structural reforms aimed at revitalizing the economies, with financial sector reforms at the core. The financial sector reforms across developing countries were possibly informed by the arguments that successful economic development was typically preceded or was accompanied by a major episode of financial innovation.

The general policy instrument adopted by most of these countries to combat the shocks to the economy was monetary policy. Some of the prescriptions for monetary policy included lending strength to currencies on the exchange market; stimulating capital formation and growth; generating additional foreign reserves or both, while staving off financial instability or contracting the money supply to slow down demand-related inflation. On one hand, it is well noted that contractionary monetary policy can result in undesirable outcomes which are clear opposites to the initial expectations, such as currency depreciation, high unemployment rates and stagnation of the general economy. On the other hand, a very expansionary monetary policy of very low interest rates with very low inflation levels that fails to stimulate aggregate demand poses the risk of financial instability because it makes cash holdings more attractive in comparison with interest-bearing bank deposits (see Stein, 1998; Chiesa, 2001; van den Heuvel, 2002; Herrero and Lopez, 2003; Diamond and Rajan 2006).

There is a consensus, according to Gamber and Hakes (2005), that monetary policy matters for the economy. While this is the case in developed economies (Angeloni *et al.*, 2003; Starr, 2005; Bhattacharya *et al.*, 2011; to mention but a few), the same cannot necessarily be said for developing countries mainly due to a dearth of literature for developing economies and also because of structural and institutional differences between developing and developed economies that constrain the applicability of a developed country findings for developing countries. Indeed, Bernanke and Gertler (1995) indicate that the transmission mechanism of monetary policy still remains ‘a black box’ because the exact dynamics of the transmission of monetary policy to the economy still remain largely unknown.

1.2 Problem Statement

As indicated earlier, in the 1980s, a number of the countries in Sub-Saharan Africa embarked on a process of major economic reforms, typically referred to as the Structural Adjustment Programme (SAP). The motive for the reforms was to increase and sustain economic growth in

these countries through price and macroeconomic stability. The main features of the reforms included cuts in government spending, removal of import controls, privatization, currency devaluations and tight-fisted control of money supply. Of the structural reforms pursued, the financial sector reforms were key, mainly motivated by the financial repression model formulated by McKinnon (1973) and Shaw (1973). The financial sector reforms were core to the structural reforms also because, according to the World Bank Institute (2013), by the end of the 1980s, many low-income countries, SSA included, faced unsustainable amounts of both domestic and foreign debt. This caused investment stagnation, choked off economic growth, dropped social spending and increased the suffering of the populace. In the quest to raise long-term capital to finance both government and business activity and stimulate economic growth, these economies pursued the financial reforms. These reforms notwithstanding, Sub-Saharan Africa has failed to converge, in terms of growth, with the developed world (Mwega, 2003). This situation has given rise to many, often diverse and conflicting, explanations on the genesis and nature of the developmental difficulties in Africa – ranging from structuralist schools of thought to neoclassical monetarist analyses.

The transmission mechanism of monetary policy typically evolves in stages. According to Pétursson (2001), the first stage of monetary transmission is the financial system channel where monetary policy actions transmit to interest rates, asset prices and exchange rate of the domestic currency. The next stage encompasses the transmission from the financial system to the rest of the economy, i.e. the effect on spending decisions, aggregate demand and ultimately inflation. Studies exploring the various stages of the transmission abound in the literature. Of the studies on the impact of monetary policy on interest rates (Sander and Kleimeier, 2004; De Bondt, 2005; Sørensen and Werner, 2006); on asset prices (Filardo, 2000; Bernanke and Gertler, 2000; Gilchrist and Leahy, 2002; Rigobon and Sack, 2004; Geromichalos *et al.*, 2007); on the exchange rate setup (Connolly and Da Silveira, 1979; Tanner, 2001; Gochoco-Bautista and Bautista, 2005; Gali, and Monacelli, 2005; Iacoviello, 2005); on spending decisions (Chowdhury *et al.*, 1986; Gaiotti and Generale, 2001; McCarthy and Peach, 2002; Erceg and Levin, 2006); on aggregate demand (Chari *et al.*, 1995; Christiano *et al.*, 2005; Bhattacharya *et al.*, 2009; Uhlig, 2005) and on inflation (Rabanal, 2007; Gupta *et al.*, 2010), however, not many have focused on Africa and even less on Sub-Saharan Africa, in particular. This gap in the literature poses a number of problems; notable among these is the lack of appropriate design of monetary policy for sustainable growth and development.

In view of this gap in the literature on SSA and the fact that the core of the numerous economic reforms in Sub-Saharan Africa have been financial in nature and centred on monetary policy dynamics, the empirical questions that come to mind are, ‘is monetary policy design and its implementation part of the solution to Africa’s slow growth problems?’ Does monetary policy really offer the answers for rapid economic growth through its impact on the financial system and capital accumulation, for example? The study is also motivated by the fact that Sub-Saharan Africa is yet to attain the desired level of economic development. This study seeks to provide answers to some of the questions raised and in the process add to the extant literature on the transmission mechanisms of monetary policy in the context of developing countries in SSA. The study also seeks to shed some light on the question of the appropriateness of monetary policy as a tool in the pursuit of enhanced economic performance. The findings of this empirical work hold important implications for the appropriate policy responses for developing countries, for issues like pressure on currencies, for bank behaviour and financial stability, for capital accumulation and economic performance on the whole. Here economic performance is a broad metric that encompasses issues of economic growth, financial sector development and stability, effectiveness of policy implementation and capital accumulation.

1.3 Research Objectives

The main objective of the study is to explore the finance-growth nexus in SSA with the focus on monetary policy transmission mechanism. The specific objectives of the study are:

- To examine the relationship between monetary policy transmission and financial development in some selected countries in Anglophone West Africa.
- To determine the link between monetary policy and exchange market pressure in Sub-Saharan Africa.
- To examine the relationship between monetary policy and bank risk taking behaviour in some selected countries in Sub-Saharan Africa.
- To determine the relationship between monetary policy, private investment and economic growth in Sub-Saharan Africa.

1.4 Significance of the Study

This dissertation examines the role of monetary policy in the economic performance of selected countries in Sub-Saharan Africa. This it does by employing both macro and micro level data. As one of the contributions to the literature, the study examines the ongoing debate on monetary

integration and the role of financial architecture in explaining the effectiveness of monetary policy transmission. This is done by examining the differences in the interest-rate-pass-through mechanisms of selected countries in Anglophone West Africa. A second contribution is that it examines the interrelations between monetary policy and exchange market pressure. Yet another contribution from this study is its findings on how macroeconomic fundamentals influence domestic currencies in the selected countries in SSA. The study also contributes to the discussions on how economic agents respond to monetary policy changes. This is achieved by examining the role of monetary policy changes in explaining the risk-taking behaviour in the banking sector. Last but not least, the study examines the tail end of the pass-through mechanisms – assessing the relationship between monetary policy and economic output together with intermediate targets, like aggregate investment, in the private sector.

Practically, it also seeks to add to the understanding of the monetary transmission mechanism so as to facilitate the appropriate design and implementation of monetary policy for sustainable growth and development in SSA.

1.5 Limitations of the Study

The focus of this dissertation is Sub-Saharan Africa. Despite this broad focus, the general lack of datasets for all the countries within this sub region constituted the main limitation for the study. On account of this data limitation, the richness of a large cross-country data could not be fully explored. It also limited the span in terms of time, thus limiting some of the dynamics that could have been gained from individual country analyses of some of the phenomena being studied. Another limitation, also due to insufficiency of data, was the inability to cluster similar countries so as to elicit more nuances in the response of the target phenomena to monetary policy changes.

This data limitation, notwithstanding, the study presents some interesting findings that add to the literature and stimulate further exploration into the ‘black box’ of the monetary transmission mechanisms in Sub-Saharan Africa.

1.6 Structure of the Dissertation

Chapter Two presents the first essay of the dissertation, investigating the level of financial development and the effectiveness of the interest rate pass-through. The third chapter presents

the second essay on monetary policy and exchange market pressure. The third empirical essay is on the risk-taking behaviour of banks. Given expansionary monetary policy is presented in Chapter Four. The fifth chapter investigates the relationship between monetary policy, capital accumulation and growth. The last chapter, Chapter Six, presents the conclusions, implications and suggestions for future research.

CHAPTER TWO

MONETARY POLICY AND FINANCIAL DEVELOPMENT IN ANGLOPHONE WEST AFRICA

2.1 Introduction

In the last two decades or so, the definition and measurement of the concept of financial development has attracted a significant portion of the academic and policy literature. This research interest has been kindled mostly by the notion that ‘finance leads growth’- a hypothesis which seems to be winning the argument with most economists, despite the fact that the debate on the finance-growth nexus still rages on. Quite a number of the studies that have been devoted to financial development have identified its level as a key ingredient in the pursuit of economic agendas. Bhattacharya and Sivasubramanian (2003), for instance, investigated the possibility of causal relationship running from financial development to economic growth using data spanning the period 1970 – 1999 for India and concluded that financial sector development causes GDP growth. Chakraborty (2008) also found a long-run relationship between financial development indicators (bank credit, stock market capitalization) and economic growth while Katircioglu *et al.*, (2008) also found support for a long-run relationship between financial development and real GDP (see also King and Levine, 1993; Khan, 2001; Minella, 2001; Masten *et al.*, 2008, among many others).

Financial development has been generally defined as the policies, factors and institutions that facilitate efficient intermediation and effective financial markets. According to Aghion *et al.*, (2006), financial development is beneficial to economic growth at sufficiently high levels. This benefit, they argue, works through the capacity of highly developed financial sectors to shield economies from the negative effects of volatility that may stem from unfavourable shocks to the economy.

In linking the value of financial development to the theory on convergence, Aghion *et al.*, (2006) further argue that any country that attains a certain critical level of financial development will ultimately converge to the growth rate of the world technology frontier. Given the obviously important role that the level of financial development seems to play in the quest for growth, can it be hypothesized that the effectiveness of economic policies in stimulating an economy towards

it desired growth target is also influenced by the level of financial development? Is the effectiveness of economic policy, say monetary policy, an attribute of the level of financial development in an economy? Effectiveness of monetary policy is captured as the fullness and speediness of pass-through of monetary policy to target variables like inflation, aggregate demand, and market interest rates.

In answer to these questions and related ones on macroeconomic performance, a number of studies have sought to measure the effectiveness of monetary policy transmission. Some have argued that there is a link between the effectiveness of monetary policy in an economy and the level of financial development that has been attained by the economy in question. In fact, a number of such studies have concluded in one way or the other that the pass-through of monetary policy is dependent on the level of financial development: the structure, the level of competition, stages of financial development, among other characteristics (see Cottarelli and Kourelis, 1994; Krause and Rioja, 2006, among others).

While these studies linking monetary policy effectiveness to the level of financial development do not necessarily abound, they seem even more limited for a region like Sub-Saharan Africa; a region that is in dire need of answers to its growth issues, ineffective policies and institutions. This study is therefore one such attempt at filling this research gap, by empirically documenting, for some selected countries in the Anglophone West African sub region, the relationship between the level of financial development and monetary policy effectiveness, given the implications for savings, investment and growth.

Studying the Anglophone West African Sub region is particularly relevant at this time. The region presents a very opportune setting because of its quest for a unified monetary union. In this regard, the assertion by De Bondt (2000) that the viability of a monetary union is partly dependent on member states' responsiveness to monetary policy makes such a study even more pertinent and timely. This study seeks to highlight possible and relevant policy issues that may need to be addressed in the quest for a successful single monetary policy framework. The study contributes to the literature in the following ways: the first is to document the levels, differences and the pace of financial development for the region over the past 3 decades. It also seeks to examine the relationship between the level of financial development and monetary policy effectiveness. The findings of this study thus seek to provide answers to relevant questions as

regards the effectiveness of monetary policy for the region and how financial development may be harnessed in the pursuit of policy effectiveness.

As argued by Giginishvili (2011), knowing what factors drive market responses and bank behaviour to central bank actions would have valuable implications for strengthening monetary policy effectiveness. This knowledge could also provide important input for the choice of a monetary framework, including intermediate targets and policy instruments, and help identify measures that are needed to improve it.

2.2 Literature Review

2.2.1 Monetary Policy Effectiveness

The concept of monetary policy effectiveness has gained a lot of research prominence in recent times as economies around the globe continue to search for ways to improve the effectiveness of economic policy in general. The importance of monetary policy effectiveness has increased specifically on account of the need to determine whether central banks, of both developing and developed countries, can exert strong and systematic effects on aggregate demand through monetary policy. Policy, in this setting, is considered effective when it is capable of influencing a predetermined target in the manner and intensity intended.

Testing for the effectiveness of monetary policy, despite having been around for a while, has mostly focused on identifying which of the traditional transmission mechanisms of monetary policy is prominent in a particular economic setting without much attention to the catalytic factors. While monetary policy effectiveness seems visible as regards developed economies (Mishra, Montiel and Spilimbergo, 2011), the same cannot be necessarily said of developing economies. For the developed economies, for instance, the interest rate channel of monetary transmission is perceived as the most effective, whereas the bank-lending channel is believed to work for developing economies (Mishra *et al.*, 2011). The bank-lending channel seems to be considered the route for effective monetary policy in developing countries because these economies are mostly bank dependent, while lacking the other frameworks, namely bond markets, stock markets *et cetera* on which the other transmission mechanisms are deemed to work.

According to Mishra and Montiel (2013), though a significantly large literature has emerged in recent years with a focus on the empirical measurements of the effects of monetary policy on

aggregate demand and price levels, the beneficiaries have been mostly advanced economies. They go on to intimate that most of these studies have tended to confirm the effectiveness of monetary policy in influencing aggregate demand and prices, but are quick to add that there are strong reasons to believe that similar effects may not necessarily hold for countries with fundamentally different financial structures. This general conclusion has kindled research interest into the determinants of monetary policy effectiveness as opposed to just the identification of transmission mechanisms. Of the determinants in literature, levels of financial development have received significant attention.

2.2.2 Financial Development and Macroeconomic Pursuits

The view that a well-structured financial system is important in boosting an economy has, for some decades now, directed a significant amount of research towards the definition and measurement of financial development. This has also fostered research aimed at identifying the impact that financial development may have on macroeconomic variables. Studies linking the financial sector and its level of development to various aspects of economic performance are abundant and still adding up (King and Levine, 1993; Levine, 1997; Khan and Senhadji, 2000, among many).

Financial sector development, according to DFID (2004), encompasses issues of competitiveness and efficiency within the financial sector; the range of services provided; the diversity of institutions within the sector; the volume of credit intermediated, along with access to the services and financial stability. These characteristics, in turn, reduce transaction costs, facilitate capital accumulation and ultimately increase aggregate output. Given the numerous characteristics that come with financial sector development, its measurement, despite being of significant research interest, has over the years defied a clear consensus. While some measures are skewed towards developments in the banking sector, some are also skewed towards securities' markets with yet another set trying to deduce indices by combining characteristics of all the parts that make up the financial sector.

Notwithstanding the apparent lack of consensus on how to appropriately measure financial development, quite a number of studies have provided empirical evidence to support the notion that financial development, irrespective of its mode of measurement, is important to the growth and development debate. One of such early studies on financial development and growth is that of King and Levine (1993). They find evidence that point to a strong and positive relationship

between the various indicators of financial development and growth, with the values of the coefficient estimates implying that the impact is large. Levine, Loayza and Beck (2000) also confirm that financial development exerts a large and positive influence on economic growth. Susanto *et al.*, (2011), using a sample of developed and developing countries documented a positive relationship between the level of financial development and international trade, notably exports. This positive relationship between financial development and exports is further corroborated by Kiendrebeogo (2012), focusing on manufacturing exports, with evidence from 75 countries over the period 1971 – 2010. Berthelemy and Varoudakis (1996) also suggest that when there is insufficient financial development, a country may find itself in a ‘poverty trap’. This, they argue, can happen even if the economy has attained other conditions necessary for sustained economic development. They find that countries with a high level of educational attainment, but a low level of financial development, are saddled with relatively low standards of living compared to other countries with similar levels of educational attainment but more developed financial sectors.

From the foregoing, it seems quite obvious that financial development is important for economic growth and development. Suffice it to argue that another area worth exploring, in connection with financial development, is the monetary policy transmission mechanism.

2.2.3 Monetary Policy Effectiveness and Financial Development

The effectiveness of monetary policy as a research agenda has been around for some decades now. The focus of such studies, however, has been on identifying the most effective monetary transmission mechanism at work in (any) particular economy(ies). Over the years, it has emerged from most of these studies that traditional monetary transmission mechanisms such as the credit channel and the interest rate channel operate through the financial system (Carranza *et al.*, 2010). This suggests that the financial system is crucial to the effectiveness of the monetary transmission mechanism. Carranza *et al.*, (2010) go on to indicate that, this notwithstanding, the theoretical and empirical literature has largely ignored the relationship between financial development and monetary policy effectiveness. This is even so in spite of the wide variations that have existed in the structures of financial systems across countries for decades now.

The proposition to determine the effects of the financial system on the monetary transmission mechanism interestingly, seems to have been raised much earlier by Allen and Gale (1999) and Cottarelli and Kourelis (1994). Allen and Gale (1999) believed that insights into the financial

structure of economies were of crucial importance because it had large potential effects on economic efficiency in general and monetary policy transmission specifically. Cottarelli and Kourelis (1994) furthered this argument by also arguing that the effectiveness of monetary policy hinged on a “set of structural parameters not directly controlled by central banks”, one of which was obviously the level of financial development. De Bondt (2000) later also buttressed this need to look into the relationship between financial development and monetary policy effectiveness by intimating that the imperfection of financial markets gives an essential role to the financial structure in the monetary transmission mechanism. Financial development vis-à-vis monetary transmission has only recently received the needed attention as a result of the need to identify means of enhancing the effectiveness of monetary policy.

The empirical literature, which has been far and in between, has mostly concluded that the level of financial development is crucial to the effectiveness of monetary policy. One of the pioneering works in this area was by Cottarelli and Kourelis (1994). They concluded that differences in interest rate pass-through in the Euro zone can be explained by differences in their financial structures: banking system competition, extent of developments in the money markets, ownership structure of banking institutions and barriers to foreign competition (see also Mojon, 2000). Cecchetti (1999) corroborated the significance of financial development in monetary policy effectiveness by also reporting that “countries with many small and less healthy banks with poorer access to direct capital displayed greater sensitivity to monetary policy changes than did countries with big healthy banks and deep well-developed capital markets”. In another study of 21 countries by Lastrapes and McMillin (2004), they found that where the financial markets were developed and allowed economic agents to easily rebalance their portfolios in reaction to monetary policy shocks, the liquidity effect of monetary policy was subsequently weaker. In a relatively larger study of 37 industrialised and developing economies by Krause and Rioja (2006), the finding was that a more developed financial market significantly contributed to a more effective monetary policy implementation, irrespective of whether the economy was a developed or a developing one. This finding is a contradiction to Cecchetti (1999) and Lastrapes and McMillin’s (2004) negative relationship between financial development and monetary policy effectiveness. Sorensen and Werner (2006) also found that competition within the banking sector, a characteristic of developed financial markets, was positively significant in explaining a speedier pass-through for the policy interest rate. In a recent study by Carranza *et al.*, (2010), it also emerged that while monetary policy has a larger cumulative impact when financial systems

are less developed, there are significant time lags between implementation and impact, while for developed economies the experience was that of a speedier pass-through for monetary policy.

In general, the scant empirical literature definitely lends itself to the idea that financial development is key to determining the effectiveness of monetary policy. The impact, however, could be facilitative or dampening. In one dimension, a well-developed financial system provides the structures for the transmission of policy to the economy, thus contributing to effectiveness. On another dimension, well-developed financial markets could also provide insulation against monetary policy shocks by providing numerous media/innovations by which economic agents can counter the effects flowing from monetary policy shocks. This ambiguity in direction and the fact that most of these studies are limited to the advanced economies still leave open the question, how does financial development affect the effectiveness of monetary policy transmission, and in this particular case, for Anglophone West Africa?

2.3 Methodology and Data

This section details the approach to the study. It touches on the empirical model, data types and sources as well as the model estimation.

2.3.1 Hypothesis and Empirical Model

The basic generalization from the literature presupposes that the efficacy of monetary policy as a stabilization tool is influenced in a large part by the strength and reliability of the linkage between instruments of monetary policy and the target economic variable. The strength and reliability of this linkage, according to Opolot *et al.*, (2013), is also in part dependent on the country's financial architecture: the size, the composition of the formal financial sector, the degree of development of money and capital markets, the level and degree of financial innovations and financial integration and the external payments regime. Based on the foregoing, this study seeks to test the hypothesis that '*the effectiveness of monetary policy is dependent on the financial development characteristics within an economy*'.

In testing for the efficacy of monetary policy in an economy, many studies have relied on the strength and speed of the traditional transmission mechanisms (Gigineishvili, 2011). The common feature of all the transmission channels is that they transmit policy decisions to aggregate demand and/or supply through financial markets. In order to test for the pass-through of monetary policy for the countries under study, *the cost-of-funds approach*, developed by de Bondt

(2005) is employed. The cost-of-funds approach is employed following John and Pokhariyal's (2013) argument that the stage of the pass-through from policy rate to bank retail rates is best described using the cost of funds approach because the lending rate is the price of financial goods provided by the banking sector. In following with Mojon's (2000) study on the varying impact of financial structure on the strength of the interest rate channel, this study models the interest rate pass-through as also being dependent on financial development. In controlling for other determinants in the pass-through studies (see Cottarelli and Kourelis, 1994; Sorensen and Werner, 2004b, Sander and Kleimeier 2004 and Gigineishvili, 2011) the most common variables have been inflation, volatility, economic growth and competition. Inflation, however, could not be modelled mainly because of its high correlation with one of the important variables of interest, (the policy rate, which could not be dropped). Similarly, competition could not be modelled because of inconsistency of data series for the countries being studied. Consequently, the interest rate pass-through is specified as a function of the central bank policy rate, financial development, economic growth and interest rate volatility, giving the empirical model for the study as:

$$LR_t = \beta_0 + \beta_1 MPR_t + \beta_2 BSIZE_t + \beta_3 GDP + \beta_4 BVOL_t + \varepsilon_t \dots \dots \dots (1)$$

In order to test if changes in monetary policy have differential impacts given varying levels of financial development, equation (1) is re-estimated with an interaction term, *MPR*BSIZE* following the intuition of the general literature on modelling the moderating effects of financial development on pass-through (Cottarelli and Kourelis, 1994; Cecchetti, 1999; Mojon, 2000; de Bondt, 2005; Krause and Rioja, 2006, and others). The expectation is that if financial development influences the pass-through of monetary policy, then in equation 2, $\beta_3 \neq 0$. In essence, the pass-through effect is $\beta_1 + \beta_3$. As a robustness check, the financial development variable is still included as an explanatory variable. This ensures that any no-zero effect from the interaction term does not flow from an inappropriately specified equation. The augmented model is thus given as:

$$LR_t = \beta_0 + \beta_1 MPR_t + \beta_2 BSIZE_t + \beta_3 MPR_t * BSIZE_t + \beta_4 GDP + \beta_5 BVOL_t + \varepsilon_t \dots \dots \dots (2)$$

For both equations, LR is the average annual bank lending rate in each economy, MPR is the central bank discount/prime rate to proxy for the monetary policy stance; BSIZE is the size of

the banking sector, proxied by the private credit to GDP ratio and the indicator of financial development within an economy while GDP and BVOL measure the overall health of the macroeconomic environment and banking industry volatility respectively. MPR*BSIZE (in model 2) is the interaction term between financial development and monetary policy.

Following from the cost of funds approach, β_1 (the coefficient for the monetary policy) is expected to follow the path of $0 \leq \beta_1 \leq 1$. A value close to zero implies that the pass-through is ineffective and sluggish while a value equal to one (1) is indicative of the completeness and effectiveness of monetary policy. In instances where β_1 is greater than one (1), the situation is described as over-shooting and according to de Bondt (2005) is indicative of banks' adjustment to control for the decrease in probability of repayment in periods of contractionary monetary policy.

While the conventional argument has a positive sign as the *a priori* expectation for financial development (BSIZE), the empirical pass-through literature has exhibited more of mixed signs. On the one hand, because high levels of financial development provide the appropriate structures for the transmission of policy moves, financial development is expected to reflect positively on pass-through. On the other hand, where high levels of financial development provide innovative platforms to circumvent the implications for central bank rate changes, the sign is expected to be negative. Samba and Yan (2010) show that when financial market developments are characterised by imperfections, like lack of banking sector competition, excess banking sector liquidity and a poor structure (stock markets), it serves to impede pass-through. This seems to suggest that unless developments in the financial sector promote competition its contribution to pass-through is compromised. On the basis of these, the financial development variable is expected to exhibit either a positive or negative relationship with lending rates.

According to Gigineishvili (2011), how banks respond to interest rate movements is largely determined by the degree to which they believe that interest rates carry reliable information about underlying market trends. Interest rate volatility, however, introduces uncertainty into market signals, causing banks to interpret interest rate movements with more caution. Consequently, rather than immediately passing the changes in market rates to customers, they choose to wait until the noise is filtered out. If this happens, interest rate volatility is expected to exhibit a negative effect with lending rates. This path notwithstanding, high levels of volatility will cause banks to adjust lending rate significantly upwards to compensate for the decreased

probability of repayment whilst maximising their risk-adjusted returns and protecting their profitability. In this case, volatility will be expected to have a positive relationship with bank lending rates. In view of the differing paths of volatility transmission to lending rates, there is no *a priori* expectation in terms of the coefficient sign.

It is also argued that, in periods of rapid economic growth, *ceteris paribus*, there is an attendant rise in the demand for credit. This ultimately creates competition in the financial sector. This competition in response to the increased loan demand can compel banks to easily pass on downward changes in the central bank policy rate to lending rates (Egert *et al.*, 2006), where loan demand is elastic. If the increase in loan demand becomes inelastic, however, then lending rates are likely to be characterised by rigidities and sluggishness in response to policy rate changes. In terms of empirical evidence, however, the path is not so clearly mapped out. Sander and Kleimeier (2004), on the one hand, found economic growth to be insignificant in the short-run but significant in the long run. Gigineishvili (2011), for instance, found per capita GDP to be insignificant in explaining the interest rate pass-through mechanism. He interpreted the insignificance as possibly indicative of the cyclicity of GDP, which banks do not factor into their pricing decisions. Based on the available and relatively inconclusive empirical evidence, there is no *a priori* expectation with regard to the coefficient sign.

