

UNIVERSITY OF GHANA

FINANCIAL INCLUSION, MONETARY POLICY, FINANCIAL
SECTOR DEVELOPMENT AND FINANCIAL REGULATION IN
SUB-SAHARAN AFRICA

BY:

EBENEZER BUGRI ANARFO

10507919

INTEGRI PROCEDAMUS

THIS THESIS IS SUBMITTED TO UNIVERSITY OF GHANA, LEGON IN
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DECLARATION

I hereby declare that; this thesis is my own research work produced under supervision. This work has not been submitted to any other academic institution for any academic award. I wish to state that, all the references used have been duly acknowledged. I wish to also state that, for any shortcoming in this document I take full responsibility.

.....

Ebenezer Bugri Anarfo

(Student)

.....

Date

CERTIFICATION

I hereby certify that, this thesis was undertaken and supervised in conformity with the procedures of University of Ghana.

.....

Prof. Joshua Yindenaba Abor

(Principal Supervisor)

.....

Date

.....

Prof. Kofi Achampong Osei

(Co-Supervisor)

.....

Date

.....

Dr. Agyapomaa Gyeke-Dako

(Co-Supervisor)

.....

Date

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DEDICATION

I dedicate this thesis to the Almighty God, Creator of the universe for His divine providence and guidance throughout my period of study. It has been his grace and favour that has brought me far. I also dedicate this thesis to my Principal supervisor (Professor Joshua Yindenaba Abor). I am eternally grateful for his support. He did not only play a lead supervisory role but he also played a brotherly and fatherly role for the successful completion of this program.

ABSTRACT

This thesis is made up of three stand-alone empirical chapters that examine the relationship among financial inclusion, monetary policy, financial sector development and financial regulation in Sub-Saharan Africa. Chapter two presents an overview of financial inclusion, monetary policy, financial sector development and financial regulation in Sub-Saharan Africa. The overview shows that Sub-Saharan Africa stock markets are comparatively young, undercapitalized and they are not liquid. Nevertheless, in the last decade stock markets in Africa have performed well even after taking into consideration standard measures of risk and exchange rate effect adjustment. A lot of progress has been made across Sub-Saharan African countries to implement and strengthen structural reforms to enhance the process of financial intermediation. Over the years, credit provided by banks in Africa has been improving, though they are quite low relative to other emerging sub-regions.

Chapter three is the first empirical chapter, which investigates the dynamic and bi-causal link between monetary policy and financial inclusion in sub-Saharan Africa using a panel VAR framework. The researcher obtained data from World Development Indicators (WDI) spanning from 1990 to 2014 for 48 sub-Saharan African economies. The findings suggest that a bi-causal relationship exists between monetary policy and financial inclusion. Specifically, it is evident that monetary policy affects financial inclusion, and financial inclusion is also influenced by monetary policy. The policy implication of this study is that the effectiveness of monetary policy depends on financial inclusion. Hence, the efforts of governments in sub-Saharan African countries should aim at policies that enhance financial inclusion for effective implementation of monetary policy. Also, promoting financial inclusion will require governments in sub-Saharan Africa to reduce their monetary policy rates.

Chapter four is the second empirical chapter and it investigates the dynamic link between financial inclusion and financial sector development in Sub-Saharan Africa. This paper employs a panel Vector Autoregressive framework to examine the dynamic link between financial inclusion and financial sector development in Sub-Saharan Africa. The findings indicate that, there is a reverse causality between financial sector development and financial inclusion in both the Sub-Saharan Africa countries sample and the full sample. It is evident that, financial inclusion is a driver of financial sector development and vice versa. The practical implication of this study is that, financial inclusion should not only be pursued as a policy objective but it could also be an outcome variable of financial sector development and vice versa. This implies, African economies and governments in their effort to enhance financial inclusion, financial sector development can serve as a policy tool. This means that, policies aimed at promoting financial inclusion will not impede financial sector development because the two are complementary. This suggests that, we can achieve financial inclusion without sacrificing financial sector development and vice versa. This paper provides first empirical evidence of the link between financial inclusion and financial sector development from the Sub-Saharan Africa perspective using data sourced from World Development Indicators (WDI) spanning from 1990-2014 for 48 Sub-Saharan African economies and 217 economies in the world for the full sample.

Chapter five presents the last empirical chapter which examines the impact of financial regulation on financial inclusion in Sub-Saharan Africa, considering the moderating role of financial stability. By analysing the relationship between financial inclusion and the most prominent macro-prudential regulation (capital adequacy), we find that tightening prudential regulations could negatively impact access to finance, thereby conflicting with Sub-Saharan African economies' financial inclusion goals. More specifically, the capital adequacy requirement tremendously reduces banks'

capacity to provide financial services and this could lead to credit rationing thereby reducing financial inclusion. The results also indicate that, the interaction of financial regulation with financial stability positively impacts financial inclusion. Thus, financial stability augments financial regulation to have an affirmative impact on financial inclusion. The practical implications of this paper are that, one of the ways central governments and policy makers in Sub-Saharan African countries can increase and get the most out of financial inclusion is to formulate policies targeted at reducing capital adequacy requirements of financial institutions and other constraints that limit the operations and efficiency of financial institutions. Such policies should also aim at creating an enabling environment that promote financial stability.

Keywords and Phrases: *Monetary policy; financial inclusion; GDP growth rate; Inflation Rate; Real Effective Exchange Rate; Economic growth; Financial sector development, Panel vector autoregression; Financial Stability; Financial Regulation*

ACRONYMS

GDP –	Gross Domestic Product
GFD –	Global Financial Development
ICT –	Information Communication Technology
IMF –	International Monetary Fund
JSE –	Johannesburg Stock Exchange
NPL –	Non-Performing Loans
PVAR–	Panel Vector Autoregressive
WDI-	World Development Indicators

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CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

A major issue that has engaged the attention of researchers worldwide, over the last two decades, is the extent of coverage of financial systems and institutions. This has been generally discussed under the term Financial Inclusion or Financial Exclusion (Bhanot, Bapat & Bera., 2012; Hasnol, Alwee & Salleh., 2013). Generally, the term financial inclusion is concerned with how an economy's financial services incorporate the vulnerable and low-income earners in such a way that they are not marginalized from having access to financial services. These services, according to Sinclair (2013), include access to insurance services, access to credit, banking services, assets and savings, consultancy on wealth management and financial literacy. The purpose of financial inclusion is to provide a variety of quality financial services and products to those that are financially excluded. Over the years, African economies have made much progress towards advancing financial inclusion. The introduction of some innovative financial instruments such as mobile money in Africa offers more opportunities mostly for the poor, youth, rural dwellers, and Small and Medium Enterprises (SMEs) to be financially included. Policymakers have recognized that if the vulnerable and the poor have effective access to financial services, it will promote social cohesion and reduce poverty. Sinclair and Bramley (2011) argue that financial systems that are all-inclusive promotes efficiency and well-being by providing opportunities for safe and secure saving, secure money transfer and prudent financial management practices. Thus, it is therefore not surprising that financial inclusion has gained a significant attention world-wide by researchers, development finance institutions, policymakers, and other development agencies such as World Bank and the International Monetary Fund (IMF). While

institutions of development finance and policymakers continue to seek for ideas from researchers for the effective implementation of financial inclusion policies, empirical research in this area remains limited and scarce.

Given the elevated role financial inclusion is assuming in Sub-Saharan African countries, monetary policy formulation must be taken into consideration for financial inclusion to be effective. Also, due to the significance of financial inclusion for African countries and other developing countries, policymakers need to understand the factors that drive financial inclusion which monetary policy, financial sector development and financial regulation is not an exception to enable them create an enabling environment to promote financial inclusion. There is yet to be a comprehensive study that links financial inclusion, monetary policy, financial sector development and financial regulation.

Thus, a study of financial inclusion, the theory of monetary policy, financial sector development and financial regulation is not only urgent but imperative as well. Empirical studies that examine the nexus between monetary policy and financial inclusion urge that financial inclusion provides access to financial services to households. This situation affects the decisions of households with respect to consumption and this can in turn affect the effectiveness of monetary policy (Lenka & Bairwa, 2016).

The discussion so far, directly or indirectly, points to the existence of linkages between monetary policy and financial inclusion. This means that a rise in financial inclusion in Sub-Sahara African countries has implications for monetary policy effectiveness and the pace of financial market development. This calls for the need to unravel the causal links

of these variables to provide lessons for policy formulation and implementation. Yet, so far, the existing literature does not sufficiently address the interlinkages between monetary policy and financial inclusion. This thesis seeks to present empirical evidence on the monetary policy-financial inclusion nexus. In particular, the work explores the dynamic and causal link between financial inclusion and monetary policy in Sub-Saharan Africa.

According to Hannig and Jansen (2010), the pursuance of financial inclusion represents the current consensus regarding the role finance plays in the development agenda of an economy and reducing poverty; they contend that financial inclusion represents the transformation of policies in the financial sector of emerging economies and shows understanding of the merits the poor and marginalised gain in their lives when they have access to financial services. The level of financial inclusion could also be dependent on the progress a country has made in developing its financial sector and vice versa. Empirical studies on financial inclusion determinants mainly focus on growth, poverty alleviation and income inequality (Brune, Giné, Goldberg & Yang., 2011; Burgess & Pande, 2005; Honohan, 2007; 2008; Rojas-Suarez, 2010). A number of empirical researches have examined how financial inclusion affects the growth of an economy as well as its impact on alleviating poverty and reducing income inequalities (Park & Mercado Jr., 2015). Nevertheless, in spite of the findings of these empirical studies which confirm the benefits of financial inclusion on economic growth as well as its influence on poverty alleviation, there is a gap remaining in the extant literature regarding the tripartite relationship among financial inclusion, financial sector development and economic growth. The tripartite relationship among financial inclusion, financial sector development and economic growth appears to have escaped

the attention of scholars which has led to a limited comprehension among these variables. Nevertheless, gaining insight on this tripartite relationship among financial inclusion, financial sector development and economic growth by policymakers will form the bases for the development of theory and policy formulation. For countries in Sub-Saharan Africa, gaining knowledge on this tripartite relationship is imperative if they are to put their economies on the path of pro-poor growth and poverty alleviation.

The impact of financial regulation on financial inclusion is another area that remains unexplored in the literature. The lack of empirical research in this subject matter has resulted in a limited understanding by policymakers on how financial regulation affects financial inclusion. Gaining understanding on the impact of financial regulation on financial inclusion will facilitate economic growth in Sub-Saharan African economies. There is yet to be a study that examines how financial regulation affects financial inclusion from the Sub-Saharan Africa perspective. This study attempts to bridge the gap by investigating how financial regulation affects financial inclusion from the Sub-Saharan Africa perspective. This study is also distinct because it considers the moderating role financial stability could play in the financial regulation-financial inclusion nexus. The researcher believes that in a stable financial environment, strict financial regulatory requirement will not impede the ability of financial institutions to provide financial services.

1.2 Problem Statement

The first empirical chapter investigates the relationship between monetary policy and financial inclusion in Sub-Sahara Africa. Most past researches have investigated the

implications for financial exclusion for model stability and the central bank policy rule parameters (see Bilbiie, 2008; Colciago, 2011; Gali, López-Salido & Vallés., 2004) the efficacy of monetary policy (see di Bartolomeo & Rossi, 2007) and the implications regarding why central bank choose the price index as a target (Anand & Prasad, 2012). In this study, the researcher investigates the reverse causality between monetary policy and financial inclusion from the Sub-Saharan Africa perspective. Despite the evidence that financial inclusion could promote monetary policy and monetary policy could also enhance financial inclusion, researchers know little about the possible endogeneity problem that could exist when investigating the relationship between monetary policy and financial inclusion from the sub-Saharan Africa context. Also, studies into the effects of financial inclusion have been largely skewed towards growth, income inequality and poverty alleviation (Park & Mercado Jnr., 2015). Therefore, there are hardly empirical studies that have investigated the link between monetary policy and financial inclusion. To the researcher's knowledge, the only empirical study that investigates this phenomenon was undertaken by Mbutor and Uba (2013), who sought to investigate how financial inclusion impacts on monetary policy in Nigeria. Using Johanssen's co-integration framework, they found evidence that financial inclusion has an affirmative impact on monetary policy effectiveness in Nigeria. However, their study was centred only on Nigeria. One of the difficulties and problems with single country studies is that, knowledge generated from such studies cannot be generalised. Moreover, their study did not include the potential reverse causality that may exist between monetary policy and financial inclusion. Due to this, a gap exists in the extant literature regarding the link between financial inclusion and monetary policy. This study will contribute to the finance and economics literature by investigating the potential endogeneity that may exist between monetary policy and financial inclusion.

Our study adds in several ways to the finance and economics literature. First, the use of Panel vector autoregressive (VAR) framework. This enables the researcher to analyze the dynamic link between monetary policy and financial inclusion which includes country-specific fixed effects simultaneously. Secondly, orthogonalised impulse response functions is employed to help separate the effect of each of the variables shocks in the system on the other variables one at a time.

This study further broadens the knowledge frontier in the field of finance and economics by showing new evidence proving that, there is a reverse causality between monetary policy and financial inclusion.

The second empirical chapter investigates the dynamic and causal link among financial inclusion, financial sector development and economic growth. Admittedly, there is a hot debate among scholars and development economist as to the functions of financial inclusion and financial sector development, but most of these studies are theoretical in nature and therefore lacks empirical evidence (Otchere, 2016; Allen, Carletti, Cull, Qian, Senbet & Valenzuela., 2014). Thus, there is still a vacuum remaining in the empirical literature with respect to the implications of financial sector development on financial inclusion and vice versa. Thus, the bi-causal relationship between financial sector development and financial inclusion appears to have escaped the attention of empirical scholars and researchers and this has led to a limited understanding of the link between financial sector development and financial inclusion. The study provides policy prescriptions that can guide policy makers in their efforts to alleviate poverty and achieve sustainable growth in Sub-Saharan Africa economies through financial inclusion and financial sector development. Economic growth was controlled by adding it to the

panel Vector Autoregressive (pVAR) framework. This is because economic growth according to the literature is a driver of financial sector development and financial inclusion and also financial inclusion and financial sector development could also be drivers of economic growth and hence the tripartite relationship among financial inclusion, financial sector development and economic growth was examined. Some studies have analysed the effect of financial inclusion on economic growth, poverty alleviation and income inequality (Park & Mercado Jr., 2015). Other researches have also investigated the nexus between economic growth and financial sector development and found them to have a positive relationship (Levine, R., 1997; Tsuru, 2001; Suleiman, & Abu-Quan, 2008; Creane Goyal, Mushfiq & Sab, 2003; Odhiambo, 2005). Other studies did not find sufficient evidence on the impact of financial development on economic growth (Quartey & Prah, 2008; Nyamongo, et al., 2012; Menyah, et al., 2014). But on the balance of theoretical plausibility and empirical evidence, financial development can be said to spur growth and reduce poverty (Cihak, et al., 2012)

However, despite empirical findings supporting the positive effect of financial inclusion on growth and financial sector development on economic growth, there is a gap remaining in the extant literature regarding the tripartite relations amongst financial inclusion, financial sector development and economic growth using a panel Vector Autoregressive (pVAR) estimation technique. This is yet to be examined empirically from the Sub-Saharan Africa perspective. The study reckons that financial inclusion can help develop the financial sector; however, on the other hand, development of the financial sector can boost access to financial services amongst the marginalised. Similarly, although financial inclusion is found to influence economic growth positively, economic growth could equally influence financial inclusion. Financial sector

development could as well have an effect on economic growth and vice versa. The tripartite relations among financial inclusion, financial sector development and economic growth appears to have escaped scholars and policymakers which has led to a limited comprehension of the link among them. The panel VAR estimation technique was employed because it gives a framework that is flexible where all the variables in the system are considered as endogenous variables, and it is now regarded as the standard instrument for the analyses of the impacts of policy transmissions as well as other economic variables interactive behaviour.

This study differs from past studies in many ways. First, use of Panel VAR helps to examine the dynamic link amongst financial inclusion, financial sector development and economic growth simultaneously and this includes country-fixed effects. Secondly, orthogonalized impulse responses, which makes it possible to separate the effect of each of the variables shocks in the system on the other variables one at a time, was employed. The third empirical chapter explores the link between financial regulation and financial inclusion by considering the moderating function of financial stability. Despite the role financial regulations play in preventing distortions to competition, maintaining market integrity, mitigating negative externalities and reducing information asymmetry, they may also present undesirable consequences by unwittingly inhibiting efficient intermediation process of financial institutions and impede their ability to provide financial services. For example, capital adequacy rules may compel some banks that are less financially endowed to close down or merge with other banks and restrict entry into the banking sector thereby stifling competition and reduce the availability of funds to commercial banks for lending and this will impede financial inclusion. There has been a number of regulatory requirements of financial institution in Sub-Saharan Africa

ranging from Basel I capital adequacy requirement to Basel II, just to mention a few. Whether the impressive compliance with regulation of financial institutions in Sub-Saharan Africa has been associated with greater financial inclusion is an open empirical question that requires answers. Most researchers that examine financial regulation and financial inclusion nexus are theoretical papers (Alper, 2017; Getnet, 2014; Kanittha, 2015; Ricardo, 2015; Lewis & Lindley., 2015; Nurbekyan & Hovanesian, 2018). An empirical exploration of the link between financial regulation and financial inclusion in Sub-Saharan Africa seems to have escape the attention of researchers. Therefore, there is a gap remaining in the extant literature regarding the effect of financial regulation on financial inclusion from the Sub-Saharan Africa perspective. Most empirical studies on the subject as a whole did not also consider the potential mediating effect of financial stability in the financial regulation-financial inclusion nexus. For example, financial stability is known to play an intermediary role in the financial regulation-financial inclusion nexus. The researcher posits that, in a stable financial environment, financial regulation will have a positive effect on financial inclusion.

This study contributes in several ways to the discipline of Economics and Finance. First, the study contributes to the financial inclusion literature by giving a detail evidence on the nexus between financial regulation and financial inclusion from the Sub-Saharan Africa perspective using a large sample of data covering 48 countries for a period of two decades. This paper broadens knowledge frontier in finance and economics by presenting new facts indicating that financial regulation affects financial inclusion in Sub-Saharan Africa. The use of linear mixed effect models helps to analyse the link between financial regulation and financial inclusion which contains both fixed and random effects.

On the whole, the thesis is distinct from the prevailing literature in a number of respects. On the issue front, it is the first paper to investigate the dynamics of monetary policy, financial inclusion, financial sector development and financial regulation simultaneously and from all directions (independent effects, substitutionary effects and complementary effects).

1.3 Research Questions

The thesis seeks to address the following three major research questions:

Research Question 1: Is there a reverse causality between financial inclusion and monetary policy in Sub-Saharan Africa?

Research Question 2: Is there a bi-causal link between financial inclusion and financial sector development in Sub-Saharan Africa? Is there a theoretical basis supporting the existence of a tripartite relationship amongst financial inclusion, financial sector development and economic growth?

Research Question 3: Does financial regulation affect financial inclusion in Sub-Saharan Africa? Does financial stability play a moderating role between financial regulation and financial inclusion in Sub-Saharan Africa?

1.4 Objectives of the Study

The general objective of this thesis is to examine the dynamic and causal relationships that potentially exist among financial inclusion, monetary policy, financial sector development and financial regulation. It also seeks to discuss the complementary, substitutionary or independent effects among these variables for Sub-Saharan Africa economies.

The specific objectives are:

- i. To establish the causal and dynamic linkages between monetary policy and financial inclusion in Sub-Saharan African countries.
- ii. To examine the causal interactions between financial inclusion and financial sector development in Sub-Saharan Africa
- iii. To investigate the effect of financial regulation on financial inclusion and the interactive impact of financial stability and financial regulation on financial inclusion in Sub-Saharan African countries.

1.5 Scope, Limitations, and Delimitations of Study

The data used for the study fall within the period 1990 to 2014. The period chosen for this study is largely based on data availability. All countries which constitute the seven sub-regions of the world including Sub-Sahara Africa are covered in the sample. The list of all economies added in the study is based on the World Bank classification of countries in the various sub-regions which include: Sub-Sahara Africa, South Asia, Latin America and Caribbean, Europe and Central Asia, East Asia and Pacific, Middle East and North Africa and North America. The study captures all Sub-Saharan African countries for which sufficient data for financial inclusion, monetary policy and financial sector development is available. Some of the countries used in the study had missing data in some of the years for all the variables. Therefore, the conclusions drawn from this thesis will not be bias and inconsistent. Also, the index of financial inclusion was made of only six variables. This is because other measures of financial inclusion had a lot of missing data for the study period and that inform their exclusion from the index. The researcher believes that the index of financial inclusion would have been more comprehensive and reliable if all the variables of financial inclusion were used.

1.6 Justification/Significance of the Study

Despite the role financial inclusion plays in development agenda of developing economies, the macroeconomic consequences of financial inclusion are not clear in the literature, more especially the implications of financial inclusion for monetary policy effectiveness and economic growth. The study takes up this research agenda and throws more light on the dynamic linkages between monetary policy and financial inclusion. On this basis, this thesis provides empirical evidence to guide monetary authorities on how to utilize monetary policy to stimulate financial inclusion, and also, how to utilize financial inclusion to enhance monetary policy effectiveness.

Financial sector development is an important conduit for financial inclusion and yet, finance experts are not certain about the implications of financial sector development for enhancing financial inclusion and growth. An empirical examination on the tripartite relationship among financial inclusion, financial sector development and economic growth is none existent. Building on this literature, this thesis throws light on the implications of financial inclusion for financial sector development and economic growth. This knowledge will help financial institutions to position themselves to benefit from the increasing financial inclusion.

Lack of empirical research on the link between financial inclusion and financial regulation further makes this thesis imperative. This thesis wades into the debate by exploring how financial stability moderate the impact of financial regulation on financial inclusion. This sheds light on the role that financial stability plays in promoting financial inclusion. This knowledge is needed to help policy makers determine which financial regulation and

institutional structures should be prioritized in order to fully capitalize on financial inclusion to propel economic growth and development.

This study is also significant for households. There is a possibility that households can also benefit directly from this study. For instance, if it is found that overall, monetary policy do increase financial inclusion while promoting economic growth and financial development, policy makers will now have an incentive to enact policies that reduce the monetary policy rate which will reduce borrowing costs. The reduction in the cost of borrowing and financial transaction will enable households gain access to financial services.

1.7 The Structure of the Thesis

Chapter 1 provides an introduction to the thesis by presenting the background, the problem statement, the research objectives, the research questions, limitation and delimitations, and significance of the thesis. Chapter 2 presents stylized facts on financial inclusion. The first empirical chapter, which investigates the link between monetary policy and financial inclusion is presented in Chapter 3. The second empirical chapter investigating the financial inclusion-financial sector development nexus is presented in Chapter 4. The third and last empirical chapter, chapter 5, examines the effect of financial regulation on financial inclusion and the mediating role of financial stability. Chapter 6 reports the summary of findings, conclusions, recommendations, the thesis contributions and the future direction of study.

1.8 Chapter Summary

The chapter presents the introduction of the thesis, the statement of problem, stated the research questions and objectives, and explained the significance of the thesis. It also presented the scope, limitations and delimitations of the thesis. Finally, it explained the chapter disposition of the thesis.

CHAPTER TWO

OVERVIEW OF FINANCIAL INCLUSION, MONETARY POLICY, FINANCIAL SECTOR DEVELOPMENT AND FINANCIAL REGULATION IN SUB-SAHARA AFRICA

2.1 Introduction

This chapter reports a detailed overview and stylized facts of all the issues relevant in the thesis. It identifies the stylized facts and trends in all the variables of interest in the thesis. This chapter is arranged accordingly. Section 2.2 is a presentation of Sub-Saharan Africa's formalized facts of financial inclusion and determinants. Section 2.3 provides the policies and challenges of financial inclusion in Sub-Saharan Africa. Section 2.4 presents an overview of monetary policy and financial inclusion in Sub-Saharan Africa. Section 2.5 presents an overview and stylized facts on the relationship between financial sector development and financial inclusion in Sub-Saharan Africa. Section 2.6 presents financial sector development in Sub-Saharan Africa, section 2.7 presents stylized facts of financial regulation in Sub-Saharan Africa and finally section 2.8 presents the summary of this chapter.

2.2 Financial Inclusion in Sub-Saharan Africa: Stylized Facts and Determinants

As a main component of financial sector development, financial inclusion fosters economic growth in emerging economies by delivering at an affordable cost a wide array of financial services to a growing share of households and small medium-sized corporations. Financial inclusion is limited in Sub-Saharan Africa (SSA), and in particular in the Franc zone, both in terms of bank accounts (access and intensity of use) and credit. Widespread bank account access differentials according to education, age, gender, income and location are observed. The prevalence of financial exclusion in SSA

reflects structural factors affecting the supply of financial services (cost, management of information asymmetries), demand (income and education level, possible self-exclusion) or weak regulatory environment and business climates. Like any other forms of financial development, financial inclusion implies new risks for financial stability and therefore, strengthening financial regulations and supervision will increase public trust in the financial sector and access to financial services and hence this will promote sustainable and stable economic development.

Promoting all-encompassing access to formal financial services and products at low cost within the frame of flourishing consumer protection structures is a critical tool in bringing extensive policy aims like economic empowerment, financial health, sustainable growth and financial stability. This would guarantee that people have the ability to recognize the financial tools which are readily available for use and leveraged to aid them in their efforts to build savings, ensure that they are insulated from economic shocks, and to fund their business and commercial objectives. It should be a vital concern of public and private bodies to ensure that individuals have access to these financial tools in order to safeguard their present and future welfare. At 2014, approximately 350 million adults did not have access to formal financial ecosystems, the Sub-Saharan Africa region provides numerous avenues to extend accessibility and use of services available in the formal financial sector. A lot of countries in Sub-Saharan Africa are characterized by minimal banking infrastructure, financial exclusion and high levels of poverty. However, with its rapidly growing mobile financial system, Sub-Saharan Africa countries are poised to take advantage of digital financial services.

The Brookings Financial and Digital Inclusion Projects (FDIP) August 2016 report focused on 26 countries. The report looked at these countries' financial inclusion ecosystems. The countries selected were considered heterogeneous in their geography, economy, and political situation. The report evaluated the financial inclusion climate focusing on four problems of financial and digital inclusion. These are the country's commitment to inclusion, the country's mobile capacity, regulatory situation, and its adoption of selected digital and conventional financial services. The report suggested proposals for further advancement towards financial inclusion.

Mobile money is particularly playing a vital part in reducing financial exclusion among the unserved and underserved groups in different settings in Africa. Out of 19 global markets, with mobile money accounts overshadowing the number of bank accounts possessed by individuals at 2015, almost all those markets were sub-Saharan global markets. As at 2015, Groupe Spéciale Mobile Association (GSMA), which is an international group representing the concerns of mobile operators, noted that Sub-Saharan Africa had approximately 52 per cent active mobile money services users.

In an overview of financial inclusion trends in Africa and global trends, Demirguc-Kunt and Klapper (2012) concluded that financial systems in Africa lag behind although they have experienced tremendous improvements over the last few decades. This they support with statistics from World Bank (2012) that shows that the ratio of private sector credit to GDP (used as a measure for financial development) averaged 24% in Sub-Saharan Africa, relative to 39% in North Africa, 77% for emerging countries, and 172% in developed countries. Furthermore, according to Demirguc-Kunt and Klapper (2012) – based on the Global Financial Inclusion Database – account penetration (defined as the

percentage of persons above 15 who have an account) stood at 24% in sub-Saharan Africa compared to 33% in South Asia, 39% in Latin America and Caribbean, 45% in Europe and Central Asia, 55% in East Asia and Pacific, and 89% in High income countries. Deaton (2008) showed that, for adults living under \$2 per day, sub-Saharan Africa ranked highest in terms of not having an account with almost 60% not having access to financial services. The state of financial inclusion in Sub-Saharan Africa in comparison to other sub-regions of the world is presented in table 2.1 to table 2.6. Table 2.1 to table 2.6 presents stylized facts of the six measures of financial inclusion the researcher used in this study. These include ATMs per hundred thousand adults, bank branches per hundred thousand adults, commercial bank branches per hundred thousand adults, bank accounts per thousand adults, borrowers from commercial banks per thousand adults and depositors with commercial banks per thousand adults. The averages of these financial inclusion measures in Sub-Saharan African countries are compared to Europe and Central Asia countries to see how the level of development of these variables differ over time in Sub-Saharan Africa countries from countries in Europe and Central Asia. The average performance of these variables over the years for Sub-Saharan Africa countries has been increasing. However, the Sub-Saharan Africa countries average is lower than their counterparts in Europe and Central Asia countries. This suggests that financial inclusion is much of a Sub-Saharan Africa problem than Europe and Central Asia. The only few countries in Sub-Saharan Africa that have an average performance of some of these financial inclusion measures relative to countries in Europe and Central Asia are Botswana, Mauritius, Namibia, South Africa and Kenya. Details of the average performance of these variables over the years are shown in table 2.1 to table 2.6 below.

Measures of Financial Inclusion in Sub-Sahara Africa**Table 2. 1: Automated teller machines (ATMs) per hundred thousand adults**

Year	2009	2010	2011	2012	2013	2014	2015	2016	Average
Sub-Sahara Africa									
Angola	8	10	13	15	17	18	19		14
Botswana	27	29	27	26	27	28	31	31	28
Burundi	0	1	1	1	2	1	1		1
Burkina Faso		1	2	2	3	3	3	4	3
Congo, Rep.	1	2	2	3	4	6	8		4
Cote d'Ivoire		4	5	4	6	7	7	7	6
Ethiopia	0	0	0	0					0
Ghana	4	4	4	5	8	8	10	5	6
Kenya	7	9	9	10	10	10	10	9	9
Malawi	3	3	4	4	5	5	5		4
Mauritius	40	41	43	44	45	45	46	45	44
Namibia	42	49	50	49	52	55	56	64	52
Mozambique	5	6	6	7	7	9	10	11	8
Nigeria	11	11	12	11	13	16	16	17	14
South Africa	52	56	58	58	59	66	69	69	61
Tanzania	3	4	5	5	6	6	6		5
Uganda	3	3	4	4	5	4	4	4	4
Zimbabwe	7	5	4	4	4	5	6	6	5
Average	13	13	14	14	16	17	18	23	15
Europe and Central Asia									
Austria	112	113	114	116	117	119	118	116	116
Belgium	87	92	93	94	94	94	94		92
France	104	106	109	109	109	108	107	104	107
Germany	112	117	121	119	118	123	121		119
Norway	58	55	54	53	50	48	46	39	50
Portugal	192	195	191	185	180	177	175	170	183
Spain	152	149	147	136	131	119	117	113	133
Sweden	43	43	45	43	41	40	41	35	41
Turkey	46	52	59	63	72	76	79	78	66
United Kingdom	121	122	123	126	129	130	131	129	126
Average	103	104	106	104	104	103	103	98	103

Source: World Development Indicators and Author's Computation

Table 2. 2: Bank accounts per thousand adults

	2009	2010	2011	2012	2013	2014	2015	Average
Sub-Sahara Africa								
Angola	71	67	86	425	507	543	592	327
Botswana	483	482	448	547	589	606	596	536
Burundi	20	27	31	33	26	30	30	28
Burkina Faso	71	79	91	105	112	127	138	103
Congo, Rep.	52	58	69	94	97	124	146	91
Cote d'Ivoire	104	130	218	183	186	203	200	175
Ghana	272	283	346	456	458	504	599	417
Ethiopia	90	103	111	136				110
Kenya	377	513	599	648	868	1095	1316	774
Malawi	163	187	188	208	241		103	182
Namibia	166	166	441	645	713	834	877	549
Nigeria	461	469	501	639	645	648	662	575
Uganda	171	190	177	200	186	197	206	190
Zimbabwe	86	152	75	81	79	88	81	92
Tanzania	156	190	210	219	220	238	265	214
Average	183	206	239	308	352	403	415	301
Europe and Central Asia								
Norway	1156	1150	1170	1165	1219	1215	1228	1186
Turkey	1282	882	910	918	974	963	1030	994
Average	1219	1016	1040	1041	1096	1089	1129	1090

Source: World Development Indicators and Author's Computation

Table 2. 3: Bank branches per hundred thousand adults

	2009	2010	2011	2012	2013	2014	2015	Average
Sub-Sahara Africa								
Angola	6	8	9	10	11	11	12	10
Botswana	8	9	8	8	8	9	8	8
Burundi	2	2	2	2	3	3	3	2
Burkina Faso	2	2	2	2	2		3	2
Congo, Rep.	2	2	3	3	4	4	4	3
Cote d'Ivoire	3	4	4	5	5	5	5	4
Ghana	5	5	5	6	6	6	7	6
Ethiopia	1	1	2	3				2
Kenya	5	5	5	5	6	6	6	5
Malawi	2	3	1	3	3	3	3	3
Namibia	13	13	13	12	12	13	13	13
Mozambique	3	3	4	4	4	4	4	4
Nigeria	6	7	6	6	6	6	5	6
South Africa	9	10	10	10	10	11	11	10
Mauritius	21	21	22	22	22	24	24	22
Uganda	2	2	2	3	3	3	3	3
Zimbabwe	4	4	6	12	12	13	14	9
Tanzania	2	2	2	2	2	2	2	2
Average	5	6	6	7	7	8	7	7
Europe and Central Asia								
Austria	12	11	15	16	16	15	14	14
Belgium	48	45	43	42	41	40	39	43
France	42	42	41	39	39	38	38	40
Germany	16	16	16	14	15	15	14	15
Portugal	66	66	64	61	58	53	51	60
Norway	11	11	11	10	9	9	8	10
Spain	99	96	88	84	74	70	68	82
Turkey	17	18	18	19	20	20	19	19
Sweden	23	23	22	22	22	21		22
Average	37	36	35	34	32	31	31	34

Source: World Development Indicators and Author's Compilations

Table 2. 4: Borrowers from commercial banks per thousand adults

Year	2009	2010	2011	2012	2013	2014	2015	2016	Average
Sub-Sahara Africa									
Angola					14	16	17	18	16
Botswana	235	180	156	206	188	177	243	169	194
Burundi	3	5	6	10	12	12	14		9
Congo, Rep.					19	34	38		30
Ethiopia	2	2	2	2					2
Ghana	34	35	35			46	48	45	41
Kenya	73	76	82	82	118	162	223	273	136
Malawi	16	17					318		117
Namibia	50	50	150	201	262	250	240	302	188
Mozambique	17	21	26	30	58	59	65	69	43
Tanzania	25	25	31	29	27	206	27		53
Uganda		18	19	17	18	20	24	31	21
Zimbabwe	7	11	15	51	52	37	34	219	53
Average	46	40	52	70	77	93	108	141	78
Europe and Central Asia									
Belgium	568	570	696	710	708	704	689	699	668
Portugal	390	391	390	379	373	371	371	366	379
Turkey	746	767	816	873	847	838	845	804	817
United Kingdom	53	50	54	59					54
Average	439	445	489	505	642	637	635	623	552

Source: World Development Indicators and Author's Compilation

Table 2. 5: Commercial bank branches per hundred thousand adults

Year	2009	2010	2011	2012	2013	2014	2015	2016	Average
Sub-Sahara Africa									
Angola	5	7	8	9	10	10	10	10	9
Botswana	8	9	8	8	9	9	8	8	8
Burundi	2	2	2	3	3	3	3		3
Burkina Faso	2	2	2	2	2	3	3	3	2
Congo, Rep.	2	2	2	3	3	3	4		3
Cote d'Ivoire	3	4	4	5	4	5	5	5	4
Ethiopia	1	1	2	3					2
Ghana	5	5	5	6	6	6	7	7	6
Kenya	4	5	5	5	5	6	6	5	5
Malawi	2	3	1	3	3	3	3		3
Mauritius	21	21	22	22	22	22	22	20	22
Namibia	13	13	13	13	13	13	13	15	13
Mozambique	3	3	4	4	4	4	4	4	4
Nigeria	6	7	6	6	6	6	5	5	6
South Africa	9	10	10	10	10	11	11	10	10
Tanzania	2	2	2	2	2	2	2		2
Uganda	2	2	2	3	3	3	3	3	3
Zimbabwe	4	4	6	11	12	13	5	5	8
Average	5	6	6	7	7	7	7	8	7
Europe and Central Asia									
Austria	12	11	15	16	16	15	14	13	14
Belgium	12	11	10	9	9	8	8	7	9
France	42	42	41	39	39	38	38	37	39
Germany	16	16	16	14	15	15	14	13	15
Norway	11	11	11	10	9	9	8	6	9
Portugal	66	66	64	61	58	53	49	43	57
Spain	99	96	88	84	74	70	68	62	80
Sweden	23	23	22	22	22	21	19	18	21
Turkey	17	18	18	19	20	20	19	18	19
United Kingdom	25	25	24	22	25				24
Average	32	32	31	30	28	28	26	24	29

Source: World Development Indicators and Author's Compilation.

Table 2. 6: Depositors with commercial banks per thousand adults

Year	2009	2010	2011	2012	2013	2014	2015	2016	Average
Sub-Sahara Africa									
Angola	193	214	277	454	472	499	732		406
Botswana				710	793	799	754	835	778
Burundi	24	33	35	41	34	37	39		35
Congo, Rep.	61	69	81	97	101	140	160		101
Ghana	296	386	437	478	494	501	681	641	489
Kenya	373	506	588	634	842	1061	1270	1442	839
Malawi			274	231	245		305		264
Mauritius	2163	2192	2243	2228	2262	2274	2347	2290	2250
Namibia	729	756	812	752	833	1028	1167	1273	919
Mozambique	132	137	157	169	230	242	287	332	211
Nigeria	464	472	504	644	650	653	667	814	609
South Africa	874	975	1007	1325	1554	1626	1566	1641	1321
Tanzania	155	189	209	217	218	237	263		213
Uganda	169	186	174	196	186	199	225	253	198
Zimbabwe	87	152	121	127	162	87	85	125	118
Average	440	482	494	554	605	670	703	965	614
Europe and Central Asia									
Austria	1393	1364	1334	1280	1304	1275	1249	1220	1302
Belgium	3962	4046	4000	3998	4023	3929	3931		3984
Norway	1157	1150	1171	1165	1219	1215	1230	1236	1193
Portugal	2497	2526	2538	2257	2326	2358	2411	2300	2402
Spain	2269	2281	2177	2096	2042	1987	1942	1869	2083
Sweden		3772	3856	3983	4083	4243	4223	4092	4036
Turkey	1721	2978	3066	3190	3463	3354	3443	3719	3117
Average	2166	2588	2592	2567	2637	2623	2633	2406	2526

Source: World Development Indicators and Author's Compilation

2.3 Policies and Challenges of Financial Inclusion

There are a couple of cross-country studies about the policies and problems of financial inclusion in Asia and Europe respectively (Rosengard & Prasetyantoko, 2011; Burkett & Drew, 2008; Jones, 2008). The problems investigated focused on how government actions could help provide access to finance, some investigated the regulatory guidelines which limit Indonesia's financial inclusion as well as how

financial institutions involved in community development can benefit from market failures so as to ameliorate financial inclusion.