2.3.2 Model Estimation

The empirical model was run as a time-series analysis. This choice flows from the major drawback that arises in relation to cross-country studies; they generate estimates of the average effects, though the relationship of interests may vary considerably between countries. Fedderke (2005) argues that “where general laws genuinely hold, then they must be evident not only in aggregate, but in particular instances as well”. This presupposes that studies of particular or individual cases become useful because they allow for circumstances and factors that may be unique to the specific instance under study to be controlled for with a degree of precision that may not be possible for aggregate cross-country studies. This intuition has stimulated a number of studies examining the pass-through nexus employing country-level time series data and some (for example Odedokun 1996; Demetriades and Hussein 1996 among others) have actually found variations in the relationship that can be attributed to country-level dynamics. On account of the countries’ desire to ascend onto a single monetary framework, the model is estimated with an *a priori* expectation that the relationships being tested will exhibit synchronicity across the

sample countries, and serve as attestation to their readiness to mount the single monetary framework.

2.3.2.1 Main Variables of Interest

Private credit to GDP is used as the proxy for measuring financial development for the study sample. Financial development is measured this way primarily because the SSA region's financial markets are dominated by banks. The second reason for using private credit is because it is the standard metric for measuring developments in the banking system. High levels of financial development, all things being equal, are expected to enhance the effectiveness of monetary policy. The expectation is that the pass-through of monetary policy to retail rates will be larger and swifter. The central bank policy rate/prime rate following Delis and Kouretas (2011) is used as the measure for monetary policy rate, *MPR*. As per their study, the choice of interest rate measure does not lend much difference to the outcome. The central bank rate is used also because it is the *de facto* indicator of the monetary policy stance in the economy given and also because it is the primary tool used by central banks for implementing monetary policy. The monetary policy stance is expected to exhibit a direct relationship with bank retail rates.

2.3.2.2 Control Variables

In order to account for other factors, aside the variables of interest that may exert influences on the monetary transmission mechanism, a set of controls are included: a measure of the macroeconomic environment, proxied by GDP growth and market volatility, proxied by the standard deviation on the policy rate. Apart from measuring the level of economic activity, GDP is also quite informative with regard to other macroeconomic characteristics. GDP is expected to enhance pass-through. The use of the standard deviation of the policy rate to proxy market volatility follows Gigineishvili (2011). Market volatility is included as a control to assess the effects of market uncertainty and the information flow dynamics in the financial market setting – a significant factor in the pass-through of policy moves.

2.3.3 Data

Annual data covering three out of the six Anglophone West African economies (Ghana, Nigeria, and The Gambia), for which data are available, are sampled for this study. These Anglophone economies in West Africa are on the path of integrating their monetary frameworks and

therefore present a unique dataset for the study. The study period is from 1975 to 2011. Data on all the variables are obtained from the World Bank’s Development Indicators (WDI) and the IMF’s International Financial Statistics.

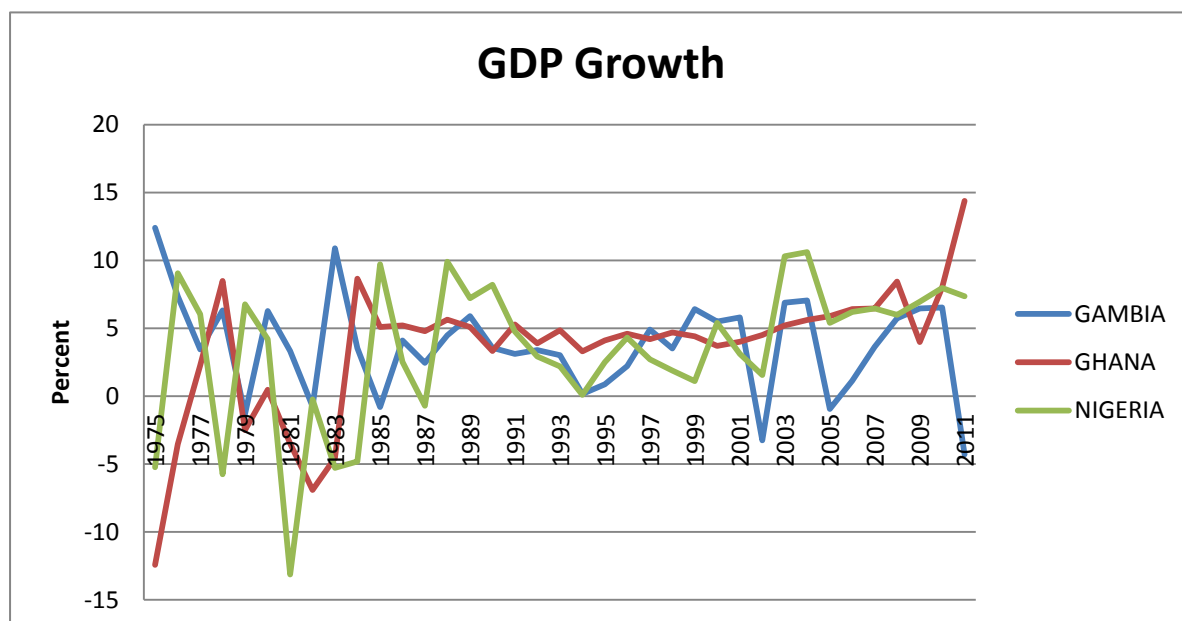
2.4 Findings and Discussions

This section, divided into two main parts, deals with the findings of the study. The first part presents some stylized facts on the countries under study, specifically on the economic and financial structure over the sample period. The second part presents the country-level analysis on variable unit roots and the regression analysis.

2.4.1 Some Stylized Facts: Financial and Economic Structure of Sample

Economic growth for the 3 countries under study has waxed and waned over the 37-year period from 1975-2011 (see Figure 2.1).

Figure 2.1: Trends in GDP for Gambia, Ghana and Nigeria



<i>Economic Growth_GDP</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Min</i>	<i>Max</i>
<i>Gambia</i>	3.752162	3.528698	-4.3	12.39
<i>Ghana</i>	3.552703	4.837447	-12.43	14.39
<i>Nigeria</i>	3.462274	5.227168	-13.12788	10.6

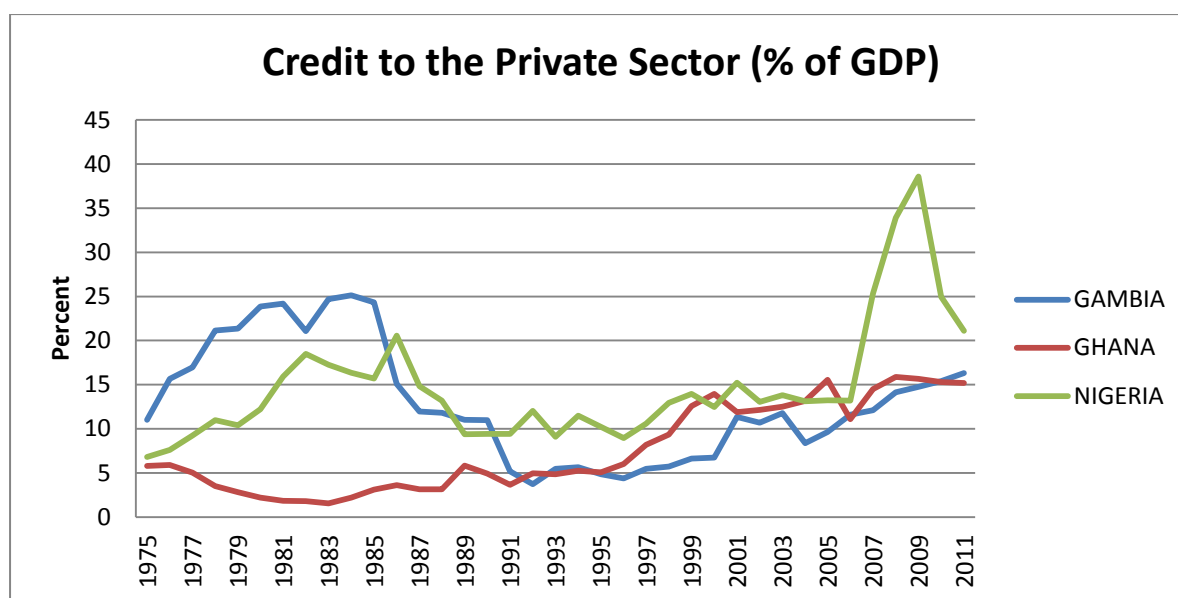
Data compiled by author from WDI

Gambia recorded the highest average growth for the sample at, 3.752%, for the whole period with its highest negative growth being -4.3% in 2011. Within the 37-year period, the country also experienced annual growth of 12.39% in one period. Ghana followed closely behind with an average growth of 3.552%, its highest negative growth being -12.43% and its maximum positive growth being 14.39% over the period of study.

Nigeria had the least mean GDP growth of 3.462% whilst also recording the highest negative (-13.128%) and lowest positive (10.6%) growth within the sample. In terms of highest GDP growth in one fiscal year, Ghana took the lead with its record 14.39% in 2011.

Financial development (Figure 2.2), measured as the ratio to GDP of credit to the private sector, also exhibits some divergence across the countries over the period under study. To start with, all the countries had initially low levels of financial development. This improved markedly for Gambia and Nigeria over the late 1970s, through to the middle and late 1980s.

Figure 2.2: Trends in financial development for Gambia, Ghana and Nigeria



<i>Financial Development_ BSIZE</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Min</i>	<i>Max</i>
<i>Gambia</i>	12.97703	6.568595	3.73	25.12
<i>Ghana</i>	7.651892	4.944318	1.54	15.88
<i>Nigeria</i>	14.72873	6.798227	6.814002	38.59011

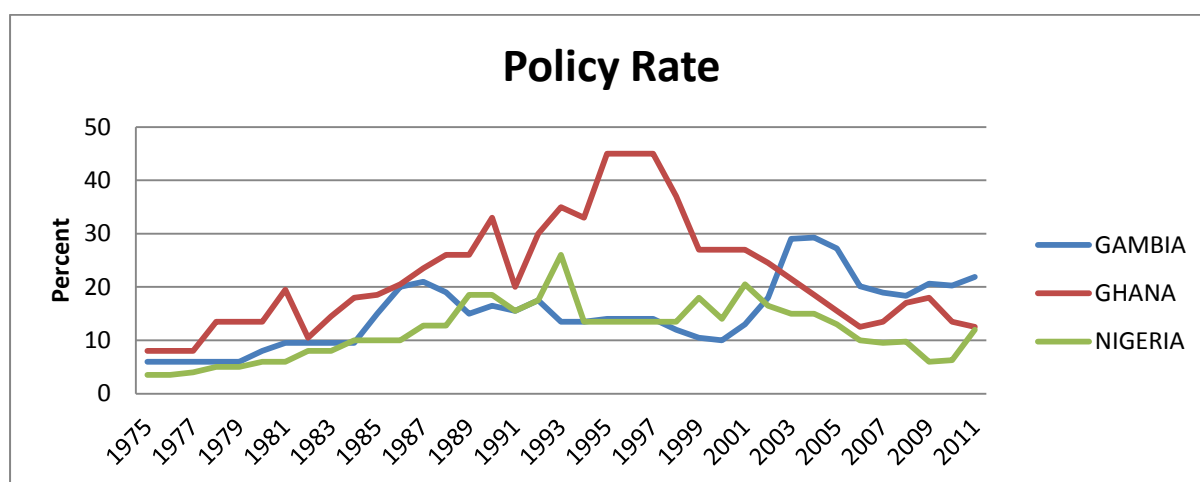
Data compiled by author from WDI

From this point on, credit to the private sector, which also proxies for financial depth began to deteriorate. Gambia, for example, has not been able to return to the level of financial depth that characterized the era of the 1980s. Nigeria, on the other hand was able to pick up the pace, peaking at 38.59% around 2009 before dropping once more to approximately 21% in 2011.

The story for Ghana, though, has been somewhat different. Prior to the IMF-led financial sector liberalization programmes, the Ghanaian financial sector obviously lacked depth, evident from the very low levels of private credit to GDP at the time. After the reforms in the late 1980s, financial depth in Ghana has witnessed a consistent upward trend, implying increasing financial development. Suffice to say that Ghana still recorded the lowest period average of 7.652% for the measure of financial development and the highest period average was by Nigeria, 14.729%.

In terms of interest rates (Figure 2.3), the policy rate for Ghana showed the highest peaks over the period. Gambia followed closely behind with Nigeria lagging behind. In terms of averages, Ghana, Gambia and Nigeria recorded 21.96%, 14.964% and 11.716% respectively for the policy rate.

Figure 2.3: Trends in central bank policy rate for Gambia, Ghana and Nigeria



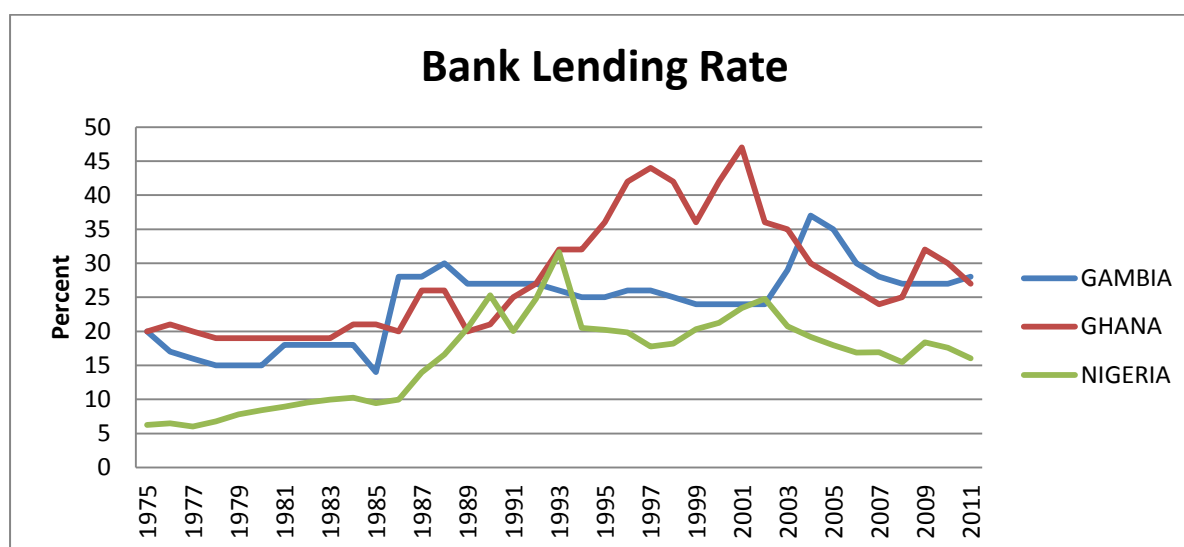
<i>Policy Rate_MPR</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Min</i>	<i>Max</i>
Gambia	14.96432	6.333497	6	29.25
Ghana	21	10.35105	8	45
Nigeria	11.71622	5.246084	3.5	26

Data compiled by author from WDI

In the last decade or so, however, Gambia recorded relatively high levels in its prime rate, in comparison to the decade before, while the other two countries, Ghana and Nigeria experienced relative declines in the rates over the same period. Between 1994 and 2002, the prime rate for Ghana diverged significantly from those of Gambia and Nigeria, though the same period saw more of a convergence between Nigeria and Gambia in their prime rates. From 2003 onwards, Gambia experienced higher policy rates compared to Ghana and Nigeria.

The lending rate for Ghana, just like the policy rate, showed the highest peaks over the 37-year period. The convergence between the Nigerian and Gambian policy rates was not so evident as that of the lending rate. The lending rate for Nigeria was relatively lower than in the other two countries over the sample period. In the year 2004, lending rates in all 3 countries began to experience some decline. This decline continued for Gambia. The other 2 countries, however, did not experience this consistency in the decline of their commercial bank lending rate.

Figure 2.4: Trends in bank lending rates for Ghana, Gambia and Nigeria



<i>Lending Rate_LR</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Min</i>	<i>Max</i>
<i>Gambia</i>	24.18919	5.636379	14	37
<i>Ghana</i>	27.78378	8.310419	19	47
<i>Nigeria</i>	16.16177	6.389534	6	31.65

Data compiled by author from WDI

Volatility in the policy rate (see the Table 2.1) was also highest for Ghana, averaging 3.75 over the period, followed by Gambia at 2.6 and Nigeria at 2.0. In general, Nigeria displayed the least variability with regard to interest rates over the sample period.

Table 2.1 Summary Statistics of Interest rate volatility over study period per country

Interest rate volatility_BVOL	Mean	Std. Dev.	Min	Max
Gambia	2.628226	2.303575	0	8.871302
Ghana	3.75164	1.830891	.9797959	8.064738
Nigeria	2.057864	1.276957	0	5

Data compiled by author from WDI

2.4.2 Country Level Analysis

2.4.2.1 Model Estimations and Discussion by Country

In order to test the interest rate pass-through for the sample countries, their data series were first subjected to the Augmented Dickey-Fuller and Phillips-Perron tests of unit root to ascertain their order of integration, as this was key to the appropriateness of the autoregressive distributed lag (ARDL) approach that was employed for the study. The ARDL approach, though not requiring the series to be stationary in levels, is not applicable to series integrated of order 2 or above. The unit root table below (Table 2.1) shows that the series for all 3 countries are integrated of order 1 and below.

Table2.2: Results of unit root tests

	ADF	PP	ADF	PP	
	LEVEL		1 st DIFFERENCE		
NIGERIA					
	<i>t-Statistic</i>	<i>t-Statistic</i>	<i>t-Statistic</i>	<i>t-Statistic</i>	
DR	-2.375193	-2.143998	-2.920130*	-7.265499***	I(1)
LR	-2.142630	-1.870137	-6.559456***	-6.569828***	I(1)
MPR	-2.455623	-2.317772	-8.091393***	-8.410575***	I(1)
BSIZE	-1.930660	-1.961486	-5.245551***	-6.671918***	I(1)
BVOL	-2.776801*	-2.649276*	-7.469877***	-11.04667***	I(1)
GDP	-5.12988***	-5.28999***	-10.89798***	-12.27508****	I(0)
GHANA					
	<i>t-Statistic</i>	<i>t-Statistic</i>	<i>t-Statistic</i>	<i>t-Statistic</i>	

DR	-2.494185	-2.410461	-7.049917***	-7.188982***	I(1)
LR	-1.522339	-1.569858	-5.436549***	-5.440068***	I(1)
MPR	-1.681625	-1.712045	-6.737009***	-6.689303***	I(1)
BSIZE	-0.271095	-0.151687	-6.715834***	-6.723649***	I(1)
BVOL	-1.644078	-1.931408	-6.285033***	-5.265712***	I(1)
GDP	-3.91429***	-3.92425***	-6.595241***	-8.583349***	I(0)

GAMBIA

	<i>t-Statistic</i>	<i>t-Statistic</i>	<i>t-Statistic</i>	<i>t-Statistic</i>	
DR	-2.510405	-2.063369	-2.838321*	-5.022258***	I(1)
LR	-1.763751	-1.763751	-6.018453***	-6.018453***	I(1)
MPR	-1.90905	-1.774799	-5.537147***	-3.986938***	I(1)
BSIZE	-3.26010**	-1.376169	-5.075021***	-5.075021***	I(1)
BVOL	-1.018895	-1.946150	-3.876228**	-4.639237***	I(1)
GDP	-6.03006***	-6.73547***	-4.175552***	-10.82130***	I(0)

Note: ADF=Augment Dickey Fuller Test, PP=Phillip-Perron Test, I=Order of Integration, I(0)= Integrated at levels, I(1)=Integrated at order 1, ***, ** and * denotes 1%, 5% and 10% level of significance for rejection of null hypothesis of unit root

After subjecting the series to unit root tests, the next step in the ARDL methodology was the OLS estimation of models 1 and 2 in order to test for the presence of a long-run (level) relationship. All three countries rejected the null hypothesis of no long-run relationship at 95% following the F-statistics provided by Pesaran *et al.*, (2001).

The regression models are thus estimated using the Autoregressive Distributed Lags with error correction modelling. This approach is preferred over the other error-correction estimation methods like the Engle-Granger two-step (1987) and Johansen (1988), mainly because it does not require that the series be integrated of the same order and also because of its good small sample properties (Bahmani-Oskoe and Hegerty, 2009). The ARDL model selection was based on the Akaike information criterion, mainly because of its good small sample size properties. The diagnostic tests (Tables 2.3-2.8) reveal no anomalies with the estimated models for all the three countries. Thus, we proceed to present the findings.

Gambia

From Table 2.3, the coefficient of the monetary policy variable is positive and significant, suggesting the presence of a pass-through effect. From Table 2.3, the pass-through, however, is

incomplete, standing at approximately 54%. This suggests that only 54% of an increase in the policy rate is transmitted to bank lending rates. By inference, the policy rate must change by twice the rate change that is expected in bank retail rates. This finding is in consonance with a number of the studies that also document interest rate pass-through for developing countries as being incomplete (Bhattacharya *et al.*, 2011). They argue that this is because their financial markets are also under-developed. In the short-run, as well, the coefficient is less than unity, implying that changes in monetary policy are not completely transmitted to the lending rate. With reference to both the short-run and long-run coefficients, it is apparent that the interest pass-through is (quite) incomplete in Gambia.

The coefficient of the level of financial development, contrary to major findings in the literature (see Krause and Rioja, 2006; Singh *et al.*, 2008; among others), is negatively and significantly signed in relation to the lending rate. This may suggest that increasing levels of financial development impede interest rate pass-through for Gambia. This negative effect of financial development on the interest rate pass-through could also be indicative of bottlenecks in the financial system, specifically the banking system in Gambia hence the negative effect. On account of the Cottarelli and Kourelis' (1994) argument that competition and efficiency in the financial sector are important for pass-through, the negative effect of financial development on pass-through could be an indication that developments in the financial markets of Gambia are not necessarily characterised by competition and efficiency, thus hampering the interest rate pass-through. The negative sign and statistical significance persist even for short-run changes in the level of financial development. In general, these findings could also be an indication that the financial sector in Gambia is uncompetitive and possibly concentrated.

Contradictory to the literature as this finding may be, however, it seems to find support with the finding by Carranza *et al.*, (2010) that financial development can be negatively related to the effectiveness of monetary policy.

Table 2.3: ARDL output on financial development and monetary policy: Gambia

Dependent Variable D(LR)	F-statistic	95% Lower Bound	95% Upper Bound	90% Lower Bound	90% Upper Bound	Conclusion
Model 1	10.25059***	2.850	4.049	2.425	3.574	Reject at 95%

Autoregressive Distributed Lag Estimates					
ARDL(1,2,0,2,1) selected based on Akaike Information Criterion					
Diagnostic Tests					
Test Statistics	LM Version			F Version	
Serial Correlation	CHSQ(1) = .55840 [.455]			F(1, 23)= .37290 [.547]	
Functional Form	CHSQ(1) = 4.0443 [.044]			F(1, 23)= 3.0049 [.096]	
Normality	CHSQ(2) = 1.4169 [.492]			Not applicable	
Heteroscedasticity	CHSQ(1) = .24174 [.623]			F(1, 33)= .22951 [.635]	
Variable	Long-run Coefficients		Variable	Short-run coefficients	
MPR	.53704	[.000]***	D(MPR)	.33189	[.001]***
			D(MPR(-1))	-.15063	[.159]
BSIZE	-.32282	[.000]***	D(BSIZE)	-.43763	[.000]***
BVOL	.43753	[.070]*	D(BVOL)	-.19918	[.405]
GDP	.089695	[.388]	D(GDP)	.12215	[.072]*
			D(GDP(-1))	.11827	[.066]*
C	18.9907	[.000]***	D(C)	25.7446	[.000]***
			ECM (-1)	-1.3556	[.000]***

***, **, * indicate significance at 1%, 5% and 10% respectively. MPR is central bank policy rate and proxy for monetary policy; BSIZE is private credit to GDP ratio and proxy for financial development; BVOL is interest rate volatility; GDP is real GDP growth; ECM is error correction term. The model was subjected to the following diagnostic tests: the Breusch-Godfrey test for serial correlation, the Ramsey's RESET test for functional form, the Jacque-Bera test for normality and the White test for heteroscedasticity. The diagnostic tests suggest that the above model has no significant autocorrelation, the functional form is appropriate, the errors are normally distributed and the disturbances are homoscedastic.

Volatility of market rates, for Gambia, shows a significantly positive relationship with the lending rate. From the perspective of uncertainty, it appears increasing volatility leads to increased lending rates (increasing risk premium), possibly as a protective mechanism by banks against potential declines in profitability. Though the sign is analogous to the expectations of the pass-through literature (Sander and Kleimeier, 2004), another view from the market efficiency perspective shows that volatility on the market actually filters into lending rate determination. In the short-run, however, market volatility shows the expected negative sign but it is statistically insignificant.

GDP shows the expected positive sign but it turns out to be statistically insignificant. This seems to suggest that the interest rate pass-through is, in the long-run, divorced from macroeconomic fundamentals like GDP. The statistical insignificance of GDP in the pass-through mechanism could be flowing from threshold effects. In other words, there must be a certain level of growth within an economy before the financial system becomes responsive to monetary policy action. Short-run changes in GDP, as well as previous period changes, however, seem more relevant in explaining pass-through in Gambia. The error correction term in this model is significantly negative, implying a reversion to the long-run equilibrium lending rate after an exogenous shock to the lending rate. The error-correction term has a larger than unity value, pointing to some over-shooting in the reversion to long-run equilibrium lending rate.

Given that the speed of adjustment is equally informative on the magnitude of adjustment in lending rates to central bank policy moves, the mean adjustment lag was computed, following Hendry (2005). The mean adjustment lag for model 1 shows that for Gambia, bank-lending rates take approximately 5.86 months (approximately half a year) to respond to central bank policy rate changes. This indicates that policy moves must take into cognizance the half-year lag when proposing and implementing policy directives. This adjustment lag obviously makes for a sluggish pass-through.

In order to measure the effects of financial development on the pass-through mechanism, the policy rate is interacted with the financial development variable (MPR*BSIZE) in model 2. The long-run regression coefficients for model 2 for Gambia do not show a marked difference from model 1 except for GDP that reverses its sign. Much consequence is not attached to this since it remains statistically insignificant. The interaction term, MPR*BSIZE, exhibits a positively significant relationship, suggesting that there is an enhancement of pass-through of policy in a developed financial market. On the whole, however, it appears that financial development plays only a marginally positive role in the pass-through for Gambia. The error-correction term (ECM(-1)) is also statistically significant and negative, implying a reversion of lending rates to its long-run equilibrium after an adverse shock. From the coefficient value, it appears that some overshooting also occurs in this case.

Table 2.4: ARDL output interacting financial development and monetary policy: Gambia

Dependent Variable	F-statistic	95% Lower Bound	95% Upper Bound	90% Lower Bound	90% Upper Bound	Conclusion
D(LR)						
Model 2	10.34479***	2.649	3.805	2.262	3.367	Reject at 95%
Autoregressive Distributed Lag Estimates						
ARDL(1,0,1,1,2,2) selected based on Akaike Information Criterion						
Diagnostic Tests						
* Test Statistics		*LM Version		* F Version		
Serial Correlation		CHSQ (1) = 1.7002[.192]		F (1, 21)= 1.0722[.312]		
Functional Form		CHSQ (1) = 2.5680[.109]		F (1, 21)= 1.6628[.211]		
Normality		CHSQ (2) = 1.1707[.557]		Not applicable		
Heteroscedasticity		CHSQ (1) = .071500[.789]		F (1, 33)= .067553[.797]		
Variable	Long-run Coefficients		Variable	Short-run Coefficients		
MPR	.23416	[.069]*	D(MPR)	.32216	[.051]*	
BSIZE	-.49653	[.000]***	D(BSIZE)	-.23824	[.227]	
MPR*BSIZE	.013249	[.067]*	D(MPR*BSIZE)	-.0076654	[.505]	
BVOL	.78792	[.004]***	D(BVOL)	.020663	[.939]	
			D(BVOL(-1))	-.36727	[.185]	
GDP	-.014831	[.888]	D(GDP)	.029581	[.706]	
			D(GDP(-1))	.13238	[.048]*	
C	22.8393	[.000]***	D(C)	31.4224	[.000]***	
			ECM(-1)	-1.3758	[.000]***	

***,**, * indicate significance at 1%, 5% and 10% respectively. MPR is central bank policy rate and proxy for monetary policy; BSIZE is private credit to GDP ratio and proxy for financial development; BVOL is interest rate volatility; GDP is real GDP growth; MPR*BSIZE is the interaction term for monetary policy and financial development; ECM is error correction term. The model was subjected to the following diagnostic tests: the Breusch-Godfrey test for serial correlation, the Ramsey's RESET test for functional form, the Jacque-Bera test for normality and the White test for heteroscedasticity. The diagnostic tests suggest that the above model has no significant autocorrelation, the functional form is appropriate, the errors are normally distributed and the disturbances are homoscedastic.

The mean adjustment lag for model 2, at 5.9 months (approximately 6 months), is also not significantly different from that of model 1, confirming the fact that lending rates in Gambia take approximately 6 months to adjust and reflect central policy changes in the monetary policy rate.

It would be expected that policy moves that are expected to reflect in bank retail rates must either be made taking cognizance of the lagged effect or alternatively necessary step must be taken to remove the bottlenecks in the banking sector that may impede the interest rate pass-through

Ghana

The model 1 results for Ghana (Table 2.5) show a positively significant relationship between the policy rate and the bank-lending rate. This coefficient value suggests that approximately only 48% of a unit increase in the policy rate filters into the bank-lending rate. In the short-run, the pass-through to the lending rate is even more sluggish, evidenced by the fact that only 28% of a change in the policy rate is immediately transmitted to the lending rate. This rigidity of interest rate pass-through could also be an indication of a lack of credibility in the monetary policy process, hence the significantly low pass-through.

The financial development variable, BSIZE exhibits a positive relationship with the lending rate. By implication, developments in the banking sector enhance the pass-through of policy rates to bank retail rate. It may be that in the long-run, developments in the banking sector promote competition, facilitate symmetric information and discourage collusive behaviour, hence the improvement in the pass-through. In the short-run, the financial development variable is negative but not statistically significant. Market volatility for Ghana, like Gambia, also shows a significantly positive relationship with lending rates. While contrary to the major findings in the literature, it appears that lending rates in Ghana adjust upward in the presence of uncertainty. In the short-term, however, volatility is inconsequential in affecting the pass-through.

The long-run and short-run coefficients for GDP growth were negative and insignificant. Thus, like Gambia, economic fundamentals, like GDP growth, are divorced from the pass-through process. Given that GDP is also a proxy for the overall economic conditions in a country, the insignificance of GDP is a possible indication that bank-lending rates are influenced more by factors external to the economy and less by internal factors. In essence, lending rates in Ghana do not reflect macroeconomic growth conditions. This lack of statistical significance, according to Gigineishvili (2011), could stem from the cyclicity of GDP which, he argues, banks do not factor into their long-term pricing functions. GDP is also a proxy for aggregate demand so another possible reason why GDP is not significant could be the operation of threshold effects. Hence, without a certain minimum level of aggregate demand, lending rates are not responsive to

GDP. All in all, apart from the coefficient of short-run changes in monetary policy which was significant, none of the other short-run variables were significant in model 1.

Table 2.5: ARDL output on financial development and monetary policy: Ghana

Dependent Variable	F-statistic	95% Lower Bound	95% Upper Bound	90% Lower Bound	90% Upper Bound	Conclusion
Model 1	34.45689***	2.850	4.049	2.425	3.574	Reject at 95%
Autoregressive Distributed Lag Estimates						
ARDL(1,0,1,0,1) selected based on Akaike Information Criterion						
Diagnostic Tests						
* Test Statistics		*LM Version			* F Version	
Serial Correlation		CHSQ (1) = .0098756 [.921]			F (1, 26) = .0073382 [.932]	
Functional Form		CHSQ (1) = 4.3542 [.037]			F (1, 26) = 3.6941 [.066]	
Normality		CHSQ (2) = 3.4122 [.182]			Not applicable	
Heteroscedasticity		CHSQ (1) = 2.3218 [.128]			F (1, 33) = 2.3447 [.135]	
Variable	Long-run Coefficients		Variable	Short-run Coefficients		
MPR	.48383	[.000]***	D(MPR)	.28378	[.002]***	
BFSIZE	.81989	[.001]***	D(BFSIZE)	-.30127	[.377]	
BVOL	2.0019	[.017]**	D(BVOL)	.19197	[.704]	
GDP	-.12025	[.644]	D(GDP)	-.070532	[.643]	
C	3.9592	[.150]	D(C)	2.3222	[.196]	
			ECM(-1)	-.58654	[.000]***	

***,**, * indicate significance at 1%, 5% and 10% respectively. MPR is central bank policy rate and proxy for monetary policy; BFSIZE is private credit to GDP ratio and proxy for financial development; BVOL is interest rate volatility; GDP is real GDP growth; ECM is error correction term. The model was subjected to the following diagnostic tests: the Breusch-Godfrey test for serial correlation, the Ramsey's RESET test for functional form, the Jacque-Bera test for normality and the White test for heteroscedasticity. The diagnostic tests suggest that the above model has no significant autocorrelation, the functional form is appropriate, the errors are normally distributed and the disturbances are homoscedastic.

The error-correction term for the model is highly significant, negative and less than unity. This implies a stable long-run relationship between the lending rate and the policy rate, with a reversion to equilibrium after an adverse shock. From the results of model 1 for Ghana,

approximately 59% of any anomaly in the lending rate that occurs in the prior period is corrected in the current period. The speed of the pass-through for model 1 indicates that monetary policy moves through changes in the policy rate by the central bank take approximately 14.65 months (15 months) to filter through to lending rates. This overly slow speed of adjustment points to a very ineffective interest rate pass-through in Ghana.

The results from model 2 with the interaction term MPR*BSIZE for Ghana (Table 2.6), show that in a developed financial sector, both in the long-run and short-run, the transmission process is enhanced. For the same model, the financial development variable is insignificant in the long-run but significant and negative in the short-run. This could point to the fact that in the absence of a financial sector that is capable of transmitting policy signals, policy rate changes are ineffective in driving bank-lending rates and ultimately investment dynamics and growth. The differences in effect of the single variable and the interacted variable could thus be interpreted as indicating the need for alignment between policy actions and the characteristics of the economy. This argument is proffered because it appears that in itself, financial development does not unequivocally aid pass-through but when interacted it becomes significant both in the short-run and the long-run.

Table 2.6: ARDL output interacting financial development and monetary policy: Ghana

Dependent Variable	F-statistic	95% Lower Bound	95% Upper Bound	90% Lower Bound	90% Upper Bound	Conclusion
Model 2	39.02940***	2.649	3.805	2.262	3.367	Reject at 95%
Autoregressive Distributed Lag Estimates						
ARDL(2,0,1,0,0,1) selected based on Akaike Information Criterion						
Diagnostic Tests						
* Test Statistics		*LM Version			* F Version	
Serial Correlation		CHSQ (1) = 1.8763[.171]			F (1, 24)= 1.3595[.255]	
Functional Form		CHSQ (1) = .66918[.413]			F (1, 24)= .46781[.501]	
Normality		CHSQ (2) = 6.1447[.046]			Not applicable	
Heteroscedasticity		CHSQ (1) = .54121[.462]			F (1, 33)= .51830[.477]	

Variable	Long-run Coefficients		Variable	Short-run Coefficients	
			D(LR(-1))	.20708	[.133]
MPR	.0076760	[.962]	D(MPR)	.0062690	[.962]
BSIZE	-.39886	[.359]	D(BSIZE)	-1.2321	[.019]**
MPR*BSIZE	.070373	[.004]***	D(MPR*BSIZE)	.057474	[.014]**
BVOL	1.2473	[.035]**	D(BVOL)	.18821	[.688]
GDP	.090775	[.620]	D(GDP)	.074136	[.624]
C	13.9932	[.000]***	D(C)	11.4283	[.005]**
			ECM(-1)	-.81670	[.000]***

***,**, * indicate significance at 1%, 5% and 10% respectively. MPR is central bank policy rate and proxy for monetary policy; BSIZE is private credit to GDP ratio and proxy for financial development; BVOL is interest rate volatility; GDP is real GDP growth; MPR*BSIZE is the interaction term for monetary policy and financial development; ECM is error correction term. The model was subjected to the following diagnostic tests: the Breusch-Godfrey test for serial correlation, the Ramsey's RESET test for functional form, the Jacque-Bera test for normality and the White test for heteroscedasticity. The diagnostic tests suggest that the above model has no significant autocorrelation, the functional form is appropriate, the errors are normally distributed and the disturbances are homoscedastic.

Volatility shows a positive relationship with lending rates in the long-run but is insignificant in the short-run. This seems to suggest that short run variations in the policy rate do not filter into bank lending rate determination but in the long run, such volatility seems to cause banks to adjust rates upward to compensate for the uncertainty and noise level in the central bank policy rate setting. From Table 2.6, it appears that the central bank rate has no statistically significant relationship with bank lending rates. The insignificance could be reflective of asymmetric information in the banking sector. On the other hand it could be reflective of collusive behaviour on the part of banks since such collusive behaviour will result in a relatively long lag before arriving at a new equilibrium price hence the lack of a significant relationship. Real GDP remains insignificant.

The error-correction terms for both models are highly significant and negative and less than unity, implying a stable long-run relationship with a reversion to equilibrium after an adverse shock. In model 2, as much as 82% of any disequilibrium created in the previous period is corrected in the current period. By inference from the results, the interest rate pass-through is relatively ineffective, but improves in the presence of financial development.

Nigeria

Nigeria, contrary to its sister countries, is characterised by overshooting of the lending rate in response to changes in the policy rate and this is significant at 1%. According to De Bondt (2000), lending rates respond to changes in the policy rate by either overshooting or undershooting. As per Sander and Kleimeier (2004) overshooting in lending rates can occur if banks charge higher rates to offset the risks inherent in banking. Sorensen and Werner (2006) also argue that overshooting may be an indication of significant information asymmetry between lenders and borrowers.

Table 2.7: ARDL output on financial development and monetary policy: Nigeria

Dependent Variable	F-statistic	95% Lower Bound	95% Upper Bound	90% Lower Bound	90% Upper Bound	Conclusion
D(LR)						
Model 1	6.579069***	2.850	4.049	2.425	3.574	Reject at 95%
Autoregressive Distributed Lag Estimates						
ARDL(1,0,0,0,0) selected based on Akaike Information Criterion						
Diagnostic Tests						
* Test Statistics		*LM Version			* F Version	
Serial Correlation		CHSQ (1) = .65844[.417]			F (1, 29)= .54029[.468]	
Functional Form		CHSQ (1) = 1.1310[.288]			F (1, 29)= .94063[.340]	
Normality		CHSQ (2) = .93711[.626]			Not applicable	
Heteroscedasticity		CHSQ (1) = 2.5838[.108]			F (1, 34)= 2.6290[.114]	
Variable	Long-run Coefficients		Variable		Short-run Coefficients	
MPR	1.2203	[.000]***	D(MPR)	.70939	[.000]***	
BSIZE	.20371	[.032]**	D(BSIZE)	.11842	[.034]**	
BVOL	.23285	[.724]	D(BVOL)	.13537	[.732]	
GDP	.10220	[.380]	D(GDP)	.059411	[.389]	
C	-1.8564	[.436]	D(C)	-1.0792	[.426]	
			ECM(-1)	-.58134	[.000]***	

***,**, * indicate significance at 1%, 5% and 10% respectively. MPR is central bank policy rate and proxy for monetary policy; BSIZE is private credit to GDP ratio and proxy for financial development; BVOL is interest rate volatility; GDP is real GDP growth; ECM is error correction term. The model was subjected to the following diagnostic tests: the Breusch-Godfrey test for serial

correlation, the Ramsey's RESET test for functional form, the Jacque-Bera test for normality and the White test for heteroscedasticity. The diagnostic tests suggest that the above model has no significant autocorrelation, the functional form is appropriate, the errors are normally distributed and the disturbances are homoscedastic.

Inferring from the two opinions leads to the conclusion that the risks inherent in banking, as a result of information asymmetry between borrowers and lenders, account for the overshooting in the lending rates of the Nigerian banking sector. In the short run as well, there is evidence of a pass-through at approximately 71% and this is significant at 1%. Financial development exhibits a positive relationship with the lending rate, indicating that it facilitates the interest rate pass-through both in the long and the short-run.

Market volatility and GDP growth are both insignificant, implying they are inconsequential in explaining the pass-through in Nigeria. The insignificance of GDP is corroborated by the findings of Egert *et al.*, (2006). From the coefficient of the error correction term, approximately 58% of the disequilibrium in the lending rate in the previous period is offset in the current period. The mean adjustment lag for model 1 for Nigeria is 5.99 months (approximately 6 months). This suggests that policy rates take about 6 months to be reflected in the cost of capital of economic agents.

For model 2 (Table 2.8), the overshooting in the lending rate to changes in the policy rate becomes even more pronounced, both in the short-run and long-run. In this instance, a unit change in the policy rate reflects in more than a unit change in the lending rate. Upon interacting the policy rate with financial development to measure the pass-through implication of monetary policy as a function of developments in the financial sector, it appears, based on the significance and the sign, that the pass-through is hampered in the presence of developments in the financial markets. Both in the long-run and the short-run, the coefficients are negative and significant. This could be an indication that increasing innovations in the financial sector of Nigeria provide alternative means for market players to insulate themselves from monetary policy effects, thus leading lending rates to exhibit a sluggish relationship to developments in the financial sector.

Another implication could be that the financial sector of Nigeria is underdeveloped, hence its inability to transmit policy changes to lending rates, or that developments in the financial sector are not necessarily characterised by competition and efficiency, the main drivers of the interest rate pass-through. GDP growth and market volatility still remain insignificant. Giginishvili

(2011) explains the insignificance of GDP growth in the pass-through framework as a possible effect from GDP cyclical which banks do not factor into their long-run pricing decisions.

The error term is significantly negative and less than unity, indicating a stable long-run relationship that corrects approximately 60% of the previous period's disequilibrium in the current period. The speed of pass-through, inferred from the mean adjustment lag, is not computed for this model as the short-run pass-through also exhibits overshooting.

Table 2.8: ARDL output interacting financial development and monetary policy: Nigeria

Dependent Variable	F-statistic	95%Lower Bound	95% Upper Bound	90%Lower Bound	90%Upper Bound	Conclusion
D(LR)						
Model 2	13.60962***	2.649	3.805	2.262	3.367	Reject at 95%
Autoregressive Distributed Lag Estimates						
ARDL(1,0,0,0,0) selected based on Akaike Information Criterion						
Diagnostic Tests						
Test Statistics	LM Version			F Version		
Serial Correlation	CHSQ (1) = .12368 [.725]			F(1, 28)= .096525 [.758]		
Functional Form	CHSQ (1) = .018393 [.892]			F(1, 28)= .014313 [.906]		
Normality	CHSQ (2) = .70360 [.703]			Not applicable		
Heteroscedasticity	CHSQ (1) = 1.6593 [.198]			F(1, 34)= 1.6429 [.209]		
Variable	Long-run Coefficients		Variable	Long-run Coefficients		
MPR	2.2947	[.000]***	D(MPR)	1.3210	[.000]***	
Bsize	.91519	[.001]***	D(Bsize)	.52688	[.000]***	
MPR*Bsize	-.087808	[.004]***	D(MPR*Bsize)	-.050551	[.002]***	
BVOL	-.30658	[.628]	D(BVOL)	-.17650	[.614]	
GDP	.12853	[.205]	D(GDP)	.073997	[.214]	

C	-9.5183	[.008]**	D(C)	-5.4797	[.003]***
			ECM(-1)	-.59963	[.000]***

***,**, * indicate significance at 1%, 5% and 10% respectively. MPR is central bank policy rate and proxy for monetary policy; BSIZE is private credit to GDP ratio and proxy for financial development; BVOL is interest rate volatility; GDP is real GDP growth; MPR*BSIZE is the interaction term for monetary policy and financial development; ECM is error correction term. The model was subjected to the following diagnostic tests: the Breusch-Godfrey test for serial correlation, the Ramsey's RESET test for functional form, the Jacque-Bera test for normality and the White test for heteroscedasticity. The diagnostic tests suggest that the above model has no significant autocorrelation, the functional form is appropriate, the errors are normally distributed and the disturbances are homoscedastic.

Inferring from the formula for the mean adjustment lag, however, seems to indicate that lending rates may actually pre-empt policy moves in Nigeria and thus adjust ahead of policy changes, resulting in the over-shooting even in the short-run.

2.5 Conclusion and Policy Implications

The study sought to test the hypothesis that effective monetary policy transmission via bank lending rates is a function of the level of financial development in an economy. Three countries, Gambia, Ghana and Nigeria, within the West African Monetary Union, for which data was available, were studied. Of the three countries studied, Nigeria exhibited the highest pass-through, followed by Gambia and then Ghana. In the long-run, the depth of the financial sector, as per evidence from the study, is somewhat important in explaining the transmission of interest rates in the three countries, having exhibited differences in significance and mathematical signs. Interestingly though, market characteristics like volatility and growth were not quite as important, as far as the transmission mechanism was concerned. All three countries exhibited a co-integrated relationship in the behaviour of lending rate. The long-run and the short-run results from the error-correction modelling, using the ARDL, revealed significant divergences in the pass-through responses of the three countries. Given that policy is considered effective when it is capable of influencing a predetermined target in the manner and intensity intended, the imperfect mapping of lending rates to policy rates is a clear indication of ineffective monetary policy transmission to retail rates in the countries studied.

In terms of policy implications, the significant divergences among the three countries obviously call into question the ascension on to a single monetary framework by these economies. Following from De Bondt's (2000) assertion that the viability of a single monetary framework depends in part on the member states' responsiveness to monetary policy, these disparities point to a lack of readiness on the part of the economies to merge their monetary frameworks. There

is a need to re-evaluate the parameters and seek ways to address the underlying differences in these member states.

Secondly, the evidence of incomplete pass-through for Gambia and Ghana brings to the fore issues of monetary policy effectiveness. In essence, the inability of policy moves to transmit into costs of capital for these countries implies that the durable sectors that are dependent on bank financing cannot be manipulated via central policy moves. Put simply, there is the need to begin exploring alternative monetary policy regimes that have the capacity to influence the cost of capital and investment incentives of economic agents and ultimately economic growth. The overshooting, on the other hand, that characterizes the Nigerian case also implies that in periods of rising interest rates, costs of capital via lending rates will lead to a magnified reduction in investments in the durable sector and ultimately shrink growth. On the one hand, periods of falling interest rates, assuming lending rates are not sticky downwards, will create ease of access to capital. This, however, brings with it the added risk of qualifying non-creditworthy firms due to an increase in collateral valuations. This situation, in the event of an adverse shock to the economy that triggers defaults, will ultimately predispose the banking sector to a financial crisis and negatively affect the economy.

In the peculiar case of Ghana that is on an inflation-targeting regime of monetary policy, the lack of responsiveness of bank lending rates to changes in the policy rate threatens the sustainability of the policy regime. This is because a policy rate that is unable to induce changes in interest rates so as to alter the effective cost of capital and the wealth of households and enterprises is, in essence, unable to effect adjustments in consumption and investments and ultimately aggregate demand and prices. It therefore calls for further probing into the efficacy of the prevailing structural requirements that are expected to facilitate a policy regime like inflation targeting and thus improve its efficacy. With regard to the effectiveness of pass-through in the presence of financial development, it appears the findings of the study must be interpreted with caution given the conflicting signs that characterised the results, and especially so because some of the results pointed to negative pass-through implications of financial development. One insight, though, is a perspective by Gigineishvili (2011) which indicates that an underdeveloped, uncompetitive and inefficient financial market is actually an impediment to the pass-through mechanism. This may be the case in Anglophone West Africa. In light of the findings, there is no need to compromise on the quest to develop the financial sectors of the West African region,

but rather to take steps to improve the competition and efficiency of these markets so that they serve the function of facilitating pass-through and ultimately economic growth.

CHAPTER THREE

MONETARY POLICY AND EXCHANGE MARKET PRESSURE - EVIDENCE FROM SUB-SAHARAN AFRICA

3.1 Introduction

In the wake of the globalization euphoria, the foreign exchange market has taken on a very important role in the growth quest of many countries around the globe. Countries have had to seriously manage their domestic currencies in relation to major trading currencies to attain and sustain steady rates of long-term economic growth. This renewed attention is premised on the argument that an appreciation or depreciation of domestic currencies plays a key role in influencing a country's trade balance (Stucka, 2004; Aziz, 2008) and ultimately its growth (McPherson and Rakovski, 2000).

In light of this argument, countries have, over the decades, either sought to stimulate an appreciation or depreciation in their domestic currencies in order to achieve some developmental target. From conventional economic theory, currency depreciation makes a country's exports cheaper relative to foreign imports and is expected to promote economic growth by directing the flow of capital into the domestic economy. This growth effect, however, is dependent on the country having a positive net export position or, as Guitian (1976) and Dornbusch (1988) illustrate, on the ability of the country to switch demand in the proper direction and magnitude.

Other theoretical arguments (see Cooper, 1971; Krugman and Taylor, 1978; and Barbone and Rivera-Batiz, 1987) are, however, of the view that currency depreciation is more of a contractionary, as opposed to being an expansionary move. From their perspective, consistent currency depreciations may not necessarily lead to growth. It can, instead, lead to a currency crisis when the exchange rate setup is poorly managed. A typical currency crisis results in loss of trust in the ability of a country's currency to act as a store of value. This directs the flow of capital away from the domestic economy and negatively affects the currency. Excessive pressures in the exchange market, according to Garcia and Malet (2007), can therefore be disastrous for a country's growth agenda.

Given the seemingly important role of a country's currency to its growth objectives, a number of studies have sought to unravel the determinants of exchange market pressure and ultimately

currency crisis. The motives have been for appropriate policy formulation. Parlaktuna (2005) in a Turkish study spanning 1993 and 2004 reports that domestic credit is an important factor in explaining the occurrence of exchange market pressure (EMP). Ucer *et al.*, (1998) employed the signals approach, also for Turkish data for the period from 1986 to 1999, and found that short-term foreign debt and weak exports, relative to imports, increased the economy's EMP and ultimate vulnerability to currency crises. Studies by Girton and Roper (1977) and Connolly and da Silveira (1979) on Canada and Brazil respectively suggest that growth in real GDP has an appreciative effect on local currencies. Studying EU member states, Van Poeck *et al.*, (2007) found current account deficits and growth in domestic credit to be consistently significant in explaining EMP. Hegerty (2010) later confirmed part of Van Poeck *et al.*'s (2007) conclusions by also reporting that a deterioration in current account deficits worsens the EMP. Kibritcioglu *et al.*, (1998) employed the leading indicators approach for the period from 1986 to 1998 for Turkey and identified terms of trade as a leading indicator of a currency crisis. Tanner (2001) in a cross-country study reported that contractionary monetary policy helps to alleviate currency pressure. Gochoco-Bautista and Bautista (2005), however, are of the view that contractionary monetary policy only alleviates currency pressure during tranquil periods, but during crisis periods the effect is in the opposite direction. This suggests that contractionary monetary policy deepens exchange market pressure when there is a prevailing currency crisis.

In general, the empirical results from these studies seem to point in the direction of macroeconomic fundamentals as determinants of EMP. The empirics also strengthen Jayaraman and Chee-Keong's (2008) argument that, for developing countries, the determinants of EMP are macroeconomic in nature. This argument notwithstanding, the studies on the determinants of EMP are far and few between and where available are mostly skewed in the direction of developed economies, making generalizations difficult. Furthermore, the available literature on exchange market pressure (EMP) also offers no common ground with regard to sample selection, methodology and variable choices. As a result, the findings vary along with the different approaches in the literature. According to Feridun (2009), the heterogeneity of crises in each country also makes the results of available studies unreliable for drawing specific conclusions regarding the crises in other countries.

Probing the literature on exchange market pressure further reveals a dearth of literature to aid policy design for Sub-Saharan Africa. This dearth in the literature is especially intriguing, as most of the countries in Sub-Saharan Africa, in their quest to achieve and maintain sustainable levels

of economic performance have often alternated between the use of monetary or fiscal policy variables. For this region, a question that has not been adequately addressed is whether the monetary policy tools employed in the quest for growth and development have had the posited effect on the target macroeconomic variables. Another question is whether these macro variables exert some feedback that affects the conduct of policy.

This study is one such attempt to provide some empirical answers and help fill the gap for Sub-Saharan Africa. The main objective of the study is to explore the monetary policy transmission mechanism in some selected countries in SSA from the perspective of the foreign exchange market. The study mainly seeks to test the hypothesis that a contractionary (expansionary) monetary policy strengthens (weakens) a currency. The secondary objective is to identify which macroeconomic fundamentals help to explain exchange market pressure in SSA.

3.2 Literature Review

3.2.1 The Monetary Policy Transmission Mechanisms

This section provides a brief review of the literature on monetary policy transmission mechanisms in emerging economies and the determinants of exchange market pressure. Monetary policy is generally defined as the measures and the set of procedures used by monetary authorities to manage the supply of money, interest rates and exchange rates and to influence credit conditions to achieve certain economic objectives. This area has witnessed significant research interest in the past few decades. This interest, which is mainly focused on unravelling the transmission mechanism of monetary policy, is, according to Meier and Muller (2005), due to the fact that better insights into the nature of the transmission mechanism have obvious benefits for policy-making. The literature in general seems to posit numerous mechanisms by which monetary policy impacts an economy. The most traditionally acclaimed routes, however, are the interest rate channel, the credit channel, the asset price channel and the exchange rate channel (Mishkin 1996).