Jones (2008) noted that credit unions could serve as tools in the financial service industry to reduce financial exclusion in communities. Chakraborty (2010) categorized obstacles to financial inclusion as supply side obstructions (expected to be solved by financial institutions) and demand side obstructions (expected to be subdued by those who lack access to finance) (Gupte et al., 2012). According to Chavan and Birajor (2009), improvement of financial inclusion is hindered by several factors which include irregular repayment of loans and high interest rates. The other factors are bank stipulations concerning identity, terms and conditions associated with possessing an account, high charges by banks, access to bank branches, psychological and cultural pressures as well as the ease in the usage of banks' services (Kempson, Atkinson & Pilley., 2004). Collard (2007) also argued that small amount short-term loans with constant costs are factors hampering financial inclusion.

Most policies focused at reducing financial exclusion tend to focus more on financial inclusion in rural areas while urban areas, especially shanty towns, are overlooked. Using access to savings and loans as a measure of the degree of financial inclusion is questionable as people have access to loans without owning an account. This phenomenon has resulted in research initiated to study more pertinent methods by which the financially excluded may be involved in the formal financial sector. Researchers have concluded that improving urbanization, human development, inequality, income, physical infrastructure and literacy for connectivity and information tend to encourage individuals to be active in the formal financial sector (Dixit & Ghosh 2013; Sarma &

Pais 2011). Bester, Chamberlain, De Koker, Hougaard, Short, Smith, and Walker (2008) evaluated the effect of the institution Combating the Financing of Terrorism (CFT) and Anti-Money Laundering (AML) restrictions on financial regulations and policies which focus on different aspects of the financial system have different impacts on macroeconomic aggregates and are distinct to every economy (Dabla-Norris, Townsend & Unsal., 2015). Obstacles to financial inclusion appears to be the same across nations with higher interest rates and lack of access to accounts and loans, being the most recurring obstacles. Policies target enhancing and controlling payment systems, specifically mobile money, and controlling it appears to be absent in these researches.

2.4 Monetary Policy and Financial Inclusion

Some empirical papers posit that, there is a link amongst financial inclusion, economic growth, poverty reduction as well as reduction in income inequality (Manji, 2010; Dittus, & Klein, 2011). Subba Rao (2007) posit that rural areas have increased access to credit through informal financial services. Financial inclusion enhances domestic socio-economic development (Diniz, Birochi & Pozzebon, 2012). Unnikrishnan and Jagannathan (2015) argued that human development is affected by mediating impacts of financial inclusion. A change in the degree of financial inclusion is noted to have a positive impact on total human development at income classes of a country: high, middle and low.

With regards to the impact of financial inclusion on monetary policy, this area is scarcely examined. This could be a very important research area of study since financial inclusion could promote or adversely impact monetary policy objectives of Central Banks.

Mehrotra and Yetman (2014) provides evidence which suggests that when financial exclusion is high, central banks are driven to increase their rates so that the economy is stabilized after a shock. They observed further that as levels of financial inclusion rose, central banks were more capable in stabilizing inflation rates without impacting economic activity. Mehrotra and Yetman (2015) profiled diverse means by which greater levels of financial inclusion impacts the policies that central banks make to sustain financial stability.

Table 2. 7: Monetary Policy Rates

Year	2009	2010	2011	2012	2013	2014	Average
Sub-Sahara Africa							
Angola	0.00	0.00	10.50	10.25	9.75	9.00	6.58
Benin	4.25	4.25	4.25	4.00	3.50	3.50	3.96
Burkina Faso	4.25	4.25	4.25	4.00	3.50	3.50	3.96
Congo, Dem. Rep.	70.00	22.00	20.00	4.00	2.00	2.00	20.00
Cote d'Ivoire	4.25	4.25	4.25	4.00	3.50	3.50	3.96
Ghana	18.00	13.50	12.50	15.00	16.00	21.00	16.00
Guinea	4.25	4.25	4.25	4.00	3.50	3.50	3.96
Kenya	7.00	6.00	18.00	11.00	8.50	8.50	9.83
Mali	4.25	4.25	4.25	4.00	3.50	3.50	3.96
Mauritius	5.75	4.75	5.40	4.90	4.65	4.65	5.02
Niger	4.25	4.25	4.25	4.00	3.50	3.50	3.96
Sao Tome and Principe	16.00	15.00	15.00	14.00	14.00	12.00	14.33
Senegal	4.25	4.25	4.25	4.00	3.50	3.50	3.96
Sierra Leone	0.00	0.00	20.00	20.00	10.00	10.00	10.00
South Africa	7.00	5.50	5.50	5.00	5.00	5.75	5.63
Togo	4.25	4.25	4.25	4.00	3.50	3.50	3.96
Average	9.86	6.30	8.81	7.26	6.12	6.31	7.44
Europe and Central Asia							
Albania	5.25	5.00	4.75	4.00	3.00	2.25	4.04
Belarus	13.50	10.50	45.00	30.00	23.50	20.00	23.75
Denmark	1.00	0.75	0.75	0.00	0.00	0.00	0.42
Georgia	5.00	7.50	6.75	5.25	3.75	4.00	5.38
Norway	1.75	2.00	1.75	1.50	1.50	1.25	1.63
Sweden	0.50	0.50	1.91	1.14	0.75	0.00	0.80
Switzerland	0.75	0.75	0.25	0.25	0.25	0.25	0.42
Turkey	6.50	1.63	5.00	5.00	3.50	7.50	4.86
United Kingdom	0.50	0.50	0.50	0.50	0.50	0.50	0.50

Source: Author computation and compilation

They observed that greater level of financial inclusion smoothens consumption because households are able to take loans and save. A majority of research work on financial inclusion have mainly clustered around its determinants. Thus, there is a yawning gap in the extant literature regarding the relations between monetary policy and financial inclusion. Table 2.7 above presents stylized facts of monetary policy rates in Sub-Sahara Africa and Europe and Central Asia countries.

The results show that, the average monetary policy rate in Sub-Saharan Africa has been rising over the years as well as Europe and central Asia countries. However, the average monetary policy rate in Sub-Sahara Africa is higher than Europe and Central Asia and that explains why interest rate in Sub-Sahara Africa is higher than Europe and central Asia.

2.5 Stylized Facts of Financial Inclusion and Financial Sector Development in Sub-Saharan Africa.

In the last decade, African economies performance has been tremendous in terms of indicators of financial development. Individuals and businesses in Africa currently have access to more financial services, notably credit, from financial institutions (Govind & Marcus, 2012). Furthermore, the increased use of ICT in Africa has led to innovative technology like mobile money and point of sale (POS). This has aided in extending financial services access, deposits, savings and payment products to individuals and businesses who may otherwise have been underserved. Despite improving in financial inclusion on the continent relative to other emerging economies, the financial systems in majority of African nations still require more improvement even though their financial sectors have seen a lot of reform and progress in the past years. Sub-Saharan Africa economies need to build resilient and more inclusive financial systems that are capable

of enhancing sustainable growth. Indicators of financial products and services usage by adults and businesses in the sub-Saharan region in comparison to other sub regions provides evidence that there are still obstacles to sub-Saharan Africa's ability to build a strong financial system capable of promoting financial inclusion and sustainable growth. Obstacles to financial inclusion include but are not limited to underdeveloped infrastructure and low-income earnings. Concerning infrastructure for example, Honohan and Beck (2007) noted that Africa has the least road density worldwide except South Asia which has population density little bit higher in contrast to Africa. Similarly, in Sierra Leone, Ethiopia and Uganda an amount equal to over 50% of GDP per capita is required to open a checking account. In Zimbabwe, Malawi, Uganda and Sierra Leone, yearly fees in connection with checking account is over 20 percent of GDP per capita. Comparing this financial system with other emerging economies and the developed financial systems that do not require minimum balance and no charges in connection with the use of routine checking account (Beck, Demirgüç-Kunt & Levine, 2006). Figure 2.1 represents the African map showing each country level of financial inclusion.

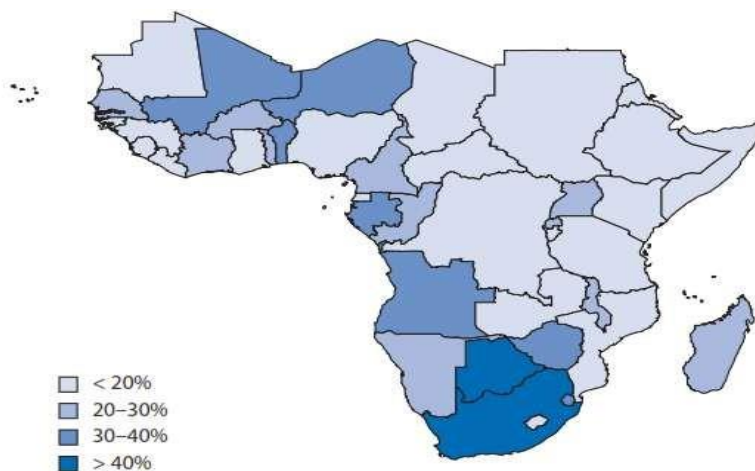


Figure 2.1: Level of Financial Inclusion in Africa
Sources: Honohan 2006

There are grave obstacles that need to be overcome for sub-Saharan African countries to achieve financial inclusion. Figure 2.2 provides clear evidence that in comparison to Sub-Saharan African countries, the other sub-regions in the world have been more proactive at improving financial inclusion at the household level. Sub-Saharan African countries still have a wide gap to bridge in order to achieve the same level of household financial inclusion.

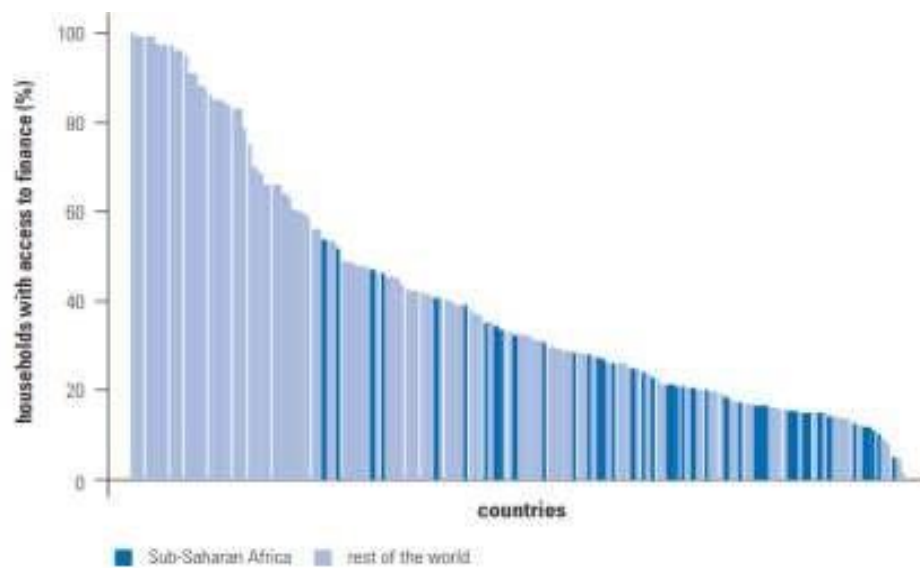


Figure 2. 2: Financial Inclusion (Sub-Saharan Africa vs rest of the world)

Sources: Honohan 2006

In spite of the challenges faced by Sub-Saharan African economies in the world, they continue to make continued advancement in financial inclusion index though progress made in each country differs. The 2008 Finscope survey listed African countries by categorising them by lowest level of financial exclusion. The survey reported that, in South Africa, financially excluded adults formed 27 per cent of the adult population, Namibia followed with a percentage of 31, Botswana with a percentage of 33, Lesotho had 19 per cent of adults being financially excluded even though the country had a high inclusion percentage at the informal level; Swaziland was at 37 per cent, Rwanda 28 per

cent, while Mozambique had 78% adults lacking access to financial services. The Finscope survey was undertaken in different years ranging between 2008 and 2012 and it shows the level of inequality in gaining financial services in sub-Saharan Africa is still high. Even though a country like Uganda has the highest level of financial inclusion of 42 per cent of adults at the informal level, despite the fact that it has a low level of formal financial services, Namibia has the lowest in this category of only 4%. Figure 2.3 presents the financial inclusion efforts of some selected African countries. It clear from the figure 2.3 below that, the level of financial exclusion represented by red bars is quite high in Africa.

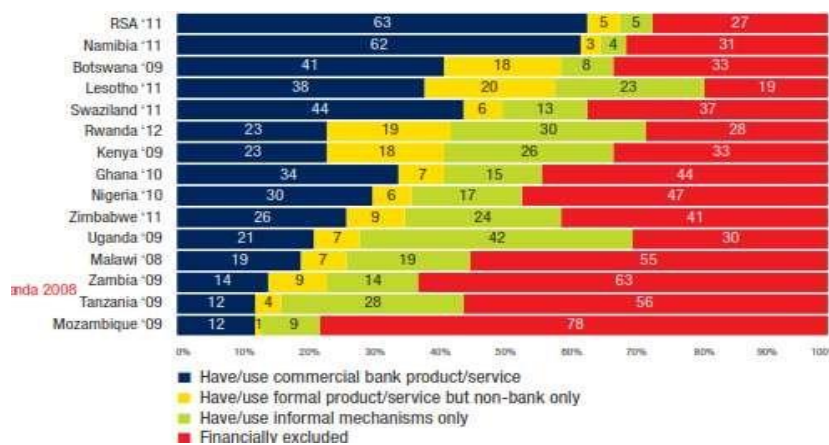


Figure 2. 3: Inclusion Effort in Sub-Saharan African countries

Source: Finscope 2011 survey

2.6 Sub-Sahara Africa Financial Sector Development

The financial architecture of a country is very vital as it plays an important role in transferring funds from surplus sectors to deficit sectors to promote investment and productivity. Stock markets, banks, bond markets and derivatives markets are examples of financial markets. A majority of sub-Saharan African economies have seen extensive reforms in past decades. Before the global financial crunch, a majority of countries conventionally relied on their banking systems. However, in Sub-Saharan Africa, capital

markets have taken a foothold in its financial system. Nigeria's and Ghana's financial markets, except South Africa, are still in the budding stages with a lot of African countries.

However, the gains made are worth noting. Project bonds which finance infrastructural investment are beginning to grow in Africa in spite of the fact that government securities (both T-bills and T-bonds) form approximately 90% of whole outstanding local currency denominated debt being dispensed by the governments themselves to raise funds for government projects. Another advantageous development is that, there is an increasing usage of marketable instruments in comparison to non-marketable debt. This allows countries to build more liquid benchmarks for prospective corporate issuances. The average maturity percentage of instruments has risen and in low-income nations such as Benin, Burkina Faso, Kenya, Mali, Tanzania, and Zambia, it is usual to find debt instruments which have maturities longer than 10 years. The study focusses on stock markets development and banking sector development since they are comparatively more developed in the Sub-Sahara African context. These are discussed below:

2.6.1 Banking Sector Development in Sub-Sahara Africa

Many Sub-Sahara African economies have made a tremendous progress in the area of banking reforms to decrease financial risks and enhance financial sector development (Flamini, McDonald, & Schumacher, 2009). According to Flamini et al. (2009), banks operating in Sub-Sahara Africa continue to face risks as they operate in Africa's financial markets which are usually characterized by mostly ineffective legal institutions and arbitrary enforcement of the rights of creditors. Central banks in Nigeria and Ghana acknowledged the important role that banks play in economic development. These

countries raised the capital adequacy requirement of their respective banks to 200 million Naira and 400 million Ghana cedis, respectively.

The banking sector's growth is crucial to the growth of every country's economy because it is the banking sector that makes credit available to the real sectors of the economy. There are many indicators of financial sector development which include the M2 as a percentage of GDP, credit provided by the banking sector scaled by GDP, credit provided to the private sector as a proportion of GDP and domestic credit provided by the financial sector as a proportion of GDP. In table 2.2 a picture is given on the growth of the sub-Saharan Africa's banking sector. Table 2.2 throws more light on the growth of the banking sector development in Sub-Sahara Africa. It is not feasible to make generalisations about the advancement of the banking system in sub-Saharan Africa because countries are different from each other in terms of financial development and accessibility to financial services. African economies in the last decade have experienced an increase in credit provided to the private sector as a proportion of GDP and bank assets as a proportion of GDP. Even though there has been an accelerated development in the banking system in Africa, measures of financial depth are the lowest relative to the rest of the world. This means bank credit in Africa to the private sector forms less than 15% of GDP compared to advanced economies where the average is over 100%. However, even though this disparity with other economies exists, African banking systems tend to be reasonably stable (Gulde, Pattillo, Christensen, Carey, & Wagh, 2006). Even though there has been a reduction in government intervention, improvement in macroeconomic stability and a reduction in the ratio of nonperforming loans in Sub-Sahara Africa, each country has some specific unique characteristics which explains the

disparity in the level of banking sector development among Sub-Sahara African countries.

The capital adequacy ratio averages 16% of risk-weighted assets in Africa. Despite the fact that African banks tend to be less efficient relative to other countries, they are still profitable. According to Honohan and Beck (2007), overhead costs and net interest rate margins is more improved than in other low-income countries. In Sub-Saharan Africa, the banking system is usually mainly concentrated. This is probably because of the market size being small though the larger the country, the higher the number of banks due to economies of scale. Additionally, Foreign banks monopolize SSA's banking systems and in comparison, to other developing markets, African banks play little role in the economy.

Banking services are usually more easily accessed in urban areas while they are limited or virtually non-existent in rural areas with penetration as low as 5%. Furthermore, the legal system in SSA are not effective in terms of supporting the growth and development of the banking sector. It is problematic when it comes to enforcing property rights which are not well-defined and enforcing contracts because the legal systems are extremely complicated and hence it cannot attract the informal sector. Accordingly, Gulde et al. (2006) argued that, even though regulatory requirements are satisfied, regulators tend to have little authority to implement corrective action due to the fact that they do not have the freedom or resources to do so.

2.6.1.1 Domestic Credit Provided by Banks

During the early 1990s, credit provided by the banking sector has improved tremendously in many Sub-Sahara African countries. For African economies, credit

provided to the private sector scaled by GDP and the ratio of bank assets as a proportion of GDP are now relatively better than a decade ago (Andrianaivo & Yartey, 2009). This improvement in credit inflows could be due to structural adjustment programmes initiated by governments of Sub-Saharan African economies in the 1980s and the early 1990s. Again, in spite of the accelerated development of their banking systems, indicators of financial growth and depth of SSA countries is the lowest compare to the rest of the world (Andrianaivo & Yartey, 2009). The banking sector is the largest in terms of providing domestic credit in SSA countries. In the years 2013 and 2015, Mauritius' GDP was surpassed by the credit extended by its banks (refer to table 2.8). As noted in table 2.8, South Africa has a much well-developed financial sector. Mauritius banking sector provides the largest domestic credit as a proportion of

Table 2. 8: Domestic credit to private sector by banks percentage of GDP

Year	2009	2010	2011	2012	2013	2014	2015	2016	Average
Sub-Sahara Africa									
Angola	21.42	19.87	20.17	22.21	23.36	22.86	27.18	21.08	22.27
Botswana	28.82	27.10	26.77	31.20	31.75	30.98	33.77	31.64	30.25
Burundi	14.78	18.06	20.12	18.68	17.16	16.49	16.15	16.42	17.23
Burkina Faso	16.48	15.81	16.08	17.92	22.85	25.65	27.61	27.47	21.23
Congo, Rep.	4.89	6.51	7.73	9.54	11.27	14.03	21.97	24.88	12.60
Cote d'Ivoire	15.61	16.24	16.75	16.33	17.92	19.05	21.88	22.40	18.27
Ghana	15.54	14.58	14.38	14.74	16.07	18.84	19.37	18.41	16.49
Kenya	24.93	27.13	30.42	29.48	31.63	34.07	34.32	32.81	30.60
Malawi	10.87	13.83	13.93	14.57	12.45	11.40	12.26	10.47	12.47
Mauritius	80.05	85.28	89.26	98.80	106.26	98.73	102.68	96.33	94.67
Namibia	47.98	47.97	48.54	48.47	47.83	49.90	53.39	53.13	49.65
Mozambique	21.83	24.18	23.05	24.21	27.92	31.68	34.82	34.16	27.73
Nigeria	38.35	15.39	12.46	11.79	12.59	14.49	14.19	15.66	16.86
South Africa	74.60	70.35	67.59	68.63	67.27	67.02	68.24	66.80	68.81
Tanzania	11.20	11.73	12.49	12.91	12.82	13.71	15.03	14.16	13.01
Uganda	11.34	13.28	15.39	13.63	13.46	14.12	14.75	14.49	13.81
Average	27.42	26.71	27.20	28.32	29.54	30.19	32.35	31.27	29.12
Europe and Central Asia									
Austria	97.40	98.19	95.72	93.86	92.16	87.20	85.39	84.34	91.78
Belgium	58.29	56.50	54.96	54.55	56.48	58.28	61.56	63.83	58.06
France	94.91	95.70	96.75	96.63	96.09	94.17	95.26	96.89	95.80
Germany	98.19	87.95	84.60	83.41	81.66	79.16	77.67	77.07	83.71
Norway	109.05	110.02	107.77	105.62	106.91	110.02	117.88	122.85	111.26
Portugal	159.76	155.26	156.12	152.78	143.20	129.65	119.69	111.95	141.05
Spain	172.41	170.71	166.74	156.83	145.74	129.89	118.98	111.04	146.54
Sweden	125.91	124.38	126.41	130.13	132.23	131.20	128.34	128.72	128.42
Turkey	34.78	41.87	46.51	49.10	57.15	59.94	62.93	65.74	52.25
United Kingdom	194.39	187.71	173.15	163.35	152.00	137.39	132.74	134.22	159.37
Average	114.51	112.83	110.87	108.63	106.36	101.69	100.04	99.66	106.82

Source: World Development Indicators and Author's Compilation. All indicators are expressed as a percentage of GDP

GDP. Credit provided by Mauritius banks was far above GDP between 2013 and 2015 (table 2.8). The financial sector of South Africa is well-developed (see table 2.8). With the exception of Congo Republic, Tanzania and Uganda, banks in Sub-Sahara African economies domestic credit provided by banks which was in excess of GDP by 15% on average over the period. According to table 2.8, Congo Republic, Tanzania and Uganda

have the lowest average levels of credit provided by banks scaled by GDP. Mauritius and South Africa also have very well-developed banking system almost close to those in Europe and Central Asia countries (see table 2.8).

2.6.1.2 Domestic Credit to the Private Sector

The ratio of domestic credit to the private sector as a proportion of GDP in many instances are higher than the ratio of domestic credit provided by the banks as a proportion of GDP. Table 2.2 indicates that more credit is being given to businesses in the private sector. In table 2.2, it can be noted that South Africa provides more domestic credit to their private sector than any of the other African countries. Domestic credit to the private sector is also high in Mauritius (see table 2.2). Amidu (2014) noted that, between 2004 and 2007, private lending formed 17% of GDP for sub-Saharan African countries whereas in South Africa and Mauritius private sector lending was greater than 100% of GDP and this can be attributed to their advanced financial infrastructure.

In table 2.9, Burundi, Congo Republic, Ghana, Uganda and Tanzania showed a low average private credit over the study period. In the economies of these countries, credit provided to the private sector are traditionally below 20% of GDP. Andrianaivo and Yartey (2009) noted that averagely in Africa, credit provided to the private sector forms less than 15% of GDP; conversely in advanced economies, bank credit to the private sector is greater than 100%. Tables 2.8 and 2.9 show that averagely, the indicators of financial development for many of Sub-Saharan African economies falls below 50% of GDP. Out of the Sub-Saharan African economies, South Africa and Mauritius were the only countries whose average private credit ratio could be compared to the Europe and Central Asian countries. European countries like Portugal, Norway, Spain, Sweden and

the United Kingdom had private credit as a ratio of GDP above 100% while for countries such as Austria, France and Germany, the private credit ratio was above 80% (see table 2.9)

Table 2. 9: Domestic credit to private sector percentage of GDP

Year	2009	2010	2011	2012	2013	2014	2015	2016	Average
Sub-Sahara Africa									
Angola	21.47	20.22	20.18	22.26	23.39	22.89	27.22	21.13	22.34
Botswana	28.93	27.19	26.84	31.25	31.79	31.02	33.81	31.68	30.31
Burundi	14.98	18.25	20.32	18.91	17.40	16.75	16.46	16.74	17.47
Burkina Faso	16.55	15.87	16.14	17.98	22.91	25.70	27.67	27.53	21.29
Congo, Rep.	4.92	6.54	7.77	9.59	11.32	14.09	22.06	25.02	12.66
Cote d'Ivoire	15.69	16.30	16.81	16.40	17.99	19.15	22.01	22.53	18.36
Ghana	15.66	15.29	15.05	15.64	17.07	19.91	20.44	19.59	17.33
Kenya	25.02	27.23	30.57	29.54	31.71	34.14	34.38	32.85	30.68
Malawi	10.87	13.83	13.93	14.57	12.45	11.40	12.26	10.47	12.47
Mauritius	80.08	85.36	89.31	98.85	106.31	98.77	102.72	96.36	94.72
Namibia	48.01	48.00	48.57	48.50	47.86	49.93	53.42	53.16	49.68
Mozambique	21.97	24.33	23.29	24.52	28.19	32.00	35.11	34.50	27.99
Nigeria	38.39	15.42	12.48	11.80	12.59	14.51	14.22	15.67	16.88
South Africa	145.94	148.98	139.60	146.48	149.24	151.03	147.66	144.41	146.67
Tanzania	11.47	11.94	12.64	13.00	12.89	13.79	15.17	14.28	13.15
Uganda	11.39	13.34	15.51	13.74	13.54	14.21	14.84	14.55	13.89
Average	31.96	31.76	31.81	33.32	34.79	35.58	37.46	36.28	34.12
Europe and Central Asia									
Austria	97.74	98.53	96.06	94.22	92.56	87.58	85.84	84.67	92.15
Belgium	58.29	56.50	54.96	54.55	56.49	58.28	61.56	64.43	58.13
France	94.94	95.73	96.78	96.64	96.11	94.18	95.27	97.60	95.91
Germany	98.19	87.95	84.60	83.41	81.67	79.17	77.67	77.23	83.74
Norway	127.98	128.21	125.61	123.30	124.81	128.86	138.37	144.80	130.24
Portugal	159.83	155.33	156.20	152.86	143.27	129.73	119.77	112.03	141.13
Spain	172.41	170.72	166.75	156.85	145.75	129.90	118.99	111.34	146.59
Sweden	125.91	124.38	126.41	130.13	132.24	131.21	128.35	128.73	128.42
Turkey	37.35	44.65	49.42	52.23	60.71	63.79	66.83	69.85	55.60
United Kingdom	194.86	187.95	173.23	163.47	152.01	137.39	132.79	134.41	159.51
Average	116.75	115.00	113.00	110.77	108.56	104.01	102.54	102.51	109.14

Source: World Bank database and Author's Compilation. All indicators are expressed as a percentage of GDP

2.6.1.3 Financial Depth

The M2 to GDP ratio is a measure of the level of financial depth of an economy. According to table 2.10, the African country with the highest M2 ratio above 100 percent on average is Mauritius. South Africa and Namibia also have high M2 ratios which is above 50% on average. The countries with the least M2 ratios are Uganda, Burundi, Malawi, Nigeria and Tanzania (see 2.10). In 2003, a majority of Sub-Saharan African countries had M2 ratio to GDP which ranges from 15% to 30% (Sacerdoti, 2005). It can be noted from table 2.10 that the average M2 ratio for Sub-Sahara Africa economies over the period is less than the mean M2 ratio of Europe and Central Asian countries.

Table 2. 10: M₂ as a percentage of GDP

Year	2009	2010	2011	2012	2013	2014	2015	2016	Average
Sub-Sahara Africa									
Angola	38.47	35.33	37.56	34.99	36.48	41.00	46.36	41.80	39.00
Botswana	52.70	49.34	41.74	44.00	42.66	38.28	45.87	41.58	44.52
Burundi	26.41	28.20	25.32	24.49	23.29	23.04	22.84	23.72	24.66
Burkina Faso	27.52	28.94	29.08	29.83	31.95	34.20	40.52	40.26	32.79
Congo, Rep.	22.27	22.38	26.99	31.53	31.97	36.08	44.14	40.99	32.04
Cote d'Ivoire	29.67	32.87	37.06	34.17	34.01	34.35	36.17	36.50	34.35
Ghana	28.25	29.62	30.55	30.36	29.25	33.10	33.95	34.20	31.16
Kenya	36.46	40.31	40.85	40.86	42.30	43.25	42.59	38.62	40.66
Malawi	19.91	22.12	25.09	25.73	25.95	23.98	24.46	23.00	23.78
Mauritius	96.25	97.49	96.64	98.57	98.18	101.40	106.86	110.00	100.67
Namibia	63.23	62.60	64.05	57.24	56.65	53.59	55.50	53.37	58.28
Mozambique	35.66	38.69	37.67	42.95	44.88	49.73	56.36	53.27	44.90
Nigeria	43.27	21.02	20.68	21.89	21.51	20.19	19.69	20.38	23.58
South Africa	77.68	75.80	74.64	72.94	71.02	70.83	73.47	72.63	73.62
Tanzania	23.27	25.12	24.68	23.87	22.70	23.35	24.34	22.05	23.67
Uganda	19.39	22.92	22.51	20.49	20.82	22.07	22.31	22.88	21.67
Average	40.03	39.55	39.70	39.62	39.60	40.53	43.46	42.20	40.59
Europe and Central Asia									
Norway	58.97	58.85	58.10	57.19	58.92	61.11	58.38	64.96	59.56
Sweden	64.92	62.77	64.45	66.11	67.08	66.92	66.90	69.25	66.05
Turkey	52.13	53.23	51.01	50.04	52.59	51.76	52.72	55.60	52.39
United Kingdom	165.30	166.41	153.69	150.27	147.53	137.18	136.06	142.46	149.86
Average	85.33	85.32	81.81	80.90	81.53	79.24	78.51	83.07	81.96

Source: World Bank Database and Author's Compilation. All indicators are expressed as a percentage of GDP

2.6.2 Stock Markets Development in Africa

Age, size and performance are features that explain the diversity of Stock markets in Africa (Ndikumana, 2001). Adjasi and Biekpe (2006) argued that, stock markets in Africa are relatively young with Egypt, Kenya, South Africa and Zimbabwe stock exchanges been established in the 1880s. The Kenyan Stock Exchange and the Casablanca Stock Exchange are the oldest stock exchanges in Africa which were set up in 1929 and 1954, respectively. Other stock exchanges are relatively young with the Libyan Stock Exchange and the Doula Stock Exchange which were established in 2007 and 2001, respectively. In the 1980s, Africa had only 8 stock exchanges (Ndikumana, 2001).

However, from the 1990s till now, the number of stock exchanges has increased significantly. Before 1989, the number of stock exchanges were five in sub-Saharan Africa and three stock exchanges in North Africa. However, by 2007, Yartey and Adjasi (2007) found that the number of stock exchanges in Sub-Saharan Africa has risen from the five to nineteen stock exchanges. These emerging stock exchanges face the added obstacle of having trade concentrated in a few stocks and some stock exchanges are being monopolized by a few numbers of firms. Evidence of monopolisation of the stock market is seen especially in the Ghana stock market and the Abidjan regional market. On the Ghana stock exchange, Ashanti Goldfields forms 90% of the market's total capitalization while only five companies forming 75% of all transactions in the Abidjan stock market (Allen, Otchere & Senbet., 2011)

Currently, there are 29 stock exchanges represented by 38 African countries. The only functional regional stock exchange in Africa is located in Abidjan; that is the Bourse

Regionale des Valeurs Mobiliere (BVRM). This stock exchange serves eight countries which includes; Benin, Mali, Togo, Burkina Faso, Niger, Senegal, Cote D'Ivoire and Guinea Bissau. The BVRM serves as a market for French speaking West African states. Discussions are ongoing to merge the BVRM, the Ghana Stock Exchange and the Nigerian Stock Exchange into a West African regional stock exchange. Central African countries have the Bourse des Valeurs Mobilières d'Afrique Centrale (BVMAC) which is located in Gabon, but currently it is not completely functional. The BVMAC currently serves as a bonds market since it has no companies listed for equity capital. The Southern African countries which are under the auspices of the Southern African Development Community (SADEC) are also making plans to set up a regional stock exchange.

On 13th November 1993 in Nairobi, Kenya, the African Securities Exchange Associations (ASEA) which is an association of stock exchanges was set up and registered with the objective of building an association for systematic mutual cooperation, information exchange, mutual assistance and joint programs among members. The current membership of ASEA is made up of 21 stock markets representing 27 African countries (ASEA, 2009).

Allen et al. (2014), observed that Sub-Saharan African stock markets when compared to fledging markets outside of Africa still had low levels of development indicators. Moreover, this is an area getting attention in the circles of policy making in Africa. There is an increasing knowledge that just setting up of stock exchanges is of little importance if there is no conducive atmosphere for these stock markets to perform vital liquidity and production of information. The likely liquidity problems of African stock exchanges are

thin trading, the dominance of institutional investors and governments which keep minority. Yet, as one progress, one will find evidence of different governments beginning to implement policy measures which will boost liquidity of the stock exchanges. Governments in Africa are beginning to institute privatization on the large scale as a measure to boost the depth and liquidity of their stock markets through the stock exchange; the Kenyan government used this procedure when they privatized Kenya Airways. Another measure which is used is the regional consolidation of stock markets is the Bourse Regional des Valeurs Mobilières (BVRM), a regional stock market located in Abidjan established as an anchor for French speaking West African countries. The BVRM is unique to the world and has the potential to be the standard to be imitated by other regions on the continent of Africa. Presently, initiatives to establish a similar one in Anglophone countries are underway. There is a possibility of the English-speaking West African countries under the auspices of the Economic Community of West African States (ECOWAS) to establish their own regional stock exchange while countries in Southern Africa will also establish their own regional stock exchange under the umbrella of the Southern African Development Community (SADEC) organization. Likewise, Eastern African countries, such as Tanzania, Kenya, Rwanda and Uganda may also come together to set up a regional stock exchange.

2.6.2.1 African Stock Markets Size

Stock markets in African are facing serious challenges with regard to their breadth which is indicated by the number of companies listed and market capitalization. With the exception of Egypt and South Africa, stock exchanges in Africa are the tiniest of any Sub-region in terms of both market capitalization and the number of companies listed. Table 2.11 presents the data on market capitalization. Stock markets have gradually become vital in providing investment capital for projects in Africa. According to

ASEA'S 2009 report, 18 stock exchanges raised more than US\$10 billion of share capital from 170 new companies listed from 2007-2009. The 10 biggest stock exchanges in Africa had their market capitalization grew from US\$222 billion to more than US\$700 billion between the period 2002-2008, realizing a yearly growth rate of 18% (ASEA, 2009). The increasingly relevance of stock exchanges to the growth of African countries is seen in the rising market capitalization of these countries. However, the global financial crunch in 2007 has resulted to a decrease in the market capitalization for many African stock markets. In South Africa, the Johannesburg Stock Exchange is comparatively similar to other countries in the developed world stock exchanges and it ranks very high in emerging market countries (see table 2.11).

Except Germany, Spain and France stock exchanges, the JSE is highly ranked relative to the other highly ranked stocks markets in the Europe and Central Asia sub-region, both in terms of market capitalization ratios and market capitalization on average (see Table 2.11 and table 2.12). Market capitalization in South Africa is more than that of United Kingdom or the United States, when scaled by GDP and it is more than double in the last 5 years (Nakagawa & Psalida, 2007). As at 2014, the mean market capitalization ratio for Sub-Saharan African countries was 94.62%, showing that stock markets in Sub-Saharan Africa are highly integrated (see Table 2.12). Moreover, the mean market capitalization in Sub-Saharan African countries amount to US\$209 billion which is much lower than Europe and Central Asia. However, the average market capitalization of Sub-Saharan Africa economies is lower than their European counterparts (see Table 2.12).