3.2.2 Monetary Policy Transmission in Emerging Market Economies (EMEs)

As per the literature, three distinct features of emerging economies make the monetary transmission mechanism in such markets worth investigating. The first of such features is the absence of a developed bond market which, according to Moreno (2008), makes transmission of changes in the short-term policy rate to other points on the yield curve weak. The second feature

has to do with banking systems that are generally characterized by low levels of competition, public ownership and high cost of information processing. These characteristics coupled with ‘the small size of the sector’, according to Bhattacharya *et al.*, (2011) result in a small impact on aggregate demand even if lending rates change in response to a policy move. The third feature peculiar of emerging markets is a large informal finance sector. As a direct result of this feature, a rise in central bank policy rate does not transmit well to the economy, because the shocks do not directly affect informal finance, and also a proportion of borrowers alternate between formal and informal finance.

The features highlighted above have inspired various studies with regard to monetary policy in emerging economies. While some explored the operation of the traditional Keynesian interest rate channel of the monetary policy transmission in a cross-section of developing country contexts (Mukherjee and Bhattacharya, 2011), others, such as Mangani (2011), for example, explored the presence of the various conventional channels of monetary policy in a single developing country context, Malawi. The empirical results of Mukherjee and Bhattacharya, (2011) suggest that private consumption and investment in the region are sensitive to movements in real interest rates. Mangani (2011) found, for Malawi, that there was a lack of unequivocal evidence in support of any of the conventional channels of the monetary policy transmission mechanism, except for the exchange rate channel, which proved the most important. Another recent study by Kovanen (2011) on Ghana also documents the interest rate pass-through as being incomplete.

From their findings, the general theme seems to be that monetary policy transmission via conventional routes such as bond markets and banking systems is weak in EMEs (Mishra *et al.*, 2011). This, they believe, flows from the fact that trade liberalization has run ahead of financial liberalization in most emerging economies, thereby providing a much more responsive route for monetary transmission via the exchange market.

3.2.3 The Exchange Rate Channel of Monetary Transmission

According to Frenkel and Taylor (2006), an appropriate level of the real exchange rate can be a key element in the quest for growth, employment creation and overall development of the ‘real’ economy. This presupposes that knowing how to control the real exchange rate will have very important implications for growth and employment. It is for this reason that several studies have

sought to unravel the exchange rate pass-through of monetary policy, also a key element of macroeconomic policy. According to this school of thought, a contractionary monetary policy stance stimulates appreciation of the domestic currency relative to foreign trading counterparts thus making imports cheaper, switching demand away from domestically produced goods and services and causing domestic price levels to drop.

As put forward by Adolfson (2001), in an open economy, inflation is greatly influenced by how its determinants adjust to exchange rate movements. Mishkin (2007) also argues that when the real price of imports fall along with domestic prices, monetary policy effects to the economy can be captured as operating through the exchange rate effects on net exports.

From the literature (see Zorzi *et al.*, 2007; Raveena and Natalucci, 2008), it seems the exchange rate pass-through provides the most viable route for the transmission of monetary policy as regards small, open or emerging economies. The importance of the exchange rate channel as the most effective route for monetary policy transmission is predicated on the ineffectiveness of the interest rate channel, which requires a well-developed financial sector to operate, a feature that is usually non-existent in developing or emerging economies. In light of this, evidence on the extent of the exchange rate pass-through is quite influential in the design of monetary policy (Monacelli, 2005; Smets and Wouters, 2002; Adolfson, 2001; Devereux, 2001). This is because an incomplete exchange rate pass-through for imports and domestic prices, according to Smets and Wouters (2002), reduces the effectiveness of monetary policy via the exchange rate channel.

3.2.4 Determinants of Exchange Market Pressure

The literature on the determinants of exchange market pressure is scanty, as previous studies on the exchange market have mostly employed changes in the nominal or real exchange rate to proxy currency pressure. Given that EMP is an improved proxy for pressure on the exchange market, its determinants are not fundamentally different from the determinants of nominal or real exchange rates. For the purposes of this study, the following determinants are reviewed: the monetary policy rate; output growth; private capital flows; current account balance; terms of trade; and public debt.

Monetary policy rate: The central bank policy rate, a *de facto* indicator of a country's policy stance (see Tanner, 2001; Kamaly and Erbil, 2000; Gochoco- Bautista and Bautista, 2005), is mostly employed as the proxy for monetary policy in studies on EMP. Increases in interest rates,

relative to trading partners, make investment in the higher interest rate economy more attractive and directs the flow of capital into the economy. This inflow results in the excess supply of foreign reserves thereby reducing exchange market pressure. This suggests that a contractionary monetary policy stance (high interest rates) results in a reduction in EMP. Godfajn and Baig (1998), Tanner (2001) and Gochoco-Bautista and Baustista (2005) are among the studies that have sought to test this relationship empirically. They all find evidence to support the posited inverse relationship between the monetary policy rate and EMP.

An alternate view, however, holds that increases in domestic interest rates may actually have a perverse effect, thereby resulting in currency depreciation (Garcia and Malet, 2007). This view argues that an increase in the monetary policy rate will trigger a rise in cost of capital, ultimately reducing output growth. The fall in returns to investment and domestic output reduces demand for the domestic currency and causes the currency to depreciate. This argument is further buttressed by the notion that an increase in interest rates can also cause panic about expected and actual bankruptcies among investors who may view the monetary policy stance as an indication of the monetary authorities' devaluation expectations. These arguments make for an ambiguous impact of the monetary policy stance on EMP.

Output growth: According to conventional economic theory, GDP growth promotes currency appreciation, all things being equal. As per the intuition, lower GDP growth generally implies smaller demand for money (due to drop in demand), leading to expectations of currency devaluation, and ultimately mounting pressure on the domestic currency. This suggests that a country with strong economic growth will attract investment capital (for domestic assets) seeking to earn higher returns. This capital inflow leads to higher demand for the domestic currency relative to foreign currency and generates appreciation pressure (Balassa, 1964)¹. Conversely, nations with weak growth rates are likely to experience capital flight and weaker currencies, as a result of demand for foreign denominated assets earning relatively higher returns. A number of studies have included real GDP growth in studying EMP. Connolly and da Silveira (1977) studied Brazil over a sample period of 1955 to 1975 and reported that GDP has a negative and significant effect on the EMP. Hegerty (2010) also reports for Latin America, that output growth eases EMP. Based on the available empirical literature, the conventional theory that growing economies will experience appreciating currencies is supported.

¹ Balassa (1964) argues that richer countries experience appreciating currencies.

Private capital flows: Flowing from the argument above linking capital flows to EMP, private foreign capital flows are also included as an explanatory variable. The investment of private capital inflows into infrastructural developments results in increased productivity and aggregate demand. This translates into increased demand for the domestic currency and ultimately, currency appreciation. On the other hand, where the capital inflows end up in the consumption basket, it only serves to increase the relative price of domestic goods, increases the demand for imported goods and spurs depreciation pressure (Combes *et al.*, 2010). A number of other studies have provided further distinctions to this argument by documenting that the impact of private capital flows on the currency position and related adjustments depends on whether the flows are pro-cyclical or counter-cyclical. According to Lueth and Ruiz-Arranz (2007) and Chami *et al.*, (2008), counter-cyclical flows of private capital only serve as buffers to the economy and, therefore, have no influence on the exchange rate setup. They proceeded to indicate that pro-cyclical flows have a tendency to overheat the economy and cause currencies to appreciate.

Despite the seemingly well-defined route through which private capital flows may affect the currency management setup of any economy, the empirical evidence is still ambiguous. Lartey (2007), for example, reports that aggregate capital flows are inconsequential in influencing the exchange rate setup, using data on economies from Sub-Saharan Africa. In an earlier study on six Central American Economies, Rajan and Subramanian (2005) also reported that aggregate capital flows are insignificant in explaining the exchange market pressure of an economy (see also Izquierdo and Montiel, 2006). Saborowski (2009), on the other hand, contradicts these findings with results that suggest that private capital inflows to developing countries are significant in explaining appreciation in the domestic currency. These arguments make for an ambiguous role for private capital flows.

Current account balance: According to Rosenberg (1996), trade flows drive currency demand. A positive or surplus trade balance on the current account implies an increase in the demand for the domestic currency relative to the foreign currency. This increases foreign reserves and reduces pressure in the foreign exchange market². Most empirical studies on EMP suggest an inverse relationship between the current account balance and EMP (see Hegerty, 2010; Khan,

² Put differently, a rise in the current account to GDP ratio is generally associated with large external capital inflows that are intermediated by the domestic financial system and could facilitate asset prices and credit booms and thereby increase the probability of a currency appreciation via improved output and investment return (Berg & Pattillo, 1999)

2010). Karfakis and Moschos (1999) find that the current account balance has a negative impact on the foreign exchange market pressure. Hegerty (2010) also finds that the current account balance exerts the most significant influence on EMP as predicted by theory (see also Van Poeck *et al.*, 2007). Khan (2010) strengthens this position by also reporting that the current account balance is significant not only in explaining the current level of EMP but also that of two subsequent future periods. Licchetta (2009) also provides evidence on the role of external balance sheet variables in determinants of currency crises in emerging markets and advanced economies. He additionally found that the likelihood of a crisis is increased with a larger current account deficit.

Terms of trade: According to Bagchi *et al.*, (2004) and Bergvall (2004), a general increase in terms of trade (TOT), results in more imports being exchanged for one unit of exports. *Ceteris paribus*, this leads to an appreciation of a local currency. Terms of trade also capture the elasticities of foreign demand for domestic goods and domestic demand for foreign goods. A significant deterioration in the terms of trade, either from declining export values or increasing import values, is likely to precipitate a depreciation of the local currency. This can either directly stimulate export demand or indirectly switch domestic demand to domestic products so as to minimise pressure on the domestic currency. This suggests that the appreciation in the domestic currency is driven by the increase in demand for the domestic currency due to the rising price of the country's exports. Conversely, deteriorating terms of trade imply a need for more foreign currency to fill the gap between export revenue and import expense. Based on the views above, terms of trade is expected to alleviate exchange market pressure.

Public debt: According to the Ricardian equivalence principle, increases in the levels of debt have the same implications as government financing via tax increases. It only causes rational economic agents to increase savings today in order to maintain equivalence in the future. This neutralizes the effects of government deficit financing via debt. Opponents to this theorem, however, indicate that accumulation of public debt could undermine investor confidence and, therefore, lead to capital flight resulting in depreciation pressure on the domestic currency (Mandilaras and Bird; 2008). Another argument is that the use to which the accumulated debt is put is the key to its effect on the foreign exchange market pressure. Public debt is employed in models of EMP to capture fiscal effects. Mandilaras and Bird (2008) in a study on Latin America find evidence to support their argument that rising debt levels increase EMP. In general, it seems that the impact of debt on EMP flows more from the reduction in investor confidence due to

perceived unsustainability of the public debt levels and an increase in vulnerability to shocks such as reversals in capital inflows (Eichengreen and Arteta, 2000). The foregoing thus implies that levels of public debt can operate in both the positive and negative dimensions with regard to EMP.

3.3 Methodology and Data

This section details the sample, data sources and model for the study. It also discusses the conceptual framework on which the econometric model is built.

3.3.1 Sample and Source of Data

The study uses annual data on 20 Sub-Saharan African countries³ over a 20-year period from 1991 to 2010 (see Appendix B for data sources and variable measurement). The countries used in the sample are based on the Sub-Saharan emerging economies identification, carried out by Kehl (2007) and Radelet (2010). These analyses employed macro political and macroeconomic indicators in identifying emerging and upcoming emerging (threshold/frontier) economies. Performance above the international average on a significant portion of the elements for the past decade or more was used as the selection criteria. The following parameters, culled from the Africa Foreign Investment Survey 2003 by the United Nations Industrial Development Organization (UNIDO), were the metrics for the classification by Kehl (2007) -: political stability; economic stability; local market access; transparency; legal framework; skilled labour availability infrastructure and government agency support. Radelet (2010) used policy changes, the rise of democracy and economic performance as the selection criteria. Merging the output of the two studies produced a set of emerging and upcoming emerging/frontier economies. Availability of data, however, reduced the sample to 20 countries.

The data for the study were captured from the *International Financial Statistics* and are annual data series. The data series include central bank policy/discount rate (as proxy for monetary policy), international reserves, the domestic currency to US Dollar exchange rate, the real GDP growth, the current account balance (as a percentage of GDP), the terms of trade (captured as the price of exports to imports), private capital flows and public debt.

³ Benin; Botswana; Burkina Faso; Cape Verde; Gabon; Gambia; Ghana.; Lesotho; Madagascar; Mali; Mauritius; Mozambique; Rwanda; Senegal; Seychelles; South Africa; Swaziland; Tanzania; Uganda and Zambia.

3.3.2 Model Motivation

Exchange rate management regimes fall into two broad categories, fixed or freely floating with a third being a hybrid of the two and generally referred to as a managed float. Under the floating regime, disequilibria within the money market of an open economy is usually offset via an adjustment in the exchange rate of that currency, while under a fixed regime the adjustment is via foreign reserves. The managed float entails either an adjustment of the exchange rate, a change in foreign reserves or a combination of the two, a phenomenon generally captured as exchange market pressure (henceforth EMP). According to Girton and Roper (1977), EMP can be defined as the sum of exchange rate depreciation and change in foreign reserves that is required to restore equilibrium to the domestic foreign exchange market. Large, an increasing or positive EMP is generally defined as depreciation pressure whilst small, decreasing or negative values indicate pressure for the domestic currency to appreciate.

Given that EMP is a composite measure of adjustments to restore equilibrium to the money market, macroeconomic characteristics that exert influences on the equilibrium of the exchange rate market can be expected to also influence exchange market pressure. On the basis of Jayaraman and Chee-Keong's (2008) conclusion that EMP is fuelled by macroeconomic fundamentals and on the basis of the EMP literature (see Kibritcioglu *et al.*, 1998; Tanner, 2001; Gochoco-Bautista and Bautista, 2005 Van Poeck *et al.*, 2007; and others) EMP, in this study, is modelled as being a function of the central bank policy rate, the rate of real GDP growth, the current account balance, the level of private capital flows, the level of public debt and the terms of trade. This is on the assumption that, *ceteris paribus*, changes in these macroeconomic variables will influence the demand and supply of domestic currencies and thus affect the pressure that is exerted on a country's currency relative to major trading currencies. The general model for the study is therefore stated as:

$$EMP_{it} = \beta_0 + \beta_1 MPR_{it} + \beta_2 RGDP_{it} + \beta_3 CABA_{it} + \beta_4 PKFL_{it} + \beta_5 PD_{it} + \beta_6 TOT_{it} + \varepsilon_{it} \dots\dots\dots (1)$$

Where EMP_{it} is the measure of the exchange market pressure on a currency. It is captured as the sum of the percentage change in the domestic price of the US Dollar (it is the currency most countries trade in) and the changes in international reserves. In terms of interpretation, the general tendency is to infer depreciation pressure when the EMP value is positive (increasing), and to infer an appreciation pressure when the value is negative (decreasing). MPR_{it} is the central

bank policy rate, a de factor measure of the monetary policy stance. $RGDP_{it}$ is the annual rate of growth of GDP. $CABA_{it}$ is the current account balance as a percentage of GDP . $PKFL_{it}$ is private capital inflows as a percentage of GDP. PD_{it} is the stock of public debt as a percentage of the GDP. TOT_{it} is the terms of trade, proxied by the ratio of exports to imports. ϵ_{it} is the error term, with i and t representing country i in time t .

3.3.4 Estimation Methodology

Panel data regressions were used to test the relationship between exchange market pressure, the central bank monetary policy rate, the current account balance, output growth, terms of trade, private capital flows and debt. The use of panel data regressions allow for the control of omitted variable bias that may result from the exclusion of unobservable variables. The increase in number of observations, as a result of the panel data technique, also provides more information and hence precision while allowing for the analysis of economic questions that cannot be addressed using time series or cross-sectional data (Hsiao, 2003).

The dependent variable for the study is based on the EMP index of Girton and Roper (1977) for capturing exchange market dynamics. The exchange market pressure index is modelled as a function of the macroeconomic fundamentals. Given the possibility of persistence flowing into the determination of EMP, dynamic panel data estimation is used, where the lag of the dependent variable is also included as an explanatory variable. The system is estimated as:

$$EMP_{it} = \beta_0 + \beta_1 EMP_{it-1} + \beta_2 MPR_{it} + \beta_3 GDP_{it} + \beta_4 PD_{it} + \beta_5 PKFL_{it} + \beta_6 TOT_{it} + \beta_7 CABA_{it} + \epsilon_{it}$$

(2)

where EMP_{it-1} is the lag of the dependent variable along with the policy rate, real GDP growth, debt, private capital flows, the terms of trade and the current account balance.

The Arellano and Bond (1991) approach to dynamic panel estimation, using the difference Generalised Method of Moments (GMM), is used. This is on account of the fact that the right-hand variables cannot be said to be strictly exogenous, coupled with the possibility of unobserved heterogeneity. Another reason is that the panel is unbalanced and the sample selection is not random.

3.4 Results and Discussions

This section presents the discussion of study findings. The first section presents the correlation matrix between the variables under study and the second section presents the regression output for the various equations.

3.4.1 Correlation Analysis

In testing for the possible presence of multicollinearity in the regressors, a correlation matrix was constructed. From Table 3.1, real GDP growth, private capital flows, and the monetary policy rate are positively correlated with EMP. On the other hand, levels of public debt, the terms of trade and the current account balance are negatively correlated with EMP. None of these, except the terms of trade variable, is significant at 10%. The monetary policy rate is significantly negatively related to terms of trade and the current account balance, but positively and significantly related to debt levels. Private capital flows and output growth are negatively correlated with the monetary policy rate, but the relationships are not statistically significant. Private capital flow(s) is significantly and negatively correlated to terms of trade and the current account balance, but positively significant to public debt levels, though its relationship with output growth is insignificant.

Table 3.1: Correlation matrix of study variables

	EMP	MPR	PKFL	TOT	DEBT	GDP	CABA
EMP	1.0000						
MPR	0.0634	1.0000					
PKFL	0.0414	-0.0336	1.0000				
TOT	-0.0833*	-0.1422**	-0.1408**	1.0000			
DEBT	-0.0316	0.4668***	0.1398**	-0.2414***	1.0000		
GDP	0.0414	-0.0415	0.0490	-0.1206**	-0.1251**	1.0000	
CABA	-0.0500	-0.1377**	-0.4344***	0.6508***	-0.3291***	-0.0900*	1.0000

***, **, * = significance at 1%, 5% and 10% respectively. EMP is exchange market pressure; MPR is monetary policy rate; PKFL is private capital flow; TOT is terms of trade; DEBT is stock of public debt; GDP is real GDP growth; CABA is current account balance.

Terms of trade is negatively and significantly correlated with both debt levels and real GDP growth, but significantly positively related to the current account balance. Public debt is in turn negatively and significantly correlated with output growth and the current account balance, while output growth is significantly negatively correlated to the current account balance. Given the high and significant correlation between the terms of trade and the current account balance, these were alternated in the regression estimations so as to avoid multicollinearity.

3.4.2 Regression Results

The regression results are presented in Table 3.2. Due to the relatively high correlation between the current account balance (CABA) and terms of trade (TOT), they are alternated in the regressions (regression #1 and #2). As such the two do not feature simultaneously in each regression. From the table, the lag of the dependent variable, $EMP(-1)$, returns a negative and significant coefficient. This indicates that past (higher) levels of EMP reduce current EMP and suggests the absence of EMP persistence. It could be an indication that high periods of EMP are usually expected to taper out and therefore end up doing so. The central bank policy rate, MPR, has a significant and negative impact on EMP, which is consistent with Tanner (2001) and Kamaly and Erbil (2002). It also confirms the position of the conventional argument, that there is an appreciative effect when domestic interest rates are increased. This implies, that a contractionary monetary policy stance that translates into higher interest rates has a tendency to ease depreciation pressure on the domestic currency. Given that the countries under study are yet to experience currency crises, the findings of Gochoco-Bautista and Bautista (2005) may prove more relevant to the SSA situation. In light of this, the study findings can only be expected to hold during tranquil periods but not in crisis periods.

The stock of public debt has a significant and negative effect on EMP. This indicates that rising levels of public debt is characterised by lowering levels of exchange market pressure. This contradicts the generally accepted notion which supports a depreciation effect for high levels of debt due to perceived unsustainability (see Eichengreen and Arteta, 2000). The appreciating effect seems to indicate that accumulated debt finds its way into the production function of the sample countries to stimulate output growth. This then translates into high demand for the local currency (as a result of a high demand for goods and investments from the domestic economy).

Output growth, captured as real GDP growth, shows a significant and positive relationship with exchange market pressure. This indicates that increasing real GDP is associated with

depreciating domestic currencies, which is contrary to the general theoretical and empirical literature which posits an appreciation effect (see Balassa, 1964; Samuelson, 1964; Hegerty, 2010). This is similar to the findings of Gunsel *et al.*, (2010) from a panel of Latin American and Asian Economies. The results suggest that currency depreciation in the face of increasing GDP is usually underpinned by excessive local demand for foreign goods. This creates an excess demand for foreign currency over and above the domestic currency and triggers depreciation. Alternatively, the finding is also supported by the inflation-induced depreciation argument. According to this intuition, increases in aggregate spending and the resulting increases in GDP, when not matched by the productive capacity of the economy in the tradable sector, will result in inflation and a subsequent depreciation in the currency (see also Combes *et al.*, 2011).

Table 3.2: Regression output including South Africa

Variable	Regression #1		Regression #2	
EMP(-1)	-0.0314146	(0.000)***	-0.0300204	(0.000)***
MPR	-5.936033	(0.000)***	-6.035031	(0.005)**
PKFL	-7.185381	(0.160)	-7.807155	(0.272)
DEBT	-1.967312	(0.000)***	-2.044135	(0.000)***
GDP	6.166616	(0.008)**	5.68232	(0.035)**
TOT		-	-254.6899	(0.007)**
CABA	-4.7200282	(0.006)**		-
Wald Chi², Prob.	1484.17	(0.0000)***	1365.86	(0.0000)***
Arellano-Bond Test for Autocorrelation	Order 1	-1.3107 (0.1900)	-1.31153 (0.1898)	
	Order 2	-0.34128 (0.7329)	-0.39653 (0.6917)	
Sargan's Test	14.76282	(1.0000)	14.38127	(1.0000)

***, ** and * denotes significance at 1%, 5% and 10% respectively. Values in parenthesis are the p-values. The following diagnostic tests are run for the model: the Sargan test for over identification, the Arellano-Bond test for autocorrelation and the Wald Chi² for model fit. The results indicate that the over identifying restrictions are valid, there is no first order or second order autocorrelation and the model fits the data well.

The coefficient of terms of trade (TOT), as expected, has a significant and negative effect on EMP. This implies that as terms of trade improves (export earnings flow in in excess of import expenses), the supply of foreign currency exceeds that of the local currency, creating appreciation

pressure on the domestic currency. This is consistent with the findings of Combes *et al.*, (2011), who document that the possibility of currency crises is heightened when terms of trade deteriorates. Kaminsky *et al.*, (1998) have also reported that an economy's terms of trade is a leading indicator of currency crises.

The second regression, which included the current account balance, (CABA), and therefore excluded TOT for issues of multicollinearity, returned similar findings for the lag of EMP, the policy rate, the stock of public debt and the GDP. The additional finding from the alternate regression flows from the current account balance which shows the theoretically posited sign and significance. It can be explained that increases in the current account balance contribute to a reduction in exchange market pressure on the domestic currency. This finding supports the finding of Eichengreen *et al.*, (1995), that improving current account positions have appreciating effects on the domestic currency. In general, it can be expected that as countries within SSA work to improve their current account positions, their domestic currencies will appreciate relative to foreign trading partners.

Private capital flows, (PKFL), as shown in Table 3.2, prove inconsequential with regard to EMP in both estimations. A possible explanation for the insignificance of private capital flows could be illegal capital flight or capital flight due to an unstable economy. With such capital flight, inflows of private capital only come in to offset the loss of capital, hence the neutrality. Another explanation is that capital flows that do not enhance productivity in the tradable sector have negligible effects on the foreign exchange market. On another hand, if private capital flows come in to stabilise economies from foreign exchange losses due to macroeconomic shocks then its effect is negligible. Another reason, following Lartey's (2007) argument, has to do with the individual effects of the components of private capital flows. Whilst the other components of private capital exert appreciation pressure, FDI which is the largest component of private capital flows in Africa, exerts a depreciation pressure, hence a neutral effect for PKFL. It could also be the case of "hot money", the incidence where there is an inflow of funds into the economy but on a temporary basis only, just to take advantage of favourable interest rates in the economy. The insignificant finding is in consonance with Lartey (2007), Izquierdo and Montiel (2006) and Rajan and Subramanian (2005), who document that aggregate private capital flows is not influential in explaining the exchange market pressure on a currency. Following the opinion of Lueth and Ruiz-Arranz (2007) and Chami *et al.*, (2008), it can also be said that private capital flows are insignificant because they are counter-cyclical and therefore only serve to neutralize

whatever currency pressures may be in existence within the economy. The finding, however, contradicts Saborowski (2009), who suggests that for developing countries, private capital inflows are significant in explaining appreciation in the domestic currency.

Sensitivity analysis and robustness checks

To test for the possibility of biases in the coefficient estimates, the models were subjected to robustness checks. The first test was to exclude South Africa (being the oldest and largest emerging economy in the sample) so as to rule out any form of domination by South Africa. From Table 3.2 and 3.3, there is no indication of significant differences from the previous regression that included South Africa in the sample. On the whole, the variables retained their signs and significance, giving no reason to infer any biases in the coefficient estimates as a result of including South Africa in the panel.

Further tests for sensitivity to specification also included the addition of lags of GDP to the main model (results in Appendix B). Upon the addition of one lag, both the current level and the lag of the GDP became insignificant but maintained their signs.

Private capital flows, however, became significant with the expected negative sign. This implies that an increase in private capital flows causes an appreciation in the domestic currency. This finding is in consonance with the findings of Hegerty (2010). In essence, it appears that when countries are able to direct the flow of foreign capital into the economy, the local currency will appreciate. Given that EMP captures changes in the exchange rate and international reserve positions, inflow of foreign capital ultimately translates into accumulated reserves, thus causing currency appreciation. It can thus be expected that countries that pursue policies to direct the flow of foreign private capital flows into the domestic economy are likely to experience currency appreciation.