Table 2. 11: Market capitalization of listed domestic companies (current US\$)

Year	2010	2011	2012	2013	2014	2015	2016	Average
Sub-Sahara Africa								
Cote d'Ivoire	7,158,120,000	6,287,600,000		11,818,850,000	11,710,400,000	12,493,030,000	12,363,659,089	9,707,998,441
Ghana	2,947,690,000	3,098,510,000						2,824,406,667
Kenya	14,460,870,000	10,202,610,000						11,876,760,000
Mauritius	7,752,770,000	7,845,150,000	7,180,100,000	8,942,350,000	8,751,020,000	7,238,550,000	7,568,297,309	7,732,535,914
Namibia	1,176,270	1,152,430						11,139,903
Nigeria	50,546,400,000	39,028,390,000	56,205,200,000	80,609,900,000	62,766,310,000	49,973,880,000	29,792,434,000	50,143,239,250
South Africa	925,007,150,000	789,037,130,000	907,723,200,000	942,812,110,000	933,930,700,000	735,945,170,000	951,320,328,604	873,099,942,325
Average	143,982,025,181	122,214,363,204	323,702,833,333	261,045,802,500	254,289,607,500	201,412,657,500	250,261,179,750	209,923,887,925
Europe and Central Asia								
Austria	126,031,960,000	85,269,520,000	106,036,780,000	117,671,410,000	96,790,330,000	96,079,380,000	120,976,729,937	107,866,522,492
Belgium	268,726,290,000	229,320,850,000	299,517,140,000	374,325,590,000	378,525,790,000	414,556,380,000	377,756,548,791	325,312,146,099
France	1,911,515,390,000	1,553,956,950,000	1,808,188,710,000	2,301,085,210,000	2,085,895,800,000	2,088,317,310,000	2,156,832,792,355	1,981,497,162,794
Germany	1,429,719,050,000	1,184,500,160,000	1,486,314,810,000	1,936,106,260,000	1,738,539,060,000	1,715,800,490,000	1,716,041,505,061	1,562,422,080,633
Norway	295,288,300,000	220,936,390,000	242,764,880,000	265,377,100,000	219,369,670,000	193,895,750,000	231,257,192,555	237,015,314,069
Portugal	81,996,700,000	61,689,890,000	65,519,040,000	79,177,900,000	57,774,190,000	59,837,190,000	57,196,516,622	70,179,828,328
Spain	1,171,624,980,000	1,030,987,550,000	995,088,450,000	1,116,561,030,000	992,913,610,000	787,192,290,000	704,551,326,648	1,029,182,463,331
Turkey	302,443,140,000	197,074,460,000	315,197,530,000	195,745,520,000	219,762,560,000	188,861,890,000	171,764,937,098	227,815,810,887
Average	698,418,226,250	570,466,971,250	664,828,417,500	798,256,252,500	723,696,376,250	693,067,585,000	692,047,193,633	692,661,416,079

Table 2. 12: Market capitalization of listed domestic companies as percentage of GDP

Year	2009	2010	2011	2012	2013	2014	2015	2016	Average
Sub-Sahara Africa									
Cote d'Ivoire	25.23	28.77	24.77		37.79	33.11	37.69	33.99	31.62
Ghana	9.34	9.16	7.83						8.78
Kenya	29.62	36.15	24.32						30.03
Mauritius	72.10	77.50	68.11	61.53	73.72	68.35	61.91	62.20	68.18
Namibia	0.35	0.01	0.01						0.12
Nigeria	19.01	13.70	9.48	12.19	15.65	11.04	10.39	7.36	12.35
South Africa	268.84	246.47	189.27	229.03	257.03	265.99	231.71	321.98	251.29
Average	60.64	58.82	46.26	100.92	96.05	94.62	85.43	106.38	81.14
Europe and Central Asia									
Austria	28.51	32.16	19.78	25.90	27.36	21.90	25.15	30.96	26.46
Belgium	53.61	55.57	43.51	60.16	71.86	71.28	91.07	80.72	65.97
France	72.25	72.22	54.28	67.43	81.93	73.21	85.81	87.48	74.33
Germany	37.81	41.84	31.52	41.94	51.59	44.69	50.83	49.34	43.70
Norway	58.77	68.81	44.29	47.58	50.69	43.93	50.15	62.32	53.32
Portugal	40.31	34.41	25.19	30.28	35.02	25.16	30.01	27.92	31.04
Spain	95.69	81.84	69.28	74.48	81.99	72.11	65.72	56.94	74.76
Turkey	35.94	39.18	23.67	36.06	20.59	23.52	21.97	19.89	27.60
Average	52.86	53.25	38.94	47.98	52.63	46.98	52.59	51.95	49.65

Source: Author computation and compilation

2.6.2.2 Liquidity and Depth of African Stock Markets

In this thesis, two indicators are used to measure the liquidity of African stock markets.

First, the study evaluates the trading activities of the market compared to the economy size by the total value of traded shares on the exchange as a proportion of GDP.

Secondly, the thesis evaluates the “turnover ratio” by the total value of traded shares as a proportion of the total market capitalization. These measures are generally used, even though they do not directly indicate stock market liquidity. The most direct measure of liquidity in a stock market should have been how easy it is for investors to be able to purchase and sell securities at quoted prices. Nevertheless, the two standard indicators can be considered more or less as indicators of total trading activity comparative both the economy size and the size of the stock market. Apart from South Africa and Mauritius

who have stable and secure stock exchanges, other stock exchanges in the Sub-Saharan Africa region are thin and lack liquidity in spite of the stock markets' accelerated development over the last 20 years (see tables 2.13 and 2.14). The average figure of shares traded as proportion of GDP is small among Sub-Sahara African countries, even though it has been rising over the years (see Table 2.13).

Table 2. 13: Stocks traded; total value scaled by GDP

Year	2009	2010	2011	2012	2013	2014	2015	2016	Average
Sub-Sahara Africa									
Cote d'Ivoire	0.99	0.91	0.46	0.64	1.17	1.13	1.57	1.73	1.08
Ghana	0.20	0.32	0.64	0.12	0.40				0.34
Kenya	0.54	1.98	2.19	2.00	3.28				2.00
Mauritius	3.73	3.65	4.43	2.54	2.65	3.62	3.94	2.63	3.40
Namibia	0.28	0.18	0.10	0.46	0.26	0.55			0.31
Nigeria	2.65	1.38	0.94	0.89	1.21	0.90	0.85	0.37	1.15
South Africa	73.18	73.87	54.17	57.24	63.32	69.98	73.67	136.21	75.20
Average	11.65	11.76	8.99	9.13	10.33	15.23	20.01	35.24	15.29
Europe and Central Asia									
Austria	12.87	12.46	9.00	5.77	6.17	6.50	8.31	6.79	8.48
Belgium	25.43	22.21	19.59	20.27	22.13	20.19			21.64
France	47.67	51.01	46.46	40.07	39.36	41.01			44.26
Germany	52.31	43.74	41.88	35.27	34.98	32.62	42.80	32.32	39.49
Norway	53.72	49.41	37.04	23.44	18.44	20.49	24.83	28.39	31.97
Portugal	18.37	22.51	14.56	12.22	17.24	20.38			17.55
Spain	85.25	95.99	75.78	64.70	67.19	72.03	81.68	47.48	73.76
Turkey	48.51	52.24	43.37	41.07	39.37	39.58	40.67	32.63	42.18
United Kingdom	117.82	131.62	115.85	92.80	61.14	77.97			99.53
Average	51.33	53.47	44.84	37.29	34.00	36.75	39.66	29.52	40.86

Source: Author computation and compilation

The turnover ratios and the value of stocks traded measures liquidity comparative to the economy size and stock market respectively. Thus, the value-traded ratio compares liquidity to the economy size and the turnover ratio compares liquidity to the size of the stock market itself. If a market is compared to the value traded, it could be considered as not being liquid.

However, if the stock exchange is compared to its turnover ratio then it could be considered liquid. The average stock market turnover ratio is 62.80% and value traded ratio is 15.29% in Sub-Sahara African economies which when compared to the mean of countries in Europe and Central Asia is smaller (refer to Table 2.13 and Table 2.14).

Table 2. 14: Stock traded, turnover ratio of domestic shares (%)

Year	2009	2010	2011	2012	2013	2014	2015	2016	Average
Sub-Sahara Africa									
Cote d'Ivoire	3.93	3.17	1.85		3.11	3.41	4.18	5.27	3.56
Ghana	2.13	3.45	8.20						4.60
Kenya	1.81	5.49	8.99						5.43
Mauritius	5.17	4.71	6.50	4.12	3.59	5.29	6.37	4.36	5.01
Namibia	80.38	1721.54	1107.23						969.72
Nigeria	13.94	10.10	9.92			8.18	8.17	5.36	9.28
South Africa	27.22	29.97	28.62	24.99	24.63	26.31	31.79	38.37	28.99
Average	19.23	254.06	167.33	14.56	10.44	10.80	12.63	13.34	62.80
Europe and Central Asia									
Austria	45.15	38.75	45.49	22.29	22.54	29.67	33.03	32.83	33.72
Belgium	47.44	39.97	45.02	33.70	30.80	28.33			37.55
France	65.98	70.63	85.59	59.42	48.04	56.02			64.28
Germany	138.34	104.54	132.85	84.10	67.80	73.00	84.19	74.93	94.97
Norway	91.40	71.80	83.64	49.27	36.38	46.65	49.51	45.18	59.23
Portugal	45.57	65.43	57.78	40.35	49.22	81.01			56.56
Spain	89.09	117.30	109.37	86.86	81.94	99.88	124.29	97.84	100.82
Turkey	134.98	133.33	183.22	113.87	191.19	168.25	185.15	168.60	159.82
Average	82.24	80.22	92.87	61.23	65.99	72.85	95.24	83.87	79.31

Source: World Development Indicators and Author's Computation

These figures indicate that low levels of liquidity characterize Sub-Sahara African stock markets. When compared to the selected European and Central Asian economies, Sub-Saharan African countries liquidity is lower (refer to table 2.13). Turnover ratios are as low as 0.04% in Swaziland relative to Mexico's which is about 31% (Andrianaivo & Yartey, 2009). Low level of liquidity presents a challenge when

doing market analysis for a local market because trading volumes are quite low (Andrianaivo & Yartey, 2009). The Sub-Saharan Africa stock exchanges that are fairly liquid are South Africa, Nigeria and Namibia. They have some average stock market turnover ratios of 28.99%, 9.28%, and 969.72%, respectively.

2.6.2.3 African Stock Markets Performance

Despite the low liquidity and the small size nature of Stock exchanges in Africa, in the past decade, Stock exchanges in Africa were among some of the stellar performers globally when it comes to stock returns. The Ghana Stock Exchange, for instance, was considered the most performing stock exchange in the world in 2004. There were five other stock exchanges that were also among the best performers in that same year within the African continent and these include Egypt, Uganda, Mauritius, Nigeria and Kenya (Yartey & Adjasi 2007). Stock markets in Africa have been part of the best stock performers from the period 2000 and 2010, providing international and local investors yearly returns of double-digit in terms of US dollars (ASEA, 2009). Within the period 1999-2009, the mean yearly return for these stock markets was about 25 percent (Allen et al., 2011). In terms of dollar returns, the mean returns were about 21.8% within the same period (Allen et al., 2011). Apart from 2008, the performance of these stock markets has been rising tremendously, sometimes with market returns especially in Malawi and Egypt being more than 100% (Allen et al., 2011). Moreover, the performance of African stock markets has been quite impressive when standard indicators are adjusted for risk such as the Sharpe ratio (Allen et al., 2011).

2.7 Financial Regulation in Sub-Sahara Africa

Financial regulation is a form of directive which requires financial institutions to follow particular requirements, restrictions and guidelines, aimed at maintaining the financial

system stability. Financial regulation is usually the responsibility of governments or non-governmental organisations. Financial regulation can influence the structure of banking sectors by raising the variety of financial products available to individuals and enterprises. West African regulatory changes are mainly tailored toward implementing Basel II, financial inclusion and Anti-Money Laundering (AML). For Systemically Important Banks (SIBs), new capital requirements have been introduced whilst more regulations on resolution planning and stress tests are expected.

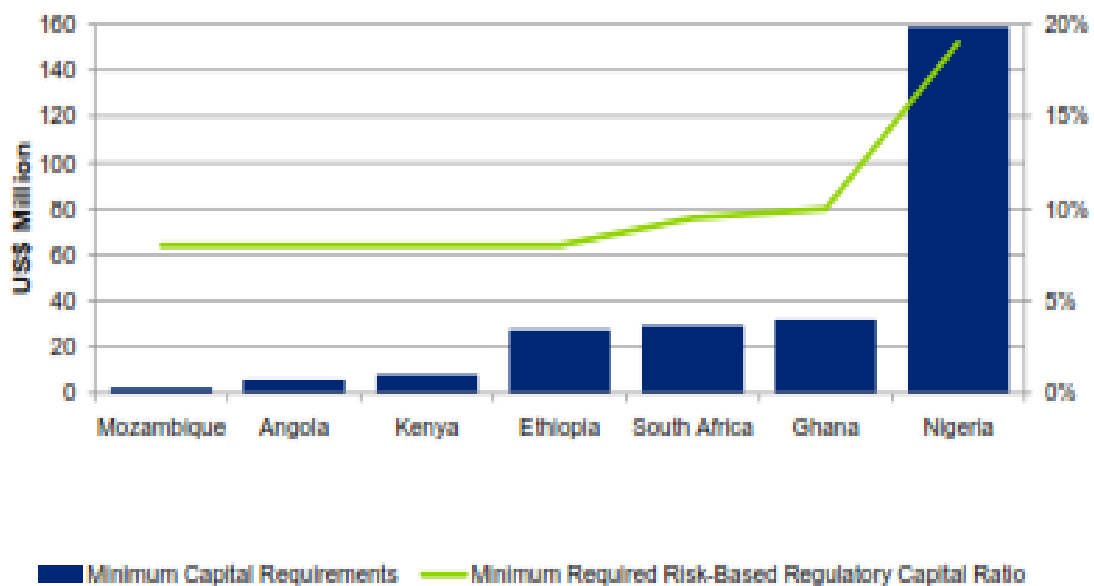
In a world fighting for economic growth, the economic growth rate of many African economies stands out and very significant. There is diversity of the extent of financial regulation coverage in Africa. The overall Regulatory Pressure Index (RPI), which is a measure of the level of regulators interference, is quite a bit high relative to the past year. Six and a half years before the global financial crisis, the regulatory pressure overall on financial institutions and banks indicate little signal of abating. KPMG also realised that in Sub-Saharan Africa, the regulatory pressure is connected to a country's over-all governance and political stability. However, on the whole, the regulatory pressures are still low in Sub-Saharan Africa relative to Asian Pacific and the Americas. Almost if not all regions, regulatory pressure should increase radically and leap-frog to match up with the world regulatory landscape.

In the past two decades, capital regulatory requirements have been fine-tuned and extended to cover different kinds of risk, classify assets of different risk, and permit a list of techniques to be used to find the risk weights to be used for each category of asset. During the process, the procedures are refined to become more complex, and this reflects the developing complexity of modern banks. In a period of economic recession, the

necessity of having sufficient capital reserves was stressed. In all economies, commercial banks are advised to avoid lending from one borrower or a group of inter-related borrowers. A quota is further placed regarding the amount that can be given out as loan in proportion to the capital at hand. In all economies that permit a quota of 20% of regulatory capital, 25% of this amount is the debt limit for any bank. Nigeria put a lending quota of 20% of regulatory capital to one particular borrower or a group of borrowers. In addition, Nigeria has also put a lending quota of 10% of its total credit portfolio to all government tiers. When applying lending quota regulation, there are some items that need to be exempted. An example is the government-guaranteed lending and cash-secured lending. All the banks, apart from those banks in Ghana and Ethiopia are permitted to lend abroad.

In making sure that there is adequate liquidity, all countries, apart from Nigeria, are required to diversify their contingency funding plans and funding sources which include stress testing, reserve to be deposited at the central bank and liquidity management of foreign currency by banks. Kenya and Ghana are the only countries allowed to impose maturity mismatch quota in Sub-Sahara Africa. As at 2010, all countries used Basel I capital adequacy requirement for their regulatory capital, and obey the guidelines and principles of Basel I, apart from Ghana which has changed Basel I version (currently introducing Basel II), Angola is also using Basel I equivalent regime, and South Africa is applying Basel II. Even though there is Basel III, it is only South African banks that are ready to implement it requirements fully. Further regulations in certain markets is expected as capital requirements rise (Deloitte on Africa Collection, 2010). Figure 2.4 below shows some stylized facts of minimum capital requirements of some selected African countries.

Figure 2.4: Stylized facts of Minimum capital requirement



Source: *Deloitte on Africa Collection 2010*

Table 2.15 also presents some stylized fact of financial regulation in terms of bank regulatory capital as a proportion of risk weighted assets of some selected Sub-Saharan African countries, on the one hand and Europe and Central Asia countries, on the other hand. The results indicate that Mauritania, Senegal, South Sudan and Swaziland have the highest bank regulatory capital as a proportion of risk weighted assets in Sub-Sahara Africa (see Table 2.15). On the average, Sub-Sahara African countries have lower bank regulatory capital as percentage of risk weighted asset than their Europe and Central Asia counterparts (see table 2.15). This implies that, banks in Sub-Saharan Africa are highly regulated in terms of bank regulatory capital scaled by risk weighted assets as compare to Europe and Central Asia countries (see Table 2.15).

Table 2.15: Bank regulatory capital to risk-weighted assets

Year	2009	2010	2011	2012	2013	2014	Average
Sub-Sahara Africa							
Gabon	24.00	22.60	21.10	17.10	11.60		19.28
Ghana	18.20	19.10	17.40	18.60	18.50	17.90	18.28
Lesotho	16.60	14.10	15.20	14.00	12.10		14.40
Mauritania	38.20	34.00	35.20	29.20	32.40	28.10	32.85
Mauritius	15.40	16.00	15.70	17.10	17.30	17.10	16.43
Mozambique	15.10	14.40	17.10	17.90	16.90	15.10	16.08
Namibia	15.00	15.30	14.00	14.20	14.40	14.70	14.60
Nigeria	4.10	1.80	17.90	18.30	17.10	17.20	12.73
Rwanda	19.00	21.60	23.80	21.40	23.00	24.20	22.17
Senegal	34.00	30.70	27.00	27.70	30.10	30.20	29.95
South Africa	14.10	14.90	15.10	15.90	15.60	14.80	15.07
South Sudan	29.90	26.60	24.40	25.90	23.20	16.70	24.45
Swaziland	28.40	29.80	28.00	31.00	22.20	24.90	27.38
Tanzania		18.20	17.20	17.20	18.10	17.00	17.54
Uganda	20.90	20.20	20.30	21.90	22.90	22.20	21.40
Average	20.92	19.95	20.63	20.49	19.69	20.01	20.28
Europe and Central Asia							
Austria	15.00	15.40	15.80	17.00	18.00	16.30	16.25
Belgium	17.30	19.30	18.50	18.20	18.70	17.60	18.27
Denmark	16.10	16.00	17.20	18.90	19.20	18.20	17.60
France	12.40	12.70	12.30	14.50	15.40	16.30	13.93
Germany	14.80	16.10	16.40	17.90	19.20	18.00	17.07
Italy	11.70	12.10	12.70	13.40	13.70	15.00	13.10
Netherlands	14.90	13.90	13.50	14.20	14.90	17.90	14.88
Norway	12.80	14.20	13.60	14.60	15.50	16.50	14.53
Portugal	10.50	10.30	9.80	12.60	13.30	12.30	11.47
Spain	12.20	11.90	12.10	11.60	13.30	13.70	12.47
Sweden	12.70	12.00	11.50	11.70	12.00	22.50	13.73
Switzerland	17.50	17.10	16.60	16.90	17.50	16.60	17.03
Turkey	20.60	19.00	16.60	17.90	15.30	16.30	17.62
United Kingdom	14.80	15.90	15.70	17.10	19.60	17.30	16.73
Average	14.52	14.71	14.45	15.46	16.11	16.75	15.33

Source: Author computation and compilation

2.8 Chapter Summary

The chapter presents the stylized facts of Sub-Saharan Africa's levels of financial inclusion and determinants and provided the policies and challenges of financial inclusion in Sub-Saharan Africa. It also explains how monetary policy and financial inclusion in Sub-Saharan Africa are connected. The chapter examined the stylized facts on the link between financial sector development and financial inclusion in Sub-Saharan Africa. Stock markets development in Sub-Saharan Africa countries has also been discussed including the development of the financial sector in Sub-Saharan Africa and finally the chapter presents the stylized facts of financial regulation in Sub-Saharan Africa.

CHAPTER THREE

MONETARY POLICY AND FINANCIAL INCLUSION IN SUB-SAHARA AFRICA: A PANEL VAR APPROACH

3.1 Introduction

Inadequate access to financial instruments and services has become a common phenomenon of the economic environment of most emerging markets and less developed countries. According to statistics from the World Bank (based on a household's survey in 148 countries), 50% of adults globally did not own accounts at formal financial institutions as at 2011 (Demirguc-Kunt & Klapper, 2012). People who are financially excluded do not have access to financial instruments that promote and enhance borrowing and saving. As a result, there is a limited impact on their intertemporal consumption decisions when the monetary policy rate changes, thereby reducing the effectiveness of monetary policy.

The issue of financial inclusion has engaged the attention of scholars, researchers and policymakers in recent times. This is so because financial inclusion has greater implications for monetary policy effectiveness. Thus, monetary policy transmission greatly depends on the level of financial inclusion. Increases in financial inclusion can have monetary policy and macroeconomic implications because financial markets provide indispensable channels for the effective transmission of monetary policy and hence the number of people that have access to finance in the financial system is very important for monetary policy effectiveness. This suggests that, monetary policy and financial inclusion are interdependent. This study examines the extent to which

financial inclusion affects monetary policy and the extent to which monetary policy also affects financial inclusion.

Most previous empirical papers have investigated the implications of financial inclusion for certain central banks' policy parameters' rule and model stability (Gali et al., 2004; Colciago, 2011; Bilbiie, 2008). Others have discussed the efficacy of monetary policy (di Bartolomeo & Rossi, 2007) and the policy implications for the decision to use the price index as central banks' target (Anand & Prasad, 2012). Some empirical studies have also examined the relationship between monetary policy and financial inclusion (Lenka & Bairwa 2016; Evans, 2016; Mbutor & Uba, 2013; Lapukeni, 2015; Mehrotra & Nadhanael, 2016). However, the problem with some of these empirical studies is that they fail to address the issue of endogeneity that might exist between monetary policy and financial inclusion (Lenka & Bairwa, 2016; Lapukeni, 2015; Mehrotra & Nadhanael, 2016). This implies that there could be a bi-directional or reverse causality between monetary policy and financial inclusion. Lack of knowledge of this reverse causality could make policymakers pursue either monetary policy or financial inclusion as a policy objective when it could be an outcome variable. This suggests that monetary policy should not only be pursued as a policy objective. It can also be an outcome variable of financial inclusion and vice versa.

Other studies have addressed the issue of endogeneity though they used inappropriate proxies for monetary policy and financial inclusion (Evans, 2016; Mbutor & Uba, 2013). One of the major problems besetting the study of monetary policy-financial inclusion nexus is the use of weak proxies for monetary policy and financial inclusion. Some studies have used inflation rate to proxy monetary policy (Lenka & Bairwa 2016; Evans,

2016; Mbutor & Uba, 2013). Inflation rate is an outcome variable of monetary policy and should not be used to measure monetary policy when monetary policy can be measured directly using central bank monetary policy rate. We believe that using central bank monetary policy rate, which is a direct measure of monetary policy, is more laudable and results generated from using this measure is more reliable and devoid of any bias.

Financial inclusion is also often proxied by single variable measures such as number of ATMs per hundred thousand adults, number of depositors with commercial banks per thousand adults, and number of bank branches per thousand adults (see Evans, 2016; Mbutor & Uba, 2013). We argue that the financial inclusion proxies listed above do not adequately mirror the other key functions of the financial system such as making bank accounts opening much easier and making credit available to borrowers. Conclusions drawn from such studies that use inappropriate financial inclusion proxies can be misleading and may not be important for the purposes of policy. Not that past studies do not recognise the problems embedded in the use of single variable proxies; they normally deal with the issue by using many of these single variable-based measures to carry out what they term as robustness checks. This solution, though commendable, is not adequate, as the different proxies themselves may be measuring different dimensions or just one dimension of financial inclusion.

It is now being recognised that financial inclusion has at least two main dimensions – demand side factors (usage) and supply side factors (access). Therefore, it is imperative that measures of financial inclusion reflect the multidimensional nature of financial inclusion. We address the gap in measuring financial inclusion by constructing a

composite index for financial inclusion after deriving the weights (factor loadings) from a panel principal component analysis (PCA). Unlike previous proxies, our composite measure is able to capture the two key dimensions of financial inclusion – usage and access. By employing these multidimensional measures, we are able to assess the link between monetary policy and financial inclusion from a holistic standpoint.

It is for this reason that this study investigates the bi-directional relationship between monetary policy and financial inclusion from the sub-Saharan African perspective using a panel Vector Auto-Regression (PVAR) estimation technique. The use of Panel Vector Auto-Regression (PVAR) estimation approach enables us to address the problem of endogeneity in order to establish the causality between monetary policy and financial inclusion. The use of panel VAR also helps us to generate the generalised impulse response functions and the variance decomposition of the variables. Generalised impulse response functions enable us to recognize the effect of shocks of monetary policy on financial inclusion and vice versa. Using generalised impulse responses functions enables one to produce shocks that do not change with the ordering of the variables compared to the usual Cholesky impulse responses (Issahaku, Harvey, & Abor., 2016). We also analyzed the variance decomposition of monetary policy and financial inclusion and the controlled variables in order to express the magnitude of the overall effect of a shock unlike impulse response functions that looks at the future direction of the variables following a shock.

Lenka and Bairwa (2016) investigated the link between monetary policy and financial inclusion using South Asian Association for Regional Cooperation (SAARC) economies and concluded that financial inclusion negatively impacts monetary policy. Mbutor and

Uba (2013) assert that increasing financial inclusion does not only have the potency to enhance economic growth, but that it also influences monetary policy by enhancing the sensitiveness of aggregate demand to changes in interest rates. Ma & Lin (2016), for instance, note that the continuous growth of financial systems in most economies could have direct effects on monetary policies instituted by an economy's central bank. This suggests that in an environment where the financial excluded lacks access to formal financial services, monetary policy will not yield the desired results.

In an overview of trends of financial exclusion in Africa and around the globe, Demircuc-Kunt and Klapper (2012) conclude that financial systems in Africa lag behind although they have experienced tremendous improvements over the last few decades. They support their assertion with statistics from World Bank (2012) that indicates that the ratio of credit to the private sector and credit to GDP averages 24 percent in sub-Saharan Africa, compared with 39% in North Africa, 77% for other developing countries, and 172% in developed countries. Furthermore, according to Allen et al. (2016), based on the Global Financial Inclusion Database, account penetration (defined as the proportion of persons above 15 who own an account) stood at 24% in sub-Saharan Africa relative to 33% in South Asia, 39% in Latin America and the Caribbean, 45% in Europe and Central Asia, 55% in East Asia and Pacific, and 89% in High income countries. Further evidence from Gallup World Poll (2012) shows that 60% of adults living under \$2 per day do not have access to banking services and sub-Saharan Africa was ranked the highest in terms of the number of people not having an account. The importance placed on financial inclusion by policymakers today and its benefits, coupled with low levels of financial inclusion in developing countries, implies that there is an aggressive effort by policymakers in developing countries to pursue financial inclusion.

Despite the empirical evidence that there is a relationship between financial inclusion and monetary policy, researchers know little about the possible endogeneity problems that could exist between financial inclusion and monetary policy in the sub-Saharan African context. As a consequence, there is a yawning gap in the extant literature regarding the relationship between financial inclusion and monetary policy from the sub-Saharan African perspective. This study, therefore, seeks to add to the literature by investigating the potential endogeneity that may exist between monetary policy and financial inclusion from the sub-Saharan African perspective. Thus, the bi-causal linkages between monetary policy and financial inclusion appear to have escaped the attention of policymakers and researchers, and this has led to a limited understanding of the link between monetary policy and financial inclusion.

However, for policy makers in both emerging and developing economies, having a grasp of the reverse causality relationship between monetary policy and financial inclusion is key if they are to put their countries and economies on the path of accelerated pro-poor growth. This is to say that they will not only focus on monetary policy as a policy objective but it could also be an outcome variable of financial inclusion and vice versa. Discovering the theoretical underpinnings of this reverse causality will enable sub-Saharan African economies' policy makers to formulate policies in their respective economies to get the optimum results of monetary policy and financial inclusion for economic development and growth. This study provides policy prescriptions that can guide policymakers in their effort to alleviate poverty and achieve sustainable growth in sub-Saharan Africa through monetary policy and financial inclusion.

Macroeconomic variables such as inflation rate, real effective exchange rate and economic growth were controlled because these variables, according to the literature, could influence both monetary policy and financial inclusion (Mbutor & Uba, 2013). As a result, we treat inflation rate, real effective exchange rate and economic growth as endogenous variables in the system of equations. This study sought to address the following research questions: (1) Does financial inclusion affect monetary policy in sub-Saharan Africa? (2) Does monetary policy affect financial inclusion in Sub-Saharan Africa?

Our study contributes in a number of respects to the discipline of finance and economics. First, this paper unlike others in the literature employs an alternative methodology by using Panel VAR. The use of Panel VAR helps us to analyse the dynamic link between monetary policy and financial inclusion together with country specific fixed effects simultaneously. Secondly, using orthogonalized impulse responses enables one to specifically single out the effect of each of the variable shocks in the system on the other variables, one at a time. This study also addresses a gap in the literature by presenting a more recent and detailed evidence on the extent to which financial inclusion and monetary policy are connected which has not been empirically investigated by previous studies from the sub-Saharan African perspective to the best of our knowledge.

Besides, this study is the first to examine the causal relationship between monetary policy and financial inclusion from the sub-Saharan African perspective. The results concur with the notion that there is a reverse causality between monetary policy and financial inclusion.

Our paper further broadens the knowledge frontiers in the economics and finance literature by providing new insights indicating that there is a bi-causal link between monetary policy and financial inclusion. Some new insights on the monetary policy-financial inclusion nexus is presented by considering the effect of macroeconomic variable such as inflation rate, real effective exchange rate and economic growth rate on financial inclusion and monetary policy. Other contributions of this paper are that we overcome the use of inadequate proxies for financial inclusion by constructing multidimensional index of financial inclusion based on a panel principal component analysis (PCA). Compared to previous studies, we use an array of econometric techniques which enable us to overcome endogeneity, model selection bias and to contribute to panel estimation procedure.

This study uses standard panel econometrics to assess the dynamic and causal links between monetary policy and financial inclusion (1) controlling for potential endogeneity, (2) controlling for other variables known to influence the interaction between monetary policy and financial inclusion and (3) performing a number of robustness checks by splitting the sample into two based on sub-Saharan African countries and the full sample of all countries to see if the story in sub-Sahara African countries differ from the rest of the world.

The main results from the study show that there is a reverse causality between monetary policy and financial inclusion. It is evident that monetary policy affects financial inclusion and financial inclusion also affects monetary policy significantly. It is also evident that financial inclusion impacts real effective exchange rate.

The rest of this study is organized as follows: Section 3.2 presents both the theoretical and empirical literature review. Section 3.3 discusses the empirical models and methodology. Section 3.4 presents the data analysis and discusses the results, estimation of PVAR results and the generalized impulse responses. Section 3.5 presents the summary, conclusions and implications of the findings.

3.2 Literature Review

3.2.1 The Theoretical Literature

Conventionally, monetary policy has been theorized to be transmitted through two channels: direct monetary transmission and interest rate channels (de Bondt, 1999). By the direct monetary transmission channel, the use of an expansionary or contractionary monetary policy to directly increase or decrease the supply of money within an economy results in surplus or adverse cash balances which would eventually increase or reduce aggregate spending in the economy, thereby affecting economic growth. The goal of monetary policy is to boost economic growth and aggregate demand. However, the effectiveness of monetary policy in achieving the objective of affecting aggregate demand and economic growth depends on the level of financial inclusion.

Another monetary transmission channel is the interest rate channel. Controlling interest rates by either decreasing or increasing real interest rates affects the money markets lending and borrowing rates. A reduction in real interest rates reduces capital costs which tend to result in increase in current consumption and the propensity to save falls. However, where real interest rates are increased, this drives up borrowing costs thereby causing the level of consumption and investment to fall; hence aggregate demand will

fall. This implies that monetary policy objective of affecting interest rates will not be effective with low levels of financial inclusion.

Another theory that underlies the link between monetary policy and financial inclusion is the bank lending channel. According to Khan, Binti and Gee (2016), the impact of monetary policy through bank lending channel is considered a well-established concept in the banking-economics literature. This assertion is supported by Ma and Lin (2016) who posit that recent empirical studies have examined the link between financial development and monetary policy focusing on the credit channel theory propounded by Bernanke & Gertler (1995). According to Bernanke & Gertler (1995), the credit channel theory contributes significantly as a tool for monetary policy transmission mechanism. They posit that monetary policy shocks tend to be amplified by financial market imperfections known as financial accelerator effect. They note that restrictions on credit markets result in substitution between different sources of financing (self-funding and credit) which are not perfectly aligned which they call the external finance premium. From the credit channel theory point of view, a shock to the external finance premium influences the activities and actions of borrowers through one of two ways: the balance sheet channel and banking lending channel (Ma & Lin, 2016).

The banking lending channel focuses on bank loans which households and small businesses rely on as their major source of funding. Where monetary policy is tightened and as a result decreases in money supply, banks are forced to readjust their portfolios, thus adversely affecting the quantum of loans they can offer. Given that bank loans have no perfect substitutes, and with the loan supply falling, banks will increase their lending rates. As a result, borrowers who depend on banks have access to reduced loans but at a

higher cost of capital which increases the external finance premium. This has the tendency of reducing financial inclusion due to a rise in borrowing cost. This adversely affects activities of bank borrowers either through high lending rates or through credit rationing. Hence, less people will be financially included (Morgan, 1998).

The transmission channels of monetary policy, therefore, clearly hypothesize an effect of monetary policy on financial inclusion. For instance, Loutskina and Strahan (2009) investigated the dwindling influence of the bank lending channel as a monetary policy transmission channel in the face of mortgages and found evidence that financial securitization weakened the impact of the banking lending channel. However, studies by Aysun and Hepp (2011) and Ashcraft and Campello (2007) have equally found evidence that securitization reinforces the balance sheet channel under the credit channel theory. In their study, Aysun and Hepp (2011) have proven that bank securitisation is more responsive to the balance sheets of borrowers and therefore in the face of financial securitization, the transmission channel of the balance sheet of credit channel theory becomes more prominent.

3.2.2 Empirical Literature

Most empirical papers on financial inclusion are largely focused on how to promote and measure financial inclusion (Ardic, Heimann & Mylenko, 2011; Marshall, 2004; Treasury, 2004; Demirgüç-Kunt & Klapper, 2012; Allen, Demirguc-Kunt, Klapper & Pería., 2016; Sarma, 2008; Hannig & Jansen, 2010). Other studies also focused on the impact of financial inclusion on economic growth, poverty reduction and income inequality (Chibba, 2009; Thorat, 2006; Dabla-Norris, et al 2015; Sarma & Pais, 2008; Kpodar & Andrianaivo, 2011; Sharma, 2016). However, few studies have looked at how

financial inclusion affects monetary policy effectiveness (Mbutor & Uba 2013; Lenka & Bairwa, 2016). Using data spanning from the period 1980 to 2012 in Nigeria, Mbutor & Uba (2013) concluded that increases in financial inclusion enhance monetary policy effectiveness. Lenka and Bairwa (2016), in a study of the South Asian Association for Regional Cooperation (SAARC) countries, found that financial inclusion influences monetary policy, suggesting that access to finance in an economy enhances monetary policy effectiveness.

With the quest for financial inclusion at all levels, it has been suggested that financial inclusion could widen the overall impact of monetary policy (Khan, 2011; Mbutor & Uba, 2013). If this were to be true, then it would imply that monetary policy could have an impact on the poor and vulnerable who previously would have been cushioned from external shocks because they do not have access to finance and hence, they are not part of the financial system.

Mehrotra and Yetman (2014) found that in an economy where there is limited access to finance, the central bank has to increase the monetary policy rate for the economy to be stabilized after a shock. They also find that for inflation rate to be stabilized in an economy without affecting economic activities, greater financial inclusion is the key. Mehrotra and Yetman (2015) suggest several ways by which increasing access to finance impacts central bank policies aimed at maintaining financial and monetary stability. They posit that access to finance smoothen consumption of households since they have access to financial services for saving and borrowing.

Standard economic theory suggests a link between monetary policy and financial inclusion. A country's monetary policy essentially revolves around controlling monetary supply in an economy based on underlying macroeconomic conditions. However, these actions have ramifications on the savings and loans functions of banks and other financial institutions. Basically, a country's monetary policy may use open market operations, discount rates and the required reserve ratio to influence the amount of money and credit in an economy with the overarching objectives of controlling inflation and interest rate spreads in order to enhance growth (Sulaiman & Migiyo, 2014). Though these policy actions tend to influence the cost of credit within the economy, they affect the way and manner the financial sector, particularly banks, operate (Balfoussia, Brissimis, & Delis, 2011).

The fact that monetary policy affects the banking system suggests that it could influence directly or indirectly, to some extent, the degree of financial inclusion within a country's economy. The issue of financial inclusion has gained considerable attention amongst researchers and policymakers, particularly after it was noted that the high degree of financial exclusion worldwide was a major reason for the global financial crisis in 2007 (Hannig & Jansen, 2010). As Chakrabarty (2012) posits, achieving financial inclusion has become a global goal.

Khan (2011) emphasizes the relevance of financial inclusion in today's global economy; he posits that financial inclusion is not just another policy tool but a way to accelerate financial inclusion for all. As a result, increasing financial services (mainly access to savings and credits from the banking sector) for the less privileged is a priority in both developed and developing countries. To this effect, Ma & Lin (2016) argue that

developing the financial systems globally in today's economic environment raises concerns which include the direct effect such improvements may have on monetary policies.

Mahendra (2006) defines financial inclusion as access to financial services at low cost to the wider segment of the marginalised and low-income people in society. He notes that financial inclusion is an embodiment of all financial services such as payment, insurance, savings and remittances but that the most important aspect is credit facility. This concurs with Harihan & Marktanner (2012) who define financial inclusion as the access to formal financial services like insurance, savings and credit for the marginalized. They further allude to potential economic benefits of financial inclusion which include economic growth and development, increase in the total factor productivity of a country and its capacity to provide capital for investment. They also found evidence that financial inclusion can increase the savings portfolio of the financial sector and enhance efficiency of financial intermediation. Khan (2011) also argues that financial inclusion allows greater involvement of all groups in a society. Consequently, this enhances the effectiveness of monetary policy. In his submission, Khan (2011) argues that the informal sector, which represents a larger portion of developing economies tends to impede the transmission of monetary policy because those in the informal sector are not financially included. This is due to the fact that financial decisions form a major part of the excluded segment who are independent and are not affected by monetary policy actions. Therefore, by including such persons and groups in the overall financial system, he notes, could lead to positive externalities which could translate into a more effective monetary policy.

Consequently, if by improving inclusion and access to financial services, monetary policy transmissions could be enhanced, does it mean that financial inclusion could probably influence monetary policy effectiveness? Despite Khan's (2011) assertion regarding the link between monetary policy and financial inclusion, there is yet to be an empirical study that examines the nature of the relationship in sub-Saharan Africa using a panel VAR approach. To the best of the researchers' knowledge, the only such study that investigates this relationship in Africa was undertaken by Mbutor & Uba (2013) in Nigeria. They found evidence to support Khan's (2011) assertion that financial inclusion would enhance monetary policy effectiveness. However, their conclusions have limited applicability since it was conducted as a one-country study and their study also failed to address the possibility of endogeneity between monetary policy and financial inclusion which might lead to bias and spurious results. This study sought to examine the possible endogeneity between monetary policy and financial inclusion using a much broader dataset from sub-Saharan Africa.

The question therefore is that if financial systems and monetary policy are directly related, could efforts made to expand financial services to the marginalised influence the effectiveness of monetary policy? Moreover, it is also worth investigating whether the very policies that make up the fabric of an economy's monetary policy drive or restrict inclusive finance. It is for this reason that this study investigates the dynamic and causal link between monetary policy and financial inclusion from the sub-Saharan African perspective. Figure 3.1 below presents the conceptual framework between monetary policy and financial inclusion.

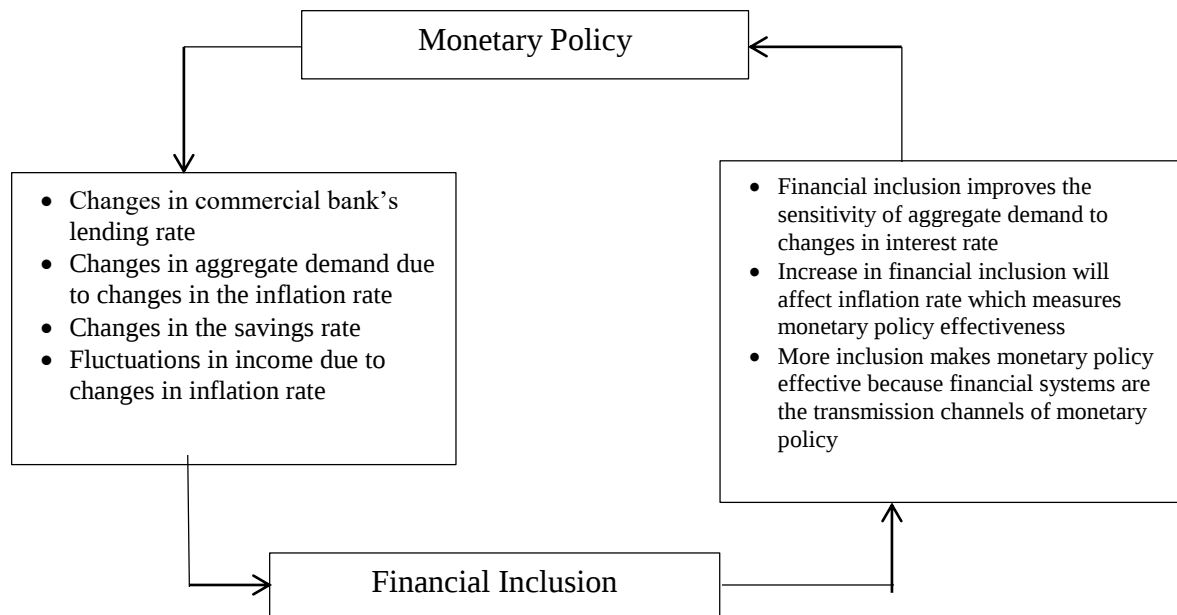


Figure 3.1: Conceptual Framework

Source: Authors Compilation

The conceptual framework demonstrates the transmission mechanisms by which the two variables are connected. The diagram shows that financial inclusion improves the sensitivity of aggregate demand to changes in interest rate and this enhances the effectiveness of monetary policy. On the other hand, monetary policy indicators such as changes in commercial banks' lending rate, changes in aggregate demand due to changes in the inflation rate, changes in the saving rate and fluctuations in income due to changes in inflation rate will promote financial inclusion.

3.3 Methodology and Data Source

This study employed Panel Vector Autoregressive (PVAR) technique to investigate the causal and dynamic link between monetary policy and financial inclusion by specifying the endogenous behaviour between monetary policy and financial inclusion. The advantages of the panel vector autoregressive (VAR) approach originate from conventional VAR framework that considers all the variables in the system as

endogenous. However, the panel VAR estimation technique is more advantageous because it permits all the variable unobserved individual heterogeneity by considering fixed effects which ensure that the estimates are consistent.

The use of panel VAR is necessitated by the fact that Panel VARs allows the flexibility of inclusion of weak and truly exogenous variables. The use of panel VARs addressed the problem of endogeneity, which is one of the most serious problems of econometric modeling of panel data analysis. The general Panel VAR model is stated as follows:

$$Y_{it} = \beta_{oi}(t) + \sum_{k=1}^p \alpha_{it} Y_{it-k} + u_{it} \dots \dots \dots (1)$$

where $u_{it} = \gamma_i + v_t + e_{it}$, Y_{it} represents a vector of K endogenous variables for each country. $i = 1, \dots, N$ over $t = 1 \dots T$ time periods,

the Y_{it} is stated as

$$Y_{it} = \begin{bmatrix} MPR_{it} \\ FINC_{it} \\ GDPGR_{it} \\ INFLRA_{it} \\ REER_{it} \end{bmatrix}$$

These variables are defined in Table 3.1. $\beta_{oi}(t)$ Captures all the deterministic components (including the constant, time dummies, etc.).

Y_{it-k} are the lagged figures of the endogenous variables and U_{it} is a $K \times I$ vector of random disturbances which is given by; $U_{it} = [U_{1t}, U_{2t}, \dots, U_{Nt}] \sim iid(0, \delta)$

α_{it} and $\beta_{oi}(t)$ are permitted to be cross-sectionally dependent. In the event that exogenous variables are present, eq (1) becomes:

$$Y_{it} = \beta_{oi}(t) + \sum_{k=1}^p \alpha_{it} Y_{it-k} + D_{ij}R_t + U_{it} \dots \dots \dots (2)$$

Where D_{ij} are $K \times M$ matrices for each lag $j = 1, \dots, p$, and R_t is an $M \times 1$ vector of exogenous variables common to all countries i . Similarly, following Love & Zicchino (2006), one can also specify the panel VAR in a reduced form as follows:

$$Y_{it} = \beta_{oi}(t) + \sum_{k=1}^p \alpha_{it} Y_{it-k} + \tau_2 R_{it} + f_i + d_t + e_{it} \text{-----} (3)$$

Alternatively, the baseline Panel VAR model following Love & Zicchino (2006) can also be written as:

$$Z_{it} = \tau_1 Z_{it-1} + \tau_2 R_{it} + f_i + d_t + e_{it} \text{-----} (4)$$

Where Z_{it} is a five-variable vector $[MPR, FINC, INFLRA, GDPGR, REER]$

R_{it} captures exogenous variables if there are any.

Where f_i captures fixed effects- unobservable time invariant effects specific to each country.

d_t captures time dummies that are country specific which represent each country specific macro shocks.

e_{it} the random error term assumed to be iid.

3.3.1 The Empirical Model.

Following equation (3) and (4), the researchers empirically model monetary policy and financial inclusion. The equations modeling these two variables are specified below. The researchers specified monetary policy as a function of its own lags, the lags of financial inclusion index and the lags of the controlled variables while controlling for time and country specific fixed effects as follows;

$$\begin{aligned} MPR_{it} = & \sum_{j=1}^p \phi_{1j} MPR_{it-j} + \sum_{j=1}^p \phi_{2j} FINC_{it-j} + \sum_{j=1}^p \phi_{3j} GDPGR_{it-j} + \\ & \sum_{j=1}^p \phi_{4j} INFLRA_{it-j} + \sum_{j=1}^p \phi_{5j} REER_{it-j} + f_i + d_i + e_{it} \text{.....} (5) \end{aligned}$$

i is the country subscript while t is the time subscript, MPR_{it} is the monetary Policy rate for country i at time t , $FINC_{it-j}$ is lag of financial inclusion index, $GDPGR_{it-j}$ is the lag of the GDP growth rate; $REER_{it-j}$ is the lag of the real effective exchange rate, $INFLRA_{it-j}$ is the lag of the inflation rate; f_i captures the country i – specific intercept representing country specific fixed effect: d_t captures time dummies, and e_{it} is the noise error term.

Similarly, financial inclusion index can also be specified as follows:

$$FINC_{it} = \sum_{j=1}^p \phi_{1j} FINC_{it-j} + \sum_{j=1}^p \phi_{2j} MPR_{it-j} + \sum_{j=1}^p \phi_{3j} GDPGR_{it-j} + \sum_{j=1}^p \phi_{4j} INFLRA_{it-j} + \sum_{j=1}^p \phi_{5j} REER_{it-j} + f_i + d_t + e_{it} \dots \dots \dots (6)$$

The controlled variables are also modelled as follows;

$$GDPGR_{it} = \sum_{j=1}^p \phi_{1j} GDPGR_{it-j} + \sum_{j=1}^p \phi_{2j} MPR_{it-j} + \sum_{j=1}^p \phi_{3j} FINC_{it-j} + \sum_{j=1}^p \phi_{4j} INFLRA_{it-j} + \sum_{j=1}^p \phi_{5j} REER_{it-j} + f_i + d_t + e_{it} \dots \dots \dots (7)$$

$$INFLRA_{it} = \sum_{j=1}^p \phi_{1j} INFLRA_{it-j} + \sum_{j=1}^p \phi_{2j} MPR_{it-j} + \sum_{j=1}^p \phi_{3j} FINC_{it-j} + \sum_{j=1}^p \phi_{4j} GDPGR_{it-j} + \sum_{j=1}^p \phi_{5j} REER_{it-j} + f_i + d_t + e_{it} \dots \dots \dots (8)$$

$$REER_{it} = \sum_{j=1}^p \phi_{1j} REER_{it-j} + \sum_{j=1}^p \phi_{2j} MPR_{it-j} + \sum_{j=1}^p \phi_{3j} FINC_{it-j} + \sum_{j=1}^p \phi_{4j} GDPGR_{it-j} + \sum_{j=1}^p \phi_{5j} INFLRA_{it-j} + f_i + d_t + e_{it} \dots \dots \dots (9)$$

Where all the variables are defined under table 3.1

The Modified Bayesian Information Criterion (MBIC), Modified Akaike Information Criterion (MAIC) and Modified Quasi-information Criterion (MQIC) are used to choose the optimal autoregressive lag order. This study employed four panel unit root test: the Levine–Lin Chu (LLC) test, Im Pesaran and Shin (IPS) test, Augmented Dickey Fuller (ADF) test and Philips Perron (PP) test to test for stationarity of the variables. These tests outperform other panel unit root tests such as Westerlund’s group-mean test, the Larsson et al. test (LLL) and Breitung test (Hlouskova & Wagner, 2006).

Finally, in order to analyze the generalized impulse-response functions (IRF), estimating the confidence intervals for the impulse-response functions is a necessary condition since the impulse-response functions are generated from the computed VAR parameters and their standard errors. Moreover, the researchers also present the forecast-error variance decompositions to show how important shocks in the variables is in modeling the variations of another variable in the panel VAR model by giving the percentage of the variation in one variable that is explained by another variable shocks over time. Unlike impulse response functions that provide the future direction of the variables when there is a shock, forecast error variance decompositions determine the overall effect magnitude.

3.3.2 Data Source and Description of variables

Table 3. 1: Data and Variables Selection

Variable	Notation	Description	Data source
Monetary Policy Rate	MPR	Central Bank Monetary Policy Rate	IFS
Financial Inclusion Index	FINC	Index of six variables of financial Inclusion	
Financial Inclusion	ATMSPHTA	ATMs per hundred thousand adults	IFS
Financial Inclusion	BRPHTA	Bank branches per hundred thousand adults	IFS
Financial Inclusion	CBB	Commercial bank branches per hundred thousand adults	IFS
Financial Inclusion	BAPTA	Bank accounts per thousand adults	IFS
Financial Inclusion	BFCB	Borrowers from commercial banks per thousand adults	IFS
Financial Inclusion	DCBPTA	Depositors with commercial banks per thousand adults	IFS
Inflation rate	INFLRA	Log of consumer price index (CPI)	WDI
Real Effective Exchange rate	REER	Real Effective exchange rate	WDI
Economic growth	GDPGR	GDP growth (annual %)	WDI

Data on the monetary policy rate (MPR) and all the financial inclusion variables were taken from the International Financial Statistics (IFS) and other variables were obtained from the World Bank Development indicators (WDI). The sample consists of 48 sub-Saharan countries spanning from the period 1990 to 2014. Even though the study focused on sub-Saharan Africa, the researchers performed Panel VARs for the full sample as well to see if the African story is different.

3.3.3 Principal Component Analysis (PCA)

The study used panel Principal Component Analysis (PCA) estimation technique to construct a financial inclusion index made up of six chosen measures of financial inclusion. According to this estimation techniques, the j^{th} factor Index can be specified as:

$$FINC_j = W_{J1} X_1 + W_{J2} X_2 + W_{J3} X_3 + \dots + W_{JP} X_P \quad W_{Ji} \text{ where } i=1, 2, \dots, p$$

$FINC_j$ is the Financial Inclusion Index; W_j are the weights of the coefficient of the factor score; X_i is the original figure of the respective components; while p is the number of variables in the equation. The financial inclusion composite index has been constructed by two dimensions of financial inclusion where each dimension consists of three factors. The first dimension is the supply side factors which include: ATMs per hundred thousand adults (ATMSPHTA), bank branches per hundred thousand adults (BRPHTA), and commercial bank branches per hundred thousand adults (CBB). The second-dimension factors are the demand side factors which include bank accounts per thousand adults (BAPTA), borrowers from commercial banks per thousand adults (BFCB), and depositors with commercial banks per thousand adults (DCBPTA). The Financial Inclusion Index (FINC) is made up of six factors. The index is specified as follows:

$$FINC = f(ATMSPHTA, BRPHTA, CBB, BAPTA, BFCB, DCBPTA)$$

3.4 Discussion of Empirical Results

3.4.1 Descriptive Statistics

The descriptive statistics of the sub-Saharan Africa sample and the full sample are presented in Table 3.2. However, because the mean is subject to distortions from outliers, the discussion is based on the median of the distribution. The median monetary policy rate (MPR) in sub-Saharan Africa is 6% while the full (world) sample median monetary policy rate is 5.50%. The sub-Saharan African monetary policy rate is higher relative to the world average. This explains why interest rates in sub-Saharan Africa are generally higher than those for the rest of the world. ATMs per hundred thousand adults (ATMSPHTA), which is a measure of financial inclusion has a median value of 3.20 per hundred thousand adults in Sub-Saharan Africa while the full sample median is 30.33 ATMs per hundred thousand adults. This indicates that the degree of financial inclusion

in sub-Saharan Africa is still very low relative to the rest of the world. The rest of the measures of financial inclusion which include bank accounts per thousand adults (BAPTA), borrowers from commercial banks per thousand adults (BFCB), bank branches per hundred thousand adults (BRPHTA), commercial bank branches per hundred thousand adults (CBB) and depositors with commercial banks per thousand adults (DCBPTA) have median values of 87.13, 2.84, 2.97, 17.42 and 106.48, respectively in the sub-Saharan sample while their world median values are 337.76, 13.03, 12.57, 97.18 and 339.50, respectively. From the median values of the other measures of financial inclusion above, the sub-Saharan Africa values are lower comparative to the world or full sample values. This explains why the extent of financial inclusion in sub-Saharan Africa is lower compared to the world sample. The median GDP growth rate in sub-Saharan Africa is 4.20% while that of the world is 3.80%. The median consumer price index which is an indicator of inflation is 71.22 in sub-Saharan Africa and 77.52 in the world sample. The median real effective exchange per the dollar in sub-Saharan Africa is 100.35 and that of the full sample (world) is 99.

Table 3.2: Descriptive Statistics

	MPR	ATMSPHTA	BAPTA	BRPHTA	CBB	BFCB	DCBPTA	GDPGR	CPI	REER
Sub-Sahara Africa Sample										
Mean	11.86	7.95	156.79	4.16	5.66	40.98	216.66	4.30	69.52	115.79
Median	6.00	3.20	87.13	2.84	2.97	17.42	106.48	4.20	71.22	100.35
Maximum	70.00	66.20	834.28	24.19	54.17	257.67	1777.71	149.97	298.51	827.17
Minimum	2.00	0.00	0.00	0.13	0.12	0.00	0.00	-51.03	0.00	47.93
Std. Dev.	11.79	12.56	170.18	4.37	8.47	55.50	293.87	8.86	36.92	58.57
Skewness	2.09	2.39	1.60	2.38	3.29	1.89	2.88	5.06	0.50	5.89
Kurtosis	7.60	8.33	4.95	9.38	14.51	5.86	12.89	90.17	4.68	60.25
Jarque-Bera	377.49	763.63	195.87	1158.35	3604.23	262.31	2074.39	365785.40	164.17	60204.57
Probability	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Observations	235.00	357.00	335.00	439.00	492.00	281.00	380.00	1140.00	1030.00	423.00
Full (World) Sample										
Mean	8.95	41.48	512.87	20.17	19.37	171.54	520.12	3.72	73.62	100.62
Median	5.50	30.33	337.76	13.03	12.57	97.18	339.50	3.80	77.52	99.47
Maximum	200.00	290.66	3368.39	285.00	289.83	1156.05	3371.49	149.97	348.17	827.17
Minimum	0.00	0.00	0.00	0.13	0.12	0.00	0.00	-64.05	0.00	32.16
Std. Dev.	13.45	44.28	559.67	27.38	26.41	208.89	545.97	6.65	32.21	30.21
Skewness	7.72	1.86	1.90	5.37	5.68	1.97	1.78	3.01	0.02	8.82
Kurtosis	90.84	7.59	7.81	45.39	50.65	7.13	7.38	84.28	5.18	172.57
Jarque-Bera	372845.80	2423.50	1277.59	144111.00	195843.00	1217.62	1145.91	1321073.00	806.52	2799888.00
Probability	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Observations	1125.00	1668.00	816.00	1809.00	1959.00	897.00	862.00	4773.00	4079.00	2312.00

Source: Authors estimate from research data

3.4.2 Selection and estimation of Lag order

The procedure for selecting the appropriate model is reported in Table 3.3. Based on the selection criteria of the three models by Donald & Biao (2001) and the overall coefficient of determination, the first order panel VAR model is selected. This is because it has the least MBIC, MAIC, and MQIC values. Based on the results of the model selection in Table 3.3, a first order panel VAR was used.

Table 3. 3: Lag order selection and estimation

Lag	CD	J	J p-value	MBIC	MAIC	MQIC
1	1	76.39136	433566	-354.8131	-73.60864	-185.9728
2	1	43.69921	.722815	-243.7704	-56.30079	-131.2102
3	.9999991	19.68907	.7629393	-124.0458	-30.31093	-67.76564

*Note: MBIC=modified Bayesian criteria, MAIC=modified Akaike information criteria
MQIC= modified Hannan- Quinn information criteria*

3.4.3 Results of Panel Unit Root Test

In panel data analysis, it is essential that the variables are stationary. Stationarity test is necessary because the variables order of integration will help in the selection of the appropriate model for the estimation of the parameters and help prevent spurious regression. This study employed four panel unit root tests: the Im Pesaran Shin (IPS) test, Levine–Lin Chu (LLC) test, Augmented Dickey fuller (ADF) test and Philips Perron (PP) test.

The results of the panel unit root test for the sub- Saharan Africa sample and the full sample are reported in Table 3.4. The results from Table 3.4 indicate that all the variables are integrated of order zero $I(0)$ except financial inclusion index (FINC) and the real effective exchange rate (REER) variables that are integrated of order one $I(1)$. This implies that not all the variables used in the study follow a unit root process. The researchers used the first difference of the variables that are integrated of order one $I(1)$ in the analysis.

Table 3. 4: Panel unit root test

	MPR	FINC	GDPGR	INFLRA	REER
Sub-Sahara Africa Sample					
Level					
LLC	-4.27***	6.76	-19.55***	-17.36***	3.65
IPS	-2.12***	11.94	-20.09***	-18.64***	33.74
ADF	79.58***	5.89	478.44***	434.70***	41.6
PP	104.30***	6.86	492.15***	453.47***	46.34
First difference					
LLC		-9.21***			3.10***
IPC		-4.69***			7.62***
ADF		131.64***			593.74***
PP		144.50***			601.09***
Full Sample					
Level					
LLC	-347.36***	7.73	-33.17***	-271.14***	5.07
IPS	-80.76***	11.6	-34.67***	-63.05***	10.32
ADF	302.65***	153.63	1662.67***	1757.92***	146.98
PP	349.24***	222.67	1660.74***	1826.43***	168.15
First difference					
LLC		-1433.6***			-1.51.68***
IPC		-85.57***			-50.54***
ADF		588.69***			1949.35***
PP		607.68***			1996.17***

Source: Authors estimate from research data; $P < 0.01^{***}$ $P < 0.05^{**}$ $P < 0.10^*$

3.4.4 Regression Results

There is strong confirmation of a reverse causality between monetary policy and financial inclusion in Africa. This evidence is shown in Table 3.5. There is strong evidence of a negative effect of the lag financial inclusion on monetary policy rate in sub-Saharan Africa as indicated by the statistical significance as well as the negative coefficient of the lag of financial inclusion in model (1) as shown in table 3.5. The explanation we offer for this finding is that when more people have access to formal financial services, it increases the number of depositors with commercial banks and this increases the supply of loanable funds and hence interest rates will reduce as well as the monetary policy rate. This finding of a negative relationship between monetary policy

rate and lag financial inclusion is consistent with other studies (Mbutor & Uba 2013; Lenka & Bairwa, 2016). We found a similar evidence of a negative relationship between monetary policy rate and the lag of financial inclusion when we used the full sample. In the full sample, the lag of financial inclusion has a negative effect on monetary policy rate in model 1 in Table 3.6.

On the other hand, the lag of monetary policy rate positively impacts financial inclusion in model (2) in Table 3.5. This finding of a positive relationship between the lag monetary policy and financial inclusion suggests that when the central bank monetary policy rate increases, the number of depositors with commercial banks increases since interest rates will also increase and hence more people will be financially included. In other words, increases in the monetary policy rate results in temporary fluctuations in people incomes due to increases in inflations rate and hence people will resort to the use of financial institutions by borrowing to smoothen their consumption according to the permanent income hypothesis. Our finding of a positive relationship between the lag monetary policy and financial inclusion is not consistent with other studies that found a negative relationship (Evans, 2016). In the full sample, we did not find a significant relationship between the lag monetary policy rate and financial inclusion in model 2 in Table 3.6.

The study also controlled for macroeconomic factors such as GDP growth rate, inflation rate and the real effective exchange rate. We found out that GDP growth rate and Inflation rate do not influence monetary policy rate in sub-Saharan Africa but rather it is the real effective exchange rate (REER) that has a significant impact on monetary policy rate in sub-Saharan Africa. This is evident by the negative co-efficient of real effective

exchange rate (REER) in model (1) in Table 3.5. It implies that increases in the real effective exchange rate (REER) reduces monetary policy rate in sub-Saharan Africa. Our finding of a negative relationship between monetary policy and the real effective exchange is consistent with other studies that found a negative relationship (Lenka & Bairwa, 2016). In the case of the full sample results, the lag of GDP growth rate and the real effective exchange rate (REER) are significant drivers of monetary policy rate according to the results in model (1) in Table 3.6.

In the sub-Saharan African sample, macroeconomic factors are significant drivers of financial inclusion index (FINC). The lag of GDP growth rate (GDPGR), the lag of Inflation rate (INFLRA) and the lag of the real effective exchange rate are drivers of financial inclusion index (FINDEX) in sub-Saharan Africa, according to the results in model (2) in Table 3.5. GDP growth rate has a negative co-efficient implying that economic growth in sub-Saharan Africa does not translate into financial inclusion index (FINC). The lag of Inflation rate (INFLRA) has a positive effect on financial inclusion. The explanation we offer for this finding is that increases in inflation rate reduces people's real income and to maintain the same living standard people will resort to the use of financial institutions to borrow to make up for the difference in their real income.

In the case of the full sample, the only macroeconomic variables that are significant drivers of financial inclusion is the lag of GDP growth rate (GDPGR) and inflation rate (INFLRA) and they both carry the expected signs. This is evident by the positive co-efficient of the lag of GDP growth rate (GDPGR) and inflation rate (INFLRA) in model (2) in Table 3.6. The explanation we offer for this finding is that increases in GDP growth rate and Inflation rate enhance financial inclusion in the world. However, the lag

of real effective exchange rate is not a significant driver of financial inclusion, according to the full sample results in Table 3.6.

Table 3.5: Sub-Saharan African Sample Panel VAR Results

	MPR	FINC	GDPGR	INFLRA	REER
MPR(-1)	0.023603 (0.15746) [0.14990]	0.02129*** (0.00646) [3.29536]	-0.013743 (0.08358) [-0.16442]	0.000546 (0.00042) [1.31335]	-0.444725** (0.17938) [-2.47919]
FINC(-1)	-3.61276* (2.10976) [-1.71240]	1.19755*** (0.08658) [13.8323]	0.819741 (1.11993) [0.73196]	-0.003619 (0.00557) [-0.64915]	-7.97499*** (2.40356) [-3.31800]
GDPGR(-1)	0.016636 (0.35095) [0.04740]	-0.08482*** (0.01440) [-5.88985]	0.072169 (0.18630) [0.38739]	0.000247 (0.00093) [0.26679]	0.256234 (0.39982) [0.64087]
INFLRA(-1)	-2.345014 (33.2947) [-0.07043]	14.9573*** (1.36629) [10.9474]	-34.4839* (17.6738) [-1.95113]	1.09650*** (0.08798) [12.4635]	-102.032*** (37.9311) [-2.68995]
REER(-1)	-0.898121** (0.36037) [-2.49223]	-0.04670*** (0.01479) [-3.15793]	0.257205 (0.19129) [1.34455]	-0.002270** (0.00095) [-2.38372]	0.325585 (0.41055) [0.79304]
C	117.2955 (79.1699) [1.48157]	-25.7529*** (3.24883) [-7.92684]	50.54684 (42.0258) [1.20276]	0.062321 (0.20920) [0.29791]	305.974*** (90.1945) [3.39238]
R-squared	0.782957	0.997287	0.605006	0.977327	0.940483
Adj. R-squared	0.511654	0.993895	0.111264	0.948985	0.866086
F-statistic	2.885910	294.0352	1.225347	34.48387	12.64150

Standard errors in () & t-statistics in []

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

We also examined how monetary Policy rate (MPR) and financial inclusion index (FINC) could also be influenced by these macroeconomic variables (GDP growth rate, inflation rate and the real effective exchange rate). According to the sub-Saharan Africa sample results presented in Table 3.5, the lag of monetary policy rate (MPR) and financial inclusion index (FINC) are not significant drivers of GDP growth rate and inflation rate but they are drivers of the real effective exchange rate in model (3) in Table 3.5. In the case of the full sample results, the lag of monetary policy rate (MPR)

significantly impacts GDP growth rate (GDPGR), Inflation rate (INFLRA) and real effective exchange rate (REER) according to the results in Table 3.6.

However, the lag of financial inclusion only impacts GDP growth rate (GDP) in model (3) in Table 3.6 though it does not influence inflation rate (INFLRA) and the real effective exchange rate (REER). This finding also confirms the widely held view that macroeconomic variables affect financial inclusion and people's behavior.

Table 3. 6: Full Sample Panel VAR Results

	MPR	FINC	GDPGR	INFLRA	REER
MPR(-1)	0.62477*** (0.02849) [21.9326]	-0.020788 (0.04264) [-0.48747]	-0.05014* (0.02625) [-1.91053]	0.32435*** (0.06565) [4.94096]	4.63737* (2.53636) [1.82836]
FINC(-1)	-0.00472* (0.00275) [-1.71906]	1.01667*** (0.00412) [247.003]	-0.007542** (0.00253) [-2.97701]	-0.009226 (0.00634) [-1.45616]	-0.127608 (0.24481) [-0.52125]
GDPGR(-1)	0.082952** (0.03690) [2.24799]	0.123499** (0.05524) [2.23564]	0.52410*** (0.03400) [15.4152]	0.203945** (0.08504) [2.39834]	-1.268414 (3.28557) [-0.38606]
INFLRA(-1)	0.019916 (0.01974) [1.00915]	0.05547* (0.02954) [1.87764]	0.06393*** (0.01818) [3.51601]	0.24265*** (0.04548) [5.33537]	-0.822442 (1.75725) [-0.46803]
REER(-1)	0.00011*** (3.7E-05) [3.12181]	2.27E-05 (5.6E-05) [0.40712]	2.27E-05 (3.4E-05) [0.66049]	0.00016* (8.6E-05) [1.90154]	1.03520*** (0.00331) [312.327]
C	1.443340** (0.48494) [2.97634]	0.487696 (0.72596) [0.67179]	1.92825*** (0.44681) [4.31560]	0.421411 (1.11753) [0.37709]	-3.338042 (43.1782) [-0.07731]
R-squared	0.678438	0.993626	0.519238	0.361553	0.995740
Adj. R-squared	0.667975	0.993418	0.503595	0.340779	0.995601
F-statistic	64.84185	4790.836	33.19301	17.40427	7183.539

Standard errors in () & t-statistics in []

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

3.4.5 Variance Decomposition

Our results seem to be confirmed by the forecast – error variance decomposition (FEVD) based on a Cholesky decomposition of the residual covariance matrix of the underlying panel VAR model of the sub-Saharan African countries (see Table 3.7 and 3.8) and the panel VAR model of the full sample (see Table 3.9 and 3.10). The results contained in Table 3.7 show that the contribution of financial inclusion (second column) and GDP growth rate (third column) explains the 48.72% and 29.19% of the variation of monetary policy in the long run that is after 10 years. After 10 years, more than 0.11% and 0.009% of the variation in monetary policy is explained by inflation rate and the real effective exchange rate shocks respectively, while in the full sample, the results contained in Table 3.9 show that the contribution of financial inclusion (second column) and GDP growth rate (third column) explains 0.42% and 0.24% of the variation of monetary policy in the long run that is after 10 years. After 10 years, more than 0.003% and 7.57% of the variation in monetary policy are explained by inflation rate and the real effective exchange rate shocks respectively. Table 3.8 represents the variance decomposition of financial inclusion index of the sub-Saharan African sample. It shows that monetary policy and GDP growth rate shocks contribute significantly to the variation of financial inclusion in the long run. After 10 years, monetary policy and GDP growth rate shocks explain about 4.63% and 28.73% respectively of the variation of financial inclusion, while in Table 3.10 which represents the variance decomposition of financial inclusion of the full sample, after 10 years, monetary policy and GDP growth rate shocks explain about 0.179% and 0.079% respectively of the variation of financial inclusion.

Table 3. 7: Variance Decomposition of Monetary Policy Rate of Sub-Saharan Africa sample

Period	S.E.	MPR	FINC	GDPGR	INFLRA	REER
1	4.281080	100.0000	0.000000	0.000000	0.000000	0.000000
2	5.514375	89.58446	2.870952	7.491100	0.027685	0.025804
3	6.438761	72.61725	11.19307	16.11312	0.051211	0.025344
4	7.419481	55.23871	21.59479	23.09076	0.055972	0.019770
5	8.505756	42.21249	30.57751	27.14819	0.046707	0.015100
6	9.632797	34.01644	37.03584	28.89880	0.036478	0.012437
7	10.72542	29.14010	41.41955	29.39421	0.035002	0.011145
8	11.73786	26.07831	44.48325	29.38107	0.046898	0.010469
9	12.65923	23.85623	46.80393	29.25651	0.073392	0.009946
10	13.50656	21.95179	48.72930	29.19593	0.113605	0.009366

Table 3. 8: Variance Decomposition of Financial Inclusion of Sub-Saharan Africa sample

Period	S.E.	MPR	FINC	GDPGR	INFLRA	REER
1	0.848924	1.771153	98.22885	0.000000	0.000000	0.000000
2	1.315779	4.791631	80.59127	14.60695	0.007533	0.002608
3	1.698374	6.701208	72.84819	20.41573	0.030787	0.004090
4	2.015370	7.721874	69.36027	22.84247	0.070532	0.004862
5	2.286837	8.008087	67.70999	24.15149	0.125365	0.005070
6	2.530160	7.741097	66.95346	25.10842	0.192156	0.004868
7	2.761521	7.115976	66.62993	25.98350	0.266172	0.004417
8	2.996294	6.309216	66.47620	26.86917	0.341551	0.003859
9	3.248891	5.453993	66.34271	27.78776	0.412234	0.003298
10	3.532526	4.632205	66.16166	28.73024	0.473102	0.002790

Table 3. 9: Variance Decomposition of Monetary Policy Rate of full sample

Period	S.E.	MPR	FINC	GDPGR	INFLRA	REER
1	1.905375	100.0000	0.000000	0.000000	0.000000	0.000000
2	2.483832	99.24542	0.016109	0.015275	8.57E-05	0.723110
3	2.824780	97.99892	0.050888	0.012007	0.000187	1.937994
4	3.049407	96.60292	0.099032	0.026881	0.000241	3.270925
5	3.205427	95.27080	0.155837	0.062404	0.000247	4.510709
6	3.316763	94.10633	0.218026	0.108836	0.000232	5.566580
7	3.397288	93.14092	0.283536	0.157224	0.000231	6.418084
8	3.455888	92.36706	0.351117	0.202166	0.000272	7.079381
9	3.498626	91.76007	0.420015	0.241201	0.000371	7.578339
10	3.529803	91.29034	0.489766	0.273691	0.000535	7.945668

Table 3. 10: Variance Decomposition of Financial Inclusion of full sample

Period	S.E.	MPR	FINC	GDPGR	INFLRA	REER
1	4.370157	0.002182	99.99782	0.000000	0.000000	0.000000
2	6.198869	0.026930	99.47850	0.148162	0.002491	0.343913
3	7.620461	0.056658	98.76834	0.190116	0.008431	0.976459
4	8.837050	0.084250	97.99793	0.178281	0.018106	1.721433
5	9.925629	0.109347	97.23605	0.152806	0.031739	2.470054
6	10.92440	0.131532	96.52374	0.128461	0.049454	3.166809
7	11.85538	0.150073	95.88119	0.109136	0.071297	3.788305
8	12.73268	0.164287	95.31505	0.095037	0.097254	4.328372
9	13.56606	0.173779	94.82426	0.085359	0.127275	4.789329
10	14.36274	0.178518	94.40380	0.079170	0.161278	5.177238

3.4.6 Impulse Response Functions

Figure 3.2 displays the impulse response functions of all the endogenous variables of the Panel VAR model of the African sample. The accumulated impulse responses are presented over time. The response of monetary policy rate to financial inclusion and GDP growth rate shocks is positive and statistically significant. This seems to be consistent with our findings.

The accumulated response of financial inclusion to monetary policy rate shocks shows it is positive and is statistically significant. This means that expansionary monetary policy can induce financial inclusion. Figure 3.3 displays the impulse response functions for all the endogenous variables of the Panel VAR model of the full sample. The accumulated impulse responses are presented over time. The response of monetary policy rate to financial inclusion shocks in the full sample is negative but not statistically significant. This implies that an increase in financial inclusion reduces the monetary policy rate.

The accumulated response of financial inclusion to monetary policy rate shocks in the full sample shows it is not statistically significant.