Table 3.3: Regression output excluding South Africa

Variable	Regression #1		Regression #2	
EMP(-1)	-0.0315269	(0.000)***	-0.0305206	(0.000)***
MPR	-6.180829	(0.000)***	-7.232136	(0.001)**
PKFL	-6.786846	(0.177)	-3.537157	(0.487)

DEBT	-1.966323	(0.000)***	-1.941454	(0.000)***	
GDP	6.245621	(0.006)**	5.684366	(0.032)**	
TOT		-	-209.1492	(0.002)***	
CABA	-4.62803	(0.005)**		-	
Wald Chi², Prob.	1454.79	(0.0000)***	1324.97	(0.0000)***	
Arellano-Bond Test for Autocorrelation	Order 1	-1.3096	(0.1903)	-1.3074	(0.1911)
	Order 2	-.35955	(0.7192)	-.52336	(0.6007)
Sargan's Test		14.06068	(1.0000)	13.60909	(1.0000)

, **, * indicate significance at 10%, 5% and 1% respectively. The following diagnostic tests are run for the model: the Sargan test for over identification, the Arellano-Bond test for autocorrelation and the Wald Chi² for model fit. The results indicate that the over identifying restrictions are valid, there is no first order or second order autocorrelation and the model fits the data well.*

This finding notwithstanding, the implication must be taken with caution since it only emerges after the inclusion of the lag of GDP.

Tests for model suitability: All the regression models were subjected to the Arellano-Bond test for autocorrelation and the Sargan's test for over-identification respectively. The implausibly perfect scores for the Sargan's tests are not considered as indicative of mis-specifications given that Abiad, Oomes and Ueda (2010) report similar p-values. On the whole, since both tests failed to reject the null hypotheses, there is no reason to doubt the regression results generated.

3.5 Conclusion and Policy Implications

The study sought to test the hypothesis that contractionary monetary policy strengthens currency positions (by reducing EMP), while controlling for other known macroeconomic determinants of exchange market pressure. From the study, it emerged that the conventional argument of defending a currency via increasing interest rates holds for the study sample. A rise in interest rates is, therefore, more likely to trigger an appreciation of domestic currencies by redirecting foreign inflows into the economy. Despite this finding, the position of Feridun (2009) that fragile financial systems are prone to perverse reactions in the face of rising interest rates must not be ignored completely (within such economies).

Contrary to the literature, debt is associated with appreciation, while economic growth is associated with currency depreciation. Currency pressure, it seems, is also not persistent across the region, with periods of high pressure being followed by periods of low exchange market

pressure and vice-versa. Terms of trade and the current account balance are highly significant in explaining the currency pressure and have the posited appreciation effects. On the whole, it can be said that while monetary policy, along with other macroeconomic fundamentals are relevant in explaining currency positions, the effects of the fundamentals, for SSA, are not completely consistent with trends in the existing literature.

In terms of policy implications, it would appear that within the SSA region, attempts at addressing depreciation pressure on their domestic currencies can be achieved by increasing interest rates. However, since these economies need lower interest rates to stimulate appropriate levels of investment, this policy move must be implemented with caution. Improving the terms of trade position and the current account balance will also provide a way of defending speculative attacks on the domestic currency.

Another policy implication from the finding is with regard to the elasticity of domestic demand for foreign goods. Policy moves aimed at stimulating demand in the direction of domestically produced goods may hold the key to reversing the growth-currency depreciation cycle. This could include export promotion policies in general through government investment in the appropriate infrastructure. Also, support could be provided to target local industries to produce goods that can compete favourably on both the domestic and the international markets. An alternative, but more stringent approach may include the imposition of significant tariffs and controls with regard to imported goods, especially consumables that are produced domestically.

CHAPTER FOUR

MONETARY POLICY AND BANK RISK-TAKING BEHAVIOUR IN SUB-SAHARAN AFRICA - SOME EMPIRICAL EVIDENCE

4.1 Introduction

Economies in search of high and sustainable levels of economic growth have, over the years, been offered numerous prescriptions and possible solutions. One of such prescriptions, among many, is the stimulation of capital accumulation via institutional and policy mechanisms (endogenous growth theory: see Barro, 1990; Easterly and Rebelo, 1993 and others). According to this theory, capital accumulation in the durable sector, driven by favourable policy environments, has significantly positive influences on economic performance. In light of this proposition, the role of monetary policy, for example, in stimulating capital accumulation and ultimately economic growth has thus received significant research attention (Erceg and Levin, 2006; Amarasekara, 2008), with the general consensus being that a reduction in interest rates spurs economic growth by stimulating capital accumulation via reduced costs of capital.

The empirical literature, following the financial crises of 2007 – 2009 has, however, questioned the expansionary monetary policy-to-growth route. According to the literature, an expansionary monetary policy, albeit capable of stimulating investment, may do so at the cost of excessive risk-taking by financial intermediaries (see Borio and Zhu, 2008; Taylor, 2009; Agur and Demertzis, 2012). Borio and Zhu (2008) refer to this effect of monetary policy as the risk-taking channel of monetary policy. As per this school of thought, banks, in their search for yield in low interest rate settings, may take on higher yielding but riskier projects, ultimately pre-disposing them to instability. Supporting this school of thought are Adrian and Shin (2009), who argue that as a result of the wealth effect created by declining interest rates in an economy, previously riskier firms that were unable to provide adequate collateral values to back required loans may consequently be in a position to do so due to increases in their collateral (asset) values. According to them, such a situation has the potential of putting the financial system on the brink of instability in the event of negative shocks to these economic agents financed by the banking system.

In the Sub-Saharan Africa (SSA), there is a quest to attain and sustain high rates of economic growth. This quest for growth, according to Hernandez-Cata (2000), has created a need for significant capital accumulation. In view of this need for significant capital accumulation, the

delicate balance between expansionary monetary policy, growth and financial stability relationship raises very important policy and academic research questions. For instance, can SSA pursue expansionary monetary policy to spur growth without the risk of financial instability? And if SSA banks are prone to risk-taking when interest rates are low, is there another route to growth that circumvents this path? Are there any bank-level or macro-level elements that may worsen or mitigate this risk-taking behaviour? Risk-taking behaviour, for the purposes of this study is defined as risk-taking that compromises the solvency of the bank.

While the literature is growing in volume and depth for most of the developed world in response to some of these questions (see Jimenez *et al.*, 2008; Ioannidou *et al.*, 2009; Altunabas *et al.*, 2010; Maddaloni and Peydro, 2011), the same cannot be said for SSA. These questions are definitely pertinent for SSA as well, and probably more so because of the dominant role that banks play in the region's financial system. So while the region has yet to experience a financial crisis on the scale and magnitude experienced by the US, Europe, Asia and the Americas, it does not preclude SSA from a study of the phenomenon, that periods of loose monetary policy in the form of low interest rates can come with negative and undesirable effects like excessive bank risk-taking behaviour and financial instability. In view of the above arguments, this study seeks to test whether there is a risk-taking channel of monetary policy in Sub-Saharan Africa; how effective it is; and whether there are bank-level and macro-level dynamics that mitigate or magnify the impact of this channel. Indeed empirical answers to such questions hold relevant policy implications for central bank monetary policy formulation as well as for macro-prudential regulation.

In general, the study contributes to the literature in several ways: it seeks, first and foremost, to document the possible existence of a bank-risk-taking channel of monetary policy in SSA. It also seeks to empirically document possible determinants of risk-taking behaviour of banks in SSA. In these regards, it also provides prudential and supervisory authorities with relevant insights that will inform the level of vigilance that may be required within the financial system, at what times and with respect to which institutions or to which economic agents.

The rest of the chapter is organized as follows: the next section reviews the literature on bank risk-taking behaviour followed by the methodology in the next section. Sections four and five present the study findings and conclusion respectively.

4.2 Literature Review

4.2.1 The Risk-Taking Channel of Monetary Policy

In the search for answers to explain the 2007 global financial crises that originated from the US, a line of research has emerged that seems to suggest that there is a significant link between monetary policy of low rates of interest for extended periods of time and high risk-taking by financial intermediaries. This monetary policy effect was labelled the risk-taking channel of monetary policy transmission by Borio and Zhu (2008).

According to the proponents of this ‘newly found’ transmission mechanism, its operation can be delineated via three main routes. The first route is labelled the search for yield (see Rajan, 2005) and operates in this manner: in periods of low interest rates, banks face a reduction in margins between lending and deposit rates. This raises their incentives to switch to riskier projects with expected higher yields. In so doing, their risk positions deteriorate. In the same framework, banks may search for higher yields when the probability of defaulting on their existing long-term liabilities is exacerbated by low yielding risky portfolios due to periods of low interest rates.

The second route under the risk-taking channel of monetary policy operates through the expectations channel: expectations of default with regards to borrowers. According to Borio and Zhu (2008) and Adrian and Shin (2010), low interest rates have the potential of inducing banks to take on more risk because of favourable estimates of borrower default due to increasing asset and collateral values. Put simply, in periods of low interest rates, economic agents that hitherto were considered risky by virtue of inability to provide collateral now qualify for loans due to the appreciation in collateral values and the reduction in price volatility. According to Borio *et al.*, (2001) such reduction in risk perception also increases risk-tolerance and increases risky behaviour by banks.

The third route, like the second, also works through expectations, this time expectations of a continued decline in interest rates and of the level of economic activity. As per this line of thought, when financial intermediaries anticipate rate reductions, they adjust their portfolio of long-term assets towards riskier but higher yielding assets and especially so if they expect interest rates to be kept at low levels for an extended or prolonged period of time (Agur and Demertzis, 2010; Valencia, 2011).

In the wake of the 2007 financial crises, the link between monetary policy and bank risk-taking behaviour came up to the forefront of policy and academic discussions and so did the scantiness of the literature in that area. The dearth in literature was attributable to the fact that past studies on risk-taking by financial intermediaries had largely ignored the impact of monetary policy (Dell'Ariccia *et al.*, 2010) and the ample literature that had actually investigated the monetary policy effects on credit markets had also largely ignored the risk-taking channel. Where monetary policy had been incorporated, the focus had been on borrowers and quantity of credit (see Huang, 2003; Hülsewig *et al.*, 2006; Iacoviello and Minetti, 2008; Wu *et al.*, 2011), but not on lenders and on the quality of credit. So while the empirical studies were few, the arguments suggest that persistently low interest rates fuelled booms in asset prices and securitized credit and led to financial intermediaries taking on increased risk.

One of such studies, by Dell'Ariccia and Marquez (2006) finds the existence of a risk-taking channel in periods of easy monetary policy and in the presence of information asymmetrical. They report, that in an era of reduced cost of funding flowing from low interest rates, the incentive to screen borrowers, which is costly and negatively affects profit, is greatly reduced, leading banks to lend to riskier borrowers. This finding was also confirmed by Lown and Morgan (2006) with their focus on the US.

After the financial crises, Maddaloni and Peydró (2010) also found evidence of risky behaviour by banks during periods of low interest rates. They documented, for the Euro area, that credit standards tighten when monetary policy takes a contractionary stance and loosen when monetary policy is expansionary. Jiménez *et al.* (2008), using data on individual Spanish banks, found that in periods of low interest rates, new loans have riskier profiles because banks lend to economic agents with previous bad credit history. On the other hand, outstanding loans with variable rates experience an improvement in credit risk because of the reduced rates and of the favourable estimation of default probabilities.

Using Bolivian data, Ioannidou *et al.*'s (2015) findings seem to indicate that when interest rates are low, banks tend to reduce loan rates of risky borrowers, relative to their less risky counterparts. This ultimately results in a higher risk profile for the bank. Further supporting evidence on the existence of a risk-taking channel of monetary policy is provided by Altunabas *et al.*, (2010). According to their study findings, unusually low interest rates over an extended period of time contributed to an increase in risk-taking for a set of listed banks across industrialized countries.

This seems to suggest that when interest rates are low, but for short periods only, risk-taking behaviour among banks may not necessarily increase or become evident.

On the whole, the growing evidence seems to point to the existence of a risk-taking channel of monetary policy. Notwithstanding the fact that the empirical evidence on the risk-taking channel of monetary policy is growing in volume and in depth, the focus is mostly on developed markets with little focus on emerging economies and least of all on Sub-Saharan Africa.

4.2.2 Determinants of Bank Risk-Taking Behaviour

Several theoretical and empirical positions have, over the years, appeared in the literature to explain the risk-taking behaviour of banks. The generally accepted position is that bank risk-taking behaviour is a function of both micro and macro level variables (see Salas and Saurina, 2003; Gambacorta, 2009). On the micro-level, some of the determinants of bank risk behaviour identified include bank size, bank capital, bank profitability, lending growth and degree of securitization activity (Crouhy *et al.*, 2001; Maddaloni and Peydro, 2010). On the macro level, the visible determinants are documented as including macroeconomic performance (GDP), stock market returns, as well as the regulatory and competitive environments (Keeley, 1990; Boyd and De Nicolo, 2005; Berger *et al.*, 2009; Boyd *et al.*, 2009). For the purposes of this study, the empirical determinants to be discussed are: size, profitability, liquidity, capital and lending growth on the bank (micro) level and economic performance on the macro-level, on account of the twin factors of availability of sufficient supporting empirical evidence and availability of data for the anticipated study sample.

Bank Size

The theoretical effect of bank size on bank risk-taking behaviour is yet to reach a consensus. This is in spite of the fact that it is generally accepted as an important determinant of bank risk-taking behaviour. On one theoretical side is the 'too-big-to-fail' perspective. According to Demirguc-Kunt and Huizinga (2010), operating under the perception that they are too big to fail, large banks have usually been found to take on excessive risks and ultimately end up failing. The banks engage in excessive risk-taking on account of their perceived 'safety nets'. The safety nets may sometimes flow from government support, because they cannot be allowed to fail for fear of destabilising the economy. On the other side is the diversification group. As per their argument, larger banks, by virtue of the diversification effect, are inherently less risky. Put simply, it is believed larger banks are less risky because they have greater potential to diversify and therefore reduce risk-taking behaviour (see Hughes *et al.*, 2001; Laeven and Levine, 2006

and Altunabas *et al.*, 2010). Critics of the ‘diversification-reduced risk-taking’ school, however, believe that large banks actually do take advantage of their diversification benefits to engage in more risky behaviour (Keeley, 1990; Allen and Gale, 2000). Others, such as Scharfstein and Stein (2000) and Goetz (2011), also believe that the increase in risk-taking behaviour of diversified banks could flow from intensified agency problems linked to size.

On the empirical level, the research findings seem to mostly indicate that big banks do take on excessive risks, either operating along the ‘too-big-to-fail’ paradigm or taking advantage of their diversification benefits to engage in risky behaviour. A study by Demsetz and Strahan (1997) concludes that banks use their diversification benefits to increase risk-taking behaviour. Gonzales (2005) also supports the finding with evidence that large banks actually operate under the ‘too-big-to-fail’ mind-set and end up taking on more risk. Deelchand and Padgett (2009), using data on Japanese co-operative banks also document the same finding. Chen *et al.*, (2006) and Mehran and Rosenberg (2008) go a step further to disaggregate bank risk into systematic and asset specific risk. Their findings also show that while size does affect risk-taking, the effect is negative for asset-specific risk but positive for systematic risk. This finding seems to suggest that while risk-taking behaviour may be a function of diversification, the perceived risk in their profiles is more of systematic in nature than of an asset-specific nature (see an earlier study by Diamond, 1984).

Bank Liquidity

Drehmann and Nikolaou (2010) define bank liquidity as the relative ability of a bank to honour monetary obligations with immediacy and without undue stress. An improvement in a bank’s liquidity position, by inference, is therefore an indication of sufficient funds to honour matured liabilities and the ability to raise cash at short notice if needed (Borio, 2000). In terms of the theoretical link between bank balance sheet liquidity and risk-taking behaviour, one view holds that in periods of low interest rates excess liquidity proves costly for the bank (in view of liability commitments with higher yields, compensation clauses, etc.). This may cause the bank to go in search of higher yielding but riskier investments (Rajan, 2005) and cause deterioration in its risk profile. Repullo (2004) also develops a predictive model that indicates that when banks have access to liquidity, even off-balance sheet liquidity from the Central bank (lender of last resort), they are very likely to assume risk profiles beyond their internal liquidity means.

Ioannidou *et al.*, (2009), for instance, find that liquid banks take on more risk by virtue of their search for yield. Berger and Bouwman (2010) also confirm this finding with research that

concludes that a high occurrence of financial crises is usually preceded by high bank liquidity creation. This gives further support to the study finding by Acharya and Naqvi (2012) that when banks experience a liquidity influx, they expand lending with a disregard for downside risk, ultimately under-pricing the risks of projects and in the process making bad quality loans. Myers and Rajan (1998), with a contrary opinion, earlier argued that in times of low interest rates, banks are rather capable of refinancing existing assets at lower rates thereby decreasing default probabilities and reducing overall bank risk. From the foregoing, one cannot thus immediately conclude on the effects of liquidity on risk-taking behaviour. With regard to the empirical literature, though, the evidence points more to risk-taking in the presence of excess liquidity.

Bank Capital

The effect of bank capital on bank risk behaviour is believed to be dependent on whether or not the bank is mostly equity-funded or debt-funded. It seems that banks that are highly leveraged have a tendency to take on excessive risks because potential losses from such risky behaviour will not be internalized. On the other hand, when there is significant equity at stake, bank risk taking behaviour is constrained. This is because capital serves as a commitment device to limit risk-taking, therefore less leverage leads to less risk-taking. On the basis of this argument, the conventional standpoint seems to lean in favour of the idea that well-capitalized banks, with higher equity at stake, take on less risk compared to their undercapitalized counterparts. Furlong and Keeley (1990) provide some empirical findings to support the conventional argument that a higher equity capital at stake reduces incentives for excessive risk taking by banks.

Kwan and Eisenbeis (1997), however, argue that banks hold on to more capital so they can take on more risk. They also provide empirical evidence that seems to indicate that capital requirements may have the perverse effect of inducing risk-taking behaviour. This seems to suggest that well-capitalized banks are well-capitalized just by virtue of their risky asset profile (see also Hellman, Murdock and Stiglitz, 2000). Shrieves and Dahl (1992) also find evidence that even for banks that are not constrained by regulations, increases in capital is positively related to risk-taking. Koehn and Santomero (1980) and Kim and Santomero (1988) suggest that the increase in risk-taking behaviour by banks flows from a reconfiguration of the composition of their risky asset portfolios, because they face a forced reduction in leverage. This implies that due to the increased regulatory capital requirements, banks may choose riskier asset profiles to make up for the loss of utility originally derived from using debt capital. Iwatsubo (2007), apparently on middle ground, argues that the relationship between bank capital and risk is actually non-linear. Agoraki *et al.*, (2011), on the other hand, hold the view that while capital requirements may

reduce bank risk behaviour in general, the effect is insignificant or even reversible with regard to banks that have high market power. On the whole the empirical evidence provides no conclusive evidence on the risk taking effects of bank capital, thus leaving it open as an empirical question with an ambiguous effect.

Bank Profitability

The school of thought on the risk-taking effects of bank profitability argues that poor performing banks have a tendency to pursue risky investments, the incentive being to re-establish profitability – the so-called ‘gambling-for-resurrection’ effect. This argument is intrinsically supported by Rajan’s (2005) search for yield proposition. In essence, when a bank is faced with declining profits due to internal or external shocks, its search for higher yields may ultimately result in risky behaviour. Delis and Kouretas (2011) contradict this argument with a hypothesis that banks may ultimately show higher profitability on account of high-risk assets in their portfolio and subsequently use the previous period’s profit to generate new and risky assets. On the other hand, if their risky assets run into problems (bad loans), the resulting drop in profitability will trigger a drop in the bank’s risky asset portfolio. In essence, they suggest that higher not lower profitability drives increased risky behaviour and vice-versa. In this regard, they suggest that the effect of profits on risk taking is with a lag. Delis and Kouretas (2011), however, do not find empirical evidence to support the increased profitability to increased risk taking hypothesis. Other studies have, however, provided some empirical evidence for the declining profits to risky behaviour argument: Allen and Gale (2004), Claessens and Laeven (2004) and Hellman *et al.*, (2002) among others. According to Allen and Gale (2004), reduction in monopoly rents and ultimately profits, as a result of competition, may force banks to engage in risky behaviour to garner more profits. Claessens and Laeven (2004) narrow it down to competition that flows from unconstrained banking activities leading to erosion of profits and thus inducing risky behaviour. Hellman *et al.*, (2002) also present evidence similar to Claessens and Laeven (2004). By implication, prior losses may be the motivator for risky bank behaviour in subsequent periods.

Excess Lending Growth

Lending, the principal activity in financial intermediation, is mainly the management of risks in the pursuit of profits. The most significant of these risks is credit risk. Excessive lending growth, by inference therefore, may be an *a priori* indicator of a bank’s risk taking behaviour. On one hand, lending growth may be a reflection of improved borrower capacity. On the other hand, it may also reflect banks’ engagement in morally hazardous behaviour or the loosening of credit

standards, with these two contributing the most to bank risk. The available empirical evidence also seems to suggest that rapid expansion of lending by banks often leads to poor quality loans because the growth in lending may exceed the lender's capacity to properly evaluate and monitor borrowers.

Reinhart and Rogoff (2009), for instance, indicate that most systemic banking crises have been preceded by periods of excessive lending growth. Dell'Ariccia and Marquez (2006) and Tornell and Westermann (2002) earlier argued that aggressive lending strategies have been usually associated with risk concentration. Altunabas *et al.*, (2010) later documented a non-linear relationship between lending growth and bank risk. The findings of Altunabas *et al.*, (2010) suggest that when a bank's lending, at the first instance, is too small to benefit from economies of scale, the lending bank is ultimately riskier. This risk tapers off when economies of scale benefits exceed the costs. When banks continue with aggressive loan growth, they once again end up with riskier positions. Agur and Demertzis (2012) suggest that aggressive lending growth can translate into risky behaviour for banks if bank loan officers are compensated on the growth rate of their risky portfolios, but not necessarily on the profitability of such assets. This compensation framework results in a disregard for downside risks in the pursuit of business. Gambacorta (2009) also argues that aggressive lending growth is linked to riskier banks, using an international dataset of listed banks across the European Union and the US.

Economic Growth

The role of macroeconomic performance in bank risk-taking behaviour, according to Matsuyama (2007), works via economic expectations of lenders about borrowers' net worth. The study argues that increases in borrowers' collateral values improve the overall perception of creditworthiness of the borrowers by banks. This gives banks greater incentives to increase lending and ease financial constraints, thereby taking on more risks. According to Kashyap *et al.*, (1993), "better economic conditions increase the number of projects becoming profitable in terms of expected net present value", thereby influencing the perception of downside risks by banks, and leading to more risk taking behaviour. On the other hand, better economic conditions can contribute to a reduction in the proportion of non-performing loans on the banks' balance sheets, thereby contributing to a reduction in a bank's risk profile. From the foregoing, there seems to be conflicting positions on the impact of economic performance on bank risk taking behaviour.

Camara *et al.*, (2012) find empirical evidence to support the two conflicting positions. Using data on European banks for the period 1992 – 2006, they found that while better economic conditions, measured by the real GDP growth, reduced the credit risk exposure, the expectations attributable to the booming economy also fostered risky behaviour by banks, thus skewing the composition of their loan portfolios towards riskier projects. Dell’Ariccia *et al.*, (2009), however, provide evidence to support the argument that when the economic outlook is good, banks tend to provide more credit, reduce their credit standards and ultimately increase their risk. Delis and Kouretas (2011) provide further support for Dell’Ariccia *et al.*, (2009) by documenting a similar nexus between GDP growth and risk, using data on the European banking sector.

4.3 Methodology and Data

This section details the sample, data sources and model for the study. It also discusses the construction of the study variables.

Sample and Source of Data. The study employed a total sample of 91 commercial banks from 12 emerging economies in Sub-Saharan Africa. These countries were chosen mainly because of data availability and also because they have deregulated their financial sectors to foster financial development and growth, hence providing an appropriate setting to test the behaviour of market agents in response to monetary policy actions. Annual financial data spanning 1999 to 2012, derived from BankScope were used. The panel data was unbalanced.

Model Motivation and Estimation. Based on the literature on determinants of bank risk behaviour and the risk-taking channel of monetary policy previously discussed, bank risk behaviour was modelled as being dependent on monetary policy, bank-specific variables and other macroeconomic controls. The empirical specification (equation 4.1) follows Gambacorta and Mistrulli (2004) and is designed to test whether the characteristics of the banks cause them to react differently to policy changes, given relevant controls. Delis and Kouretas (2011) further this model specification with the inclusion of interaction terms to test whether the total effects on interest rates changes with bank characteristics. This study employs a similar approach.

Given that risk is a potentially persistent phenomenon on account of temporal smoothing, competition and regulations, a dynamic panel is employed where a lagged dependent variable is also included as a determinant. To avoid the possibility of an endogeneity bias as regards the other study variables, the determinants are all lagged following Kashyap and Stein (1995) and Altunabas *et al.*, (2010). The general testable model is thus represented below, following

Altunabas *et al.*, (2010) and Borio and Zhu (2008) on the linear assumptions underlying bank risk and its determinants.

$$BANKRISK_{it} = \beta_0 + \beta_1 MPR_{it-1} + \beta_2 RGDP_{it-1} + \beta_3 BSIZE_{it-1} + \beta_4 LIQ_{it-1} + \beta_5 ELNDGR_{it-1} + \beta_6 CAP_{it-1} + \beta_7 PRFT_{it-1} + \beta_8 BANKRISK_{it-1} + \varepsilon_{it} \quad (4.1)$$

Where *BANKRISK* is the measure of bank risk-taking behaviour proxied by the Z-score, *MPR* is the monetary policy stance, *RGDP* is growth in real GDP, *BS* is for bank size, *LIQ* is for bank liquidity, *ELNDGR* is excess growth in bank lending, *CAP* is capital, *PRFT* is bank profit and *it* represents bank *i* in time *t*.

The study uses micro data because it allowed for the minimization of systemic effects while allowing for the control of bank specific effects that might impact risk-taking behaviour. The macro level is also controlled for on account of the fact that intermediation by banks is done mainly towards residents, as such it is expected that country-specific variables may also play an influential role as far as bank behaviour is concerned.

4.3.1 Construction of Study Variables

Bank Risk

Bank risk-taking, *BANKRISK_{it}*, is measured using the z-score of each bank. The z-score is computed as the return on assets plus the capital-asset ratio scaled by the standard deviation of asset returns. The z-score is a measure of bank stability and indicates the distance from insolvency, where insolvency is defined as a state where losses exceed equity. A number of studies on bank risk have employed the z-score (see Mercieca *et al.*, 2007; Demirguc-Kunt and Huizinga, 2010 and Laeven and Levine, 2009) In fact, according to Laeven and Majnoni (2003) and Bikker and Metzmakers (2005) risk proxies like loan loss provisions and non-performing loans are traditionally backward looking and pro-cyclical, hence the argument for the use of the z-score. Boyd *et al.*, (2009) define the z-score as indicating “the number of standard deviations that a bank’s return on assets has to drop below its expected value before its equity is depleted and the bank becomes insolvent”. According to Boyd *et al.*, (2009), it is a measure of risk that is “monotonically associated with the probability of bank failure” and also widely used in the finance literature. De Nocolo *et al.*, (2004) also indicate that this risk measure increases with higher profitability and levels of capitalization but decreases when earnings become unstable,

inferred from higher standard deviation of return on assets (ROA). A higher z-score, intuitively, therefore, indicates that the bank is more stable and engaging in less risky behaviour.