Figure 3.2 Impulse response functions of the sub-Saharan African sample

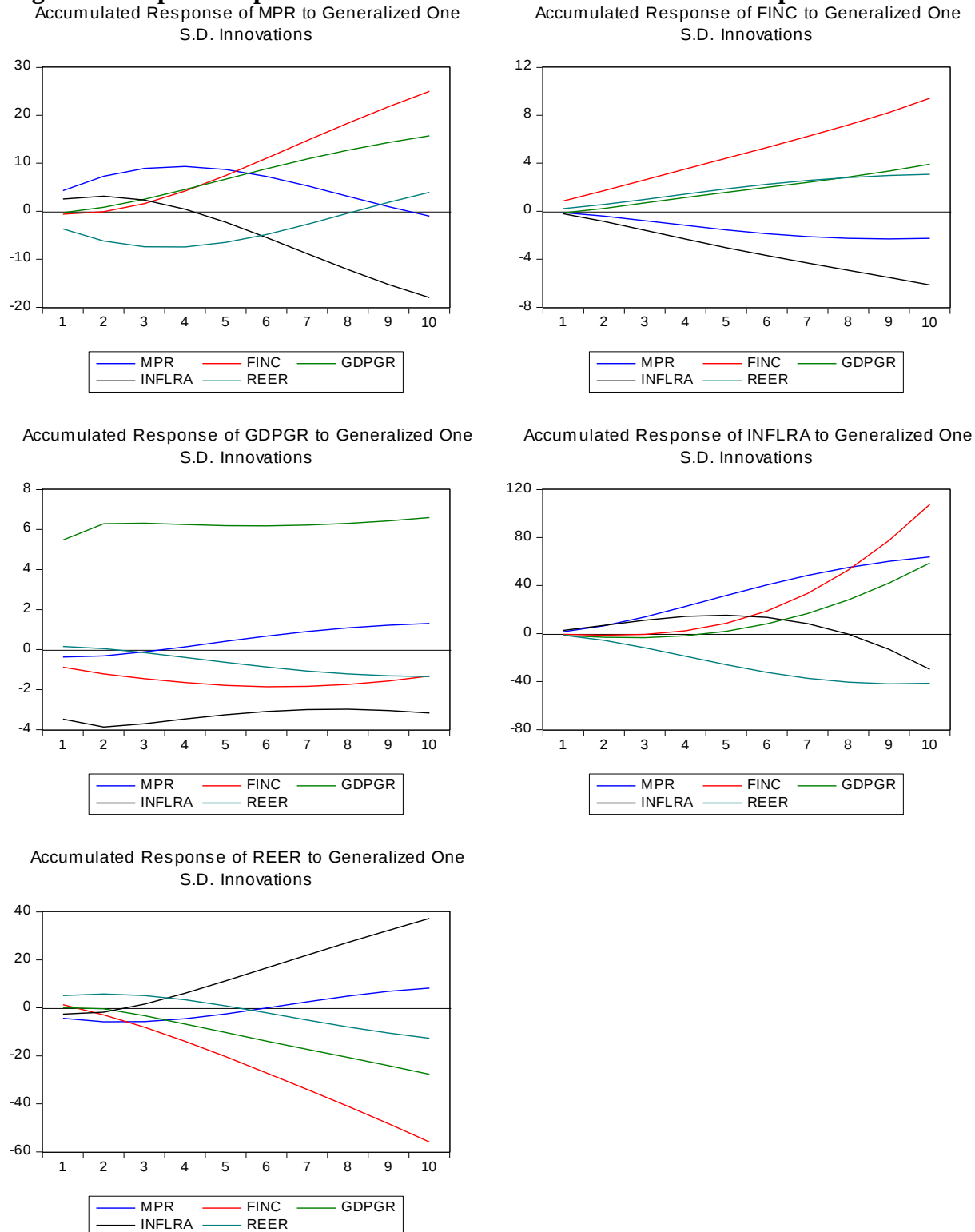
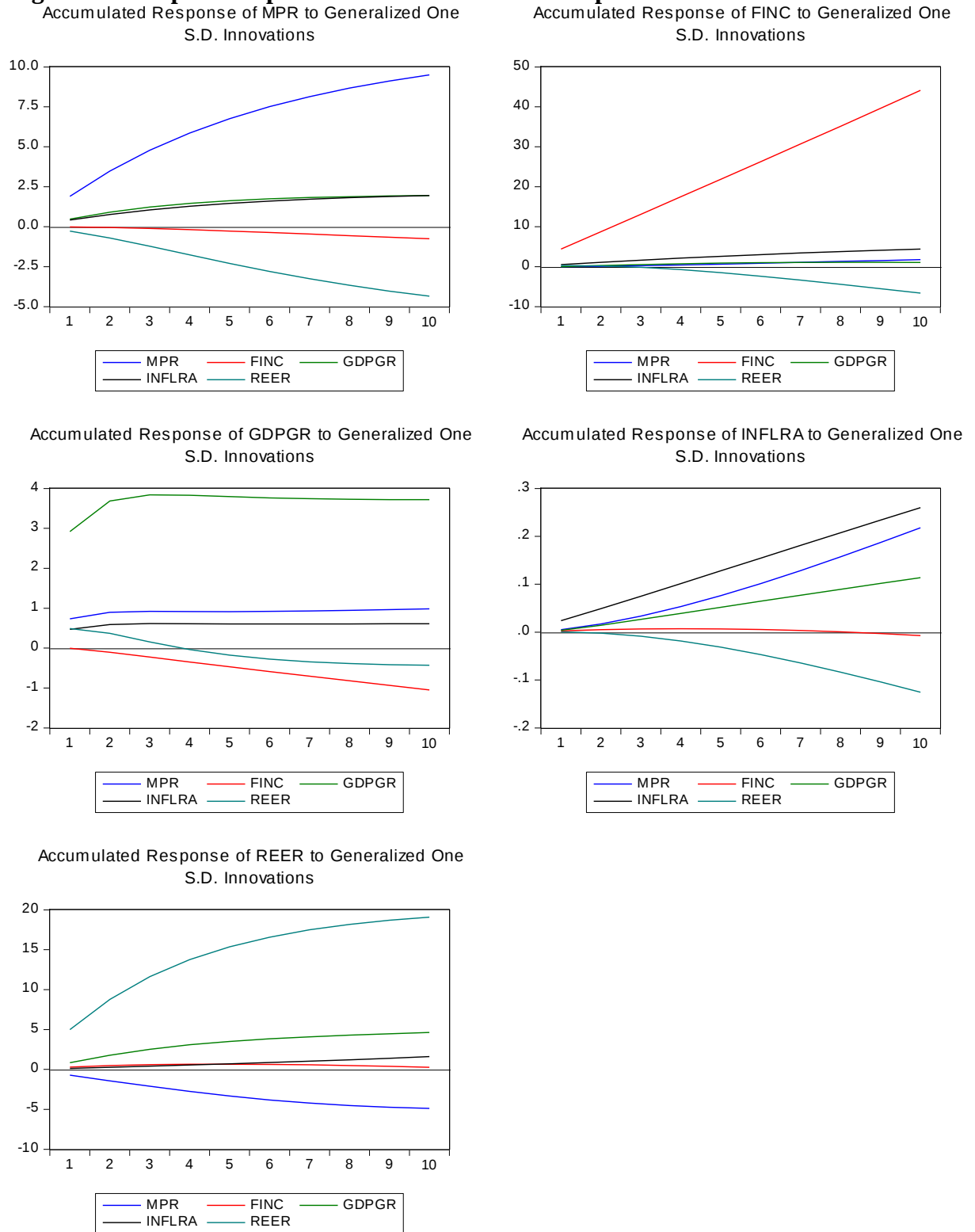


Figure 3. 3: Impulse response functions of the full sample



3.5 Conclusion and Policy Implications

This paper has investigated the dynamic link between monetary policy and financial inclusion in sub-Saharan Africa. We have examined the empirical relations between monetary policy and financial inclusion using a panel VAR approach. We found a very complex web of relationships among monetary policy, financial inclusion, GDP growth rate, inflation rate and the real effective exchange rate.

Monetary policy and financial inclusion play key roles in sub-Saharan Africa and they have greater implications for macroeconomic stability. Our study found that, there is a reverse causality between monetary policy and financial inclusion. We found that, monetary policy has a significant impact on financial inclusion and this has a strong implication for policy making. Monetary policy can be used to stimulate financial inclusion. This suggests that, monetary policy should not only be pursued as a policy objective but it can also be an outcome variable of financial inclusion and vice versa. It implies that monetary authorities in sub-Saharan Africa should not see a change in monetary policy rate as the only tool aimed at macroeconomic stability; they should also consider financial inclusion. This is because we found out that financial inclusion could also enhance macroeconomic stability. From our findings we observed that financial inclusion significantly impacts macroeconomic variables such as the GDP growth rate, the inflation rate and the real effective exchange rate. This suggests that it is not only monetary policy that could affect these variables to ensure economic stability but financial inclusion can as well perform the same function as monetary policy and therefore the two are substitutes. This finding suggests that sub-Saharan African governments should not only pursue monetary policy as a policy objective since

monetary policy can also be an outcome variable of financial inclusion. Hence, efforts should be geared towards advancing financial inclusion as well.

Our findings are consistent with studies that examine the relationship between monetary policy and financial inclusion in SAARC countries and Nigeria (Lenka & Bairwa, 2016; Evans, 2016; Mbutor & Uba, 2013). The policy implication of this finding is that, Sub-Saharan Africa (SSA) countries can leverage on the negative effect of financial inclusion on monetary policy rate by implementing financial inclusion inducing policies such as; reduction in the cost of borrowing, increase in the number of commercial bank branches of state own banks, creating an environment conducive for financial stability and increase access to financial services.

Our paper additionally found that monetary policy also depends on financial inclusion in Africa. It suggests, therefore, that since the effectiveness of monetary policy depends on financial inclusion, the efforts of governments in Africa should not only be at the behavior of macroeconomic variables to influence their monetary policy rate but also at financial inclusion.

Our paper extends the discussions on monetary policy and financial inclusion by using a panel VAR approach to establish the relationship between monetary policy and financial inclusion which addresses the endogeneity problem of these variables. We contribute to the advancement of theory by establishing that there is a reverse causality between monetary policy and financial inclusion.

CHAPTER FOUR

FINANCIAL INCLUSION AND FINANCIAL SECTOR DEVELOPMENT IN SUB-SAHARA AFRICA: A PANEL VAR APPROACH

4.1 Introduction

A major issue that has gained much momentum in the last two decades globally is the extent of coverage of financial systems and institutions. This has been generally discussed under the term Financial Inclusion or Financial Exclusion (Bhanot et al., 2012; Hasnol et al., 2013). Generally, the term financial inclusion is concerned with how an economy's financial services incorporate the vulnerable and low-income earners in such way that they are not marginalized from gaining access to financial products and services (Sinclair, 2013). Over the years, African countries have made much effort and progress towards advancing financial inclusion. The feat of some innovative financial instruments such as mobile money in Africa offers more opportunities mostly for the poor, youth, rural dwellers, and Small and Medium Enterprises (SMEs) to be financially included for poverty reduction (Abor et al., 2018). Policymakers have recognized that access to finance for the marginalised and the poor is essential for social cohesion and poverty alleviation (Sinclair & Bramley., 2011).

Thus, it is therefore not surprising that financial inclusion has become a topical issue by policymakers, researchers, development partners and global development financial institutions. This is so because financial inclusion has greater implications for financial sector development. Thus, financial sector development greatly depends on the extent of financial inclusion and vice versa. Increased in financial inclusion could promote financial sector development because the development of the financial sector in an

economy depends on the number of people that have access to finance and the level of financial inclusion could also depend on the level of financial sector development. This study examines the extent to which financial inclusion affects financial sector development and vice versa. Lack of knowledge of this reverse causality could make policymakers pursue either financial inclusion or financial sector development as a policy objective when they could be an outcome variable of each other. This suggest that, financial sector development should not only be pursued as a policy objective but it can also be an outcome variable of financial inclusion and vice versa. While policy makers continue to seek for ideas from researchers to implement financial inclusion policies effectively, research in this area remain scarce.

Most empirical studies on financial inclusion are mostly clustered around how financial inclusion is measured and promoted (Allen et al., 2016, Treasury, 2004; Marshall, 2004; Hannig & Jansen, 2010; Sarma 2008, Demirgüç-Kunt & Klapper 2012; Ardic, et al., 2011). Other studies have also focus on how financial inclusion impact on income inequality, poverty reduction and economic growth (Brune et al., 2011; Burgess & Pande, 2005; Honohan, 2007; 2008; Rojas-Suarez, 2010, Sarma, 2008; Thorat 2006; Chibba, 2009; Dabla-Norris, et al., 2015; Kpodar & Andrianaivo, 2011; Johal, 2016; Sharma, 2016).

Therefore, the empirical examination of the relationship between financial inclusion and financial development using a panel Vector Autoregressive (pVAR) framework is yet to be examined from the Sub-Sahara Africa perspective. Though, studies have investigated the link between financial sector development and financial inclusion but these studies are theoretical in nature and therefore lacks empirical evidence (Allen et al., 2014;

Otchere, 2016). Allen et al., (2014) attempted to establish what the degree of financial sector development and financial inclusion in Africa would be if the nature of the relationships that exist between financial inclusion and financial sector development in the rest of the developing world is the same. Using other developing economies as benchmarks, they find that for 32 of 40 African countries, the degrees of financial sector development and financial inclusion fall short of predicted values, thus suggesting significant gaps in the financial development–financial inclusion nexus for Africa.

There is a yawning gap remaining in the empirical literature regarding the implications of financial sector development on financial inclusion and vice versa. Thus, the bi-causal linkages between financial sector development and financial inclusion appears to have escaped the attention of policymakers and researchers, and this has led to a limited comprehension of the link between financial sector development and financial inclusion. However, for policy makers in both emerging and developing economies, having a grasp of the reverse causality between financial sector development and financial inclusion is key if they are to put their countries and economies on the path of accelerated pro-poor growth. This study will provide policy prescriptions that can guide policymakers in their efforts to alleviate poverty and achieve sustainable growth in Sub-Saharan Africa through financial sector development and financial inclusion.

We use panel VAR estimation technique because it provides a framework that is flexible where all the variables are considered as endogenous in the system of equations. Panel VAR estimation technique is now considered the standard instrument for analysing the impacts of economic policy transmissions and other economic variables interactive behaviour. We used panel vector autoregression (PVAR) in order to subdue endogeneity

issues to establish the causality between financial inclusion and financial sector development in Sub-Saharan Africa. The use of panel VARs also enables us to generate the generalised impulse responses to recognise the effect of a shock of one variable on the other variables. Unlike the usual Cholesky impulse responses, using the generalised impulse responses enables us to produce shocks that do not change with the ordering of the variable (Issahaku et al., 2016). We also analyzed the variance decompositions of financial inclusion and financial sector development in order to express the length of the overall effect of a shock unlike the impulse response functions that shows only the future direction of the variables when a shock occurs.

The study controlled for economic growth where economic growth was added to the panel Vector Autoregressive (pVAR) framework. This is because economic growth according to the literature is a driver of financial sector development and financial inclusion. Financial sector development and financial inclusion could also be drivers of economic growth (Park & Mercado Jr., 2015; Abu-Bader & Abu-Qarn., 2008; Creane et al, 2003; Odhiambo, 2005).

Some empirical papers have analysed the effect of financial inclusion on economic growth together with income inequality and poverty alleviation (Park & Mercado Jr., 2015). Other researchers have also investigated the link between economic growth and financial sector development (Levine, R., 1997; Tsuru, 2001; Abu-Bader & Abu-Qarn, 2008; Creane et al, 2003; Odhiambo, 2005). However, despite empirical findings supporting the positive impact of financial inclusion on growth and the effect of financial sector development on economic growth, there is a gap remaining in the literature regarding the tripartite relationship among financial inclusion, financial sector

development and economic growth. Thus, the tripartite relationship among financial inclusion, financial sector development and economic growth appears to have escaped the knowledge of empirical researchers; as a result, there is a limited understanding of the relationship among financial inclusion, economic growth and financial sector development. However, for policy makers in both Sub-Saharan Africa and emerging countries, having an understanding and insight on the tripartite relationship among financial inclusion, financial sector development and economic growth is paramount for putting their economies on the path of accelerated economic growth and development. This study attempts to bridge the gap by investigating the tripartite relationship amongst financial inclusion, financial sector development and economic growth from Sub-Saharan Africa perspective using a panel Vector Autoregressive (VAR) estimation technique.

One of the major problems besetting the study of financial inclusion-financial sector development nexus is the use of weak and inappropriate proxies for financial inclusion. Financial inclusion is always proxied by single variable measures such as, the number of ATMs per hundred thousand adults, number of depositors with commercial banks per thousand adults, the number of bank branches per thousand adults (e.g. Evans, O., 2016; Mbutor & Uba, 2013). We posit that, the financial inclusion proxies listed above do not adequately capture the other key measures of financial inclusion such as, number of borrowers from commercial banks and bank accounts per thousand adults. Conclusions and results arising from such studies that use weak and inappropriate financial inclusion proxies could be bias and misleading and may not be important for policy making. Not that past studies did not recognise the problems and weaknesses of using single variable proxies, they always deal with the issue by using many of these single variable-based

measures to perform what they term as robustness checks. This solution, though good but not sufficient as the alternative proxies themselves may be capturing different dimensions and aspects or just one aspect of financial inclusion. It is now being recognised that financial inclusion has at least two main dimensions –demand side factors (usage) and supply side factors (access). Therefore, it is imperative that measures of financial inclusion reflect the multidimensional nature of financial inclusion. We address this measurement gap by constructing a composite index for financial inclusion after deriving the weights (factor loadings) from a panel principal component analysis (PCA). Unlike previous proxies, our composite measure is able to capture the two key dimensions of financial inclusion–usage and access. By employing these multidimensional measures, we are able to assess the link between financial inclusion and financial sector development from a holistic standpoint.

This study contributes to the discipline of Managerial Finance and Economics in several ways. First, not much is known about the simultaneous interactions of financial inclusion, financial sector development and economic growth. Secondly, the use of Panel VAR enables us to analyze the dynamic link among financial inclusion, financial sector development and economic growth including the country-specific fixed effects simultaneously. Thirdly, using generalized impulse responses enable us to specifically single out the effect of each of the variables shocks in the system on the other variables, one at a time.

We also contribute to the literature of managerial finance by showing that, financial inclusion and financial sector development are complements and not contradictory as opposed to other studies that argued that financial inclusion can impede financial sector

development due to subprime lending (Khan, 2011). We argued that, financial inclusion can be achieved without sacrificing financial sector development. The managerial implication of this study is that, central banks and other financial institutions should not only pursue financial sector development as a policy objective but it can be an outcome variable of financial inclusion and vice versa. This study also broadens the knowledge frontier in Economics and Finance disciplines by examining the tripartite relationship among financial inclusion, financial sector development and economic growth from the Sub-Saharan Africa perspective.

Another contribution of this study is that, we overcome the use of inadequate proxies for financial inclusion by constructing multidimensional index of financial inclusion based on a panel principal component analysis (PCA). Compared to previous studies, we use an array of econometric techniques which enables us to overcome endogeneity, model selection bias and to contribute to panel estimation procedure.

Lastly, from a theory point of view, this study will form the basis for theory development on the nexus of financial inclusion-financial sector development reverse causality. Uncovering the theoretical underpinnings of this reverse causality will enable Sub-Saharan Africa countries' policy makers to formulate policies that will to help them get the optimum results of financial inclusion and financial sector development.

This paper seeks to answer the following three research questions. (1) Does financial inclusion and financial sector development granger-cause each other? (2) Is there a theoretical basis supporting the existence of a tripartite relationship amongst financial

inclusion, financial sector development and economic growth? (3) Does financial inclusion, financial sector development and economic growth granger-cause each other?

The main result from the empirical analysis is that, there is a reverse causality between financial inclusion and financial sector development in both the Sub-Saharan Africa countries sample and the full sample. It is evident that financial inclusion is a driver of financial sector development and vice versa.

The rest of this study is structured as follows. Section 4.2 presents the literature review section 4.3 reports the econometric methodology where the empirical model is discussed together with the impulse-response functions and the forecast-error variance decomposition. Section 4.4 presents the empirical results and also discusses both the forecast error variance decomposition and impulse response functions of the panel VAR model and Section 4.5 reports the summary and conclusions of the study.

4.2 Literature Review

Financial inclusion has gained much attention in recent times because of its ability to promote economic growth and financial sector development. At the same time, it helps to foster greater income equality and ensure inclusive growth. Although much has been done towards promoting financial inclusion, there is still more to be done. The movement towards an all-inclusive global financial sector has gained much momentum over the last decade. This was largely precipitated by the credit crunch that stifled growth of banks for which the high levels of global financial inclusion were identified as a contributing factor (Khan, 2011). This was so because there was an attempt to expand financial access to a pool of borrower's which resulted in a reduction in lending

standards. This suggest that, promoting financial inclusion could sometimes lower the quality of assets (subprime lending) (Khan, 2011)

According to Hannig and Jansen (2010), the pursuance of financial inclusion represents the current consensus regarding the role of finance to economic development and poverty alleviation; they contend that financial inclusion is an outcome of the evolution of financial sector policies in emerging economies and shows insights into the affirmative effect of access to finance on the livelihood of the vulnerable and the marginalised. Hannig and Jensen (2010) posit that, the movement towards inclusive finance has undergone three phases. These include: state-sponsored agricultural and industrial development through direct credit, market driven development through deregulation, liberalization and institutions building aimed at reducing the effects of government and market failures. Direct credit programmes instituted by governments in developing countries often involve issuance of credit facilities to farmers and small businesses while regulating the use of such funds. The move was initiated to assist those persons who could not access bank loans at prevailing market rates; therefore, such credits were aimed at the rural poor at lending rates below market rates.

The relevance of financial inclusion in the development and policy circles is due in part to its poverty alleviating feature which ultimately, can contribute significantly to achieving social cohesion and sustainable economic growth. Given the state of economic development in Sub-Saharan Africa and the important role of financial inclusion in development, several development agencies and international financial institutions have made significant progress to enhance financial inclusion in Sub-Saharan Africa. Nevertheless, gaps in financial inclusion remain severe in several Sub-Saharan African

countries. Studies have shown that financial inclusion gaps exist in the developing world in general where the number of financially excluded people are more than 2.7 billion while about 400 million SMEs lack access to formal sources of finance (IFC, 2012).

Though some progress has been achieved in recent times on the continent, it is imperative to evaluate the current position of financial inclusion in Sub-Saharan Africa. The goal of this study is to examine the empirical relations between financial inclusion and financial sector development which serves as catalysts for economic development. There is an increasing empirical and theoretical evidence that indicates that financial systems that are serving low-income groups enhances pro-poor growth (Beck et al., 2014). Inadequate access to financial products and services has a negative impact on poverty alleviation and growth efforts since it makes it problematic for the poor to gather their savings in building assets that will insulate them from being affected by risks and also investing in income generating assets. Since there has been much emphasis on the poverty alleviation role of finance in recent times, conscious attempts have been made by policy makers to constantly expand quality financial services in a much broader range to the vulnerable (Morduch, 1999). It is against this backdrop, that financial services to those who do not have access to banking services have become a major issue of concern for policy makers, development finance institutions, academics and practitioners who are emphasizing financial inclusion as a tool for policy making. Financial sector development is being recognized as a prerequisite for economic growth and poverty alleviation (Chibba, 2009). With a majority of population in rural areas that are facing economic challenges, financial inclusion is an indispensable tool for the sustainability of economic growth of Sub-Sahara Africa economies.

A new approach towards financial inclusion emerged during the latter part of the 1980s where attention shifted and where financial institutions were providing financial service to only certain segments of the public that lack access to finance. This method of providing financial services shifted attention from households and individual firms to institutions based on their capacity to provide financial services on a more widespread and sustainable basis. This shift led researchers to focus on microfinance and rural finance where banking services were geared towards the poor as a viable and sustainable finance approach and this resulted to a new concept called the financial system paradigm (Otero & Rhyne, 1994).

Researchers that investigate the effect of financial sector development on economic growth base their argument on the essential roles efficient financial systems play in an economy. Creane et al (2003) identify these roles as mainly covering mobilization of savings, promotion of investment through identification and financing of promising business opportunities, monitoring managerial performance, allowing for trading, risk diversification, hedging and facilitating goods and services exchange. By performing these roles, Seetanah, Sawkut, Sannasee and Seetanah (2010) argue that, financial systems ultimately result in rapid accumulation of human capital and physical capital, allocation of resources efficiently, and faster technological advancement, all of which boost economic development and growth.

Mohan (2006) posits that a financial system that is well developed broadens access to credit whereas a financial system that is underdeveloped limits access to credit and in some cases constraints people from having access to their own funds resulting in lending from informal sources at high cost. This according to him results in a cycle where fewer

economic activities can be financed and consequently lead to a negative impact on economic growth. This further show that financial deepening promotes economic growth through expanding access to financial products and services to the poor while in some under-developed financial systems, growth is restricted to the internal expansion potential of individual firms. In a developed financial system, “financial institutions develop appraisal techniques, information gathering and sharing mechanisms which enables them to finance firm’s activities leading to increased productivity” (Mohan, 2006, p. 5).

The debate on the effect of economic growth on financial sector development is widely-explored. Most empirical papers have found evidence of a positive relationship between economic growth and financial sector development and this indicates that there is a reverse causality between them (Odhiambo, 2011).

Furthermore, Gine and Townsend (2004) use empirical evidence from Thailand to indicate that expanding access to financial services results in increased growth. The term economic growth has been coined to explain growth that includes the poor and marginalised in the economy. This according to Beck et al. (2008) has been made possible due to the increase in usage of financial products which tends to improve financial development, income equality and poverty alleviation. Thus, financial inclusion may contribute to growth through the channel of financial development or may directly impact on income inequality and poverty, thus leading to economic growth.

4.3 Methodology

This study uses a panel VAR estimation technique to investigate the dynamic and causal relationship amongst financial inclusion, financial sector development and economic

growth. The study used the panel VAR estimation techniques because it addresses issues of endogeneity among the variables and it also makes it possible to generate impulse response functions and variance decomposition of the variables. The use of panel VAR model creates a framework that is more flexible where all the variables in the system equation are considered as endogenous (Abrigo & Love, 2015). Panel VARs are now considered as the standard tool for analysis if one wants to know the impact of policy transmissions as well as economic variables interactive behaviour. The study adopts the panel data technique in order to enhance the efficiency of the estimation due to the challenges when using short period of times series data. The panel vector autoregression (pVAR) estimation technique treats the variables in the system of multiple time-series as endogenous and that makes it appropriate for the study. The VAR framework was introduced by Sims (1980) and since then it has been generally used in Economics and Finance studies. The VAR framework permits unobserved individual heterogeneity with panel data. The panel VAR estimation technique which was developed by Holtz-Eakin, Newey and Rosen (1988), has been widely used in Finance and Economics studies (Love & Ariss, 2014; Love & Ziccino, 2006). This study adds to the extant literature by examining the endogenous interaction among financial inclusion, financial sector development and economic growth of Sub-Sahara African economies by using a panel vector autoregression (pVAR) estimation technique. The use of panel VAR addresses the problem of endogeneity, which is one of the most serious issues in econometric modelling of panel data analysis. The general PVAR model is stated as follows:

We consider a k -variate panel VAR of the order p with panel -specific fixed effects which are represented by the system of linear equations below;

$$Y_{it} = Y_{it-1}A_1 + Y_{it-2}A_2 + \dots + Y_{it-p+1}A_{p-1} + Y_{it-p}A_p + X_{it}B + u_i + v_t + e_{it} \dots (1)$$

$$i \in \{1, 2, \dots, N\}, t \in \{1, 2, \dots, K\}$$

where Y_{it} is a $(1 \times k)$ dependent variables vector; X_{it} is a $(1 \times l)$ exogenous covariates vector; u_{it} and e_{it} are $(1 \times k)$ vectors of dependent variable-specific fixed-effects and idiosyncratic errors respectively. The $(k \times k)$ matrices $A_1, A_2, \dots, A_{p-1}, A_p$ and the $(l \times k)$ matrix B are coefficients to be computed. We assume that the innovations have the following features: $E[e_{it}] = 0$, $E[e'_{it}e_{it}] = \Sigma$ and $E[e'_{it}e_{it}] = 0$ for all $t > s$.

The baseline Panel VAR model following Love and Zicchino (2006) is given by:

$$Z_{it} = \tau_1 Z_{it-1} + f_i + d_t + e_{it} \dots (2)$$

Where Z_{it} is a three-variable vector $[FINDEX, FSD, GDPERGR]$

Where f_i captures fixed effects- unobservable time invariant effects specific to each country.

d_t captures time dummies that are country specific which represent each country specific macro shocks.

e_{it} the random error term is independently identically distributed (iid). The panel VAR framework is made up of three equations and they are specified as follows:

$$FINDEX_{it} = \sum_{j=1}^p \phi_{1j} FINDEX_{it-j} + \sum_{j=1}^p \phi_{2j} FSD_{it-j} + \sum_{j=1}^p \phi_{3j} GDPERGR_{it-j} + f_i + d_t + \varepsilon_{it} \dots (3)$$

$$FSD_{it} = \sum_{j=1}^p \phi_{1j} FSD_{it-j} + \sum_{j=1}^p \phi_{2j} FINDEX_{it-j} + \sum_{j=1}^p \phi_{3j} GDPERGR_{it-j} + f_i + d_t + \varepsilon_{it} \dots (4)$$

$$GDPERGR_{it} = \sum_{j=1}^p \phi_{1j} GDPERGR_{it-j} + \sum_{j=1}^p \phi_{2j} FINDEX_{it-j} + \sum_{j=1}^p \phi_{3j} FSD_{it-j} + f_i + d_t + \varepsilon_{it} \dots (5)$$

We determined the lag length by using a model selection criterion such as the Modified Akaike, Bayesian or Quasi Information Criteria, thus, MAIC, MBIC and MQIC respectively since we are using a panel VAR framework. We will use the modified AIC, BIC and QIC since these criteria can generate results that are more robust (Qu and Perron, 2007). After estimating all the parameters of the panel VAR. We generate the impulse response functions (IRFs) and the variance decompositions (VDCs). The impulse response functions enable us to explain the response of an endogenous variable over time to a shock in another variable in the system while the forecast-error variance decomposition indicates the contributions of each source of shock to the variance of each endogenous variable at a given forecast period.

4.3.1 Data Source and Description of variables

The data sources and the description of the variables are presented in table 4.I below.

All the financial inclusion variables were all obtained from the International Financial Statistics (IFS). The rest of the variables were taken from the World Development Indicators (WDI). The full sample comprise of 217 countries while 48 countries make up the Sub-Saharan Africa sample. Even though this study focused on Sub-Sahara Africa, the study considers the full sample as well to see if the African story is different. The study uses an unbalanced panel annual data spanning from 1990 to 2014. The data is unbalance because not all the variables have the same data points due to missing data in some of the years.

Table 4.1: Data Source and Variable Description

Variable	Notation	Description	Data source
Financial Inclusion Index	FINDEX	An index of ATMs per hundred thousand adults, Bank branches per hundred thousand adults, Commercial bank branches per hundred thousand adults, Bank accounts per thousand adults, Borrowers from commercial banks per hundred adults and Depositors with commercial banks per thousand adults	IFS
Financial Inclusion	ATMSPHTA	ATMs per hundred thousand adults	IFS
Financial Inclusion	BRPHTA	Bank branches per hundred thousand adults	IFS
Financial Inclusion	CBB	Commercial bank branches per hundred thousand adults	IFS
Financial Inclusion	BAPTA	Bank accounts per thousand adults	IFS
Financial Inclusion	BFCB	Borrowers from commercial banks per hundred adults	IFS
Financial Inclusion	DCBPTA	Depositors with commercial banks per thousand adults	IFS
Financial Sector Development	FSD	Domestic credit provided by financial sector (% of GDP)	WDI
Economic Growth	GDPERGR	GDP per capita growth rate (annual %)	WDI

Note: WDI=world Development Indicators: IFS=International Financial Statistics

4.3.2 Principal Component Analysis (PCA)

The study used panel Principal Component Analysis (PCA) estimation technique to construct a financial inclusion index made up of six selected measures of financial inclusion. According to this estimation techniques, the j^{th} factor Index can be specified as:

$$FINDEX_j = W_{J1} X_1 + W_{J2} X_2 + W_{J3} X_3 + \dots + W_{JP} X_P \quad W_{Ji} \text{ where } i=1, 2, \dots, p$$

$FINDEX_j$ is the Financial Inclusion Index; W_J are the weights of the parameter of the factor score; X_i is the original figure of the respective components; whiles p is the number of variables in the equation. The financial inclusion composite index has been constructed by two dimensions of financial inclusion where each dimension consists of three factors. The first dimension is the supply side factors which include; ATMs per

hundred thousand adults (ATMSPHTA), Bank branches per hundred thousand adults (BRPHTA), Commercial bank branches per hundred thousand adults (CBB). The second-dimension factors are the demand side factors which include bank accounts per thousand adults (BAPTA), Borrowers from commercial banks per thousand adults (BFCB), and Depositors with commercial banks per thousand adults (DCBPTA). The Financial Inclusion Index (FINDEX) is made up of six factors. The index is specified as follows:

$$FINDEX=f(ATMSPHTA, BRPHTA, CBB, BAPTA, BFCB, DCBPTA)$$

4.4 Discussion of Empirical Results

4.4.1 Descriptive Statistics

The descriptive statistics of the variables of the Sub-Sahara Africa sample and the full sample are reported in Table 4.2. However, since the predictive power of the mean is affected by outliers, the median of the distribution is what we used for our discussion. ATMs per hundred thousand adults (ATMSPHTA), which is a measure of financial inclusion has a median of 3.54 per hundred thousand adults in Sub-Saharan Africa, while the world median value is 30.33 ATMs per hundred thousand adults. This indicates that, the degree of financial inclusion in Sub-Saharan Africa is still very low relative to the rest of the world. The rest of the measures of financial inclusion which include: bank accounts per thousand adults (BAPTA), Borrowers from commercial banks per thousand adults (BFCB), Bank branches per hundred thousand adults (BRPHTA), Commercial bank branches per hundred thousand adults (CBB) and Depositors with commercial banks per thousand adults (DCBPTA) have median values of 87.13, 2.84, 2.97, 17.42 and 106.48, respectively in the Sub-Sahara sample, while their world median values are 337.76, 13.03, 12.57, 97.18 and 339.50 respectively. From the median

distribution of the other measures of financial inclusion above, the Sub-Sahara Africa values are lower compared to the world or full sample values. This suggests that the degree of financial inclusion in Sub-Saharan Africa is relatively low relative to world level of financial inclusion.

Table 4.2: Descriptive Statistics

	ATMSPHTA	BAPTA	BRPHTA	CBB	BFCB	DCBPTA	FSD	GDPERGR
Sub-Sahara Africa Sample								
Mean	8.87	172.13	5.07	5.66	40.98	216.66	30.83	1.69
Median	3.54	92.16	3.01	2.97	17.42	106.48	17.75	1.56
Maximum	66.20	1688.27	54.78	54.17	257.67	1777.71	2066.18	141.64
Minimum	0.00	0.00	0.13	0.12	0.00	0.00	-79.09	-50.24
Std. Dev.	13.73	211.22	7.53	8.47	55.50	293.87	72.63	8.38
Skewness	2.21	2.93	4.01	3.29	1.89	2.88	20.58	5.01
Kurtosis	7.23	16.68	21.38	14.51	5.86	12.89	568.18	90.33
Jarque-Bera	603.26	3394.42	7977.48	3604.23	262.31	2074.39	14570790.00	367019.30
Probability	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Observations	387.00	368.00	476.00	492.00	281.00	380.00	1089.00	1140.00
Full (world) Sample								
Mean	41.48	512.87	20.17	19.37	171.54	520.12	57.77	2.15
Median	30.33	337.76	13.03	12.57	97.18	339.50	42.85	2.20
Maximum	290.66	3368.39	285.00	289.83	1156.05	3371.49	2066.18	141.64
Minimum	0.00	0.00	0.13	0.12	0.00	0.00	-114.69	-65.00
Std. Dev.	44.28	559.67	27.38	26.41	208.89	545.97	62.02	6.42
Skewness	1.86	1.90	5.37	5.68	1.97	1.78	9.03	2.76
Kurtosis	7.59	7.81	45.39	50.65	7.13	7.38	262.21	80.41
Jarque-Bera	2423.50	1277.59	144111.00	195843.00	1217.62	1145.91	11975600.00	1197198.00
Probability	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Observations	1668.00	816.00	1809.00	1959.00	897.00	862.00	4257.00	4770.00

Source: Authors estimate from research data

Domestic credit provided by financial sector as a percentage of GDP, which is a measure of financial sector development (FSD) has a median of 17.75% in Sub-Saharan Africa, while that of the full sample is 42.85%. This means that domestic credit provided by the financial sector is 17.75% of GDP, while the full sample median is 42.85%. The explanation we offer for this finding is that, the degree of financial sector development in Sub-Saharan Africa is low relative to the world. GDP per capita growth rate (GDPERGR) in Sub-Saharan Africa has a median value of 1.56%, while that of the

world (full sample) median is 2.20%. It implies that, world economic growth rate is higher than Sub-Saharan Africa and this explains why the living standards in Sub-Saharan Africa are lower relative to the rest of the world.

4.4.2 Unit Root Test Results

In panel data analysis, it is essential that the variables are stationary. Stationary test is necessary because the variables order of integration will help select the correct model for the computation of the parameters. Different estimation techniques have been developed for testing unit roots in panel data such as, Levin, Lin, and Chu (2002, LLC) and Im, Pesaran and Shin (2003, IPS). The LLC and IPS tests both assume that, the null hypotheses in each series in the panel has a unit root, but the alternate hypotheses of the LLC test assumes each series to be stationary with an identical autoregressive parameter for all panel units while the alternate hypothesis of the IPS test permits unit roots for some of the individual series if not for all, that is, the autoregressive parameters are not the same. This study employed four panel unit root test: Augmented Dickey Fuller (ADF) test, the Levine–Lin Chu (LLC) test, Im Pesaran and Shin (IPS) test, and Philips Perron (PP) test. There are a number of advantages of using panel unit root tests when compared with using individual time series-based unit root tests. First, the use of panel data-based unit root tests has more predictive power compare to their univariate counterparts. We used four panel unit root test because the conventional Augmented Dicky–Fuller (ADF) has low statistical power when identifying stationarity more especially in short panels in a panel setting. Second, panel unit root tests do not restrict but allows for country level fixed effects and also variations in time for the coefficients across the panels. Besides, panel data approach gives options for estimation ranging from no trend and non-constant estimation, to estimations with a constant and deterministic trend

testing for similar time effects. These approaches provide a greater level of flexibility in computing the coefficients (Issahaku et al., 2016).

Table 4. 3. Panel unit root test

	FINDEX	FSD	GDPERGR
Sub-Sahara Africa Sample			
Level			
LLC	6.76	-4.85***	-7.92***
IPS	11.94	-3.63***	-10.64***
ADF	5.89	153.88***	285.44***
PP	6.86	165.09***	596.77***
First difference			
LLC	-9.21***		
IPC	-4.69***		
ADF	131.64***		
PP	144.50***		
Full Sample			
Level			
LLC	7.73	0.02	-37.24***
IPS	11.6	2.52	-34.54***
ADF	153.63	394.16	1865.32***
PP	222.67	412.93*	1984.32***
First difference			
LLC	-1433.6***	-44.50***	
IPC	-85.57***	-40.80***	
ADF	588.69***	2221.05***	
PP	607.68***	2790.21***	

*Source: Authors estimate from research data; $P < 0.01^{***}$ $P < 0.05^{**}$ $P < 0.10^{*}$*

The results of the panel unit root test for the Sub- Sahara Africa sample and the full sample are reported in table 4.3. The results from table 4.3 show that all the variables are integrated of order zero $I(0)$ except Financial inclusion index (FINDEX) variable that is integrated of order one $I(1)$ in the case of the Sub-Sahara African Sample. This implies that not all the variables used in the study follow a unit root process. We used the first difference of the variables that are integrated of order one $I(1)$ in the analysis.

4.4.3 Selection and computation of the lag order

The technique for selecting the appropriate model is reported in table 4.4. Based on the selection criteria of the three models by Andrews and Lu (2001) and the overall coefficient of determination, first order panel VAR model is preferred. This is because it has the least MBIC, MAIC, and MQIC values. Based on the results on the model selection in table 4.4, we use the first order panel Vector Auto regression (VAR).

Table 4.4: Lag order selection and estimation

Lag	CD	J	J p-value	MBIC	MAIC	MQIC
1	.9997355	22.76279	.6976881	-115.7445	-31.23721	-65.53185
2	.9998122	12.61969	.8136526	-79.71849	-23.38031	-46.2434
3	.999521	5.963437	.7435721	-40.20565	-12.03656	-23.46811

*Note: MBIC=modified Bayesian criteria, MQIC= modified Hannan- Quinn information criteria
MAIC=modified Akaike information criteria*

4.4.4 Regression Results

There is a confirmation of a reverse causality between financial inclusion index (FINDEX) and financial sector development (FSD). This evidence is shown in table 4.5. There is a strong evidence of a positive impact of the lag of financial sector development on financial inclusion index (FINDEX) in Sub-Saharan Africa as indicated by the statistical significance and also the positive co-efficient of the lag of Financial Sector Development (FSD) as shown in table 4.5. The explanation offers we for this finding is that, a financial sector that is well-developed will lead to financial inclusion. This is because a well-developed financial sector easily provides people access to financial services. On the other hand, it is also evident that, the lag of financial inclusion significantly impacts financial sector development. It implies that when more people are financially included, it promotes financial sector development and stability. Our results are consistent with other theoretical papers that argued that, financial inclusion has a positive impact on financial sector development (Allen et al., 2014; Otchere, 2016). Our results depart from earlier studies in two ways. First, unlike earlier theoretical studies

that look at a unidirectional relationship between financial inclusion and financial sector development, we examine the bi-causal relationship between financial inclusion and financial sector development.

Table 4. 5: Sub-Sahara Africa Sample Panel VAR Results

Financial Inclusion Index, Financial Sector Development and Economic growth

	FINDEX	FSD	GDPERGR
FINDEX(-1)	0.555808*** (0.12711) [4.37264]	4.353277*** (1.53070) [2.84398]	0.881856 (1.12263) [0.78553]
FSD(-1)	0.004319*** (0.00182) [2.36939]	0.934227*** (0.02195) [42.5574]	0.022389 (0.01610) [1.39066]
GDPERGR(-1)	0.011872 (0.01074) [1.10523]	-0.150325 (0.12935) [-1.16213]	0.512635*** (0.09487) [5.40362]
R-squared	0.235238	0.924146	0.038053
Adj. R-squared	0.220389	0.922674	0.019374
F-statistic	15.84123	627.4402	2.037235

Standard errors in () & t-statistics in []

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

We believe that, knowledge generated from unidirectional studies is unreliable since the variables could depend on each other. Secondly, we found a reverse causality between financial inclusion and financial sector development suggesting that financial inclusion and financial sector development complement each other unlike other studies that argued that financial inclusion lower asset quality (subprime lending) which leads to financial instability thereby hampering financial development (Khan, 2011). The results of this study also show that, central banks and financial institutions policies aim at advancing financial inclusion will not sacrifice the development of the financial sector but rather it will improve it and vice versa.

In the full sample results in table 4.6, there is evidence of reverse causality between financial inclusion index (FINDEX) and financial sector development (FSD hence the results from the sub-Saharan Africa are not significantly different from the full sample results. This finding is concurring with other theoretical studies that examines the link between financial inclusion and financial sector development (Honohan, 2007; 2008; Rojas-Suarez, 2010). The only difference between the two samples results is that, the lag of economic growth is statistically significant in determining financial inclusion index whiles the lag of financial sector development is also significant driver of economic growth (GDPERGR) for the full sample results. The results of the full sample show the existence of a tripartite relationship among financial inclusion, financial sector development and economic growth.

Table 4. 6: Full Sample Panel VAR Results

Financial Inclusion Index, Financial Sector Development, Economic growth

	FINDEX	FSD	GDPERGR
FINDEX(-1)	0.305342*** (0.06655) [4.58806]	3.485151** (1.64820) [2.11452]	0.598118 (1.23918) [0.48267]
FSD(-1)	0.000752** (0.00037) [2.04319]	1.023598*** (0.00911) [112.321]	0.019810*** (0.00685) [2.89123]
GDPERGR(-1)	0.013630*** (0.00469) [2.90562]	-0.115573 (0.11617) [-0.99483]	0.200217** (0.08734) [2.29229]
R-squared	0.073608	0.970579	0.009908
Adj. R-squared	0.065446	0.970319	0.001185
F-statistic	9.018353	3744.239	1.135862

Standard errors in () & t-statistics in []

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

4.4.5 Variance Decomposition

The forecast–error variance decomposition (FEVD) concurs with the results based on residual covariance matrix of the underlying panel VAR model Cholesky decomposition of the of the Sub-Sahara African countries (see Table 4.7, 4.8 and 4.9) and the panel VAR model of the full sample (see Table 4.10, 4.11 and 4.12). The results in table 4.7 indicate that the contribution of financial sector development (FSD) (second column) and GDP per capita growth rate (GDPERGR) (third column) explained 0.00% and 0.00% respectively of the variation of financial inclusion index (FINDEX) in the short-run; that is one year and the same amount of variation applies to the full sample in table 4.10. In 10 years, more than 5.41% and 1.98% of the variation in financial inclusion index (FINDEX) is explained by financial sector development (FSD) (second column) and GDP per capita growth rate (GDPERGR) (third column) shocks respectively in table 4.7 while in the full sample, the results in table 4.10 indicate that the contribution of financial sector development (FSD)(second column) and economic growth (GDPERGR)(third column) explained 2.03% and 6.34% of the variation of financial inclusion index (FINDEX) in the long run; that is 10 years. However, after one (1) year which is the short-run, more than 0.005% and 0.00% of the variation in financial sector development (FSD) is explained by financial inclusion and the GDP per capita growth rate shocks respectively when using the Sub-Sahara African sample in table 4.8 and the variation is 0.02% and 0.00%, respectively when using the full sample according to table 4.11. But 10 years in the long-run, more than 31.69% and 0.57% of the variation in financial sector development (FSD) is explained by financial inclusion and the GDP per capita growth rate shocks respectively when using the Sub-Sahara African sample in table 4.8 and the variation is 3.53% and 0.25% respectively when using the full sample according to the results in table 4.11. Table 4.9 represents the variance decomposition of

Economic growth (GDPERGR) of the Sub-Sahara Africa sample and table 4.7 represents the full sample.

Table 4. 7: Variance Decomposition of FINDEX

Variance Decomposition of FINDEX, FSD and GDPERGR of Sub-Sahara Africa sample

Period	S.E.	FINDEX	FSD	GDPERGR
1	0.390796	100.0000	0.000000	0.000000
2	0.448930	98.91737	0.253023	0.829604
3	0.470694	97.72322	0.746556	1.530220
4	0.481536	96.72597	1.381065	1.892969
5	0.488279	95.88742	2.079818	2.032759
6	0.493253	95.14003	2.794103	2.065868
7	0.497359	94.44716	3.496016	2.056825
8	0.500976	93.79483	4.170922	2.034245
9	0.504276	93.17888	4.812028	2.009089
10	0.507342	92.59809	5.416954	1.984958

Table 4. 8: Variance Decomposition of FSD

Period	S.E.	FINDEX	FSD	GDPERGR
1	4.706080	0.004607	99.99539	0.000000
2	6.674710	6.866450	92.53184	0.601707
3	8.276050	13.81873	85.31367	0.867600
4	9.640308	19.09765	80.00157	0.900772
5	10.82235	22.92980	76.22018	0.850018
6	11.86007	25.73323	73.48626	0.780516
7	12.78151	27.82808	71.45754	0.714381
8	13.60761	29.43093	69.91175	0.657324
9	14.35423	30.68530	68.70509	0.609606
10	15.03356	31.68722	67.74282	0.569969

Table 4. 9: Variance Decomposition of GDPERGR

Period	S.E.	FINDEX	FSD	GDPERGR
1	3.451487	0.115842	0.303057	99.58110
2	3.892642	0.627570	0.509596	98.86283
3	4.025809	1.457904	0.779583	97.76251
4	4.079996	2.218814	1.094552	96.68663
5	4.109691	2.828546	1.434703	95.73675
6	4.130469	3.307955	1.784098	94.90795
7	4.147379	3.693925	2.131750	94.17433
8	4.162252	4.016066	2.470842	93.51309
9	4.175837	4.294399	2.797520	92.90808
10	4.188479	4.541712	3.109864	92.34842

It shows that financial inclusion index (FINDEX) and financial sector development (FSD) shocks contribute about 0.11% and 0.30%, respectively of the variation of GDP per capita growth rate (GDPERGR) in the short-run when using the Sub-Saharan Africa as shown in table 4.9 and 0.61% and 6.07% respectively in the full sample in table 4.12. In 10 years in the long run, financial inclusion index (FINDEX) and financial sector development (FSD) shocks explain about 4.54% and 3.11%, respectively of the variation of GDP per capita growth rate (GDPERGR) when using the Sub-Saharan Africa sample as shown in table 4.9. While in table 4.12 which represents the variance decomposition of GDP per capita growth rate (GDPERGR) of the full sample, after 10 years (long-run), financial inclusion index (FINDEX) and financial sector development (FSD) shocks explain about 0.90% and 7.44% respectively of the variation of GDP per capita growth rate (GDPERGR).

Table 4. 10: Variance Decomposition of FINDEX

Variance Decomposition of FINDEX, FSD and GDPERGR of the Full (World) sample				
Period	S.E.	FINDEX	FSD	GDPERGR
1	0.302084	100.0000	0.000000	0.000000
2	0.327111	94.31222	0.561726	5.126053
3	0.331541	92.89395	0.872638	6.233408
4	0.332460	92.54547	1.070328	6.384204
5	0.332829	92.37717	1.231112	6.391719
6	0.333111	92.23437	1.383064	6.382569
7	0.333386	92.09145	1.536481	6.372071
8	0.333668	91.94331	1.695282	6.361406
9	0.333963	91.78848	1.861097	6.350427
10	0.334273	91.62627	2.034737	6.338997

Table 4. 11: Variance Decomposition of FSD

Period	S.E.	FINDEX	FSD	GDPERGR
1	7.481328	0.021711	99.97829	0.000000
2	10.66821	1.103092	98.55040	0.346508
3	13.25238	1.916335	97.71077	0.372893
4	15.53092	2.445591	97.20891	0.345502
5	17.61994	2.795552	96.88709	0.317362
6	19.58170	3.037272	96.66745	0.295282
7	21.45453	3.211843	96.50958	0.278574
8	23.26387	3.342930	96.39127	0.265798
9	25.02764	3.444605	96.29958	0.255818
10	26.75900	3.525586	96.22657	0.247848

Table 4. 12: Variance Decomposition of GDPERGR

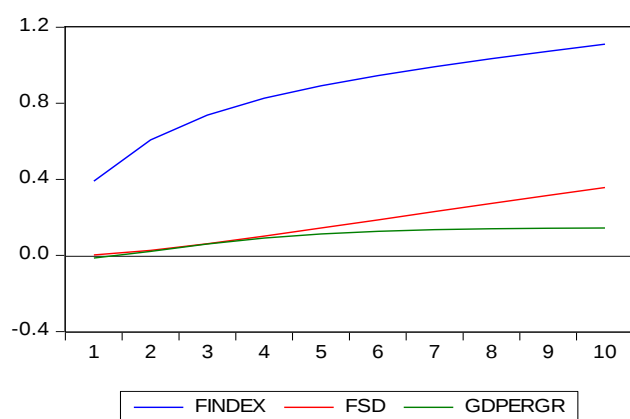
Period	S.E.	FINDEX	FSD	GDPERGR
1	5.624751	0.606281	6.072594	93.32112
2	5.751157	0.801230	6.356493	92.84228
3	5.763513	0.852702	6.515026	92.63227
4	5.768317	0.868858	6.641541	92.48960
5	5.772371	0.876685	6.763093	92.36022
6	5.776431	0.882307	6.887240	92.23045
7	5.780644	0.887369	7.016417	92.09621
8	5.785057	0.892393	7.151602	91.95601
9	5.789692	0.897562	7.293324	91.80911
10	5.794565	0.902949	7.441971	91.65508

4.4.6 Impulse Response Functions

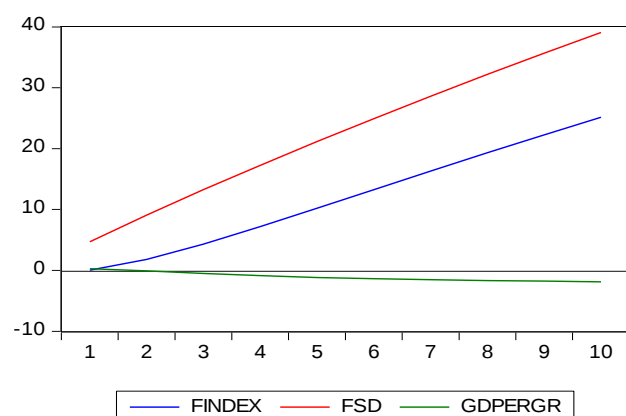
All the endogenous variables impulse response functions are displays in Figure 4.1 of the Panel VAR model of the Sub-Saharan Africa sample. The accumulated impulse responses are presented over time. The response of financial inclusion index (FINDEX) to financial sector development (FSD) and economic growth rate shocks is positive and statistically significant. This appears to concur with the findings in the Sub-Saharan Africa samples. The accumulated response of financial inclusion to financial sector development shocks shows it is positive and is statistically significant. This means that a well-developed financial sector can induce financial inclusion. Figure 4.2 displays the impulse response functions for all the endogenous variables of the Panel VAR model of

the full sample. The accumulated impulse responses are reported over time. The response of financial inclusion to financial sector development and economic growth (GDP per capita) shocks in the full sample is positive and statistically significant. This means increase in financial sector development and economic growth enhances financial inclusion. The accumulated response of financial inclusion to monetary policy rate shocks in the full sample shows it is not statistically significant. The accumulated response of financial sector development (FSD) and Economic growth (GDPERGR) of both samples are also shown.

Accumulated Response of FINDEX to Generalized One S.D. Innovations



Accumulated Response of FSD to Generalized One S.D. Innovations



Accumulated Response of GDPERGR to Generalized One S.D. Innovations

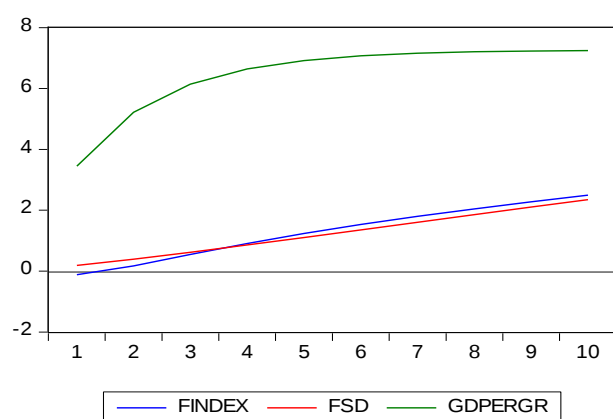
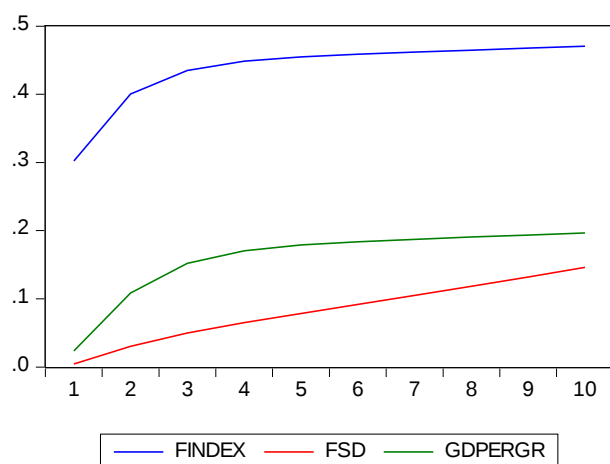
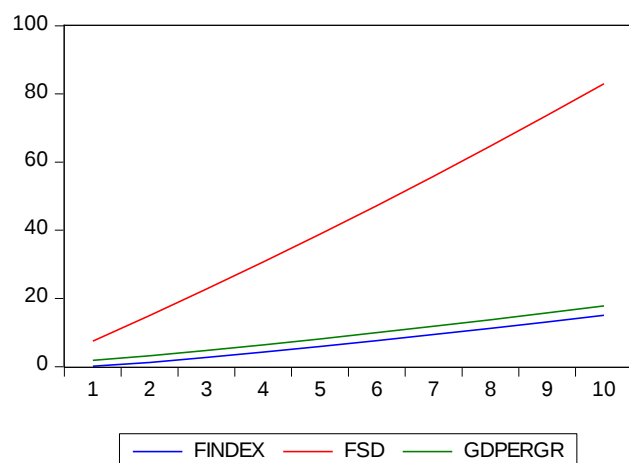


Figure 4.1: Impulse response functions of the Sub-Sahara African sample

Accumulated Response of FINDEX to Generalized One
S.D. Innovations



Accumulated Response of FSD to Generalized One
S.D. Innovations



Accumulated Response of GDPERGR to Generalized One
S.D. Innovations

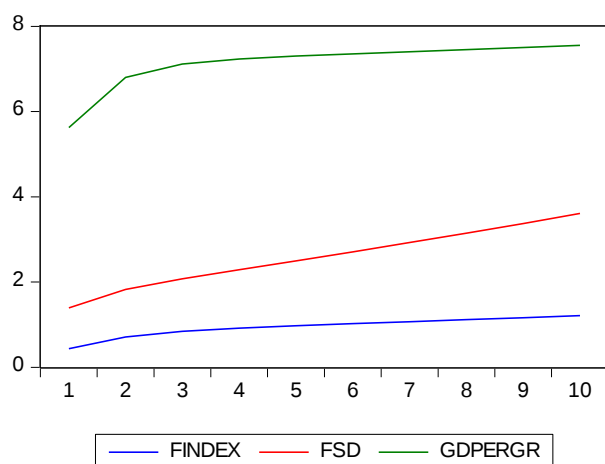


Figure 4. 2: Impulse response functions of the full sample

4.5 Conclusions and Policy Implications

Financial sector development continues to play a key role in Sub-Saharan Africa because it is becoming the major source of funds and this has implications for financial inclusion and macroeconomic policy and stability. There is an evidence of a reverse causality between financial inclusion and financial sector development in Sub-Saharan Africa. This implies that, financial inclusion and financial sector development reinforces each other. The policy implication of this reverse causality is that, financial inclusion and financial sector development are complementary and not contradictory as opposed to other researchers that argued that financial inclusion could impede financial sector development as a result of subprime lending (Khan, 2011). The results suggest that central banks and other financial institutions can leverage on the positive effect of financial inclusion on financial sector development to enhance the development of the financial sector instead of pursuing only financial sector development as a policy objective. Another managerial implication of the study is that; financial inclusion should not only be pursued as a policy objective but it could also be an outcome variable of financial sector development. This implies, African economies and governments in their effort to enhance financial inclusion, financial sector development can serve as a policy tool. This means that, policies aimed at promoting financial inclusion will not impede financial sector development. This suggest that, we can achieve financial inclusion without sacrificing financial sector development. The policy implication is that, Sub-Saharan Africa (SSA) countries can leverage on the positive effect of financial sector development on financial inclusion by implementing financial sector development inducing policies such as; upgrading capital markets, securing trade competitiveness and establishing a banking sector-friendly domestic investment framework.

This study broadens the extant literature on financial inclusion–financial sector development – economic growth nexus by using a panel VAR approach to establish the relationship among these variables. This study contributes to theory advancement by establishing the tripartite relationship amongst financial inclusion, financial sector development and economic growth. The impulse response functions generated enables us to understand the behavior of the variables to policy shocks.

CHAPTER FIVE

FINANCIAL REGULATION AND FINANCIAL INCLUSION IN SUB-SAHARA AFRICA: DOES FINANCIAL STABILITY PLAY A MODERATING ROLE?

5.1 Introduction

Despite the role financial regulations play in preventing distortions to competition, maintaining market integrity, mitigating negative externalities and reducing information asymmetry, they may also present unpleasant repercussions by inadvertently hampering the efficient intermediation processes of financial institutions and impede their ability to provide financial services (see Kodongo, 2018). For example, capital adequacy regulations may compel some banks that are not financially sound to close or merge with other banks and this may cause barriers to entry into the banking sector, thereby impeding competition and decreasing the availability of funds to commercial banks for lending and this will impede financial inclusion. Low credit volumes precipitated by financial regulatory constraints may compel lenders to pursue profit by providing credit to only successful credit applicants at high interest rates which serves as a further impediment to accessing credit and hence lead to low financial inclusion (Kodongo, 2018). It is for this reason that financial regulatory agencies should promulgate and implement regulatory policies that can help countries attain the main goal of ensuring soundness, safety and financial sector stability while at the same time boosting financial inclusion. There has been a number of regulatory requirements of financial institutions in Sub-Saharan Africa ranging from Basel I capital adequacy requirement to Basel III, just to mention a few. Whether the impressive compliance with regulation of financial institutions in Sub-Saharan Africa has resulted in greater financial inclusion is an open empirical question that requires answers. The researcher posits that growth in banking

services through regulatory agencies is only profitable if it helps in achieving an economy's financial inclusion goals.

Most empirical research that examine financial regulation and financial inclusion nexus are theoretical papers (see Getnet, 2014; Tambunlertcha, 2015; Ricardo, 2015; Lewis & Lindley, 2015; Nurbekyan & Hovanessian, 2018) with some of them taking the form of single country studies with panel regression as the major form of analytical tool (see, Kodongo, 2018; Getnet, 2014; Tambunlertcha, 2015; Nurbekyan & Hovanessian, 2018; Yoshino & Morgan, 2017; Park & Mercardo Jnr., 2015; Rojas-Suarez, 2010; Burgess and Pande, 2005; Brune et al., 2011; Allen et al., 2011). The difficulty with single country studies is that they do not permit for a general application of the ideas they produce. This study also bridges this methodological gap in the extant literature by employing linear mixed effect models' method to examine the link between financial regulation and financial inclusion. Linear mixed models also called multilevel models are a type of regression models that considers both variations explained by the independent variables (fixed effects) and variations not explained by the independent variables (random effects). The advantages of the Mixed-effects Regression Models over fixed and random effect models are that they explicitly model individual changes across time and also in terms of repeated measures they are more flexible that is the number of observations per subject do not need to be equal and unlike fixed set of points rather time can be continuous. Other studies have also focus on how financial inclusion impact on income inequality, poverty reduction and economic growth (Dabla-Norris, et al., 2015; Johal, 2016; Sharma, 2016, Kim, Yu & Hassan., 2018).

While policy makers continue to seek ideas from researchers to use financial regulation more efficiently and effectively to promote financial inclusion, research in this area is scarce (see Kodongo, 2018). Nonetheless, for emerging and developing economies' policymakers, gaining insight about the impact of financial regulation on financial inclusion is a prerequisite for putting their economies on the path to speedy growth. The literature has hitherto largely disregarded the empirical examination of the link between financial inclusion and financial regulation from a Sub-Saharan African perspective. More specifically, the impact of financial regulation on financial inclusion appears to have escaped the attention of researchers. As a result, there is a narrow understanding of the link between financial regulation and financial inclusion. This study attempts to bridge the gap by empirically examining the financial regulation-financial inclusion nexus from the Sub-Saharan African perspective. The study also introduces financial stability measured by the bank Z-score as a moderating variable to moderate the relationship between financial regulation and financial inclusion. Our decision to use bank Z-score as a measure of financial stability was influenced by the literature (Laeven & Levine, 2009; Agoraki, Delis & Pasiouras., 2011; Roy, 1952). We believe that financial stability will help strengthen the relationship between financial regulation and financial inclusion. In addition to the financial regulation variable, we controlled for factors in the bank-environment that might affect banks' decisions regarding lending and access to credit such as bank lending-deposit spread, competition and non-performing loans because these variables, according to the literature, affect financial inclusion (Ricardo, 2015).

One of the main problems bedevilling the study of the financial inclusion-financial regulation link is the use of inappropriate measures for financial inclusion. Financial

inclusion has usually been measured by one variable such as the number of bank branches per thousand adults, the number of depositors with commercial banks per thousand adults and the number of ATMs per hundred thousand adults (see Mbutor & Uba, 2013; Evans, 2016). Others use log of credit to small-scale agriculture as an indicator of financial inclusion (see Kodongo, 2018). We posit that the financial inclusion measures mentioned above do not sufficiently address certain important role of financial institutions such as credit availability and ease of making bank account opening. Conclusions arising from such studies that use weak financial inclusion measures can be fallacious and spurious and may not be relevant for policy formulation. Most empirical researchers usually solve the problem by using several of these single variable measures to carry out what they called robustness checks; it is not that they are not aware of the issues embedded in the use of a single variable measure. This solution, though not bad, is not sufficient, as the different measures themselves may be proxying different aspects or just one aspect of financial inclusion. It is now being recognised that financial inclusion has at least two main dimensions: demand side factors (usage) and supply side factors (access) (Chakrabarty, 2012; Shah & Dubhashi, 2015). Therefore, it is essential that proxies of financial inclusion reflect the multidimensional nature of financial inclusion. We address this gap in the extant literature by measuring financial inclusion by constructing a composite index for financial inclusion after deriving the weights (factor loadings) from a panel principal component analysis (PCA). Unlike previous measures, our composite proxy is able to encapsulate the two key facets of financial inclusion: access and usage. By using this multidimensional measure, we are able to examine the relationship between financial inclusion and financial regulation from a holistic point of view. We also measure financial regulation using the capital

adequacy ratio measured by a bank's capital divided as a proportion of its risk-weighted assets (see Kodongo, 2018).

From the forgoing analysis, financial institutions and for that matter banks play a key role in enhancing financial inclusion. If financial institutions play a vital role in promoting financial inclusion, could the way and manner in which they are regulated affect their capacity to expand financial services to the poor and marginalised? This question and many others remain unanswered in the extant literature to best of the researcher's knowledge. It is for this reason that this study seeks to examine the effect of financial regulation (capital adequacy ratio) on financial inclusion, taking into account the mediating role of financial stability.

This paper seeks to answer the following research questions: (1) Does financial regulation affect financial inclusion in Sub-Saharan Africa? (2) Does financial stability enhance the link between financial regulation and financial inclusion in Sub-Saharan Africa?

The study contributes to the economics and finance disciplines in many ways. First, not much is known about the relationship between financial inclusion with financial regulation in Sub-Saharan Africa. It is not also clear how financial stability intermediates the relationship between financial inclusion and financial regulation.

Secondly, the paper adds to the financial inclusion literature by presenting a detailed evidence on the link between financial regulation and financial inclusion, using a large data set on Sub-Saharan Africa, covering 48 countries for a period of two decades.

Another key contribution of this paper is that it presents evidence of the moderating role of financial stability in the financial regulation-financial inclusion nexus which other researchers ignore. This study also contributes to the literature by generating a composite index to measure financial inclusion as opposed to the use of single variable measures. Our proxy of financial inclusion reflects the multidimensional feature of financial inclusion.

Lastly, from a theoretical point of view, this study provides grounds for theory development on the link between financial regulation and financial inclusion. Understanding the theoretical underpinnings of this relationship will help developing economies' policy makers to pursue policies that will enable them achieve the ultimate results from financial regulation and financial inclusion. Also, this research on financial inclusion and financial regulation is of much relevance because it will help researchers to better recognise the financial regulation and supervisory standards that will help financial systems to function well and enhance financial inclusion. With this understanding, policy makers and central governments will be in a good position to provide the needed financial sector regulatory reforms to achieve financial inclusion goals.

Briefly, this study presents the following results. Using one main indicator of prudential regulation such as the capital adequacy to investigate whether compliance to capital adequacy regulatory requirements by commercial banks has an impact on financial inclusion in Sub-Sahara Africa, we found that prudential regulation negatively impacts financial inclusion in Sub-Saharan Africa. More specifically, capital adequacy regulations have a negative and strong significant impact on financial inclusion. The

interactive term of financial regulation (capital adequacy) and financial stability, on the other hand, has an affirmative and significant impact on financial inclusion. This suggests that the interactive effect of financial regulation (capital adequacy) and financial stability appears to mitigate the negative effects of financial regulation on financial inclusion, suggesting that prudential financial regulatory measures are likely to have their intended impact of promoting financial inclusion in a stable financial environment. This means that financial stability (bank Z-score) augments financial regulation to have a positive impact on financial inclusion in sub-Saharan Africa.

The rest of this paper is structured as follows: Section 5.2 presents both theoretical and empirical literature review. Section 5.3 reports on the empirical models and methodology adopted. Section 5.4 presents the data analysis and discussion of results. Section 5.5 presents the summary, conclusions and policy implications of the paper.

5.2 Literature Review

The financial crisis which occurred in 2007/9 has heightened the interest of several scholars globally on how important it is for improvement in the regulation of financial markets. This has led to the improvement and development of new regulations aimed at making financial institutions like the commercial banks which are deposit taking institutions safer by laying emphasis on having better asset quality (i.e., low nonperforming loans or high provisions for impaired loans), more capital (i.e., less leverage), more liquidity (i.e., less maturity intermediation) and better risk management to prevent build-up of negative externalities that might propel crises and contagion (Cecchetti, et al., 2011). The Basel Committee – Basel III Accord – has included all these major debates on how to enhance the regulatory framework of financial institutions in its latest bank supervision recommendations and has placed more emphasis on equity

capital, high liquidity standards and greater responsibility on supervisory agents to maintain integrity and discipline in the financial sector (see Sarra, 2012). Many African countries are progressively complying with the financial supervisory regulations based on Basel suggestions and recommendations. Recommendations made by the Basel committee are now backed by law and banks in Sub-Saharan Africa are, to a large extent, complying with them. Though this has strengthened the stability of the financial sector in Sub-Saharan Africa, it may be threatening the achievement of financial inclusion goals.

Carbo, Gardener and Molyneux (2007) undertook a study on financial inclusion in Europe. Their results suggest that the main reasons that could be partly accountable for financial exclusion in Europe were financial liberalization and intense competition in the banking sector. Thus, financial liberalization increased competition, economic growth and financial sector development (see Batuo, Mlambo & Asongu., 2018). And this led to the development of several strategies by financial intermediaries to target the wealthy populace and to come up with loan application selection tools like credit scoring and draw up financial contracts which excluded non-profitable market segments. Empirical evidence by Demirgüç-Kunt, et al., (2004) suggests that efficiency may be impeded in a regulated environment and cause few powerful banks to hinder competition. This is in consonance with findings from Sarma and Pais (2011) which indicate that financial regulation may have an adverse effect on financial inclusion. These authors, using data from 49 developing countries, discovered that non-performing assets as a proportion of total assets negatively affect financial inclusion. Their results also show that capital asset ratio has a negative impact on financial inclusion, suggesting that when banks are highly capitalized, they are cautious in their lending and this emphasizes the fact that high capitalization in the banking system encourages banks to be cautious in their lending

which has the tendency of impeding financial inclusion. This finding concurs with more recent empirical studies which also conclude that increase in capital requirements impede bank lending given that equity is expensive and capital buffers are binding (see Aiyar, et al., 2014).

However, in contrast, evidence from Ugwuanyi (2015) shows that bank capital increases results in bank risk-taking behaviour and this has the potential of resulting in greater financial inclusion in Nigeria. There has been increased interest in studies examining the relationship between regulations on financial integrity and financial inclusion. In principle, when individuals are financially excluded, it threatens financial integrity because these persons resort to the use of informal financial products and services which are mostly not operating within the regulatory framework. This compromises the efficacy of counter financial terrorism and anti-money laundering measures. Notwithstanding, there are still concerns that financial integrity regulations may hinder the achievement of financial inclusion goals by increasing costs of compliance, mounting regulatory barriers against new service providers and creating eligibility obstacles for new users (Bester et al., 2008; Isern & de Koker, 2009). The relationship between financial integrity and financial inclusion in many African countries remains inconclusive since access to formal financial services does not necessarily decrease preference for informal financial services (de Koker & Jentzsch, 2013).

Stijn, Liliana and Suarez (2016) posit that poor regulatory framework is one of the key setbacks to financial inclusion. Others cite lack of infrastructural development, low quality institutions and poor cooperation, economic and political instability, low level of financial literacy and higher poverty rates as the factors behind low financial inclusion

(Nurbekyan & Hovanessian, 2018). Stijn et al. (2016) also argue that financial regulation can either be a hindrance or a catalyst to financial inclusion. There is a growing recognition of regulatory frameworks that promote access to financial services and bank account ownership. The regulatory framework is expected to be designed to facilitate expanding ownership of accounts through financial regulation such as bank capital regulation, introducing tiered documentation requirements, licensing bank agents, low-fee accounts and permitting the introduction of new technologies such as mobile money. The main suppliers of financial services in any economy are banks. According to Kapoor (2009), banks are at the heart of any financial system without which the economy will not function effectively. The question this paper seeks to answer is, if banks are the main suppliers of financial services and products, could the manner in which they are regulated affect their ability to provide financial services? It is for this reason that this paper sought to examine how financial regulation impacts financial inclusion. The key challenge is how financial inclusion goals can be achieved while maintaining financial stability.

Financial stability has become a predominant objective for the world economy due to recent global financial crisis. In the early 1970s, banks deregulation and supervision mainly focussed on minimum capital requirements. The most important function of minimum capital requirements is to maintain financial stability according to the Basel Capital Accord. However, the relevance attached to regulatory capital requirements in banking supervision raises many questions. This was as a result of the increase in the number of bank failures world-wide. In the past two decades, the attention of regulatory bodies has focused on how to determine the correct ways to facilitate the performance of the financial systems of countries. Other international financial

institutions such as the International Monetary Fund and the World Bank responded to recent troubling situations by attempting to enhance economic development and financial stability through vigorously encouraging countries to adopt and implement the right supervisory practices and financial regulations for their financial systems.

The relevance of an efficiently regulated financial system in an economy cannot be over-emphasized. Various studies have found evidence of an affirmative relationship among financial systems operations, financial inclusion, economic development and growth (Levine, 2002). However, financial systems do not often perform in the manner that is profitable. Thus, they sometimes fall short of obtaining this relevant objective of expanding financial services, economic development and growth. The recent global financial crunch is just a reminder of this unfortunate situation. Policymakers' response to financial crisis in time past, normally, was to do assessment of what had caused the crisis and what restructuring and reforms could be used to enhance the financial systems to function better to promote financial inclusion while maintaining financial stability. The length and breadth of most recent financial crisis definitely underscore the relevance of assessments of this kind. Despite the numerous extant literatures on financial systems' effectiveness, a detailed study on whether financial supervision, regulation, and monitoring will promote or hinder financial inclusion and bank efficiency is limited (see Berger, 2007; Berger & Humphrey, 1997).

Capital regulation of financial institutions is seen as one of the determinants of profitability and performance of banks as long as it indicates the amount of capital requirement that banks must have in order to reduce risk (Barth et al., 2008). Were the owners of financial institutions are obliged to hold more risk capital, the gain they

would get from taking higher risk would be offset by the potential losses of their capital (Barth et al., 2008). As a consequence, capital adequacy requirements are considered to play critical role by aligning owners of financial institutions' interest with creditors and other depositors by compelling them to be prudent in their lending activities (Kaufman, 1992; Barth et al., 2008; Keeley & Furlong, 1990).

5.3 Methodology

This study employed linear mixed effect models' method to investigate the relationship between financial regulation and financial inclusion. Linear mixed models, also called multilevel models or hierarchical models, are a type of regression model that considers variations explained by independent variables (fixed effects) and variations not explained by independent variables of interest (random effects). The advantage of the Mixed-effect Regression Models over fixed and random effect models is that they explicitly model individual change across time. In terms of repeated measures, they are more flexible. This implies that the same number of observations per subject is no longer required and time can be continuous rather than fixed. The covariance structure has flexible specification among repeated measures and procedures for testing specific determinants of this structure than the use of fixed and random effect models. The general linear mixed effect model can be specified as:

$$Y_{it} = X_{it}\beta + Z_{it}u + e_i \dots\dots\dots (1)$$

where Y_{it} is an n_i -dimensional vector of responses Y_{it} for unit i X_{it} an $n_i \times p$ matrix of covariate with fixed effects β , Z_i an $n_i \times q$ matrix of covariates with the random effects u_i and e_i a vector of residual errors. For a given j , the linear mixed model can be expressed as;

$$Y_{ij} = X'_{ij}\beta + Z'_{ij}u_i + e_{ij} \dots \dots \dots (2)$$

where Y_{ij} is the vector of observations; X'_{ij} is the incidence matrix for fixed effects; β is the vector of fixed effects (to be estimated); Z'_{ij} is the incidence matrix for random effects; u_i is the vector of random effects, such as individual country values (to be estimated); e_{ij} is the vector of residual errors (random effects). Where X'_{ij} and Z'_{ij} are the j th rows of the corresponding matrices X_j and Z_i respectively

In this study, Y_{ij} is given as $Y_{ij} = \begin{bmatrix} FINDEX_{ij} \\ ATMSPHTA_{ij} \\ BAPTA_{ij} \\ BRPHTA_{ij} \\ CBB_{ij} \\ BFCB_{ij} \\ DCBPTA_{ij} \end{bmatrix}$

X'_{ij} and Z'_{ij} are also given as $X'_{ij} = \begin{bmatrix} FINREG_{ij} \\ REGSTA_{ij} \\ BALEDESP_{ij} \\ COMP_{ij} \\ NPL_{ij} \end{bmatrix}$ $Z'_{ij} = \begin{bmatrix} FINREG_{ij} \\ REGSTA_{ij} \\ BALEDESP_{ij} \\ COMP_{ij} \\ NPL_{ij} \end{bmatrix}$

Note: All the variables are defined in Table 5.1 below.