Monetary Policy.

The general banking literature is still far from settling on the best indicator of a country's monetary policy stance. A number of studies have employed the growth rates of monetary aggregates or growth in credit. These approaches have, however, been criticised for being ineffective in the face of innovation and deregulation (Bernanke and Mihov, 1998). The monetary policy stance, *MPR*, for this study is proxied for by the central bank policy rate/ prime rate following Delis and Kouretas (2010). As per their study, the choice of interest rate measure does not lend much difference to the outcome. This central bank rate is thus captured as the *de facto* indicator of the monetary policy stance in the economy because it is the primary tool used by central banks for implementing monetary policy. Based on the literature earlier discussed, a low monetary policy rate is expected to increase bank risk-taking behaviour.

Economic Performance.

The macroeconomic environment is proxied by real GDP growth, *RGDP*. Aside from measuring the level of economic activity, the GDP is also quite informative with regard to other macroeconomic characteristics. On the country-level, it also addresses and controls for the different levels of economic development in the countries under study. In view of the literature available and reviewed (Camara *et al.*, 2012; Delis and Kouretas, 2011 among others), a high level of economic performance in a country can cause banks to favourably adjust their risk perceptions and ultimately make riskier and more default-prone loans. On the other hand, an improvement in the macroeconomic situation could be an indication of more profitable projects within the economy and hence an improvement in the default risk of existing loans, which may ultimately show up as a reduction in bank risky behaviour. Expectations on the sign are therefore open.

Bank Size. Bank size, *BSIZE*, is taken as the log of the bank's total assets. It measures size effect characteristics such as the bank's market power, returns to scale, and diversification benefits. On one side, size is expected to be related to bank risk negatively, owing to potential diversification effects, or promote risk-taking behaviour on account of the too-big-to-fail argument. Given these differing positions, the expectation with regard to size effect on bank risk is also left open.

Bank Liquidity. Bank liquidity, LIQ_{it} , measures the funding liquidity position. It is calculated as the proportion of cash and all short-term claims from other banks in relation to banks' total assets. It provides a relative measure of banks' capacity to pay obligations with immediacy as well as their ability to easily raise funds by liquidating short-term securities. Very low values may be reflective of a bank with a liquidity problem, while unusually high values, except in instances of high returns on riskless assets, may be indicative of a bank with no good lending prospects. Either way, the liquidity may trigger risk-taking behaviour in two ways: as banks attempt to offload their excess liquidity, there is a propensity to relax lending rules, thus accumulating risky portfolios. On the other hand, a very low liquidity position may result in financial distress and possible bankruptcy. The *a priori* expectation is that high liquidity which might trigger a search for yield or low liquidity which may reflect liquidity crisis will reflect in a bank's risk profile.

Bank Profits. Profitability, $PRFT_{it}$, measuring financial performance, is critical to a firm's risk analysis and indispensable to good decision-making. Profitability for this study is calculated as profits before taxes, scaled by total assets. It invariably also provides a view into the cost efficiencies (funding costs, operational costs) of the bank. Lower profitability can provide incentives for banks to search for yields and thus engage in risky behaviour or it may trigger a downsizing of risky portfolios so as to stall declining profits. On the basis of that, the effect of bank profitability on risk-taking behaviour is left open.

Bank Capital. The level of bank capital, CAP_{it} , is measured as the ratio of equity capital to total assets. A relatively high value reflects the level of equity available to absorb losses, or on the other hand, the level of equity provided as security to other players in the intermediation market, such as creditors. The effect of capital on bank risk could go either way, either limiting risky behaviour on account of the capital at stake, or taking on risk because of the capital buffer available.

Lending Growth. Lending growth, $ELNDGR$, which will also reflect the level of credit expansion within individual banks is captured as the year on year growth in credit for an individual bank. This is captured as the difference between annual industry credit growth and annual credit growth of individual banks, following Altunabas *et al.*, (2010). Given that excessive lending booms usually precede systemic crises (Reinhart and Rogoff, 2008; Borio and Drehmann, 2009), controlling for this allows for the testing of an actual risk-taking channel of monetary policy. *Ceteris paribus*, excess lending growth is expected to be linked to deteriorating risk positions.

4.4 Findings and Discussions

This section presents the findings of the study along with the discussions. On account of the larger panel and relatively small time series, the Arellano-Bond General Methods of Moments (GMM) approach was employed in the dynamic panel estimation. The dynamic GMM panel estimator was chosen because it simultaneously accounts for unobserved country specific effects, allows for the exploitation of the time series variation in the data whilst controlling for the presence of endogeneity in the explanatory variables. Table 4.1 below provides the correlation matrix of the variables under study.

4.4.1 Correlation Analysis

From the correlation matrix, only bank profits show a positive relationship with bank risk behaviour. Based on this preliminary relationship, it appears that high bank profits translate into more stable banks. Both of the other variables of interest: monetary policy rate (MPR) and liquidity (LIQ) show negative and significant correlations with bank risk-taking behaviour.

This seems to suggest that contractionary monetary policy (increasing policy rate) will likely reflect in unstable banks in the financial sector. Increasing levels of bank liquidity also appear to increase risky behaviour and reduce stability. RGDP growth, excess lending growth and bank size, however, exhibit insignificant negative correlations with bank risk, probably indicative of the fact that the economic setting, the bank's size and lending behaviour do not affect bank stability. On the other hand, there seem to be positive correlations between the monetary policy rate, profits and bank liquidity. This may be evidence that as the policy rate increases, more deposits are attracted into the banking sector while at the same time banks generate good profits on loans made during these periods. The negative and significant correlation between the policy rate and bank size may, however, temper the earlier view since it appears periods of contractionary monetary policy can also lead to "shrinking" banks. Liquidity is positively related to bank size and the real GDP growth rate while profits seem positively related to bank size and real GDP growth. Excess lending growth was the only variable that was not correlated in any significant way with any of the variables under study. None of the variables exhibited correlations that were high enough to raise concerns of multicollinearity.

Table 4.1: Correlation matrix of study variables

	ZSCORE	MPR	LIQ	BSIZE	ELNDGR	PRFT	CAP	RGDP
ZSCORE	1.0000							
MPR	-0.0688 (0.0301)**							
LIQ	-0.1401 (0.0000)***	0.1302 (0.0000)***	1.0000					
BSIZE	-0.0180 (0.5732)	-0.1046 (0.0005)***	0.1565 (0.0000)***	1.000				
ELNDGR	-0.0018 (0.9545)	-0.0005 (0.9870)	-0.0171 (0.5713)	0.0053 (0.8602)	1.000			
PRFT	0.0852 (0.0067)**	0.1532 (0.0000)***	0.0250 (0.4064)	0.0625 (0.0387)**	0.0012 (0.9694)	1.0000		
CAP	0.0852 (0.0071)**	-0.0332 (0.2696)	-0.0313 (0.2989)	-0.0632 (0.0362)**	-0.0008 (0.9789)	0.2487 (0.0000)***	1.000	
RGDP	-0.0408 (0.2068)	-0.0001 (0.9964)	0.0763 (0.0130)**	0.0921 (0.0027)***	0.0002 (0.9941)	0.0125 (0.6833)	0.0161 (0.5979)	1.0000

p-values in parenthesis; ***, **, * = significant at 1%, 5% and 10% respectively. ZSCORE is measure of bank risk; MPR is central bank policy rate and proxy for monetary policy; LIQ is bank liquidity;

BSIZE is bank size (log of total assets); ELNDGR is excess lending growth in the year; PRFT is bank profit; CAP is bank equity capital and RGDP is real GDP growth

4.4.2 Regression Results

Table 4.2 shows the dynamic panel regression output for equation 4.1. From the output (Table 4.2), the coefficient of the lag of the dependent variable is positive and significant, indicating persistence in the risk behaviour of banks. The results seem to suggest that bank risk behaviour in SSA is highly dependent on history. In other words, risky banks are likely to continue being risky while stable banks will continue in their stability. The positive sign and significance of the lagged dependent variable can also be viewed as the speed of convergence to the optimal risk level with values closer to zero, implying a higher speed of adjustment. The results thus seem to suggest that previous periods of risky behaviour are usually followed by less risk-taking in the subsequent period.

The finding of this study appears to go against the findings of Agur and Demertzis (2012), Taylor (2009) and Borio and Zhu (2008) and the bank risk-taking argument, which says that it is low levels of interest rates that cause banks to go in search of yields and ultimately take on risky positions. The coefficient of the monetary policy rate, MPR, is negative and significant. By inference, increasing nominal policy rates reduces banks' Z-SCORE. It thus appears that a high central bank rate rather triggers risky behaviour among banks. On the flipside, however, it is no secret that most of the countries in the sample are characterized by high inflationary environments. The high inflation in these economies may still cause high policy rates to be associated with low real interest rates and hence trigger risky behaviour by the banks. In this, the risk-taking channel of monetary policy cannot be unequivocally rejected. Another possible explanation could be that because deposit rates are generally low in SSA, as rates rise, deposits dry up because savers go in search of better yielding investments. This shortage of cheap deposits may force the banks into costlier funding sources and ultimately cause a search for high yielding but riskier investments to balance out and maintain margins. It could also be that as interest rates rise and filter through bank lending rates, only risky borrowers take up the high interest rates hence the deterioration of bank risk profiles. These results, however, should be interpreted with caution, as there may be other factors influencing the risk behaviour of banks, like inflation, but have not been explicitly modelled in equation 4.1.

The coefficient of bank size (BSIZE) is negative and significant in relation to the Z-SCORE. It indicates that the relationship between bank size (BSIZE) and risk-taking behaviour leans towards the 'too-big-to-fail' argument, providing support for the studies of Dermiguc-Kunt and Huizinga (2010), Deelchand and Padgett (2006) and Gonzales (2005). These studies found that

large banks engage in risky behaviour given their perception of available ‘safety nets’. The findings of this study could also be indicative of the possibility that larger banks may be in competition to capture even larger shares on the loan market (Stiglitz and Weiss, 1981), following the ‘competition-fragility nexus’ and ultimately take on more risks, lured by the prospects of higher returns.

The coefficient of excess bank liquidity, (LIQ), is also negative and significant. It appears that excess liquidity seems to encourage risky positions in the banking industry. This is to be expected given that unutilized excess liquidity, unless invested in high yielding government instruments, exposes the bank to lower profitability. This finding supports the search-for-yield hypothesis by Rajan (2005). The finding also supports the conclusions of Ioannidou *et al.*, (2008) that liquid banks take on more risks by virtue of their search for higher yields. The findings further support the conclusions of Repullo’s (2004) predictive model that indicates that when banks have access to liquidity, even off-balance sheet liquidity from the Central bank (lender of last resort), they are very likely to assume risk profiles beyond their internal liquidity means. In essence, easy access to liquidity, as posited by Acharya and Naqvi (2010), expands lending with a disregard for downside risk, ultimately leading to an under-pricing of the risks of projects and in the process making worse quality loans. This may suggest a desire for higher returns and larger market shares, thus reducing the incentive to properly screen borrowers, and this culminating in higher risk profiles.

Table 4.2: Regression results for main model: Bank risk as a function of micro and macro characteristics

Variable	Regression #1	
Zscore(-1)	.213875	(0.000)***
MPR(-1)	-0.5005776	(0.000)***
BSIZE(-1)	-9.795589	(0.0000)***
LIQ(-1)	-14.72113	(0.000)***
ELNDGR(-1)	.0144758	(0.000)***
PRFT(-1)	23.3672	(0.000)***
CAP(-1)	-41.55149	(0.000)***
RGDP(-1)	.9071676	(0.000)***
_CONS	74.93821	(0.000)***

Wald Chi² (Prob.)	61466.31	(0.0000)
Arellano-Bond Test for Auto-correlation	Order 1	-3.0582 (0.0022)***
	Order 2	-.82755 (0.4079)
Sargan's Test	71.06733	(0.6689)

***, **, * = Significant at 1%, 5% and 10% respectively. Z-Score measures bank risk-taking; MPR is the central bank prime rate, proxy for monetary policy; BSIZE is the log of total assets for size; LIQ is for bank liquidity; ELNDGR is excess lending growth; PRFT is bank profitability; CAP is bank equity ratio; RGDP is real GDP growth. The following diagnostic tests are run for the model: the Sargan test for overidentification, the Arellano-Bond test for autocorrelation and the Wald Chi² for model fit. The results indicate that the over identifying restrictions are valid, there is no first order or second order autocorrelation and the model fits the data well.

Excess lending growth (ELNDGR), contrary to expectations, is positive and significant. This suggests an improvement in the risk positions of the banks as a result of excess lending. It could be an indication that excess bank lending still finds its way into safe and viable ventures, thus contributing to healthier risk profiles of banks in the SSA region. The explanation could also be that credit extension by banks in SSA is still limited so what emerges as excess lending above industry standards is still significantly below the threshold that can trigger a deterioration in bank solvency positions. In essence, what was captured as excess lending above the annual industry average cannot be considered as excess lending, possibly an indication of credit constraints in SSA. Another inference could be that since the SSA financial markets are less developed, competition in the demand market for loans far outstrips the availability in the supply market. This ultimately ensures that only creditworthy borrowers constitute the banks' risky asset portfolio.

Profit-making banks, from the results of the study, are ultimately less risky. This seems to go against the standard high risk - high return hypothesis. A possible explanation for the positive sign could be 'cream skimming' by banks in SSA. Flowing from the underdevelopment in the financial markets in SSA, the market for bank assets is possibly large and populated enough to make for profitable but relatively less risky banks. Another intuition could be that profitable banks are profitable by virtue of their effectiveness in risk management, since banking is the business of making profits by taking calculated risk. On another level, this finding seems to suggest that losses in the prior year are a trigger for risky behaviour in the subsequent year. The findings of the study reveal that less profitable banks are more likely to "gamble for

resurrection” after a period of losses and thus appear more risky. On another hand, higher profit places the bank in a position to be able to absorb any external shocks, thus emerging as less risky in its behaviour. The findings indirectly support the findings of Allen and Gale (2004) and Claessens and Laeven (2004). According to these studies, low profits in a previous period trigger risky behaviour in subsequent periods. This may suggest that high profits in previous periods are likely to reduce risky behaviour in subsequent periods. A possible explanation could be that banks experiencing good profits have no need to gamble for a resurrection by engaging in risky behaviour.

The coefficient of bank capitalization is significant and negative. It is thus expected that well-capitalized banks are more likely to engage in risky behaviour. This seems to support the hypothesis that the well-capitalized are so capitalized because of their risk profiles. The finding, however, goes contrary to the argument that well-capitalized banks are more cautious and therefore less likely to take on risky positions since they have too much to lose from such risky positions. In essence, the capitalized banks engage in more risky behaviours because there is a buffer to absorb potential losses that may arise from the risky positions taken. The finding could also be indicative of an attempt to offset the loss of utility derived from originally employing leverage in its capital structure by investing in higher yielding but ultimately riskier asset portfolios. This finding supports the findings of Kwan and Eisenbeis (1997), Kim and Santomero (1988) and Hellman *et al.*, (2000) that capital does actually trigger more risky behaviour among banks.

Real GDP growth, the proxy for the macroeconomic environment, exhibits a positive relationship with bank risk behaviour. It means that in periods of good macroeconomic performance, bank risk behaviour declines. It thus appears from the results, that in a booming economy, the banking sector exhibits a less risky profile by virtue of its portfolio reflecting more profitable projects not prone to default. The findings, however, contradict Dell’Ariccia *et al.*, (2010) and Delis and Kouretas’ (2009) findings that indicate an increase in bank risk behaviour due to favourable perception of borrower risk profiles during economic booms.

4.4.3 Catalytic or Moderating Factors

Using interacting terms, the study also sought to find out the impact of bank-specific characteristics on risk behaviour vis-à-vis the monetary policy environment. In this regard, three

characteristics: bank liquidity, bank capital and bank size were interacted with the prime rate. To avoid significantly compromising the degrees of freedom for the study, the interactive terms were included, one after the other and thus given as follows:

$$\begin{aligned}
 BANKRISK_{it} = & \beta_0 + \beta_1 MPR_{it-1} + \beta_2 RGDP_{it-1} + \beta_3 BSIZE_{it-1} + \beta_4 LIQ_{it-1} + \\
 & \beta_5 ELNDGR_{it-1} + \beta_6 CAP_{it-1} + \beta_7 PRFT_{it-1} + \beta_8 BANKRISK_{it-1} + MPR * \\
 & LIQ_{it-1} + \varepsilon_{it}
 \end{aligned}
 \tag{4.2}$$

$$\begin{aligned}
 BANKRISK_{it} = & \beta_0 + \beta_1 MPR_{it-1} + \beta_2 RGDP_{it-1} + \beta_3 BSIZE_{it-1} + \beta_4 LIQ_{it-1} + \\
 & \beta_5 ELNDGR_{it-1} + \beta_6 CAP_{it-1} + \beta_7 PRFT_{it-1} + \beta_8 BANKRISK_{it-1} + MPR * \\
 & CAP_{it-1} + \varepsilon_{it}
 \end{aligned}
 \tag{4.3}$$

$$\begin{aligned}
 BANKRISK_{it} = & \beta_0 + \beta_1 MPR_{it-1} + \beta_2 RGDP_{it-1} + \beta_3 BSIZE_{it-1} + \beta_4 LIQ_{it-1} + \\
 & \beta_5 ELNDGR_{it-1} + \beta_6 CAP_{it-1} + \beta_7 PRFT_{it-1} + \beta_8 BANKRISK_{it-1} + MPR * BSIZE_{it-1} + \varepsilon_{it}
 \end{aligned}
 \tag{4.4}$$

Where $MPR*LIQ$ is the interaction between monetary policy and bank-level liquidity, $MPR*CAP$ is the interaction between monetary policy and bank capital and $MPR*SIZE$ is the interaction between monetary policy and size of bank.

The regression results in Table 4.3 show the impact of interacting bank liquidity with the policy rate (Equation 4.2).

Table 4.3: GMM-IV regression output with interaction of bank liquidity and policy rate

Variable	Regression #2	
Zscore(-1)	.2185795	(0.000)***
MPR(-1)	-.5484064	(0.000)***
BSIZE(-1)	-12.24055	(0.000)***
LIQ(-1)	-18.15396	(0.000)***
ELNDGR(-1)	.0172323	(0.000)***
PRFT(-1)	24.89666	(0.000)***
CAP(-1)	-43.85155	(0.000)***
RGDP(-1)	.926396	(0.000)***
MPR*LIQ	-.7141919	(0.000)***

Wald Chi² , Prob.		85417.83	(0.0000)***
Arellano-Bond Test for Auto-correlation	Order 1	-3.0612	(0.0022)***
	Order 2	-.76109	(0.4466)
Sargan's Test		71.99342	(0.6400)

***, **, * = Significant at 1%, 5% and 10% respectively. The following diagnostic tests are run for the model: the Sargan test for overidentification, the Arellano-Bond test for autocorrelation and the Wald Chi² for model fit. The results indicate that the overidentifying restrictions are valid, there is no first order or second order autocorrelation and the model fits the data well.

All the coefficient signs and the levels of significance in the basic model are maintained. The coefficient of the interaction term between liquidity and the policy rate is negative and significant. It appears that the negative impact of excess or very liquid positions on bank risk behaviour is aggravated when interest rates begin to rise. In other words, when interest rates go up, liquid banks are prone to more risky behaviour. From the study results, this may be an indication that a significant portion of banks' risky assets may be in longer term fixed rate portfolios. Following from this premise then, as rates on the market rise, a funding and possible maturity mismatch occurs: longer term assets may be yielding returns significantly below banks' current liability costs, triggering a possible decline in profitability. An attempt to rebalance this mismatch may cause the banks to take on default prone, but high yielding assets, thus causing their risk profiles to deteriorate. Another perspective could be that in periods of rising interest rates, the opportunity cost of idle cash may prove very high causing banks to invest in what would have previously been considered risky projects just to maintain solvency, but which may turn out to be counterproductive. On the whole it appears that risk-taking behaviour of banks with significant liquidity is much more sensitive to monetary policy changes.

Table 4.4 presents the regression output of the main model augmented with an interaction term of bank capital and the policy rate, $MPR*CAP$ (Equation 4.3). The interaction term between capital and the policy rate is positive and significant. It appears that in an environment of rising interest rates, well-capitalized banks in SSA reduce their risk-taking behaviour, possibly a reflection of how much capital they stand to lose when risky assets go bad. It seems that when the stakes from possible loss, given default are high, banks with high equity capital engage in less risky behaviour.

Table 4.4: Regression output with interaction of bank capital and policy rate

Variable	Regression#3	
	Coefficient	p-value
Zscore(-1)	.2059217	(0.000)***
MPR(-1)	-.4855634	(0.000)***
BSIZE(-1)	-5.99402	(0.000)***
LIQ(-1)	-12.53074	(0.000)***
ELNDGR(-1)	.0086003	(0.003)***
PRFT(-1)	8.356503	(0.204)
CAP(-1)	-40.72834	(0.000)***
RGDP(-1)	.8288938	(0.000)***
MPR*CAP	3.430164	(0.000)***
Wald Chi², Prob.	171181.10	(0.0000)***
Arellano-Bond Test for Auto- correlation	Order 1	-3.0347 (0.0024)***
	Order 2	-.88292 (0.3773)
Sargan's Test		66.96571 (0.7859)

***, **, * = Significant at 1%, 5% and 10% respectively. The following diagnostic tests are run for the model: the Sargan test for over-identification, the Arellano-Bond test for autocorrelation and the Wald Chi² for model fit. The results indicate that the over identifying restrictions are valid, there is no first order or second order autocorrelation and the model fits the data well.

All other coefficients maintain their signs and significance in the model with capital and monetary policy interaction terms, except for bank profitability which becomes insignificant in the presence of the interaction term. The loss of significance of the bank's profitability variable, after including the interaction term could be an indication that in the presence of potentially significant capital losses, the search for profits or yield in risky investment is tempered, hence the loss of significance. In other words, capital and profits are not complements but rather substitutes. Another conclusion that can be drawn, based on the results, is that well-capitalized banks are less prone to risky behaviour as compared to their thinly capitalized counterparts.

The interaction term between bank size and the policy rate, *MPR*BSIZE*, in Table 4.5, has a negative and significant coefficient.

Table 4.5: Regression output with interaction of bank size and policy rate

Variable	Regression Coefficients	p-value
Zscore(-1)	.2351692	(0.000)***
MPR(-1)	-.5138069	(0.000)***
BSIZE(-1)	-9.439873	(0.000)***
LIQ(-1)	-14.4197	(0.000)***
ELNDGR(-1)	.0132871	(0.000)***
PRFT(-1)	21.92368	(0.001)***
CAP(-1)	42.03029	(0.000)***
RGDP(-1)	.9442075	(0.000)***
MPR*BSIZE	-.0290274	(0.002)***
Wald Chi², Prob.	84868.02	(0.0000)***
Arellano-Bond Test for Autocorrelation	Order 1	-3.1539 (0.0016)***
	Order 2	-1.2762 (0.2019)
Sargan's Test	69.91915 (0.7036)	

***, **, * = Significant at 1%, 5% and 10% respectively. The following diagnostic tests are run for the model: the Sargan test for overidentification, the Arellano-Bond test for autocorrelation and the Wald Chi² for model fit. The results indicate that the over identifying restrictions are valid, there is no first order or second order autocorrelation and the model fits the data well.

Based on this finding, it appears that the risk positions of large banks also seem to deteriorate when interest rates begin to rise. The possible reason for this occurrence could be that as interest rates rise, the potential for profits also rises, albeit with higher risks. This potential for higher profits may cause such large banks to try to compete for even larger shares of the market and ultimately end up with more risk. This suggests that large banks in SSA are expected to engage in more risky behaviour in an environment of rising interest rates and not the other way round. All other coefficients maintain their signs and significance.

4.5 Conclusion and Policy Implications

From the findings presented so far, there is no evidence that a risk-taking channel of monetary policy, as is posited in the literature, operates in SSA. It seems that the argument that periods of low interest rates trigger risky bank behaviour may not necessarily hold for Sub-Saharan Africa. We, however, argue that expansionary monetary policy of low interest rates may only constrain

risky behaviour in an environment of significantly low inflation. So though expansionary monetary policy may present significant gains in the area of bank stability for SSA and concurrently boost capital accumulation to spur economic growth, these findings should be interpreted with caution since nominal and not real rates were modelled for this study. Bank-level and macro-level characteristics also prove very important in explaining bank risk-taking behaviour. Despite the absence of a risk-taking channel, as per the construct documented in the literature, it can be concluded that monetary policy is not necessarily neutral with regards to the financial stability of the SSA region. There is enough evidence to suggest that a change in the monetary policy stance has implications for financial stability, especially in the banking sector.

In terms of policy implications, it appears that policy moves to reduce central bank rates may be more beneficial to the region since it seems that raising interest rates in the SSA region could be counter-productive and cause banks to engage in risky behaviour. Central banks therefore need to preserve real rates of return when pursuing contractionary monetary policy of high interest rates. The policy implications of rising interest rates need to be considered seriously given the dominance of banks in the financial systems in SSA and the implications for the economy. Improving the macro economy, i.e. increases in GDP, will also enhance the stability in the financial sector. Thus, as much as possible, policy moves to improve the macroeconomic environments should be pursued.

Another policy implication from the findings has to do with central bank supervision in periods requiring contractionary monetary policy. In such periods, it is imperative that large banks, banks with high liquidity and banks with small equity capital be monitored closely in order to curb excessive risk taking behaviour. Controlling risky behaviour in large and liquid banks will help to reduce potential bank failures and avert possible financial crises during periods of contractionary monetary policy. It might also be appropriate to promulgate rules that control excessive growth of unit banks within the sector. Increases in bank equity capital, whether by choice or as a result of regulation, should be accompanied by closer monitoring so as to curb risky behaviour. To conclude, it appears that the benefits of expansionary monetary policy may outweigh the downsides where SSA is concerned, all else equal. This calls for a concerted move towards a more expansionary monetary policy environment whenever feasible.