5.3.1 Empirical Models

Following the base line model in equation (2) we specify the empirical model involving financial inclusion index and financial regulation in this section, as the two most important variables in this study. Financial inclusion index is stated as a function of financial regulation, the controlled variables and the vector of residual errors. All the variables are defined in table 5.1 below. The empirical model is specified as follows;

$$FINDEX_{ij} = \beta_0 + \beta_1 FINREG_{ij} + \beta_2 REGSTA_{ij} + \beta_3 BALEDESP_{ij} + \beta_4 COMP_{ij} + \beta_5 NPL_{ij} + u_{0j} + u_{1j} FINREG_{ij} + u_{2j} REGSTA_{ij} + u_{3j} BALEDESP_{ij} + u_{4j} COMP_{ij} + u_{5j} NPL_{ij} + e_{ij} \dots \dots \dots (3)$$

$e_{ij} \simeq N(0, \delta_e^2)$, u_{0j} and u_{ij} are normally distributed with mean 0 and constant variance (δ^2)

The study will also run mixed effect regressions for the individual variable of financial inclusion that constituted the financial inclusion index (FINDEX) to see if the results are significantly different from that of the index. We specify the individual variables regressions as follows:

$$ATMSPHTA_{ij} = \beta_0 + \beta_1 FINREG_{ij} + \beta_2 REGSTA_{ij} + \beta_3 BALEDESP_{ij} + \beta_4 COMP_{ij} + \beta_5 NPL_{ij} + u_{0j} + u_{1j} FINREG_{ij} + u_{2j} REGSTA_{ij} + u_{3j} BALEDESP_{ij} + u_{4j} COMP_{ij} + u_{5j} NPL_{ij} + e_{ij} \dots \dots \dots (4)$$

$$BAPTA_{ij} = \beta_0 + \beta_1 FINREG_{ij} + \beta_2 REGSTA_{ij} + \beta_3 BALEDESP_{ij} + \beta_4 COMP_{ij} + \beta_5 NPL_{ij} + u_{0j} + u_{1j} FINREG_{ij} + u_{2j} REGSTA_{ij} + u_{3j} BALEDESP_{ij} + u_{4j} COMP_{ij} + u_{5j} NPL_{ij} + e_{ij} \dots \dots \dots (5)$$

$$BRPHTA_{ij} = \beta_0 + \beta_1 FINREG_{ij} + \beta_2 REGSTA_{ij} + \beta_3 BALEDESP_{ij} + \beta_4 COMP_{ij} + \beta_5 NPL_{ij} + u_{0j} + u_{1j} FINREG_{ij} + u_{2j} REGSTA_{ij} + u_{3j} BALEDESP_{ij} + u_{4j} COMP_{ij} + u_{5j} NPL_{ij} + e_{ij} \dots \dots \dots (6)$$

$$CBB_{ij} = \beta_0 + \beta_1 FINREG_{ij} + \beta_2 REGSTA_{ij} + \beta_3 BALEDESP_{ij} + \beta_4 COMP_{ij} + \beta_5 NPL_{ij} + u_{0j} + u_{1j} FINREG_{ij} + u_{2j} REGSTA_{ij} + u_{3j} BALEDESP_{ij} + u_{4j} COMP_{ij} + u_{5j} NPL_{ij} + e_{ij} \dots \dots \dots (7)$$

$$BFCB_{ij} = \beta_0 + \beta_1 FINREG_{ij} + \beta_2 REGSTA_{ij} + \beta_3 BALEDESP_{ij} + \beta_4 COMP_{ij} + \beta_5 NPL_{ij} + u_{0j} + u_{1j} FINREG_{ij} + u_{2j} REGSTA_{ij} + u_{3j} BALEDESP_{ij} + u_{4j} COMP_{ij} + u_{5j} NPL_{ij} + e_{ij} \dots \dots \dots (8)$$

$$DCBPTA_{ij} = \beta_0 + \beta_1 FINREG_{ij} + \beta_2 REGSTA_{ij} + \beta_3 BALEDESP_{ij} + \beta_4 COMP_{ij} + \beta_5 NPL_{ij} + u_{0j} + u_{1j} FINREG_{ij} + u_{2j} REGSTA_{ij} + u_{3j} BALEDESP_{ij} + u_{4j} COMP_{ij} + u_{5j} NPL_{ij} + e_{ij} \dots \dots \dots (9)$$

5.3.2 Data Source and Description of variables

The table below presents the variables and their description. All variables of financial inclusion were obtained from the IFS database while the bank variables were taken from the GFD database.

Table 5.1: Data and Variable Selection

Variable	Notation	Description	Data source
Financial Inclusion Index	FINDEX	An index of number of bank accounts, number of ATMs, borrowers from commercial banks, number of bank branches, number of depositors with commercial banks and number commercial bank branches	
Financial Inclusion	ATMSPHTA	ATMs per 100,000 adults	IFS
Financial Inclusion	BAPTA	Bank accounts per 1,000 adults	IFS
Financial Inclusion	BFCB	Borrowers from commercial banks per 1,000 adults	IFS
Financial Inclusion	BRPHTA	Bank branches per 100,000 adults	IFS
Financial Inclusion	CBB	Commercial bank branches per 100,000 adults	IFS
Financial Inclusion	DCBPTA	Depositors with commercial banks per 1,000 adults	IFS
Financial Regulation	FINREG	Capital Adequacy Ratio (CAR)	bankscope
Financial Stability	FINSTA	Bank Z-score	GFD
Interactive term	REGSTA	Financial Regulation and Financial Stability Interactive term	
Bank Lending-Deposit Spread	BALEDESP	Bank lending and deposit spread	GFD
Competition	COMP	Boone indicator	GFD
Non-performing Loans	NPL	Bank non-performing loans to gross loans (%)	GFD

Note: IFS: International Financial Statistics GFD: Global Financial Development

The financial regulation variable was taken from bankscope database. The full sample consists of 217 countries of which 48 constitute the Sub-Saharan Africa sample. Though the concentration of this paper is on Sub-Saharan Africa, the study considered the full sample made up of 217 countries to see if the results of Sub-Saharan African countries differ significantly from the results of the full or world sample. We use an unbalanced panel annual data spanning from 1990 to 2014. The study constructed a financial inclusion index (FINDEX) from six variables of financial inclusion as shown in Table 5.1 using principal component analysis (PCA). Then we ran separate mixed effect regression models for each data set with the index as well as the six variables of financial inclusion used in this paper.

5.3.3 Principal Component Analysis (PCA)

The paper employed panel Principal Component Analysis (PCA) method to generate financial inclusion index using the six variables of financial inclusion. Based on this method, the j^{th} factor Index can be written as:

$$FINDEX_j = W_{J1} X_1 + W_{J2} X_2 + W_{J3} X_3 + \dots + W_{JP} X_P \quad W_{Ji} \text{ where } i=1, 2, \dots, p$$

$FINDEX_j$ is the Index of financial inclusion; W_J are the factor score weights of the parameter; X_i is the respective initial value of the constituents; and p is the number of variables in the equation. Here, two dimensions of financial inclusion constituted the composite financial inclusion index where each dimension is made up of three factors. The first-dimension constituents are the supply side factors which include ATMs per 100,000 adults, bank branches per 100,000 adults and commercial bank branches per 100,000 adults. The second-dimension constituents are the demand side factors which include bank accounts per 1,000 adults, borrowers from commercial banks per 1,000 adults and depositors with commercial banks per 1,000 adults. In short, six variables constitute the Financial Inclusion Index (FINDEX). The index can be stated as:

$$FINDEX = f(ATMSPHTA, BRPHTA, CBB, BAPTA, BFCB, DCBPTA)$$

5.4 Empirical Results and Discussion

5.4.1 Descriptive Statistics

The descriptive statistics of the Sub-Saharan African sample and the full sample are reported in Table 5.2. However, since predictive power of the mean is affected by outliers, the median of the distribution is used for the discussion. ATMs per 100,000 adults (ATMSPHTA), which is a measure of financial inclusion, has a median of 3.20 per 100,000 adults in Africa while the world average is 30.33 ATMs per 100,000 adults (ATMSPHTA). This indicates that the degree of financial inclusion in Sub-Saharan

Africa is lower compared to the full sample. The rest of the measures of financial inclusion which includes bank accounts per 1,000 adults (BAPTA), borrowers from commercial banks per 1,000 adults (BFCB), bank branches per 100,000 adults (BRPHTA), commercial bank branches per 100,000 adults (CBB) and depositors with commercial banks per 1,000 adults (DCBPTA) have median values of 87.13, 2.84, 2.97, 17.42 and 106.48, respectively in the Sub-Saharan sample, while their world sample median values are 337.76, 13.03, 12.57, 97.18 and 339.50, respectively. From the median distribution of the other measures of financial inclusion above, the Sub-Saharan African values are lower compared to the world or full sample values. This shows that the degree of financial inclusion in Sub-Saharan Africa is lower relative to countries in the full sample.

The capital adequacy ratio which is a proxy of financial regulation (FINREG) has a median value of 17.10% in Sub-Saharan Africa but its world median value is 15.10%. This suggests that financial institutions in Sub-Saharan Africa are highly regulated compared to the other sub-regions of the world. This may be partly due to the risky nature of banking operations in Sub-Saharan Africa. Financial stability proxied by the bank Z-score has a median of 7.73% in Sub-Saharan Africa while the world sample value is 9.69%. The Z-score captures a country's banking system's probability of default. The Z-score relates capitalization and returns with the standard deviation (volatility) of those returns. From the figures in Table 5.2, the probability of default of banks in Sub-Saharan African countries is higher relative to the rest of the world. The median bank lending-deposit spread (BALEDESP) in Sub-Saharan Africa is 10.15%, while that of the full (world) sample is 6.44%. The bank lending-deposit spread (BALEDESP) is the difference between deposit rate and lending rate. Lending rate is the interest rate banks

are charging on loans to individual and businesses while deposit interest rate is the interest rate commercial banks are offering on deposits. Based on the median figures of the spread, it can be concluded that lending-deposit spread is higher in Sub-Saharan Africa than in the rest of the world. This means that lending rates in Sub-Saharan African countries are quite high compared to those in other countries in the world. The median value of the Boone indicator in Sub-Saharan Africa is -0.059 while that for the full sample is -0.054. The Boone indicator is a measure of the level of competition and it is computed as profit elasticity with respect to marginal costs. The results suggest that there is higher competition among Sub-Saharan African banks than among banks from the rest of the world. Bank nonperforming loans as a proportion of gross loans median value in Sub-Saharan Africa is 7.99% while the world's median is 4.87%. This is a clear indication that Sub-Saharan African bank loans underperform more than banks in other countries of the world.

Table 5.2: Descriptive Statistics

	ATMSPHTA	BAPTA	BRPHTA	CBB	BFCB	DCBPFTA	FINREG	FINSTA	BALEDESP	COMP	NPL
Sub-Saharan Africa Sample											
Mean	7.953	156.789	4.161	5.662	40.979	216.665	18.394	8.846	12.010	-0.065	11.060
Median	3.198	87.126	2.841	2.973	17.417	106.481	17.100	7.732	10.148	-0.059	7.990
Maximum	66.198	834.275	24.195	54.167	257.667	1777.706	43.400	89.932	80.333	1.607	74.100
Minimum	0.000	0.000	0.126	0.122	0.000	0.000	1.800	-12.025	0.167	-0.986	0.964
Std. Dev.	12.563	170.184	4.369	8.470	55.497	293.870	6.841	7.080	9.371	0.141	10.062
Skewness	2.394	1.598	2.378	3.290	1.885	2.885	0.821	3.523	3.358	1.995	2.000
Kurtosis	8.330	4.952	9.380	14.511	5.861	12.886	4.041	31.638	18.390	46.217	9.409
Jarque-Bera	763.626	195.874	1158.354	3604.226	262.307	2074.388	33.839	24426.540	7553.755	40890.530	706.350
Probability	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Observations	357.000	335.000	439.000	492.000	281.000	380.000	215.000	674.000	643.000	521.000	297.000
Full (World) Sample											
Mean	41.478	512.871	20.171	19.372	171.537	520.124	16.103	11.345	8.426	-0.073	7.845
Median	30.330	337.765	13.026	12.574	97.182	339.503	15.100	9.691	6.441	-0.054	4.868
Maximum	290.661	3368.388	285.002	289.835	1156.048	3371.491	48.600	89.932	80.333	2.129	74.100
Minimum	0.000	0.000	0.126	0.122	0.000	0.000	1.800	-21.224	0.025	-2.000	0.010
Std. Dev.	44.282	559.673	27.378	26.406	208.888	545.971	5.084	8.170	7.866	0.160	8.346
Skewness	1.859	1.897	5.367	5.679	1.971	1.783	1.666	1.361	3.687	-0.785	2.477
Kurtosis	7.588	7.814	45.387	50.648	7.128	7.381	7.737	7.886	22.360	38.693	12.516
Jarque-Bera	2423.501	1277.585	144111.000	195843.000	1217.616	1145.907	2253.296	3959.252	53757.230	125891.500	9313.254
Probability	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Observations	1668.000	816.000	1809.000	1959.000	897.000	862.000	1612.000	3038.000	3006.000	2367.000	1942.000

Source: Authors estimate from research data

5.4.2 Panel Unit Root Test Results

Panel data analysis requires that the variables used in the study are stationary. Stationary test is important because the order of integration of the variables will help choose the right model for the computation of the parameters. Different estimation techniques, such as the Levine-Lin & Chu's (2002, LLC) model and the Im, Pesaran & Shin's (2003, IPS) model, have been developed for testing unit roots in panel data. The IPS and LLC tests both assume that the null hypothesis in each series in the panel has a unit root. However, while the alternate hypothesis of the LLC test assumes each series to be stationary with the same autoregressive parameter for all panel units the alternate hypothesis of the IPS test permits unit roots for some of the individual series if not for all. That is, the autoregressive parameters are not the same. This paper uses four panel unit root tests: Augmented Dickey Fuller (ADF) test, the Levine–Lin Chu (LLC) test, Im, Pesaran & Shin (IPS) test and Philips Perron (PP) test. There are a number of advantages for using panel unit root tests when compared with using individual time series-based unit root tests. First, the use of panel data-based unit root tests has more predictive power compared to their univariate counterparts. The researcher used four panel unit root tests because one of the shortcomings of the conventional Augmented Dickey–Fuller (ADF) is that it has a low statistical power when identifying stationarity, especially in short panels' settings. Second, panel unit root tests do not restrict but allow for country level fixed effects and variation in time for the coefficients across the panels. Besides, panel data approach gives options for estimation ranging from no trend and non-constant estimation to estimations with a constant and deterministic trend testing for similar time effects. These approaches provide a greater degree of flexibility in computing the coefficients (Issahaku et al., 2016).

The panel unit root test results for the Sub-Saharan African sample and the full sample are presented in Table 5.3. The results from Table 5.3 indicate that all the variables of financial inclusion are integrated of order one $I(1)$ while the bank variables are integrated of order zero $I(0)$ except the interactive term of financial regulation and stability (REGSTA) which is integrated of order one $I(1)$. This suggests that not all the variables used in the study follow a unit root process. The first difference was used for the variables that are integrated of order one $I(1)$.

Table 5. 3: Panel unit root test

	FINDEX	ATMSPHTA	BAPTA	BRPHTA	CBB	BFCB	DCBPTA	FINREG	FINSTA	REGSTA	BALEDESP	COMP	NPL
Sub-Saharan Africa Sample													
Level													
LLC	3.96	4.28	0.56	2.30	0.16	4.41	47.00	-2.43***	-18.79***	-1.99**	-6.86***	-33.69***	-7.09***
IPS	5.22	7.74	4.42	7.98	7.36	6.38	12.63	-1.64*	-11.30***	-2.34***	-4.77***	-14.63***	-2.26**
ADF	13.97	33.04	44.65	26;84	40.25	27.29	26.48	55.56**	437.96***	60.22**	118.75***	246.11***	87.55***
PP	21.67	43.65	43.57	36.87	69.49	30.61	26.75	58.15**	328.40***	59.22**	124.06***	268.88***	239.64***
First Difference													
LLC	-10.50***	-1481.79***	-18.50***	-11.84***	-12.24***	-1.49*	-16.68***						
IPC	-4.46***	-131.00***	-7.71***	-5.24***	-5.50***	-1.70**	-7.66***						
ADF	79.30***	136.13***	197.81***	171.93***	191.66***	94.30***	200.79***						
PP	106.55***	124.07***	232.60***	215.78***	232.91***	100.84***	246.14***						
Full (World) Sample													
Level													
LLC	-0.20	0.79	8.16	-6.12**	-6.68***	-5.36***	32.71	-6.15***	-20.61***	-1.52*	-24.11***	-46.90***	-18.70***
IPS	3.20	9.77	7.22	7.75	8.42	4.61	11.62	-1.23*	-14.56***	1.06	-14.73***	-24.59***	-3.62***
ADF	102.84	240.96	125.46	312.92	331.16	158.53	112.96	284.26***	1002.14***	185.80	1174.21***	1015.89***	372.69***
PP	145.99***	353.76	164.22	428.85***	489.28***	217.27	152.46	311.36***	908.17***	231.60	1162.25***	1081.89***	598.72***
First Difference													
LLC	36.45***	-1414.00***	223.63*	-22.73***	-23.87***	-16.48***	-27.07***			22.60***			
IPC	-9.10***	-67.97***	16.99*	-10.45***	-10.81***	-7.06***	-12.14***			-26.72***			
ADF	218.77***	686.46***	420.53***	694.79***	741.39***	364.79***	438.64***			1144.85***			
PP	282.30***	735.74***	507.37***	836.94***	890.50***	432.25***	544.07***			2255.86***			

Source: Authors estimate from research data; $P < 0.01^{***}$ $P < 0.05^{**}$ $P < 0.10^{*}$

Financial inclusion Variables: ATMSPHTA=ATMs per 100,000 adults BAPTA=Bank accounts per 1,000 adults BFCB=Borrowers from commercial banks per 1,000 adults BRPHTA=Bank branches per 100,000 adults CBB=Commercial bank branches per 100,000 adults DCBPTA=Depositors with commercial banks per 1,000 adults Bank Variables: FINREG=Capital Adequacy Ratio (CAR) FINSTA=Bank Z-score REGSTA=Financial Regulation and Financial Stability Interactive term BALEDESP=Bank lending and deposit spread COMP=Competition NPL=Bank non-performing loans to gross loans (%)

5.4.3 Correlation Analysis

In a linear regression model, when two or more explanatory variables are related, it is very difficult to separate their individual impact on the dependent variable. This implies that, a variable can be linearly predicted from the others with a higher degree of precision. When the problem of multicollinearity is severe it increases the variance of the parameter estimates, thereby making the estimates very sensitive to little changes made in the model. The consequences are that the estimated coefficients are very unstable and tedious to interpret. Another consequence of severe multicollinearity is that, it saps the predictive power of the analysis and sometimes causes the coefficients to change signs and makes it more cumbersome to correctly specify the model. However, if the principal aim of the study is prediction, multicollinearity is not an issue if the pattern of the same multicollinearity persists during the forecasted period.

Due to the problem of multicollinearity among explanatory variables, a correlation matrix of the variables in both samples are presented in table 5.4. Based on the result, there is no problem of multicollinearity among the explanatory variables (bank variables) in both samples. According to the table, multicollinearity is only experienced among the dependent variables which pose no threat to the predictive power of the models.

Table 5.4: Correlation Matrix

	FINDEX	ATMSPHTA	BAPTA	BRPHTA	CBB	BFCB	DCBPTA	FINREG	FINSTA	REGSTA	BALEDESP	COMP	NPL
Sub-Sahara Africa Sample													
FINDEX	1.000000												
ATMSPHTA	0.916220	1.000000											
BAPTA	0.859600	0.649870	1.000000										
BRPHTA	0.839448	0.821296	0.520298	1.000000									
CBB	0.830610	0.817792	0.506576	0.998604	1.000000								
BFCB	0.870879	0.792858	0.706293	0.627641	0.613053	1.000000							
DCBPTA	0.854965	0.646935	0.998167	0.513989	0.503291	0.694836	1.000000						
FINREG	0.052350	0.016005	0.055343	-0.103303	-0.104487	0.269557	0.056520	1.000000					
FINSTA	0.273621	0.285141	0.111235	0.191459	0.188078	0.487448	0.106143	0.692776	1.000000				
REGSTA	0.208182	0.194444	0.111577	0.103328	0.106501	0.395650	0.114999	0.685234	0.784198	1.000000			
BALEDESP	-0.605593	-0.583248	-0.439353	-0.574777	-0.576190	-0.542963	-0.441854	-0.000902	-0.240505	-0.191619	1.000000		
COMP	0.004744	0.056074	-0.056499	0.213384	0.215798	-0.237283	-0.058466	-0.489265	-0.525374	-0.502786	0.142507	1.000000	
NPL	-0.394931	-0.350931	-0.361333	-0.339712	-0.336811	-0.301954	-0.361533	-0.185030	-0.288778	0.053910	0.169951	-0.192674	1.000000
Full (World) Sample													
FINDEX	1.000000												
ATMSPHTA	0.755803	1.000000											
BAPTA	0.872483	0.543173	1.000000										
BRPHTA	0.521933	0.302027	0.204656	1.000000									
CBB	0.551872	0.235379	0.268530	0.870896	1.000000								
BFCB	0.805731	0.619651	0.749240	0.099410	0.143669	1.000000							
DCBPTA	0.877534	0.574554	0.904160	0.193168	0.269024	0.748817	1.000000						
FINREG	0.013567	-0.062147	0.120290	-0.073406	-0.014707	-0.094909	0.137802	1.000000					
FINSTA	0.106696	0.030216	0.062419	0.010390	-0.003322	0.242559	0.095840	0.086285	1.000000				
REGSTA	0.043874	-0.043667	0.052690	-0.041557	-0.025864	0.121120	0.090621	0.486587	0.867892	1.000000			
BALEDESP	-0.072768	0.197550	-0.172963	0.217809	-0.039399	-0.181099	-0.244174	-0.071917	-0.127121	-0.138471	1.000000		
COMP	-0.049590	-0.100861	-0.039816	-0.114520	-0.097065	0.101039	-0.013960	0.016292	0.069859	0.069616	-0.213834	1.000000	
NPL	-0.338226	-0.328077	-0.262827	-0.161032	-0.115886	-0.333211	-0.265934	0.099455	-0.133349	0.055928	-0.054152	-0.116413	1.000000

Source: Authors estimate from research data

5.4.4 Regression Results

The regression results of financial inclusion index (FINDEX) and financial regulation (FINREG) of the Sub-Saharan African sample and those for the full sample are in Table 5.5 and table 5.6, respectively. There is a confirmation of a negative relationship between financial regulation (FINREG) and financial inclusion index (FINDEX) in Sub-Saharan Africa as shown in Table 5.5. Financial regulation measured by capital adequacy ratio significantly impacts the level of financial inclusion in sub-Saharan Africa. This suggests that tightening capital adequacy requirements could be detrimental to financial inclusion. This is to say that increases in financial regulation (capital adequacy) result in a decrease in financial inclusion. Our results concur with other empirical papers that found a negative relationship between financial regulation and financial inclusion (see Kodongo, 2018; Sarma & Pais, 2011; Aiyar, et al., 2014). Similarly, unlike Thakor (1996) who showed that capital regulations may increase credit rationing and lower aggregate lending, our results show that capital adequacy could be harmful to accessing financial services. However, Ugwuanyi (2015) appears to have contradicted this finding, showing that an increase in bank capital increases bank risk-taking appetite (potentially resulting in greater inclusion) in Nigeria.

We offer two explanations for this finding. First, high capital adequacy requirement may increase banks' opportunity cost of capital and reduce their return on equity. To decrease the effect of losses coming from the increase in the opportunity cost of capital on their owners' wealth, banks may increase lending rates, decrease interest on deposits, or increase service charges, such as ledger fees and loan initiation costs, all of which are a disincentive to bank usage and access to bank credit by the vulnerable and poor groups typically targeted by financial inclusion policies. Tight regulatory requirements do not

only reduce profitability but also tighten the processes involved when opening accounts at financial institutions and getting access to credit and financial services also becomes cumbersome particularly for small income earners. Secondly, financial regulations may hinder the achievement of financial inclusion goals by increasing costs of compliance, mounting regulatory barriers against new service providers and creating eligibility obstacles for new users (Bester et al., 2008; Isern & de Koker, 2009). To enhance and drive the maximum benefit of financial inclusion, Sub-Saharan African countries should employ other non-prudential regulatory measures such as supervision on the part of central banks and good corporate governance to ensure soundness, safety and stability of the financial system instead of focusing on capital adequacy requirements. However, the link between financial regulation and financial inclusion is not statistically significant in the full sample results in Table 5.6. The relationship between financial regulation and some of the individual variable measures of financial inclusion such as the number of ATMS and borrowers from commercial banks (BFCB) is statistically significant and negative as shown in model (2) and model (6) in Table 5.5. However, the only individual variable measures of financial inclusion that are not significantly affected by financial regulation include bank accounts (BAPTA) and the number of depositors with commercial banks (DCBPTA) as shown in model (3) and model (7) in Table 5.6.

This study also introduced financial stability (FINSTA) as a moderating variable to moderate the relationship between financial inclusion index (FINDEX) and financial regulation (FINREG). The paper interacted financial regulation (FINREG) and financial stability (FINSTA) to form a new variable (REGSTA). The purpose of the interactive term was to see whether financial stability could enhance and strengthen the relationship between financial inclusion (FINDEX) and financial regulation (FINREG). It is expected

that when financial institutions are stable, tight capital regulatory requirements will not affect their ability to provide financial services. The results indicate that the interactive term is statistically significant. This is evidenced by the positive coefficient of the interactive term of financial regulation and financial stability (REGSTA) in Table 5.5 in model (1).

Table 5.5: Sub-Saharan Africa Sample Results

	(1) FINDEX	(2) ATMS	(3) BAPTA	(4) BRPHTA	(5) CBB	(6) BFCB	(7) DCBPTA
FINREG	-0.060*** (-2.75)	-0.670** (-2.33)	-1.404 (-0.35)	-0.109 (-1.26)	-0.049 (-0.53)	-2.378** (-2.06)	-3.065 (-0.80)
REGSTA	0.003*** (4.23)	0.048*** (4.58)	0.122 (0.96)	0.014*** (3.47)	0.012*** (2.77)	0.268*** (5.88)	0.245 (1.43)
BALEDESP	-0.177*** (-4.63)	-2.618*** (-6.34)	-32.280*** (-3.52)	-0.748*** (-4.10)	-0.780*** (-3.85)	-8.778*** (-4.09)	-26.582*** (-2.59)
COMP	2.023*** (5.52)	18.091* (1.71)	-97.718 (-0.53)	14.226*** (4.71)	13.939*** (4.47)	9.756 (0.24)	-33.321 (-0.15)
NPL	-0.026*** (-2.75)	-0.370*** (-3.33)	-6.442*** (-2.69)	-0.092** (-2.06)	-0.079* (-1.69)	-1.614*** (-3.49)	-5.681* (-1.87)
_cons	2.622*** (6.25)	44.887*** (9.24)	609.317*** (7.17)	13.488*** (11.46)	12.911*** (10.57)	139.242** (4.07)	565.545*** (7.16)
Insig_e _cons	-0.496*** (-6.83)	2.465*** (36.65)	5.073*** (57.96)	1.298*** (15.27)	1.337*** (15.58)	3.905*** (32.59)	5.056*** (56.66)
N	52	107	73	114	113	74	74
Wald Test							
Chi2	17.18	167.72	22.76	85.28	70.84	85.43	83.78
Prob.	0.000	0.000	0.000	0.000	0.000	0.000	0.000

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Financial inclusion Variables: ATMSPTA=ATMs per 100,000 adults BAPTA=Bank accounts per 1,000 adults BFCB=Borrowers from commercial banks per 1,000 adults BRPHTA=Bank branches per 100,000 adults CBB=Commercial bank branches per 100,000 adults DCBPTA=Depositors with commercial banks per 1,000 adults **Bank Variables:** FINREG=Capital Adequacy Ratio (CAR) FINSTA=Bank Z-score REGSTA=Financial Regulation and Financial Stability Interactive term BALEDESP=Bank lending and deposit spread COMP=Competition NPL=Bank non-performing loans to gross loans (%)

This result goes to confirm the fact that, in the midst of tight capital adequacy regulatory requirement of banks, financial inclusion will not be compromised in an environment of

financial stability. This suggests that financial stability augments financial regulation to have a positive impact on financial inclusion.

This study controlled for other bank level variables which could influence banks' ability to provide financial services. These variables include bank lending-deposit spread, the level of competition measured by the Boone indicator and nonperforming loans as a percentage of gross loans. The bank lending-deposit spread (BALEDESP) is negative and significant, suggesting that widening spreads (e.g., declines in deposit rates relative to average bank lending rates) are likely to deter people from gaining access to financial services. It is evident that bank lending-deposit spread (BALEDESP) has a negative and significant impact on financial inclusion index (FINDEX) as shown in Table 5.5 in model (1) through to model (7). Most Sub-Saharan African countries are characterized by low deposit rates and high lending rates. This means that when the lending rate is high, it deters people from borrowing and if the deposit rate is too low it also deters people from depositing their surplus funds with financial institutions. Low deposit rate couple with high lending rate increases the spread. This explains the lower levels of financial inclusion in Sub-Saharan Africa where a lot of people do not access financial services.

Another important determinant of financial inclusion in Sub-Saharan Africa is the level of competition among financial institutions. We believe that keen competition among financial institutions improves efficiency and financial services delivery and eventually enhances financial inclusion. On the other hand, increased competition could reduce profits of financial institutions. As a result, they cannot expand, thereby reducing financial inclusion. The level of competition is measured by the Boone indicator which is

computed as profit's elasticity with respect to marginal costs. This study found that competition (COMP) positively relates to financial inclusion index (FINDEX) and it is statistically significant. This is evident through the positive coefficient of competition (COM) in model (1) of Table 5.5. This finding indicates that a very keen competition increases financial inclusion. This suggests that regulatory policies should be put in place by governments in Sub-Saharan Africa to encourage competition in the banking sector. This finding concurs with other studies that found a positive link between competition and financial inclusion (Mengistu & Saiz 2018). However, other studies found a negative relationship between financial inclusion and competition (Carbo et al., 2007; Sarma & Pais, 2011) and this concurs with the results in the full sample in Table 5.6 model (1).

Table 5.6: Full (world) Sample Results

	(1) FINDEX	(2) ATMS	(3) BAPTA	(4) BRPHTA	(5) CBB	(6) BFCB	(7) DCBPTA
FINREG	0.001 (0.18)	-1.718*** (-5.83)	1.112 (0.15)	-0.601*** (-5.39)	-0.351*** (-3.59)	-8.566*** (-3.30)	-1.188 (-0.16)
REGSTA	-0.000 (-0.43)	-0.004 (-0.54)	-0.544** (-2.14)	0.001 (0.33)	-0.003 (-1.07)	0.290*** (3.29)	-0.120 (-0.47)
BALEDESP	-0.012*** (-2.69)	-0.741 (-1.40)	-26.312*** (-5.84)	0.254 (1.57)	-0.481*** (-5.24)	-9.552*** (-5.09)	-25.713*** (-6.74)
COMP	-0.601*** (-3.77)	-5.048 (-0.77)	-254.907** (-2.13)	-17.136*** (-6.17)	-16.682*** (-6.34)	11.250 (0.27)	-220.630* (-1.74)
NPL	-0.020*** (-3.03)	-1.450*** (-5.58)	4.585 (0.53)	-0.341*** (-4.37)	-0.241*** (-3.18)	-9.461*** (-6.11)	7.903 (0.84)
_cons	0.218 (1.55)	89.752*** (15.70)	952.776*** (9.12)	28.305*** (19.02)	28.077*** (20.00)	436.432*** (9.82)	937.902*** (8.44)
Insig_e _cons	-0.122 (-0.41)	3.754*** (68.79)	6.468*** (111.52)	2.881*** (21.27)	2.820*** (18.94)	5.274*** (91.82)	6.455*** (107.78)
<i>N</i>	219	664	331	696	695	378	308
<i>Wald Test</i>							
Chi2	24.00	118.18	46.51	121.90	131.32	56.34	49.14
Prob.	0.000	0.000	0.000	0.000	0.000	0.000	0.000

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

We also found that banks' nonperforming loans (NPL) are also a significant driver of financial inclusion index. They have a negative impact on financial inclusion as shown in Table 5.5 model (1). This suggests that an increase in nonperforming loans decreases financial inclusion in sub-Saharan Africa and the study found a similar result when using the full sample. The explanation offered for this result is that an increase in nonperforming loans reduces financial institutions' profitability. Hence, they are unable to expand to provide financial services. This finding is in consonance with the idea that banks' nonperforming loans might impede financial inclusion, according to Sarma and Pais (2011) who, using data from 49 mostly developing countries, show that nonperforming assets as a percentage of total assets are negatively related to financial inclusion.

5.5 Conclusions and Policy Implications

Even though financial sector regulation has received considerable attention in recent times engineered by the 2007-2009 global financial crisis, the nexus between financial regulation and financial inclusions has not received much attention in the financial inclusion literature. This study sought to investigate this link using data from Sub-Saharan Africa. The empirical relations between financial inclusion and financial regulation was examined using a panel mixed effect regression approach. Financial inclusion and financial regulation play major roles in Sub-Saharan Africa and they have greater implications for financial and macroeconomic stability. The results show that financial regulation has a negative effect on financial inclusion in Sub-Sahara Africa, suggesting that tight financial regulation does not enhance financial inclusion.

By analysing the relationship between financial inclusion and the most prominent macro-prudential regulation (capital adequacy) – we find that tightening prudential regulations

could negatively impact access to finance and therefore conflict with the Sub-Saharan African financial inclusion goals. More specifically, the capital adequacy requirement significantly reduces banks' capacity to provide financial services which may result in credit rationing as observed by Thakor (1996). However, the negative impact of capital regulations on financial inclusion can be curbed with financial stability because financial stability augments financial regulation to have a positive effect on financial inclusion.

For Sub-Saharan Africa economies to drive the maximum benefit from financial inclusion, the regulatory requirement of financial institutions should be reduced in terms of their regulatory capital requirements. Financial stability was introduced in the study as a moderating variable between financial regulation and financial inclusion. The analysis shows that the interaction of financial stability and financial regulation has a positive effect on financial inclusion in sub-Saharan Africa. This suggests that financial stability negates the negative impact of financial regulation on financial inclusion in Sub-Saharan African economies. It implies that financial regulation has no impact on financial inclusion when a financial institution is financially stable. In this regard, policy and regulatory agents should focus on fostering financial stability as an instrument for increasing financial services usage as well as for better financial decision-making at the micro and macro levels. In terms of the effect of bank lending-deposit spread, the results indicate a negative relationship between bank lending-deposit spread and financial inclusion, suggesting that bank lending-deposit spread reduces financial inclusion in Sub-Saharan Africa and therefore discourages borrowers from borrowing and lenders to lend more.

The results of this study also suggest that financial inclusion is linked with the level of competition in the financial sector, meaning that increases in competition results in efficiency and quality service delivery, thereby enhancing financial inclusion. It is evident that nonperforming loans are a significant driver of financial inclusion, suggesting that increases in nonperforming loans drive down financial inclusion in Sub-Saharan Africa.

The findings of this study have a number of implications. Among the implications is the fact that Sub-Saharan African countries can increase and get the most out of financial inclusion by formulating policies that enhance financial stability and reduce regulatory capital of the financial sector. Such policies should be aimed at reducing the capital regulatory requirement of financial institutions and other constraints that limit the operations and efficiency of financial institutions. Another policy implication is that, Sub-Saharan African countries can leverage on financial regulation to foster financial inclusion but only if a framework is put in place to ensure financial stability. This study extends the literature on financial inclusion–financial regulation nexus by using a panel multivariate mixed effect model approach to establish their relationship. The contribution of this study to theory development is in the establishment of the link between financial inclusion and financial regulation.

CHAPTER SIX

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

This chapter presents the key findings of the thesis as well as the associated conclusions and policy recommendations. Section 6.1 gives a summary of the main findings, Section 6.2 presents the conclusions derived from the findings while Section 6.3 explains the contribution of the thesis to empirics, methodology, theory, and practice (policy recommendations). Section 6.4 provides future direction of research.

6.2 Summary of Findings

The thesis explores the relationships that exist among financial inclusion, monetary policy, financial sector development and financial regulation in Sub-Saharan African economies. It contains three empirical chapters. Chapter one is used to introduce the thesis. Chapter two presents the stylized facts of the thesis.

Chapter three investigates the dynamic and causal link between monetary policy and financial inclusion. The questions the study explores are: (1) Does financial inclusion affect monetary policy in Sub-Saharan Africa? (2) Does monetary policy also affect financial inclusion in Sub-Saharan Africa?

The study employed PVAR models for the estimation. The use of the PVAR completely eliminates endogeneity and reverse causality, whose problems often plague most econometric models. PVAR also allows for the test of bidirectional causality as well as allow for the generation of impulse response functions for the analysis of shock transmission.

Results from the PVAR model reveal that increases in monetary policy rate reduce financial inclusion in Sub-Saharan African countries by increasing fluctuations in interest rates. Again, financial inclusion induces a rise in the monetary policy rate. It is further established that, macroeconomic variables such as GDP growth rate and inflation rate are not significant drivers of monetary policy and but they are drivers of financial inclusion in Sub-Saharan African economies. However, the real effective exchange rate is a driver of both monetary policy and financial inclusion. These results remain robust to alternative modelling of monetary policy and financial inclusion.

The study is different from the existing literature in the sense that it is the first to examine a bi-directional link between monetary policy and financial inclusion in Sub-Saharan Africa. This means that, the study looks at the effect of monetary policy rate on financial inclusion and the effect of financial inclusion on monetary policy rate in Sub-Saharan Africa. Secondly, it also extends the current literature by investigating the role of macroeconomic variables in enhancing the ability of financial inclusion to affect monetary policy and vice versa. Another contribution of the study is that, it will form the basis for the development of theory on the relationship between monetary policy and financial inclusion reverse causality. Discovering the theoretical underpinnings of this reverse causality will enable Sub-Saharan African countries' policy makers to formulate policies that will enable them get the optimum results from monetary policy and financial inclusion.

Chapter four looks at causal relationships among financial inclusion, financial sector development and economic growth. The research questions the study explores are: (1) is

there a theoretical basis supporting the existence of a tripartite relationship amongst financial inclusion, financial sector development and economic growth? (2) do financial inclusion, financial sector development and economic growth Granger-cause each other? The panel principal components analysis was used to construct a composite index for financial inclusion. This index uniquely embraces the two dimensions of financial inclusion: demand side factors and supply side factors. In doing so, the study overcomes the use of inappropriate proxies to measure financial inclusion.

Further, panel VAR approach is used as the estimation strategy to effectively deal with the potential endogeneity of financial inclusion, financial sector development and economic growth. Impulse response functions from panel vector autoregression are used to examine how financial inclusion, financial sector development and economic growth respond to their own shocks and shocks from other system variables.

A positive and mutually beneficial relationship is established between financial inclusion and financial sector development. The findings further reveal that economic growth does not stimulate financial inclusion in Sub-Saharan African countries. A positive reverse causality exists between financial inclusion and financial sector development when the full (world) sample is used.

The study sets itself apart from the prevailing literature by considering financial inclusion, financial sector development and economic growth simultaneously in the same model. This enables a wider view of the relationships and avoids the problem of omitted variable bias. Another distinguishing feature of the paper is that, it captures potential non-linearities in the relations amongst, financial inclusion, financial sector

development and economic growth that might arise from differences in the level of financial sector development and the degree of financial inclusion across countries. Unlike previous studies, the measures of financial inclusion used in the study largely overcome the use of weak proxies in measuring financial inclusion.

Chapter five examined the effect of financial regulation on financial inclusion, the mediating role of financial stability in Sub-Saharan Africa. The paper seeks to address the following research questions. (1) Does financial regulation affect financial inclusion in Sub-Saharan Africa? (2) Does financial stability enhance the relations between financial regulation and financial inclusion in Sub-Saharan Africa?

Within the empirical literature, this study is the first to investigate how financial regulation affects financial inclusion and whether financial stability could enhance the relationship between financial inclusion and financial regulation. The intuition is that; it is expected of financial regulation to have a positive effect on financial inclusion when financial systems are stable.

The study employs linear mixed effect models' method to examine the causal link between financial regulation and financial inclusion. Linear mixed models also known as multilevel models or hierarchical models are a type of regression model which considers both variations explained by the independent variables (fixed effects) and variations not explained by the independent variables (random effects). The advantages of the mixed-effects regression models over fixed and random effects models are that, they are more flexible in terms of repeated measures and they explicitly model individual change across time. This implies that, the same number of observations per subject is no longer

required and time can be continuous rather than fixed. They have flexible specification of the covariance structure among repeated measures and procedures for testing specific determinants of this structure than the use of fixed and random effect models.

This study departs from the extant literature on financial inclusion and financial regulation by employing mixed effects models to explore the relationship between financial regulation and financial inclusion. The study also analyses the interactive effect of financial regulation and financial stability on financial inclusion.

The findings indicate that there is a negative link between financial regulation and financial inclusion in Sub-Saharan Africa. This implies that increases in financial regulation (capital adequacy ratio) results in a decrease in financial inclusion. The explanation the researcher offers for this finding is that, when financial institutions are highly regulated it reduces their level of profitability and hence, they cannot expand leading to many people been financially excluded. Tight regulatory requirement does not only reduce profitability but also it tightens the processes involved when opening accounts at financial institutions. Also getting access to credit and financial services also becomes cumbersome particularly for small income earners. The result also shows that when financial stability is interacted with financial regulation, it has a positive impact on financial inclusion. This implies that in the presence of a stable financial system, financial regulation impacts positively on financial inclusion.

6.3 Conclusions

The thesis consists of three empirical papers that border on the relationships among monetary policy, financial inclusion, financial sector development and financial

regulation. This multidirectional analysis of the relationships among the four variables is rare in the extant literature. The thesis brings out very interesting conclusions. Our study found that, there is reverse causality between monetary policy and financial inclusion in Sub-Saharan Africa. This suggests that, monetary policy should not only be pursued as a policy objective but it can also be an outcome of financial inclusion and vice versa. It can be gleaned from the thesis that financial inclusion can be used to stimulate monetary policy effectiveness and for that matter guarantee macroeconomic stability. A well-functioning financial system effectively enhances financial inclusion and serves as an efficient transmission mechanism for monetary policy. What is also clear from the study is that, monetary policy can also be tweaked to stimulate financial inclusion.

The thesis also found that, there is a reverse causality between financial inclusion and financial sector development in Sub-Saharan Africa. This suggests that, financial inclusion and financial sector development play a complementary role. This finding suggests that, a well-developed financial sector can enhance financial inclusion in sub-Saharan Africa and vice versa. Financial inclusion and financial sector development are complements. This means that, in Sub-Saharan African countries, financial inclusion and the financial sector can be developed simultaneously without serious trade-offs.

It is also worthy of note from the thesis that, tightening prudential regulations (capital adequacy) could negatively impact access to finance, thereby conflicting with Sub-Saharan African economies' financial inclusion goals. More specifically, the capital adequacy requirement tremendously reduces banks' capacity to provide financial services and this could lead to credit rationing thereby reducing financial inclusion. This also suggests that, financial regulation could be a tool for enhancing financial inclusion.

This means that, in Sub-Saharan African countries, less regulatory restrictions in terms of reducing banks regulatory capital requirements will lead to bank efficiency and hence financial inclusion will be enhanced. The results also indicate that, the interaction of financial regulation with financial stability positively impacts financial inclusion. Thus, financial stability augments financial regulation to have an affirmative impact on financial inclusion. It is suggesting that, the relationship between financial regulation and financial inclusion could be strengthened by financial stability. This implies that, if financial markets in Sub-Saharan Africa are financially stable, increases in the capital adequacy ratio will not affect their performance and their ability to enhance financial inclusion.

6.4 Contributions to Knowledge

This study makes a number of empirical, theoretical and methodological contributions to the disciplines of Economics and Finance. These contributions are discussed below.

6.4.1 Contribution to Empirics

In terms of empirical contributions, first, this thesis presents the first set of evidence on the reverse causality between monetary policy and financial inclusion in Sub-Saharan Africa. Second, the study sets itself apart from the prevailing literature by considering financial inclusion, financial sector development and economic growth simultaneously in the same modelling framework. This suggest that, it provides the first evidence on the tripartite relationship amongst financial inclusion, financial sector development and economic growth. This implies that the thesis constitutes the first step at examining a tripartite relationship among financial inclusion, financial sector development and economic growth in a single study.

Third, the thesis provides insights on how financial stability enhances the function of financial institutions in fostering financial inclusion. It sheds light on how financial regulation affects financial inclusion. It also clarifies the role of financial stability in the financial inclusion–financial regulation nexus. This means that the thesis identifies financial stability as a moderating variable in strengthening the relations between financial regulation and financial inclusion. The thesis adds to the financial inclusion literature by presenting detailed evidence on the relations between financial regulation and financial inclusion using a large sample of countries in Sub-Saharan Africa covering 48 countries for a period of two decades. The thesis broadens the knowledge frontiers in Finance and Economics literature by providing new evidence indicating that financial regulation affects financial inclusion in Sub-Saharan Africa. Also, the research on financial inclusion and financial regulation is of critical importance because it will help researchers to better identify the financial regulation and supervisory standards that enhances financial systems to function well and financial inclusion. With this knowledge, researchers would be in a good position to provide better policy guidelines to policymakers on the correct financial sector regulatory framework and reforms.

6.4.2 Contribution to Methodology

From the methodological perspective, it addresses issues of endogeneity and reverse causality using Panel VAR which altogether have been the bane of a chunk of the existing literature. First, the use of Panel VAR helps us to analyze the dynamic link among the variables in addition to country-specific fixed effects simultaneously. The use of panel VAR procedure provides a framework that permits all the variables unobserved individual heterogeneity by considering fixed effects which promotes the estimation consistency. The use of panel VAR is also necessitated by the fact that, Panel VARs allows the flexibility of inclusion of weakly and truly exogenous variables. The use of

panel VARs addressed the problem of endogeneity, which is one of the most serious econometric modeling problems in panel data analysis. Secondly, the use of Panel VAR also enables us to generate orthogonalized impulse responses and forecast-error variance decomposition analysis. Orthogonalized impulse responses enable us to specifically separate the effects of each of the variables shocks in the system on the other variables, one at a time. Variance decompositions measures the contributions of each source of shock to the variance of each endogenous variable at a given forecast period.

Thirdly, the study takes a multidimensional approach to the measurement of financial inclusion by employing principal component analysis (PCA) to construct a financial inclusion index which is more of a comprehensive measure of financial inclusion.

Fourth, the study also employed multivariate mixed effect model approach which combines both fixed effects and random effects unlike the use of the traditional approach of fixed and random effects used by other researchers. The use of mixed-effects regression models over fixed and random effect models are that they explicitly model individual change across time. Mixed-effect models are more flexible in terms of repeated measures, that is the number of observations per subject need not to be equal and time can be continuous rather than a fixed set of points. Also mixed-effects models have flexible specification of the covariance structure among repeated measures and methods for testing specific determinants of this structure than the use of fixed and random effect models.

6.4.3 Contribution to Theory

From the theoretical point of view, this thesis provides the grounds for the development of theory on the reverse causality between monetary policy and financial inclusion.

Discovering the theoretical underpinnings of this relationship will enable policy makers in Sub-Saharan African countries to pursue policies that will help them derive the maximum benefit from monetary policy and financial inclusion. The thesis also will form the basis for theory development on the tripartite relations amongst financial inclusion, financial sector development and economic growth. Discovering the theoretical implications of this relationship will enable policymakers in Sub-Saharan African countries to formulate policies that will help them get the maximum benefit from financial inclusion, financial development and economic growth for socio-economic advancement.

Lastly, from theory point of view, this thesis will also provide the foundation for theory development on the nexus of financial regulation-financial inclusion. Discovering the theoretical underpinnings of this relationship will help Sub-Saharan African countries policymakers to begin to pursue policies that will enable them get the optimal gains from financial regulation and financial inclusion.

6.4.4 Contribution to Practice and Policy Recommendations

The thesis gives rise to a number of policy recommendations. These recommendations are espoused in this subsection. Sub-Saharan African (SSA) countries can leverage on the positive effect of financial inclusion on monetary policy rate by implementing financial inclusion inducing policies such as; reduction in the cost of borrowing, increase in the number of commercial bank branches of state own banks, creating an environment conducive for financial stability and increase access to financial services. They can also reduce the monetary policy rate while maintaining macroeconomic stability. The ability of monetary policy reduction to enhance financial inclusion in Sub-Saharan Africa countries has been firmly established.

SSA countries can leverage on the positive effect of financial sector development on financial inclusion by implementing financial sector development inducing policies such as; upgrading capital markets, securing trade competitiveness and establishing a banking sector-friendly domestic investment framework. For financial markets to effectively induce financial inclusion and economic growth, financial sector reforms which enable the strengthening of financial infrastructure and the deepening of the financial system must be implemented by governments of Sub-Sahara African countries. A key lesson from the thesis is that, development of the financial sector is not enough to promote financial inclusion but economic growth is also important. Financial inclusion, on the other hand, can be used to promote financial sector development by enhancing financial stability through households' deposit and lending activities.

Another policy recommendation from the thesis is that, since financial regulation has a negative effect on financial inclusion in sub-Saharan Africa, it suggests that tight financial regulation does not enhance financial inclusion. SSA countries can promote financial inclusion by reducing capital adequacy requirements of financial institutions and other constraints that limit the operations and efficiency of financial institutions. Such policies should also aim at creating an enabling environment that promote financial stability. For sub-Saharan African economies to drive the maximum benefit from financial inclusion, they should not over burden financial institutions with large regulatory capital requirements since increases in regulatory capital reduces financial inclusion. A rise in the capital requirement reduces financial institutions ability to expand and provide financial services to the marginalized. The thesis also shows that, the interaction of financial stability and financial regulation has a positive effect on financial inclusion in Sub-Saharan Africa. This suggests that, financial stability negates the

negative effect of financial regulation on financial inclusion in Sub-Saharan Africa economies. This indicates that governments in Sub-Saharan African economies should enact policies aim at advancing financial stability in the financial sector to enhance financial inclusion.

6.5 Directions for Future Research

Notwithstanding the immense contributions made by the study, some issues remain for exploration by future research. Since financial inclusion and monetary policy play a key role in Sub-Saharan African countries, it will be interesting to examine whether institutional quality play a role in the monetary policy-financial inclusion nexus.

Other studies can investigate the financial inclusion-financial sector development-economic growth tripartite relationship by developing an index for financial sector development which this thesis did not do. This implies future works are encouraged to develop more comprehensive measures of financial development and use them to re-examine the controversial link amongst, financial inclusion, financial sector development and economic growth.

Future studies should probe possible variations in the moderating influence of financial stability in the relations between financial inclusion and financial regulation in advanced and developing economies using the comprehensive measures of financial regulation employed in the third empirical chapter. Lastly, each of the three empirical papers can be re-examined by comparing samples involving developing countries and developed countries. Results from such studies will certainly enhance the understanding of the monetary policy-financial inclusion-financial sector development-financial regulation link.

REFERENCES

- Abor, J. Y., Amidu, M., & Issahaku, H. (2018). Mobile telephony, financial inclusion and inclusive growth. *Journal of African Business*, 19(3), 430-453.
- Abrigo, M., & Love 1. (2015). "Estimation of panel vector autoregression in Stata: a package of programs", <http://paneldataconference2015.ceu.hu/Program Michael-A brigo.pdf>.
- Abu-Bader, S., & Abu-Qarn, A. S. (2008). Financial development and economic growth: The Egyptian experience. *Journal of Policy Modeling*, 30(5), 887-898.
- Adjasi, C.K.D., & Biekpe, N.B. (2006). Stock market development and economic growth: the case of selected African countries. *African Development Bank*, 18(1), 144-161.
- Agoraki, M.E.K., Delis, M.D. & Pasiouras, F., (2011). 'Regulations, competition and bank risk-taking in transition countries', *Journal of Financial Stability*, vol. 7, pp. 38–48.
- Aiyar, S., Calomiris, C. W. & Wieladek, T. (2014). Identifying channels of credit substitution when bank capital requirements are varied. *Economic Policy*, 29(77), 45-77.
- Allen, F. E., Carletti, R., Cull, J., Qian, L.S, & Valenzuela, P. (2014). *The African Financial Development and Financial Inclusion Gaps*. World Bank Policy Working Paper No. 7019. Washington, DC.
- Allen, F., Carletti, E., Cull, R., Qian, J. Q., Senbet, L., & Valenzuela, P. (2014). The African financial development and financial inclusion gaps. *Journal of African economies*, 23(5), 614-642.
- Allen, F., Demirguc-Kunt, A., Klapper, L., & Pería, M. S. M. (2016). The foundations of financial inclusion: Understanding ownership and use of formal accounts. *Journal of Financial Intermediation*
- Allen, F., Otchere, I., & Senbet, L. W. (2011). *African Financial Systems: Review of Development Finance*, 1 (2), 79-113. Retrieved from <http://dx.doi.org/10.1016/j.rdf.2011.03.003>
- Alper, A. (2017). *Financial Regulatory Issues for Financial Inclusion*
- Amidu, M. (2014). What Influences Banks' Lending in Sub-Saharan Africa? *Journal of Emerging Market Finance*, 13(1), 1-42.
- Anand, R & Prasad, E.S., (2012). "Core vs headline inflation targeting in models with incomplete markets," manuscript.
- Anand, R. & Prasad, E.S. (2012): Core vs headline inflation targeting in models with incomplete markets., A manuscript.

- Andrews, D. W., & Lu, B. (2001). Consistent model and moment selection procedures for GMM estimation with application to dynamic panel data models. *Journal of Econometrics*, 101(1), 123-164.
- Andrianaivo, M., & Yartey, C.A. *Understanding the Growth of African Financial Markets, August 2009*. IMF Working Paper.
- Ardic, O. P., Hermann, M., & Mylenko, N. (2011). "Access to Financial Services and the Financial Inclusion Agenda around the World: a Cross-Country Analysis with a New Data Set". *World Bank Policy Research, Working Paper*
- ASEA Year Book, (2009). African Securities Exchanges Association
- Ashcraft, A., & Campello, M. (2007). Firm balance sheets and monetary policy transmission. *Journal of Monetary Economics* 54, 1515–1528.
- Aysun, U., & Hepp, R. (2011). "Securitization and the balance sheet channel of monetary transmission". *Journal of Banking & Finance*, vol. 35 (8), 2111–2122.
- Balfoussia, H., Brissimis, S. N. & Delis, M. D. (2011). The theoretical framework of monetary policy revisited. Working Paper No. 138, Bank of Greece, Greece.
- Barth, J. R., Caprio, G. & Levine, R. (2008). *Rethinking bank regulation: Till angels govern*. Cambridge University Press.
- Batuo, M., Mlambo, K., & Asongu, S. (2018). Linkages between financial development, financial instability, financial liberalisation and economic growth in Africa. *Research in International Business and Finance*, 45, 168-179.
- Beck, T., Degryse, H., & Kneer, C. (2014). Is more finance better? Disentangling intermediation and size effects of financial systems. *Journal of Financial Stability*, 10, 50-6
- Beck, T., Demirguc-Kunt, A. & Martinez Peria, M. S. (2008). "Banking Services for Everyone? Barriers to Bank Access and Use around the World." *World Bank Economic Review* 22 (3): 397–430.
- Beck, T., Demirgüç-Kunt, A., & Levine, R. (2006). Bank concentration, competition, and crises: First results. *Journal of Banking & Finance*, 30(5), 1581-1603.
- Berger, A. N. & Humphrey, D. B. (1997). Efficiency of financial institutions: International survey and directions for future research. *European journal of operational research*, 98(2), 175-212.
- Berger, A.N. (2007). International comparisons of banking efficiency. *Financial Markets, Institutions & Instruments*, 16(3), 119-144.
- Bernanke, B. & Gertler, M. (1995). "Inside the Black Box: The Credit Channel of Monetary Policy Transmission," *Journal of Economic Perspectives*, Vol. 9, No. 4, pp. 27-48.

- Bester, H., Chamberlain, D., De Koker, L., Hougaard, C., Short, R., Smith, A. & Walker, R. (2008). *Implementing FATF standards in developing countries and financial inclusion: Findings and guidelines* (Doctoral dissertation, FIRST Initiative (World Bank)).
- Bester, H., Chamberlain, D., De Koker, L., Hougaard, C., Short, R., Smith, A. & Walker, R. (2008). *Implementing FATF standards in developing countries and financial inclusion: Findings and guidelines* (Doctoral dissertation, FIRST Initiative (World Bank)).
- Bhanot, D., Bapat, V. & Bera, S. (2012). Studying financial inclusion in north-east India. *International Journal of Bank Marketing*, 30(4) pp. 465-484.
- Bilbiie, F.O (2008) Limited asset markets participation, monetary policy and (Inverted) aggregate demand logic *Journal of Economic Theory* 140(1), 162–196.
- Brune, L., Giné, X., Goldberg, J., & Yang, D. (2011). *Commitments to save: A field experiment in rural Malawi*. The World Bank.
- Burgess, R. & Pande, R., (2005). Do Rural Banks Matter? Evidence from the Indian Social Banking Experiment. *American Economic Review*, 95(3): pp. 780–795.
- Burgess, R. & Pande, R., (2005). Do Rural Banks Matter? Evidence from the Indian Social Banking Experiment. *American Economic Review*. 95(3): pp. 780–795.
- Burkett, I. & Drew, B. (2008). Financial Inclusion, market failures and new markets: Possibilities for Community Development: Brisbane: Foresters Community Finance
- Carbo, S., Gardener, E. P. & Molyneux, P. (2007). Financial exclusion in Europe. *Public Money and Management*, 27(1), 21-27.
- Cecchetti, S. G., Domanski, D. & Peter, G. V. (2011). New regulation and the new world of global banking. *National Institute Economic Review*, 216(1), R29-R40.
- Chakrabarty, K. C. (2012). Financial inclusion – issues in measurement and analysis. Keynote address at the Bank for International Settlements-Central Bank of Malaysia Workshop on ‘Financial Inclusion Indicators’, 5th November, 2012, Kuala Lumpur.
- Chakraborty, I. (2010). Financial development and economic growth in India: An analysis of the post-reform period. *South Asia Economic Journal*, 11(2), pp. 287-308.
- Chavan, P. & Birajdar, B. (2009). Micro finance and financial inclusion of women: An evaluation. *Reserve Bank of India Occasional Papers*, 30(2), pp. 109-129.
- Chibba, M. (2009). Financial Inclusion, Poverty Reduction and the Millennium Development Goals. *European Journal of Development Research*, 21(2), 213-230.
- Chibba, M. (2009). Financial inclusion, poverty reduction and the millennium development goal. *The European Journal of Development Research*, 21(2), 213-230.

- Čihák, M., Demirgüç-Kunt, A., Feyen, E. & Levine, R., (2012) Benchmarking Financial Systems Around the World (August 1, 2012). World Bank Policy Research Working Paper No. 6175. Available at SSRN: <https://ssrn.com/abstract=2152254>
- Colciago, A. (2011). “Rule-of-thumb consumers meet sticky wages,” *Journal of Money, Credit and Banking* 43(2-3), 325–353.
- Collard, S. (2007). Toward financial inclusion in the UK: Progress and challenges. *Public Money and Management*, 271, pp. 13-20.
- Creane S., Goyal, A., Mushfiq M. and Sab, R. (2003). *Financial development and growth in the Middle East and North Africa*. IMF Working Paper, Washington, DC.
- Dabla-Norris E., Townsend Y.J.I. & Unsal D.F. (2015). *Identifying constraints to financial inclusion and their impact on and inequality: a structural framework for policy*. IMF working paper
- Dabla-Norris, E., Ji, Y., Townsend, R. M. & Unsal, D. F. (2015). *Distinguishing constraints on financial inclusion and their impact on GDP, TFP, and inequality* (No. w20821). National Bureau of Economic Research.
- de Bondt, G. J. (1999). Financial structure and monetary transmission in Europe: A cross-country study. Unpublished PhD Thesis, University of Amsterdam, Netherlands.
- de Koker, L., & Jentzsch, N. (2013). Financial inclusion and financial integrity: Aligned incentives? *World development*, 44, 267-280.
- Deaton, A. (2008). Income, health, and well-being around the world: Evidence from the Gallup World Poll. *Journal of Economic perspectives*, 22(2), 53-72.
- Demirguc-Kunt, A. & Klapper, L. (2012). *Measuring financial inclusion: The Global Findex database*. Policy Research Working Paper No. 6025, World Bank.
- Demirguc-Kunt, A., Laeven, L. & Levine, R. (2004), “Regulations, Market Structure, Institutions, and the Cost of Financial Intermediation”, *Journal of Money, Credit and Banking*, 36, pp. 593-622.
- di Bartolomeo, G & Rossi, L. (2007). Effectiveness of monetary policy and limited asset market participation: Neoclassical versus Keynesian effects. *International Journal of Economic Theory* 3(3), 213–218
- Diniz, E., Birochi, R. & Pozzebon, M. (2012). Triggers and barriers to financial inclusion: The use of ICT-based branchless banking in an Amazon county. *Electronic Commerce Research and Applications*, 11(5), 484-494.
- Dittus, P. & Klein, M. (2011). On harnessing the potential of financial inclusion. *Bank of International Settlements*.
- Dixit, R. & Ghosh, M. (2013). Financial inclusion for inclusive growth of India—a study of Indian states. *International Journal of Business Management & Research*, 3(1), 147-156.

- Donald A., & Biao L., (2001). Consistent model and moment selection procedures for GMM estimation with application to dynamic panel data models, *Journal of Econometrics*, 101, (1), 123-164
- Evans, O. (2016). The effectiveness of monetary policy in Africa: modeling the impact of financial inclusion. *Iranian Economic Review*, 20(3), 327-337.
- Flamini, V., McDonald, C., & Schumacher, L. (2009). The determinants of commercial bank profitability in Sub-Saharan Africa. *IMF Working Paper*, WP/09/15.
- Galí, J., López-Salido, J.D., & Vallés, J., (2004). “Rule-of-thumb consumers and the design of interest rate rules,” *Journal of Money, Credit and Banking* 36(4), 739–763.
- Gallup World Poll, (2012). Gallup World Poll. Gallup, Washington, DC.
- Getnet, A. (2014). *Financial inclusion, regulation and inclusive growth in Ethiopia* (Vol. 408). Working paper.
- Giné, X. & Townsend, R. (2004). “Evaluation of Financial Liberalization: A General Equilibrium Model with Constrained Occupation Choice.” *Journal of Development Economics* 74, no. 2: 269–307.
- Govind, H., & Marcus M., (2012). *The Growth Potential from Financial Inclusion*. Atlanta Fed/GSU International Development Economics Workshop
- Gulde, A. M., Pattillo, C. A., Christensen, J., Carey, K. J. & Wagh, S. (2006), *Sub-Saharan Africa: Financial Sector Challenges* (Washington: International Monetary Fund).
- Gupte, R., Venkataramani, B. & Gupta, D. (2012). Computation of financial inclusion index for India. *Procedia-Social and Behavioural Sciences*, 37, 133-149.
- Hannig, A. & Jansen, S. (2010). *Financial inclusion and financial stability: current policy issues*. ADBI Working Paper No. 259, Asian Development Bank Institute, Tokyo. Retrieved from <http://www.adbi.org/working-paper/2010/12/21/4272.financial.inclusion.stability.policy.issues/>
- Hariharan, G., & Marktanner, M. (2012). The growth potential from financial inclusion. *ICA Institute and Kennesaw State University*, Kennesaw, Georgia
- Hasnol, A. M., Alwee, P. & Salleh, M. (2013). Integrating financial inclusion and saving motives into institutional zakat practices: a case study on Brunei. *International Journal of Islamic and Middle Eastern Finance and Management*, 8(2), pp. 150-170.
- Hlouskova J., & Wagner, M. (2006). The performance of panel unit root and stationarity tests: Results from a large-scale simulation study, *Econometrics Reviews*, 25, 85-116.

- Holtz-Eakin, D., Newey, W., & Rosen, H., (1988). Estimating vector autoregressions with panel data. *Econometrica* 56:6, 1371-1395.
- Honohan, P. (2006). *Household financial assets in the process of development*. The World Bank.
- Honohan, P. (2008). Cross-Country Variation in Household Access to Financial Services. *Journal of Banking and Finance* 32 2493–2500.
- Honohan, P., & Beck, T. (2007). Making finance work for Africa. World Bank Publications.
- IFC. (2012). “IFC Advisory Services Access to Finance Annual Review 2011.” Washington DC: International Finance Corporation World Bank Group
- Im, K. S., Pesaran, M. H., & Shin, Y. (2003). Testing for unit roots in heterogeneous panels. *Journal of econometrics*, 115(1), 53-74.
- Isern, J. D. & de Koker, L. (2009). AML/CFT: Strengthening financial inclusion and integrity. Focus Note 56, CGAP, Washington, DC,
- Issahaku, H., Harvey, S. K., & Abor, J. Y. (2016). Does development finance pose an additional risk to monetary policy? *Review of Development Finance*, 6(1), 91-104.
- Johal, S. (2016). *Tackling Poverty and Inequality through Financial Inclusion: A Case Study of India*. In Third ISA Forum of Sociology, Vienna, Australia.
- Jones, P.A. (2008). From tackling poverty to achieving financial inclusion. The changing role of British credit unions in low income communities. *The Journal of Socio-Economics*, 37(6), 2141-2154.
- Kanitha, T., (2015) *Financial Inclusion, Financial Regulation, and Financial Education in Thailand*. ADBI Working Paper Series
- Kapoor, S. (2009). What should the banking system look like? Online Article Retrieved from [www.re-define.org>sites>default>files](http://www.re-define.org/sites/default/files)
- Kaufman, G. G. (1992). Capital in banking: past, present and future. *Journal of financial services research*, 5(4), 385-402.
- Keeley, M. C. & Furlong, F. T. (1990). A re-examination of mean-variance analysis of bank capital regulation. *Journal of Banking & Finance*, 14(1), 69-84.
- Kempson, E., Atkinson, A. & Pilley, O. (2004). Policy level response to financial exclusion in developed economies: lessons for developing countries. *Report of Personal Finance Research Centre, University of Bristol*.
- Khan H. R. (2011). Financial inclusion and financial stability: are they two sides of the same coin? Address by Shri H R Khan, Deputy Governor of the Reserve Bank of India, at BANCON 2011, organized by the Indian Bankers Association and Indian Overseas Bank, Chennai, 4 November 2011. Retrieved from [http://www.bis.org/ review/r111229f.pdf](http://www.bis.org/review/r111229f.pdf).

- Khan, H. H., Binti, R. & Gee, C. S. (2016). Bank competition and monetary policy transmission through the bank lending channel: Evidence from ASEAN. *International Review of Economics and Finance*, Vol. 44, 19-39.
- Kim, D. W., Yu, J. S., & Hassan, M. K. (2018). Financial inclusion and economic growth in OIC countries. *Research in International Business and Finance*, 43, 1-14.
- Kodongo, O. (2018). Financial Regulations, Financial Literacy, and Financial Inclusion: Insights from Kenya. *Emerging Markets Finance and Trade*, 54(12), 2851-2873.
- Kpodar, K., & Andrianaivo, M. (2011). *ICT, financial inclusion, and growth evidence from African countries* (No. 11-73). International Monetary Fund.
- Laeven, L., & Levine, R. (2009). Bank governance, regulation and risk taking. *Journal of financial economics*, 93(2), 259-275.
- Lapukeni, A. F. (2015). The impact of financial inclusion on monetary policy effectiveness: the case of Malawi. *International Journal of Monetary Economics and Finance*, 8(4), 360-384.
- Lenka, S. K., & Bairwa, A. K. (2016). Does Financial Inclusion Affect Monetary Policy in SAARC Countries? *Cogent Economics & Finance*, 4(1), Retrieved from <http://dx.doi.org/10.1080/23322039.2015.1127011>.
- Levin, A., Lin, C. F., & Chu, C. S. J. (2002). Unit root tests in panel data: asymptotic and finite-sample properties. *Journal of econometrics*, 108(1), 1-24.
- Levine, R. (1997). Financial development and economic growth: Views and agenda, *Journal of Economic Literature*, 35, 688-726.
- Levine, R. (2002). Bank-based or market-based financial systems: Which is better? *Journal of Financial Intermediation*, vol. 11, pp. 398-428.
- Lewis, S. & Lindley, D. (2015). Financial inclusion, financial education, and financial regulation in the United Kingdom, ADBI Working Paper Series, No. 544, Asian Development Bank Institute (ADBI), Tokyo
- Loutskina, E., & Strahan, P. (2009). Securitization and the declining impact of bank finance on loan supply: evidence from mortgage originations. *Journal of Finance* Vol. 64, 861–889.
- Love, I. & Ziccino, L. (2006). Financial development and dynamic investment behaviour: evidence from panel VAR. *Quarterly Review of Economics and Finance*, 46: 190-210.
- Love, I., & Ariss, R.T., (2014). Macro-financial linkages in Egypt: A panel analysis of economic shocks and loan portfolio quality. *Journal of International Financial Markets, Institutions and Money* 28: 158-181.
- Ma, Y. & Lin, X. (2016). Financial development and the effectiveness of monetary policy, *Journal of Banking and Finance*, Vol. 68, pp. 1-11.

- Mahendra, S. D. (2006). Financial Inclusion: Issues and Challenges. *Econ. Political Weekly* 41(41):4310-4313.
- Manji, A. (2010). Eliminating poverty? 'Financial inclusion', access to land, and gender equality in international development. *The Modern Law Review*, 73(6), 985-1004.
- Marshall, J. N. (2004). Financial Institutions in Disadvantaged Areas: a Comparative Analysis of Policies Encouraging Financial Inclusion in Britain and the United States. *Environment and Planning A*, 36(2), 241-261.
- Marshall, J. N. (2004). Financial Institutions in Disadvantaged Areas: A Comparative Analysis of Policies Encouraging Financial Inclusion in Britain and the United States. *Environment and Planning A*, 36(2), 241-261.
- Mbutor, M. O., & Uba, I. A. (2013). The Impact of Financial Inclusion on Monetary Policy in Nigeria. *Journal of Economics and International Finance*, 5(8), 318-326.
- Mehrotra, A., & Nadhanael, G. V. (2016). Financial Inclusion and Monetary Policy in Emerging Asia. In *Financial Inclusion in Asia* (pp. 93-127). Palgrave Macmillan, London.
- Mehrotra, A.N. & Yetman, J. (2015). Financial Inclusion-Issues for central banks. *BIS Quarterly Review*, pp. 43–57.
- Mehrotra, A.N., & Yetman, J. (2014). Financial Inclusion and optimal monetary policy. *BIS Quarterly Review* December, BIS Working Papers No 476
- Mengistu, A., & Saiz, H. P. (2018). *Financial Inclusion and Bank Competition in Sub-Saharan Africa*. International Monetary Fund.
- Menyah K., Nazlioglu, S., & Wolde-Rufael, Y., (2014), Financial development, trade openness and economic growth in African countries: New insights from a panel causality approach *Economic Modelling*, 2014 - Elsevier
- Mohan, R. (2006), "Agricultural credit in India: status, issues and future agenda", *Economic and Political Weekly*, pp. 1013-1023.
- Morduch, J. (1999). The microfinance promises. *Journal of economic literature*, 37(4), 1569-1614.
- Morgan, D. P. (1998). The credit effects of monetary policy: Evidence using loan commitments. *Journal of Money, Credit and Banking*, 102-118.
- Nakagawa, S., & Psalida E.L. (2007). The quality of domestic financial markets and capital inflows. In *Global Financial Stability Report Financial Market Turbulence: Causes, Consequences, and Policies*, 3rd Chapter, IMF.
- Ndikumana, L. (2001). Financial markets and economic development in Africa. University of Massachusetts Amherst, Working Paper 17.

- Nurbekyan, A. & Hovanesian, N. (2018). Financial Inclusion, Regulation, Financial Literacy, and Financial Education in Armenia. ADBI Working Paper 843. Tokyo: Asian Development Bank Institute. Available: <https://www.adb.org>
- Nyamongo, E. M., Misati, R. N., Kipyegon, L., & Ndirangu, L. (2012). Remittances, financial development and economic growth in Africa, *Journal of Economics and Business*, 64,240-260.
- Odhiambo, N. M. (2005). Financial Development and Economic Growth in Tanzania: A dynamic casualty test. *The African Finance Journal*, 7(1): 1 – 17.
- Odhiambo, N. M. (2011). Economic growth and carbon emissions in South Africa: an empirical investigation. *International Business and Economics Research Journal*, Vol. 10, No.7, pp.75-84.
- Otchere, I., (2016). Financial inclusion and development in Africa: gaps, challenges and policy recommendations. In *18th AERC senior policy seminar 22nd-23rd March, Nairobi, Kenya, Revised: April*.
- Otero, M., & Rhyne, E. (1994). “Financial Services for Microenterprises: Principles and Institutions.” In *The New World of Microenterprise Finance*, edited by Maria Otero and Elizabeth Rhyne, pp. 11–26. Hartford, Conn.: Kumarian Press.
- Park, C-Y & Mercado Jr., R. V. (2015). Financial inclusion, poverty, and income inequality in developing Asia. ADB Economics Working Paper Series, No. 426, Asian Development Bank.
- Qu, Z., & Perron, P., (2007), Estimating and Testing Structural Changes in Multivariate Regressions, *Econometrica*, 75, (2), 459-502
- Quartey, P. & Prah, F. (2008). Financial development and economic growth in Ghana: Is There a Causal Link? *The African Finance Journal*, 10(1), 28-54.
- Ricardo, G. (2015) What financial regulation for stability and financial inclusion in Africa? The views of regulators of Ethiopia, Kenya and Lesotho Working and discussion papers March 2015 Ricardo Gottschalk
- Rojas-Suarez, L. (2010). Access to Financial Services in Emerging Powers: Facts, Obstacles, and Policy Implications. OECD Global Development Background Papers
- Rosengard, J. K. & Prasetyantoko, A. (2011). If the banks are doing so well, why can't I get a loan? Regulatory constraints to financial inclusion in Indonesia. *Asian Economic Policy Review*, 6(2), 273-296.
- Roy, A. D. (1952). Safety first and the holding of assets. *Econometrica: Journal of the econometric society*, 431-449.
- Sacerdoti, E. (2005). Access to bank credit in Sub-Sahara Africa: key issues and reform strategies. IMF Working Paper, WP/05/166.

- Sarma, M. & Pais, J. (2008). Financial Inclusion and Development: A Cross Country Analysis. *Indian Council for Research on International Economic Relations*, Retrieved from <http://test.icrier.org/pdf/Mandira%20Sarma-Paper.pdf>.
- Sarma, M. & Pais, J. (2011). Financial inclusion and development. *Journal of International Development*, 23(5), 613-628.
- Sarma, M. (2008). Index of Financial Inclusion. *Indian Council for Research on International Economic Relations Working Paper* No. 215.
- Sarra, J. (2012). Prudential, pragmatic, and prescient, reform of bank resolution schemes. *International Insolvency Review*, 21(1), 17-66.
- Seetanah, B. P., Sawkut, R., Sannasee, V. & Seetanah, B. (2010). Stock market development and economic growth in developing countries: evidence from Panel VAR framework
- Shah, P. & Dubhashi, M. (2015). Review paper on financial inclusion-the means of inclusive growth. *Chanakya International Journal of Business Research*, 1(1), 37-48.
- Sharma, D. (2016). Nexus between Financial Inclusion and Economic Growth: Evidence from the Emerging Indian Economy. *Journal of Financial Economic Policy*, 8(1), 13-36.
- Sims, C. (1980). Macroeconomics and reality. *Econometrica*, 48, 1–48
- Sinclair, S. (2013). Financial inclusion and social financialisation: Britain in a European context. *International Journal of Sociology and Social Policy*, 33(11-12) 658-676.
- Sinclair, S., & Bramley, G., (2011) Beyond virtual inclusion communications inclusion and digital divisions. *Social Policy and Society*, 2011 - cambridge.org
- Sinclair, S., & Bramley, G., (2011). Beyond virtual inclusion communications inclusion and digital divisions. *Social Policy and Society*, 2011 - cambridge.org
- Stijn, C. Liliana, R. & Suarez, C. (2016). Financial Regulations for Improving Financial Inclusion (brief) | Centre for Global Development
- Subba Roa. K. G. K. (2007). Financial inclusion: An introspection. *Economic and Political Weekly*, 42(5), 355-360.
- Sulaiman, L. A. & Migiro, S. O. (2014). The nexus between monetary policy and economic growth in Nigeria: a causality test. *Public and Municipal Finance*, Vol. 3, Iss. 2, 35-40.
- Tambunlertchai, K. (2015). Financial Inclusion, Financial Regulation, and Financial Education in Thailand ADBI Working Paper Series

- Thakor, A.V. (1996). Capital requirements, monetary policy and aggregate bank lending: Theory and empirical evidence. *The Journal of Finance* 51:279–324. doi:10.1111/j.1540 6261. 1996.tb05210. x.
- Thorat, U. (2006). Financial Inclusion and Millennium Development Goals. *RBI Bulletin*, 50(2), 239-43.
- Treasury, H. M. S. (2004). *Promoting Financial Inclusion*. London: HM Treasury
- Tsuru, K. (2001). Finance and Growth: Some Theoretical Considerations, and a Review of the Empirical Literature. Organisation for Economic Co-operation and Development.
- Ugwuanyi, G. O. (2015). Regulation of bank capital requirements and bank risk-taking behaviour: Evidence from the Nigerian banking industry. *International Journal of Economics and Finance* 7:31–37. doi:10.5539/ijef. v7n8p31.
- Unnikrishnan, R. & Jagannathan, L. (2015). Unearthing global financial inclusion levels and analysis of financial inclusion as a mediating factor in global human development. *Serbian Journal of Management* 10 (1), pp. 19 – 32.
- World Bank. (2012). *The Little Data Book on Financial Inclusion*. Washington, D.C: World Bank.
- Yartey, C.A., & Adjasi C.K.D. (2007). *Stock market development in sub-Saharan Africa: critical issues and challenges*. International Monetary Fund Working Paper, WP/07/209.
- Yoshino, N. & Morgan, P. J. (2017). *Financial Inclusion, Regulation, and Education: Asian Perspectives*. Asian Development Bank Institute.