CHAPTER FIVE

MONETARY POLICY, PRIVATE CAPITAL FORMATION AND ECONOMIC GROWTH – THE CASE OF SUB-SAHARAN AFRICA

5.1 Introduction

Significant differences in the rates of growth in economies across the globe have, over the years, stimulated quite a large volume of research into what drives economic growth. In the light of this search, a number of economists have come up with a list of variables seeking to explain economic growth. A few on the list include public infrastructure (Easterly and Rebelo, 1993; Munnell, 1992; Aschauer, 1990), high returns to public infrastructure (Sanchez-Robles, 1998; Kelly, 1997), educational attainment and the nature of political systems (Barro, 2002; Barro, 1999 and Barro and Lee, 1993), cultural factors (Harrison, 1992; Dieckmann, 1996), linguistic and ethnic differences (Easterly and Levine, 1997), democracy (Barro, 2002; Barro, 1999), and even religion (McCleary and Barro, 2006).

This preoccupation to find the drivers of economic growth also saw the emergence of numerous theories seeking to explain the dynamics of economic growth. One of the prominent theories that emerged is the endogenous growth model (Barro, 1990; Romer, 1990; Lucas 1988). According to the endogenous growth theory, capital accumulation is key to economic growth. Capital accumulation is in turn stimulated by the appropriate cost of capital. In following with the cost of funds approach by de Bondt (2005), then the monetary policy rate, which is the primary indicator for cost of funds in an economy, becomes one of the most important determinants of its capital accumulation and ultimately its growth.

In spite the seemingly obvious consensus that monetary policy has a relevant role in macroeconomics, Starr (2005), argues that the extent to which a country can use a monetary policy to affect output is still an open empirical question. This is because even though the available literature is seeking to provide a role for monetary policy in the growth debate, the evidence, according to Fan *et al.*, (2011), is unequally skewed in the direction of developed economies, especially the US. It appears, therefore, that the role of monetary policy in the growth dynamics of developing regions, like the Sub-Saharan African region, cannot be necessarily taken as a given, and primarily so because of the dearth of supporting empirical evidence. It is in this regard that this study seeks to empirically explore the question –‘does monetary policy hold the key to capital accumulation and economic growth for SSA?’ In other

words, does monetary policy stimulate capital accumulation and ultimately economic growth in the context of SSA, a region that has been lagging significantly behind the rest of the world in terms of development?

Answers to these questions are obviously relevant given the view of Reed and Ghossoub (2012) on the relevance of a tailored policy. They argue that if policy makers in the developing world look to the experiences of advanced countries as a guide for policy making, then aggregate activity in these countries will be even more distorted. This line of argument seems to suggest that while aggregate activity in developing countries is already distorted, failure to devise tailored policies to stimulate the needed growth will worsen the case. Zakir and Malik (2013) further support this view by arguing that international experiences even provide reason to believe that asymmetries are present with regard to the impact of monetary policy on the economy. These asymmetries in response to aggregate demand, according to Morgan (1993), were evident in the practical experiences of the US and Japan. In 1988 and 1989, for instance, a tight monetary policy in the US succeeded in slowing down the economy, but an expansionary policy in 1990 failed to stimulate the economy. In Japan, in the late 1990s, an expansionary monetary policy also failed to revive the economy that was in recession. In recent times, following the global financial crisis, unusually low interest rates have not yet been able to trigger the required changes in economic output in the US, for example. Zakir and Malik (2013) go on to intimate that the asymmetries in response of aggregate output to changes in monetary policy can have strong implications for an economy concerning issues such as the conduct of monetary policy and the costs of changes in nominal demand. Such experiences obviously motivate a study that empirically investigates the actual impact of monetary policy on economic performance for SSA.

This chapter sheds some light on some of these issues by looking for empirical evidence on the real effects of monetary policy on economic output, and exploring its pathway through private capital formation. The contributions of the study to the literature are thus three-fold: the first is the findings on the impact of monetary policy on private capital formation in SSA, the second is literature contribution to the debate on the link between private capital formation and economic performance and the last is the real effects of monetary policy on economic output. The rest of the chapter is structured in the following manner: the next section, section 2, addresses the relevant literature. Section 3 provides the details of the study methodology. Sections 4 and 5 deal with the discussions and policy implications respectively.

5.2 Review of the Literature

This section reviews the available theoretical and empirical literature on monetary policy of interest rates, private capital formation and economic performance. The first section addresses the relationship between interest rates and private capital formation, the second on private capital formation and growth and the third on interest rates and economic growth.

5.2.1 Interest Rates and Private Investment

According to Ahmed and Islam (2006), economic theory suggests that changes in either nominal or real interest rates exert a direct influence on investment spending. Monetary policy, according to Kahn (1998), also works principally through its direct control of very short-term rates and indirectly through long-term interest rates, the latter being the mode for affecting sensitive sectors of the economy: housing, business investment and consumer durables among others.

On the issue of the posited relationship between interest rates and investment, though, there are two very divergent views. There is the substitutability hypothesis, discussed in the works of Tobin (1965) and Johnson (1967). They view money as a substitute for physical assets. Thus an increase in the rates of interest on monetary assets would result in the shifting of portfolios towards monetary assets with the consequences being a reduced rate of physical capital accumulation. This view therefore holds that interest rates, being the primary user cost of capital, must be low in order to stimulate fixed capital formation. In this regard as well, the thinking is that monetary policy that facilitates affordable credit to the private sector will enhance capital formation, while contractionary monetary policy, by making capital expensive, will reduce capital formation. In essence, the relationship is negative.

The alternative view, however, places interest rates in relation to the savings (both domestic and foreign) that provide the funds for investment. This view is predicated on the complementarity hypothesis of McKinnon (1973) and Shaw (1973), which was later formalized by Galbis (1979) and Fry (1980). According to this view, when real interest rates are realistic (positive), savings mobilization is more effective and there is availability of loanable funds. The high cost of capital, as a result of high nominal rates, also provides an inducement to efficiency in resource allocation and ultimately higher productivity of capital. This is predicated on the thinking that because investments take place when marginal productivity of the investment exceeds or equals the cost of the investment, then a high cost of capital is associated with mostly highly productive investments. Emery (1971) earlier advocated positive real rates of interest for developing

countries, given that these regions have a relative scarcity of funds in relation to their strong demand for capital. He pointed out further, that low interest rates in these regions spurred inefficiency and misallocation of economic resources. Following along these lines of reasoning, the relationship between interest rates and capital formation is posited as being a positive one.

These differing perspectives on the responsiveness of investment spending to interest rate movements, vis-à-vis the viewpoint of new growth theories that have investment spending as key, have triggered a significant volume of research interest in search of supporting evidence. The evidence, from a number of these studies, seem to indicate that aggregate level investment spending in general is negatively related to interest rates. Shafik (1992) in a study on Egypt arrives at the conclusion that a tight monetary policy is significantly and negatively related to private capital formation. This finding was also corroborated by Ogunbenro *et al.*, (1996) and by Kumar and Mlambo (1995) for Nigeria and SSA, respectively. In a recent study for South Africa, Khumalo (2014) documented a unidirectional causation running from interest rates to private capital formation, and the relationship is negative and statistically significant. Despite the seemingly overwhelming evidence of an inverse relationship between interest rates and capital formation, some other studies such as Mehrara and Karsalari (2011) argue that this negative effect is only evident when real rates exceed a threshold of 5 – 6%, otherwise the effect is positive. They employed 101 developing countries for the period 1970 – 2010 and found the relationship between real rates and investment to be that of an inverted U-form. Shapiro (1986) and Baldawi (2005), on the other hand, actually concluded from their studies that aggregate level investment spending is insensitive to interest rate movements. To further strengthen the point with regard to the interest effect on capital accumulation, subsequent studies employed disaggregated data and micro-level data. Upon disaggregating the investment data, some more findings have emerged to support the negative link between investment and interest rates, although most of these studies are skewed more towards developed economies. Chatelain *et al.*, (2003) in a study on firm investment and monetary policy in the Euro area, for example, concluded that monetary policy actually has negative and significant long-run effects on the capital stock of firms in Germany, Italy, Belgium, Luxembourg, and France. Inferring from the impact of user cost of capital, Akbar and Jamil (2012) also report that monetary policy has an adverse but insignificant relationship with private investment in the agricultural sector in Pakistan. In general, the view that seems to be supported by the available literature is the substitutability hypothesis that advocates low interest rates to stimulate investment.

5.2.2 Private Investment and Economic Performance

In both developed and developing countries, private investment is considered one of the major contributors to economic growth (Matwang'A Lusambili, 2000). In fact, according to Blomstrom et al., (1996), economists and historians generally agree that there can be no fast long-run growth without large investments in fixed capital. This is because increasing investment triggers the adoption of new technology, creates new employment opportunities, grows incomes and, these, ultimately lead to economic growth. In general, private investment is considered a very crucial pre-condition for economic development because, by bringing together resources for the production of goods and services, it allows economic activity to be set in motion. In light of these, the question: 'can a country create growth by enhancing fixed capital formation?' has received a lot of research interest. This interest is heightened more because of the notion that private investment, when successfully harnessed, can play a very valuable role in reducing poverty. A number of empirical studies support this view and further indicate that private sector-led growth has an even more positive impact on growth compared to public investment. This differential impact, according to Serven and Solimano (1990) and Coutinho and Gallo (1991), is because public sector investment is relatively less efficient compared to private investment. In response to the alleged efficiency of private investment in stimulating economic growth, a number of studies have been conducted to ascertain the link.

De Long and Summers (1992) concluded from their study that the rate of capital formation determines the rate of a country's economic growth. In a study of East Asia, Young (1994) concluded that investment was the main driver of the growth experienced in the East Asian economies. Barro (1991), on the determinants of growth, also pointed out investment as one of the many factors responsible. Gutiérrez (2005), in a study of the six largest countries in Latin America also found that investment in machinery and equipment and private investment in general were most effective in raising per capita GDP growth. M'Amanja and Morrissey (2006) examined the determinants of growth for Kenya for the period 1964 – 2002. Using per capita GDP to proxy growth, the study found that investment has a strong impact on growth. Athukorala and Sen (2002) corroborate these findings, but add that the growth effect of private investment is not only dependent on the volumes but also linked to the efficiency of the investments. On the whole, these findings go to support the conventional argument that a slowdown in investment translates into a slowdown in growth, suggesting a positive effect of investment spending on economic performance.

5.2.3 Interest Rates and Economic Output

In terms of the relationship between interest rates and aggregate output, one of the conventional economic theories has it that, as cost of capital becomes cheaper, investment spending increases with an ultimate increase in growth. In essence, a contractionary monetary policy contracts the economy while an expansionary monetary policy expands the economy via its effect on investment. A second school of thought, however, holds that investment spending, which is the foundation for growth, can only take place when there is funds availability. Funds availability is in turn dependent on savings. According to this perspective, since savings can only take place in an environment of positive real interest rates (high nominal rates in the presence of high inflation), investment spending and growth are rather associated with high and not low nominal interest rates. In other words, a contractionary monetary policy actually spurs savings, which lead to investment and growth. Yet another view, which seems to be an extension of the second view, is of the opinion that the relationship between interest rates and economic growth is more of a non-linear one, with an inverted U shape. As per this perspective, at very low or very high levels of interest rates, economic growth is hindered. They suggest that though growth and investment can be positively associated with interest rates, these rates must operate within a threshold.

On the empirical level, the World Bank (1989) documented that the rate of economic growth in countries with strongly negative real deposit rates is lower compared to countries with positive real rates. In the same study, they documented higher productivity of investment in the higher real rate environment (approximately 4 times more). According to this study, the potentially negative effect of a low interest rate on growth is exerted, not only through the quantity of investment, but also through the quality of investments. De Gregorio and Guidotti (1995) also found the growth and interest rate relationship to resemble an inverted U-curve. This indicates that low and negative real rates tend to cause financial disintermediation and a slowdown in growth, following from the McKinnon and Shaw (1973) hypothesis. On the other hand, when very high real interest rates are not a reflection improved investment efficiency but point more to a lack of credibility with regards to economic policy or other forms of country risks, there is a likelihood that growth may be hampered. Fry (1997a) confirms the inverted U-curve relationship, using a sample of 85 developing countries over the period 1970 – 1995. He concludes that growth is maximised when real rates lie within the range of -5% to +15%. Shafik and Jalali (1991) empirically corroborate this positive relationship between interest rates and growth. They explain the positive relationship as being indicative of improved investment efficiency even when investment volumes decline.

In line with the conventional argument on cost of capital effect, Van Els *et al.*, (2001) found that after an increase in the policy-controlled interest rate in the euro area, the decrease in investment accounted for between 30 to 50 percent of the drop in GDP during the first year. This share rises to as much as 80 percent of the fall in GDP after three years. In essence, a rise in the policy interest rate causes a reduction in growth. Using data spanning 111 years (1901 – 2011), Hansen and Seshadri (2013) also find a negative correlation between interest rates and GDP growth. Along the same lines, Nouri and Samimi (2011) find a positive and significant relationship between expansionary monetary policy and growth.

Looking at the empirical evidence so far, there is no doubt that the relationship between monetary policy and economic performance is still ambiguous and the debate is still ongoing, yet to arrive at a consensus.

5.3 Methodology

This section presents the details of the methodology employed for the study. The first part deals with the model and estimation approach, followed by the empirical justification of the variables included in the model.

5.3.1 Modelling and Estimation Approach

In order to estimate the effect of monetary policy on economic performance and private capital formation in SSA, nine countries are sampled. The sample is based purely on the availability of data for the period under study: 1999 – 2011. The countries are: Botswana, Ghana, Kenya, Mauritius, Namibia, Nigeria, South Africa, Swaziland and Zambia. The variables for the study are GDP per capita, private capital formation (as a percentage of GDP), monetary policy rate (annual average), stock market capitalization (as a percentage of GDP) and openness (exports plus imports as a percentage of GDP). The series were drawn from the World Development Indicators (WDI) and the International Financial Statistics (IFS).

In terms of model selection, the study adopted the growth model by Zakir and Malik (2013). In their model, output is a function of its own lag, monetary policy and the standard determinants of growth: terms of trade, stock market development, private investment (Khan and Senhadji, 2000). The private capital formation model for the study follows the adaptation by Adjasi and Biekpe (2009) of the traditional simple investment model by Barro (1990). Following the user

cost of capital and investment literature (Mishkin, 2007; Ribeiro and Teixeira, 2001; Iacoviello, 2000 and others), this investment model is augmented with the monetary policy variable, mainly to capture the effects of interest rate on investment. The study thus arrives at the following models for growth and capital formation respectively:

$$GDPC_{it} = \beta_0 + \beta_1 MPR_{it} + \beta_2 Privcap_{it} + \beta_3 Mktcap_{it} + \beta_4 Trade_{it} + \beta_5 GDPC_{it-1} + e_t \quad (5.1)$$

$$PrivCap_{it} = \beta_0 + \beta_1 MPR_{it} + \beta_2 Mktcap_{it} + \beta_3 Trade_{it} + \beta_5 PrivCap_{it-1} + e_t \quad (5.2)$$

To explore the effect of monetary policy on growth via private capital formation, the monetary policy variable is interacted with private capital formation in model 1 to arrive at:

$$GDPC_{it} = \beta_0 + \beta_1 MPR_{it} + \beta_2 Privcap_{it} + \beta_3 MPR * Privcap_{it} + \beta_4 Mktcap_{it} + \beta_5 Trade_{it} + \beta_6 GDPC_{it-1} + e_t$$

.....

(5.3)

Where $GDPC_{it}$ is *GDP per capita* for country i in time t . MPR_{it} is the *monetary policy rate* to proxy for the stance of monetary policy, $Privcap_{it}$ is *private capital* scaled by GDP, $Mktcap_{it}$ is *stock market capitalization* scaled by GDP, $Trade_{it}$ is *imports plus exports* scaled by GDP and $MPR * Privcap_{it}$ is the interaction term between *private capital and the monetary policy rate*. $GDPC_{it-1}$ is the lag of *GDP per capita* in time t for country i .

The equations are estimated as dynamic panels, where a lag of the dependent variable is also included as an independent variable. This dynamic panel setting creates endogeneity issues. To address the potential issues of endogeneity and possible omitted variable bias that may arise from the model, the estimation is done using the more efficient system generalized method of moments (GMM) by Blundell and Bond (1998). This simultaneously corrects for endogeneity issues that arise because of a two-way effect among the variables of study, and unobserved heterogeneity issues. The system GMM uses lagged values of the regressors (in levels and in differenced form) as instruments for right-hand side variables and removes the fixed effect from the error term.

5.3.2 Justification of Variables

5.3.2.1 Central Bank Policy Rate

Based on the theoretical literature, the relationship between interest rates and investment and economic growth can be either negative or positive. In the former case, which follows the Barro-Becker path, high interest rates and ultimately high cost of capital is a deterrent to investment and growth. In the latter case, the relationship to investment and growth works via savings. In this instance, therefore, high interest rates attract savings which serve as loanable funds for investment and ultimately promote growth. Like the theoretical literature, the empirical evidence on interest rates, private capital formation and growth is also yet to arrive at a consensus. While some studies have arrived at a strongly negative relationship between interest rates on capital formation and growth (Khumalo, 2014; Hansen and Seshadri, 2013; Van Els *et al.*, 2001) and some others have documented a positive relationship (Fry, 1988; Asante, 2000; Munir *et al.*, 2010; World Bank, 1989; De Gregorio and Guidotti, 1991), yet some have documented a non-linear relationship (Mehrrara and Karsalari, 2011; Fry, 1997a). Based on the evidence so far, there is no *a priori* expected sign for the impact of monetary policy on investment and growth.

5.3.2.2 Stock Market Development

Stock markets, according to Adjasi and Biekpe (2009), enable firms to quickly and efficiently acquire capital which is channelled into profitable projects, thus making a significant contribution to economic performance. Tobin (1969) and Atje and Jovanic (1993) also point to a positive link between stock market development and investment. In contradiction to the above, there are theoretical arguments, that the services provided by the stock markets can also hinder economic growth (Demirgüç-Kunt and Levine, 1996). Devereux and Smith (1994), for example, believe it reduces saving rates through income and substitution effects, thus hindering economic growth. Another view also holds that economic development is thwarted when dissatisfied participants find it easy and quick to sell in a liquid equity market.

Empirical investigations into the link between stock market development and investment and economic growth also seem to be far from conclusive. While Yartey (2008) and Rousseau and Wachtel (2000) find that stock market development is positively influential on investment and growth, Stiglitz (1994), Shleifer and Vishny (1986) and Bhide (1993) find otherwise. Adjasi and Biekpe (2006) find mostly insignificant relationships for their growth models and significant relationships in their investment models. The coefficient sign in this study is thus left open.

5.3.2.3 Private Capital Formation

The link between private capital formation and economic growth is a relatively well-documented one. The theory holds that private capital is more efficient compared to public capital and spurs higher productivity and ultimately growth. According to Athukorala and Sen (2002) this productivity effect is however dependent not only on the volume of investment but also on (the) efficiency. There is a significant volume of empirical studies to support the conventional argument that private capital formation fosters growth (Blomstrom *et al.*, 1996; De Long and Summers 1992; Young, 1994; Gutiérrez 2005; M'Amanja and Morrissey, 2006). On the basis of the empirical evidence, the *a priori* expectation of private investment on growth is positive.

5.3.2.4 Trade

With the emergence of the endogenous growth theories, the role of government policy in stimulating growth has received significant research attention. The proponents of liberalization policies, for example, advocate trade openness on account of its benefits: reduction in production inefficiencies (Roubini and Sala-I-Martin, 1991; Kar *et al.*, 2008); increased competition in the domestic economy and hence productivity, and enlarged market for domestic producers to enjoy scale economies (Taylor, 1994). These benefits are based on the import discipline hypothesis (Aghion, Harris and Vickers, 1997). Serven (2002) is, however, of the view that “an abrupt increase in exposure to external competition in certain sectors can make these sectors less attractive as a destination for new capital flows” and ultimately be inimical to growth. Also, where openness to trade is accompanied by currency depreciations, then capital formation, that is reliant on imports, will suffer and negatively affect growth. On account of the arguments above, the study does not set an *a priori* expectation on the effect of trade openness on private capital formation and growth.

5.4 Findings and Discussion

This section presents the analysis and discussion of study findings. It also deals with the summary statistics of the variables under study, the correlation matrix of the variables and finally the regression output for the three equations.

5.4.1 Descriptives and Correlation Analysis

In terms of the descriptives, Table 5.1 indicates that the average GDP per capita for the nine⁴ countries that were studied averaged approximately 2.69 over the 13-year period. Some countries were, however, as low as -8.690 and others as high as 30.344. For private capital formation, the highest value over the study period was 20.66 percent of GDP and a low of 4.06% of GDP. The period average was 12.61% of GDP. It appears that investment spending in SSA is not significant in relation to GDP.

Table 5.1: Summary Statistics of Study Variables (1999-2011)

Variable	GDP_per capita	Privcap	MPR	MktCap	Trade
Mean	2.698681	12.61943	12.87535	39.75085	89.65551
Std dev.	3.750647	4.469236	6.367084	59.43053	33.67453
Min.	-8.690764	4.066759	2.96	4.243549	42.65139
Max.	30.34408	20.66257	40.0981	291.2753	202.8499

Source: author computations.

The proxy for the monetary policy stance, the central bank policy rate, had a mean of 12.87% over the period, with minimum and maximum values of 2.96% and 40.09% respectively. Stock market development, proxied by market capitalization over GDP, was approximately 39.75% on average for the sample. Some countries, however, had low ratios, evidenced in the minimum value of 4.24% of GDP while others exhibited significant stock market investment (291.2% of GDP) over the same period. Like stock market development, trade openness also exhibited some significant differences among the countries under study. For instance, in spite of a maximum value of 202.84% of GDP within the study sample, indicating a very open economy, the minimum value stood at 42.65% of GDP, roughly one-fifth of the maximum value. The average trade share value for the sample for the period stood at 89.6555% of GDP.

To test for the possibility of multicollinearity in the regressors, the correlation between the variables were tested (see Table 5.2). From Table 5.2, private fixed capital formation exhibits a positive correlation with GDP per capita and trade openness, but a negative relation with the central bank policy rate and stock market capitalization.

⁴ Botswana; Ghana; Kenya; Mauritius; Namibia; Nigeria; South Africa; Swaziland; Zambia

Table 5.2: Correlation Matrix of Study Variables

Variable	GDP_percapita	PrivCap	Mpr	MktCap	Trade
GDP_percapita	1.0000				
PrivCap	0.1512	1.0000			
Mpr	0.0049	-0.0401	1.0000		
MktCap	-0.0360	-0.2302**	-0.2030**	1.0000	
Trade	-0.1059	0.1522	0.0653	-0.3098***	1.0000

*, **, *** = significance at 10%, 5%, and 1% respectively

Of these relationships with private capital formation, only the relationship with stock market capitalization was significant at 5%. The monetary policy rate has a positive and insignificant correlation with GDP per capita and trade openness but a significant and negative correlation with stock market development. Trade openness further exhibits negative correlations with GDP per capita and stock market development, the latter relationship being significant at 1%; the relationship with the policy rate is, however, positive but insignificant. None of the correlations are high enough to raise concerns of multicollinearity in the regression.

5.4.2 Regression Analysis

The results of the dynamic panel data regression of monetary policy on economic performance reveal some interesting relationships. There is a negatively significant relationship between the lag of GDP per capita and its current value. The significance points to the fact that past levels of GDP per capita help to explain current levels while the negative sign is indicative of cyclicity. This seems to suggest that periods of growth and contractions seem to alternate in SSA or that a period of increased growth is immediately followed by a period characterised by decreased growth. In other words, GDP growth is not a smooth or persistent occurrence. According to Lipsey and Chrystal (2011), such cyclicity results from deviations in the trend of growth in GDP and shifts in the aggregate demand curve.

The monetary policy variable, from Table 5.2, has a positive and significant coefficient. In terms of interpretation, it appears that increasing interest rates and thus higher nominal cost of capital actually stimulates growth. This finding is obviously contrary to the more general literature (Hansen and Seshadri, 2013; Nouri and Samimi, 2011; Van Els, 2001, and Barro, 1991) that has

mostly documented a strongly negative relationship, or at best an insignificant relationship, but still with a negative sign. By inference from the sign and significance, however, it may appear that while the nominal interest rates rise, real interest rates may still be low or negative, given that most of these economies also experience high inflation rates. In such instances, the high nominal rates may not necessarily stifle productivity growth, as the real cost of capital still stays low. Contrary as the study finding may be to the conventional argument, it supports the findings of studies by the World Bank (1989), De Gregorio and Guidotti, (1995) and Fry (1997a) that interest rates and growth are positively related. The explanation of the positive link between growth and interest rates was indicated as flowing more from the high marginal productivity of investment capital and not just from the volume of the investment that feeds growth. In this instance, while the volume may fall because of capital costs, productivity of the acquired capital exceeds the drop in capital formation and the net effect on growth remains positive.

The other intuition for the positive effect of contractionary monetary policy on economic performance, according to Emery (1971), flows more from the ability of high interest rates to attract both domestic and foreign savings to fund growth. In other words, when interest rates are high, savings increase and provide the needed funding for investment and thus growth. The reasoning follows further, that high interest rates hold the potential to spur more labour-intensive productivity as opposed to capital-intensive productivity, thus creating employment and stimulating consumer spending, the most significant component of aggregate demand. Emery (1971) offers yet another explanation for this puzzling evidence. He argues that low interest rates stimulate inefficient capital accumulation, which may not necessarily foster growth. He also suggests that when economic agents fail to pay a realistic cost of capital because of low interest rates, their resource allocation is less than efficient. Following from Emery (1971) and the other arguments above, the positive link can be attributed to more efficient savings mobilization coupled with higher productivity of both labour and fixed capital in the SSA region. The positive sign does not, however, rule out the possibility of a non-linear relationship between interest rates and growth.

The proxy for stock market development, market capitalization to GDP, returns a statistically insignificant and negative relationship with economic growth (Table 5.3). From the results, it appears that developing the stock market is inconsequential in promoting the economic growth of SSA. While this contradicts the empirical studies that support the finance-leads growth hypothesis (Filer *et al.*, 1999; Yartey, 2008), it does support the findings of Singh (1997) and

Levine and Zervos (1996), that financial development, like development on the stock market, has little or even potentially negative effects on economic growth. Hoti and Nuhui(2011) also argue that the negative association with the stock market and growth may flow from unfavourable conditions associated with the stock market, such as price volatility, illiquidity, inappropriate regulation or organization. Bawumia *et al.*, (2008) and Senbet and Otchere (2008) further concur by indicating that the negative effect is due to the underdevelopment of these stock markets, hence serving as a drain instead of a driver of economic growth. Another explanation can be Azarmi *et al.*'s (2005) notion that the relevance of the stock market for economic growth is a function of the policies prevalent at the time of study. In essence, if the policies do not complement the stock market, the growth effect of the stock market will be negative. These arguments ultimately raise the question on the role of effective institutions in the growth process.

Table 5.3: Regression output for growth in SSA

	Regression #1	
Dependent Variable	GDP_PerCapita	
	Coefficient	p-value
GDP (-1)	-.1817796	(0.036)**
Mpr	.4345404	(0.000)***
Mktcap	-.0307553	(0.211)
PrivCap	.3929374	(0.043)**
Trade	-.058466	(0.145)
Wald Chi, Prob.	56.34	(0.0003)***
Sargan's Test	78.92551	(0.0000)***

***, **, * = Significant at 1%, 5% and 10% respectively. GDP is GDP per capita; MPR is monetary policy rate; MKTCAP is stock market capitalization; PrivCap is private capital formation; Trade is international trade. The following diagnostic tests are run for the model: the Sargan test for overidentification, the Arrelano-Bond test for autocorrelation and the Wald Chi² for model fit. The results indicate that the over identifying restrictions are valid, there is no first order or second order autocorrelation and the model fits the data well.

Private fixed capital formation, on the other hand, shows the expected positive sign and is significant. By inference, increasing levels of fixed capital formation in the private sector stimulates aggregate demand and vice versa. This finding is in consonance with Adjasi and Biekpe (2009), Gutiérrez (2005), Barro (1991), M'Amanja and Morrissey (2006). In essence, the finding seems to indicate that there can be no significant growth without investments in fixed

and productive capital or as De Long and Summers (1992) put it, capital formation determines the rate of a country's economic growth. It is therefore expected that as more and more private capital is accumulated in productive areas, economic growth rates will be enhanced.

Trade openness has a negative and insignificant coefficient, contrary to the expectations of the liberalization schools of thought (Barro, 1991). By inference, increasingly becoming open to global trade does not hold any benefits for SSA. This could very well be a reflection of the very uncompetitive position of SSA with regards to global trading. By being mostly net importers and with exports of mainly primary products, trade openness allows for goods that compete with growth stimulating sectors of the economy to flood the market and ultimately crowd out local industries, suppress employment and impact growth negatively. The insignificance of the trade variable also confirms the findings of Adjasi and Biekpe (2009) for SSA. So while it is not critical that the SSA region be open to freer trade, the effects could be more of a negative than positive effect for growth. The findings may, however, be in support of Balamoune-Lutz and Ndikumana (2007) that the limited effect of trade on growth is due to the weakness of relevant institutions. They also hold the view that trade and growth have a U-shaped relationship. So at the pre-threshold levels of trade, the effect of increasing trade is negative, and it is only after a certain magnitude of trade that growth effects become positive. Mazumdar's (1996) stance builds on the magnitude of trade argument by linking the growth effects of trade to the composition of trade, in other words, the quality of the trade basket. It may therefore be concluded, given that the countries under study have mostly primary goods in their trade basket, that the features that characterize the whole trade scenario contribute to its negative effect on growth.

The second model, (Regression # 2, Table 5.4) for this study, regresses private capital formation on its own lag, the policy rate, stock market development and trade openness.

Table 5.4: Regression Results for capital formation for SSA

Variable	Regression #2	
	PrivCap	
PrivCap (-1)	.8054611	(0.000)***
Mpr	-.009169	(0.897)
MktCap	-.0230604	(0.100)
Trade	.0348031	(0.072)*

Wald Chi, Prob.	520.70	(0.0000)***
Sargan's Test	43.40852	(0.0028)***

***, **, * = Significant at 1%, 5% and 10% respectively. PrivCap is private capital formation; MPR is monetary policy rate; MKTCAP is stock market capitalization; Trade is international trade. The following diagnostic tests are run for the model: the Sargan test for overidentification, the Arrelano-Bond test for autocorrelation and the Wald Chi² for model fit. The results indicate that the over identifying restrictions are valid, there is no first order or second order autocorrelation and the model fits the data well.

From Table 5.4, the coefficient of the lag of the dependent variable is positive and significant. It may be indicative that private capital formation in SSA is a persistent phenomenon. This finding conforms to the findings of Adjasi and Biekpe (2009) that current levels of private capital formation are positively influenced by its past levels. It also suggests that there is year on year improvement in fixed capital formation in the private sector and this function is very smooth. It appears that SSA is steadily and persistently accumulating private capital, and this is fundamental to long-term growth. It also appears that bursts of investment in the previous period spill over to the subsequent periods. The policy rate, the proxy for the cost of access to capital in the SSA regions, shows the expected negative sign albeit without any of the appropriate significance levels. This implies that the policy rate does not in any way influence capital formation in the private sector. It may also be indicative of the fact that while a contractionary monetary policy could be inimical to private capital formation, it is obviously not one of the critical factors that drive capital formation, hence the statistical insignificance. This finding supports the findings of Shapiro (1986) that aggregate level investment is insensitive to interest rate movements. According to Gelb (1989), such a relationship could emerge if capital formation is conditioned on other factors like the productivity of the investment, the investment need and not just the cost of capital.

Stock market development, from Table 5.4, is insignificant in relation to private capital formation. Given the findings, there is the possible indication that funds that find their way on to the stock market do not flow into the private sector of the region and if they do, they do not end in fixed capital formation. It may also suggest that the stock markets compete for the available investible funds and crowd out private sector capital formation. This finding contradicts the findings of Adjasi and Biekpe (2009) on the positive association between stock market development and private capital formation.

Trade openness is positive and significant in this regression. By interpretation, the increasing share of foreign trade to GDP enhances private capital formation. This could be indicative of the fact that as the trade openness enlarges the market for domestic producers, they respond with an increase in capital accumulation so as to enjoy scale economies (Taylor, 1994). It could also be that the reduction in trade barriers through liberalization creates an advantage to the export sector and thus increases the incentive to accumulate capital.

The third model, (see Table 5.5), which is model 1 augmented with an interaction term between monetary policy and private capital formation, presents similar results. The regression output does not show any sign changes, though one of the insignificant variables in model 1 became significant in model 3 and that is the trade variable.

Table 5.5: Regression output for growth in SSA

	Regression #3	
Variable	GDP_PerCapita	
GDP (-1)	-0.2063823	(0.018)**
Mpr	.7940917	(0.000)***
MktCap	-0.0331377	(0.175)
PrivCap	.6208867	(0.011)**
Trade	-0.0795867	(0.058)*
PrivCap*Mpr	-0.0231086	(0.133)
Wald Chi, Prob.	59.66	(0.0000)***
Sargan's Test	78.02389	(0.0000)***

***, **, * = Significant at 1%, 5% and 10% respectively. GDP is GDP per capita; MPR is monetary policy rate; MKTCAP is stock market capitalization; PrivCap is private capital formation; Trade is international trade. PrivCap*Mpr is the interaction term between monetary policy and private capital formation. The following diagnostic tests are run for the model: the Sargan test for overidentification, the Arrelano-Bond test for autocorrelation and the Wald Chi² for model fit. The results indicate that the over identifying restrictions are valid, there is no first order or second order autocorrelation and the model fits the data well.

Given the negative and significant trade coefficient, it appears that for SSA, as the economies become more open to foreign trade, growth in the region reduces. This confirms the view of Serven (2002) on the possibility that foreign competition in certain sectors can make these sectors less attractive as a destination for new capital flows and ultimately be inimical to growth.

Also, it is possible that because currency depreciation is common to the sample, imports for production that stimulates growth is stifled due to high import prices. Another inference could be the stifling of local industries and growth due to increased foreign competition.

The interaction term between private capital and the policy rate is negatively signed but statistically insignificant, thus confirming what appears to be an inconsequential relationship between private capital formation and monetary policy in SSA. The statistical insignificance, notwithstanding increasing policy rates, can potentially serve as a tax on private capital accumulation and compromise its role in growth. Given the potentially negative impact of the interaction term, it can also be adduced that the economic growth prospects of less capital endowed economies are quite sensitive to monetary policy hikes. It may also suggest, that though private capital is likely to be negatively affected by high cost of capital, the impact is not significant enough to pass-through to growth and also possibly because other factor may be more relevant in driving the kind of capital accumulation that fosters growth and not necessarily monetary policy actions.

5.5 Summary, Conclusion and Policy Implications

The study sought to test the impact of the policy rate on growth and investment in some selected countries in the SSA region. Data for nine (9) countries over a 13-year period was captured and a dynamic panel model estimated. Based on the study results, the major findings were: growth in SSA is cyclical whilst private capital formation is a persistent and smooth function in the region. Growth is positively related to the policy rate, following the McKinnon and Shaw (1973) hypothesis, but stock market development has no effect on growth or private capital formation. The overall impact of trade openness is ambiguous and the policy rate is not a critical factor to private capital formation in the SSA region.

Based on the purpose of the study it can be concluded, that while private capital is obviously positively influential on growth, the formation of private capital to stimulate growth is not driven by the monetary policy stance.

In terms of policy implications, the findings seem to advocate high policy rates. While the high policy rate may hold negative implications for private capital formation, the highly positive relationship with growth may be indicative of its potential to attract both foreign and domestic savings to fund growth. Such realistic market rates will also stimulate a better and more efficient

utilization of acquired capital. It will also stimulate higher employment of the labour force in the region and thus reduce unemployment and stimulate consumption and growth. Empirical testing for the point, when the potentially negative effect of the policy rate on investments turns significant, may be relevant in identifying the threshold for target policy rates in the region.

Another policy implication flowing from the positive link between private capital formation and growth is the need to stimulate private capital formation as it leads to growth. Policies to encourage capital formation should be aggressively pursued. On account of the insignificant relationship between capital formation and the policy rate, there may be the need to further investigate the other determinants that stimulate private capital formation. Stock markets in the SSA region seem to be failing in their functions because they are mostly undercapitalized, thinly traded and illiquid. Policy moves to address these structural failures may work to reverse the potentially negative effect found in this study.

On the issue of trade and the ambiguity of the findings, the argument is that while there may be favourable effects of trade on aggregate capital accumulation, trade may not necessarily ensure capital accumulation in sectors that are growth-enhancing hence the negative effect. The ambiguity also calls for selective openness. In other words, sectors that can be harmed when opened to foreign trade should be protected, whilst those that will benefit from being opened to free trade can be liberalized. In essence, openness should be tailored as per target sector. This kind of policy will require further study to identify sectors that will or will not benefit from openness and be managed as such.

CHAPTER SIX

SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

This final chapter summarises the important findings and policy implications emerging from the various chapters constituting the dissertation. The conclusions that are drawn are based on the findings of the study. In line with the broad objectives of the dissertation, relevant policy recommendations are suggested, along with recommendations for future research.

6.2 Summary of Purpose and Findings

This dissertation is a collection of four stand-alone empirical essays exploring the monetary transmission mechanism in SSA. The dissertation examines both micro level and macro level responses to changes in monetary policy. Chapter One provides the overview while chapters two to five are the empirical studies examining some issues on the monetary transmission mechanism: the interest rate pass-through, exchange market pressure, bank risk-taking behaviour, and the response of private capital formation and economic growth to changes in the policy rate.

Chapter Two assessed the fullness of the interest rate transmission mechanism of the monetary transmission mechanism. The chapter examined the effectiveness of the monetary policy transmission to retail rates as being a function of the level of financial development. This particular paper was limited to Anglophone West Africa, mainly because these countries seek to integrate their monetary frameworks. The summary statistics revealed differences in the levels of financial development, the policy rates and economic growth. These differences ultimately came to bear on the study results. The study revealed significant differences in the transmission mechanisms of the 3 countries that were studied: Gambia, Ghana and Nigeria. Whilst Ghana and Gambia were mostly characterised by sluggish responses in the lending rate to policy moves, Nigeria was characterised by overshooting in its lending rate response to policy changes. The findings indicate a pass-through of less than unity for Gambia and Ghana but greater than unity for Nigeria. In general the study failed to find an effective interest-rate pass-through in Anglophone West Africa. That aside, there were also significant differences in the effect of the level of financial development on the pass-through, thus the study failed to provide concrete evidence to support the argument that the effectiveness of pass-through is dependent on the level of financial development.

Chapter Three examines exchange market pressure on a currency as a function of the policy rate and some macroeconomic fundamentals. Using a panel dataset on frontier markets for which data was available, the paper sought to test the hypothesis that depreciation pressure on domestic currencies in SSA can be eased with monetary policy changes. The regression results showed the exchange market pressure on a currency as being dependent on its own lag, the policy rate, the terms of trade, the stock of public and the current account balance. The results revealed that a contractionary monetary policy can stave off depreciation pressure. The results also indicate that GDP growth in SSA exerts depreciation pressure as far as domestic currencies are concerned. Real GDP growth was significantly and statistically positively related to exchange market pressure. The results also showed an appreciative effect of the stock of debt, the terms of trade and the current account balance on domestic currencies. Private capital flows were insignificant across all the regressions, including the ones that excluded South Africa, to test for the possibility of biases in the estimates. The results of the chapter seem to support the notion that higher domestic interest rates relative to other countries attract foreign capital in search of high investment returns and subsequently cause domestic currencies to appreciate. The findings also point to the fact that macroeconomic fundamentals are important in explaining currency position in the foreign exchange market.

Chapter Four investigates the risk-taking behaviour of banks as a function of the monetary policy rate, real GDP growth and bank characteristics, like liquidity, capital, lending and size. The chapter sought to test for the presence of a risk-taking channel of monetary policy transmission in SSA. The study also sought to test for the possibility that certain bank-level characteristics predispose banks to risky behaviour. The results of the study failed to support the risk-taking channel in the manner that is hypothesized in the literature: ‘that low interest rates trigger a search for higher yield and make banks risky’. Instead, the results show that banks engage in risky behaviour when interest rates begin to rise. This evidence is, however, unequivocal as the behaviour of the banks in response to the contractionary policy environment may still be a function of real interest rates. The results showed that a bank’s risk profile is a function that is significantly dependent on its history, the size of the bank, the bank’s liquidity, its lending growth and its economic growth. The results also suggest that real GDP growth, lending growth and profitability are positively and significantly associated with improved risk profiles of banks, while bank size, bank liquidity and bank capital drive risky behaviour. The use of interaction terms also

revealed that the large banks, and banks with high liquidity are more prone to risky behaviour when interest rates are high.

Chapter Five examined three interrelated issues. The first part investigated the relationship between the monetary policy rate and economic growth; the second, the relationship between the policy rate and private capital formation; and the last part, the link between private investment and growth, given monetary policy changes. In the first case, the results show that economic growth is a function of its own lag, the policy rate and the level of private capital formation. GDP per capita was negatively and significantly related to its lag, but positively and significantly related to the policy rate and private capital. In the second case, private capital formation emerged as a function of itself and the share of foreign trade. In the third case, growth emerged as being influenced by its own lag, the policy rate, private capital formation and the share of foreign trade. In all the two growth regressions, the lag of GDP per capita was significantly negative, indicating cyclicity. Private capital formation was positively influenced by its lag, indicating investment persistence. The policy rate emerged as positively significant in all the growth regressions, failing to support the hypothesis that at high interest rates, growth diminishes. The share of foreign trade shows up as positively significant in explaining investment but negatively significant in explaining economic growth. The study fails to find a growth impact for stock market development as well as confirm private capital as a function of interest rates.

6.3 Recommendations

Based on the findings made from the study, the following recommendations are suggested with the aim that it will enhance the effectiveness of monetary policy in the pursuit of economic growth. It is important that central banks find the appropriate trade-off between conflicting goals that require changes to the policy rate. This will ensure a policy design that has more benefits than costs. A case in point, for instance, is with some of the findings of this study: while increasing the policy rate may be beneficial for economic growth and the domestic currency position, it has the potential of increasing bank risk-taking behaviour and of possibly lowering private investment. Given that bank risk-taking behaviour can trigger a financial crisis, reduce private investments and retard growth, there is the need to assess the costs and benefits of each policy move before it is implemented. In this particular regards, it might be prudent for central banks to ensure that real rates of return are preserved in periods of rising policy rates. This is to minimise the potential risk-taking effect that nominal rate hikes may trigger.

It is also important for Sub-Saharan Africa to pursue policies that will improve upon their trade positions. Currently, most of the countries are net importers. Policies that will transform them to net exporters might prove beneficial in the long run. Steps to add more value to the current tradables in SSA might also prove valuable. On the same issue of trade, it might be imperative for Sub-Saharan Africa to re-evaluate its trade openness with the view to protect some sensitive sectors of the economies. This will ensure, that whilst still being open to trade in the globalized world, the free trade agreements are tailored to bring the best of benefits to the table for Sub-Saharan Africa.

In a related framework, it might also prove beneficial to encourage consumption of locally manufactured goods. This can either be through restrictions on imported substitutes, or if price is the determining factor, then targeted subsidies to make the local alternative competitive. This will ensure that growth is accompanied by strong domestic currencies. Policies should also be directed at improving the export capacity of the Sub-Saharan African region, both in terms of volumes and value. This will also lend strength to the currencies.

Furthermore, it should be noted that monetary policy is not neutral in terms of financial stability. In periods of rising interest rates, when banks are predisposed to potentially risky behaviour, large banks, liquid bank and under-capitalized banks need to be monitored even more closely to control overly risky behaviour. Banks with these characteristics are also obviously very important for the stability of banking systems, given that size, liquidity and adequate capital are the pillars of stable financial systems. As such, prudent supervision during contractionary monetary period should be appropriately designed to ensure that the stability of the financial system is not in jeopardy.

The test of the interest rate pass-through, which is one of the earlier points of the monetary transmission mechanism (MTM), reveals a lot of deficiencies in West Africa. It might be beneficial for the West African sub-region to improve on or establish, where non-existent, the channels that facilitate the interest rate pass-through: stock markets and bond markets. Credit to the private sector, which also serves as a conduit for the policy rate transmission and is the measure of financial development in this study, should be improved upon. In essence, as more credit flows through to the private sector, a medium for policy transmission is created.

Private capital formation should be encouraged through policy moves to protect property rights and ensure appropriate legal recourse where needed. In essence, institutional weaknesses such as contractual incompleteness, corruption, lack of well-defined property rights and poor enforcement of contracts should be corrected.

A reasonable certainty on good policies being implemented could also work to create the appropriate climate for investment planning.

6.4 Conclusions and Recommendations for Future Research

On the whole, this dissertation makes a case for the relevance of monetary policy in the pursuit of a macroeconomic agenda as well as in the behaviour of economic agents. A key implication is that monetary policy is not neutral in the pursuit of economic goals, both on the macro level and on the micro level. The collective thrust of this dissertation is the confirmation of the potentially conflicting effects of a particular stance of monetary policy. This raises the ultimate question, how do we find the optimal trade-offs with regards to the effects of monetary policy? This could form the foundation for future research.

A limitation in this dissertation that could provide direction for further research is in the choice of the variable to proxy monetary policy. While this measure, the policy rate, may be adequate within the context of the study objectives, a major concern is the possibility of losing valuable information on the transmission mechanism because other measures of monetary policy, such as the money supply or real interest rates, for example, were not employed. In this regard, future research could still explore the areas within the study but this time employing other measures of monetary policy. Another area worth exploring is the transmission mechanism as it operates in the rather large informal financial sectors across Sub-Saharan Africa. This may offer better insights into the design and implementation of effective monetary policy. Further studies could also focus on monetary policy effects on sectoral divisions of the economy as well as other macroeconomic fundamentals not captured in this study.

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Appendix A

A_1: Variable Definitions

Variable	Measurement
LENDING RATE (LR)	Average annual lending rate for banking sector
CENTRAL BANK POLICY RATE (MPR)	Annual average of Central Bank policy rate
FINANCIAL DEVELOPMENT (BSIZE)	Domestic credit to the private sector (% of GDP)
ECONOMIC GROWTH (GDP)	Real GDP growth
MARKET VOLATILITY (BVOL)	Standard deviation of prime rate (5-year rolling window)

A_2: Summary Statistics of Study Variables by Country

Gambia

Variable	Mean	Std. Dev.	Min	Max
Lr	24.18919	5.636379	14	37
Mpr	14.96432	6.333497	6	29.25
Bsize	12.97703	6.568595	3.73	25.12
GDP	3.752162	3.528698	-4.3	12.39
Bvol	2.628226	2.303575	0	8.871302

Ghana

Variable	Mean	Std. Dev.	Min	Max
Lr	27.78378	8.310419	19	47
Mpr	21	10.35105	8	45
Bsize	7.651892	4.944318	1.54	15.88
GDP	3.552703	4.837447	-12.43	14.39
Bvol	3.75164	1.830891	.9797959	8.064738

Nigeria

Variable	Mean	Std. Dev.	Min	Max
Lr	16.16177	6.389534	6	31.65

Mpr	11.71622	5.246084	3.5	26
Bsize	14.72873	6.798227	6.814002	38.59011
GDP	3.462274	5.227168	-13.12788	10.6
Bvol	2.057864	1.276957	0	5

Appendix B: Regressions on sensitivity to model specifications

B-1: Regression output on complete sample with one (1) lag of GDP

Variable	Regression #1		Regression #2	
EMP(-1)	-0.0264559	(0.000)***	-0.0288086	(0.000)***
MPR	-3.950874	(0.081)*	-4.658843	(0.018)**
PKFL	-8.800449	(0.030)**	-6.680622	(0.088)*
DEBT	-1.720672	(0.000)***	-1.956307	(0.000)***
TOT		-	-219.0571	(0.000)***
CABA	-4.702457	(0.005)**		-
GDP	2.028739	(0.468)	4.532991	(0.443)**
GDP(-1)	0.0984553	(0.973)	2.826173	(0.461)
Wald Chi ² ,	1812.42	(0.000)	6735.03	(0.000)
Arellano-Bond Test for Autocorrelation	Order 1	-1.3172 (0.1878)	-1.3071	(0.1912)
	Order 2	0.00046 (0.9996)	-0.23292	(0.8158)
Sargan's Test	11.7107 (1.0000)		12.02655 (1.0000)	

***, ** and * denotes significance at 1%, 5% and 10% respectively. Values in parenthesis are the p-values. The following diagnostic tests are run for the model: the Sargan test for over identification, the Arrelano-Bond test for autocorrelation and the Wald Chi² for model fit. The results indicate that the over identifying restrictions are valid, there is no first order or second order autocorrelation and the model fits the data well.

B-2: Regression output on complete sample with two (2) lags of GDP

Variable	Regression #1		Regression #2	
EMP(-1)	-0.031608	(0.000)***	-0.03199	(0.000)***
MPR	-3.863759	(0.184)	-2.102238	(0.496)
PKFL	1.810495	(0.804)	8.365	(0.334)
DEBT	-1.301327	(0.031)**	-1.385754	(0.084)*
TOT		-	-149.0739	(0.183)
CABA	-2.80531	(0.142)		-
GDP	8.892914	(0.001)***	9.288287	(0.015)**
GDP(-1)	6.753634	(0.126)	6.155255	(0.200)
GDP(-2)	10.35197	(0.000)***	12.80457	(0.000)***
Wald Chi ² , Prob.	544.00	(0.000)	11196.24	(0.000)
Arellano-Bond Test for Autocorrelation	Order 1	-1.3112 (0.1898)	-1.3079	(0.1909)
	Order 2	-0.49858 (0.6181)	-0.58664	(0.5574)
Sargan's Test	11.30779	(1.0000)	9.408012	(1.0000)

***, ** and * denotes significance at 1%, 5% and 10% respectively. Values in parenthesis are the p-values. The following diagnostic tests are run for the model: the Sargan test for over identification, the Arrelano-Bond test for autocorrelation and the Wald Chi² for model fit. The results indicate that the over identifying restrictions are valid, there is no first order or second order autocorrelation and the model fits the data well.

B-3: Regression output on sample excluding South Africa (with one lag of GDP)

Variable	Regression #1		Regression #2	
EMP(-1)	-.0266064	(0.000)***	-.0263768	(0.000)***
MPR	-4.247091	(0.062)*	-4.25285	(0.052)**
PKFL	-7.448417	(0.065)**	-5.900472	(0.000)*
DEBT	-1.631857	(0.000)***	-1.581775	(0.000)***
TOT		-	-215.3596	(0.000)***
CABA	-4.435739	(0.013)**		-
GDP	2.357813	(0.380)	4.591192	(0.381)**
GDP(-1)	.5866153	(0.846)	2.881538	(0.381)
Wald Chi2, Prob.	1565.63	(0.0000)	11244.22	(0.0000)
Arellano-Bond Test for Autocorrelation	Order 1	-1.3147 (0.1886)	-1.3107	(0.1900)
	Order 2	-.04309 (0.9656)	-.20786	(0.8353)
Sargan's Test	10.56739	(1.0000)	9.605388	(1.0000)

***, ** and * denotes significance at 1%, 5% and 10% respectively. Values in parenthesis are the p-values. The following diagnostic tests are run for the model: the Sargan test for over identification, the Arrelano-Bond test for autocorrelation and the Wald Chi² for model fit. The results indicate that the over identifying restrictions are valid, there is no first order or second order autocorrelation and the model fits the data well.

B-4: Regression output on sample excluding South Africa (with 2 lags of GDP)

Variable	Regression #1		Regression #2	
EMP(-1)	-.0320827	(0.000)***	-.0324843	(0.000)***
MPR	-3.602594	(0.223)	-1.024539	(0.746)
PKFL	-2.870956	(0.704)	.4274937	(0.929)
DEBT	-1.352708	(0.034)**	-2.209669	(0.003)***
TOT		-	-258.4076	(0.000)***
CABA	-3.180687	(0.175)		-
GDP	10.13556	(0.001)	7.30406	(0.097)*
GDP(-1)	7.452832	(0.116)	3.320865	(0.539)
GDP(-2)	11.45752	(0.000)	12.06022	(0.000)
Wald Chi ²	531.95	(0.0000)	5813.25	(0.0000)
Arellano-Bond Test for Autocorrelation	Order 1	-1.3108 (0.1899)	-1.312	(0.1895)
	Order 2	-.38424 (0.7008)	-.48361	(0.6287)
Sargan's Test	11.7819	(1.0000)	9.584343	(1.0000)

***, ** and * denotes significance at 1%, 5% and 10% respectively. Values in parenthesis are the p-values. The following diagnostic tests are run for the model: the Sargan test for over identification, the Arrelano-Bond test for autocorrelation and the Wald Chi² for model fit. The results indicate that the over identifying restrictions are valid, there is no first order or second order autocorrelation and the model fits the data well.

Appendix B-5: Sample and data sources

Variable	Measurement	Source
Monetary Policy Rate	Central Bank Discount Rate	IFS
Terms of Trade	Value of Exports to Imports	IFS
Current Account Balance	Current Account to GDP	IFS
International Reserves	Foreign Assets of Monetary Authority	IFS
Exchange rate	Official Exchange Rate (per \$)- period average	IFS
Public Debt	Debt outstanding and disbursed, (% of GDP)	World bank African Development Indicators
Economic Growth	Real GDP growth	IFS
Private Capital Flows	Private capital flows, total (% of GDP)	World bank African Development Indicators

Author's Compilation