

**FINANCIAL REFORMS AND CREDIT GROWTH NEXUS ON INCOME INEQUALITY
IN SELECTED SUB-SAHARAN AFRICAN COUNTRIES**

By

**ADELEYE, BOSEDE NGOZI
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June, 2018

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Thesis submitted to the School of Postgraduate Studies of Covenant University, Ota, Ogun State, Nigeria. In partial fulfilment of the requirements for the award of Doctor of Philosophy (Ph.D) degree in Economics, in the Department of Economics and Development Studies, College of Business and Social Sciences, Covenant University, Ota.

June, 2018

ACCEPTANCE

This is to attest that this thesis is accepted in partial fulfillment of the requirements for the award of the degree of **Doctor of Philosophy in Economics** in the Department of **Economics and Development Studies**, College of Business and Social Sciences, Covenant University, Ota.

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DECLARATION

I, **ADELEYE, BOSEDE NGOZI**, (15PAF01053), declare that this research was carried out by me under the supervision of Prof. Evans S. Osabuohien of the Department of Economics and Development Sciences, Covenant University, Ota and Dr. Simplic A. Asongu Oxford Brookes Business School, Oxford Brookes University, Oxford. I attest that the thesis has not been presented either wholly or partly for the award of any degree elsewhere. All sources of data and scholarly information used in this thesis are duly acknowledged.

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CERTIFICATION

We certify that the thesis titled “Financial Reforms and Credit Growth Nexus on Income Inequality in Selected Sub-Saharan African Countries” is an original work carried out by ADELEYE, Bosede Ngozi (15PAF01053), in the Department of Economics and Development Studies, Covenant University, Ota, Ogun State, Nigeria, under the supervision of Prof. Evans S. Osabuohien and Dr. Simplicie A. Asongu. We have examined and found the work acceptable for the award of a degree of Doctor of Philosophy in Economics.

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DEDICATION

To the Almighty God who in His infinite mercies made it possible to achieve this milestone; to my late husband, Matthew Adewuyi Adeleye who supported me in every of my endeavours and to my daughter, Oyinade Melody Chinyere Godiya Adeleye, for the inspiration to rise above all odds.

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LIST OF ACRONYMS

2SLS-IV	Two-stage Least Squares Instrumental Variables
AfDB	African Development Bank
ARCH-LM	Autoregressive Conditional Heteroscedasticity-Lagrange Multiplier
AR(2)	Second order autocorrelation
ARDL	Autoregressive Distributed Lag
CA	Central Africa
CBN	Central Bank of Nigeria
CEMAC	Economic and Monetary Union of Central Africa
CFA	Communauté Financière d'Afrique
CUSUMSQ	Cumulative sum of squared residuals
DC	Domestic Credit to the Private Sector
DCB	Domestic Credit Provided by Banks
DCF	Domestic Credit Provided by Financial Institutions
DF-GLS	Dickey-Fuller Generalised Least Squares
DFE	Dynamic Fixed Effects
DSGE	Dynamic Stochastic General Equilibrium
EA	East Africa
EAC	East African Community
EAP	East Asian and the Pacific
ECA	Europe and Central Asia
ECCAS	Economic Community of Central African States
ECM	Error Correction Model
ECOWAS	Economic Community of West African States
ECRI	European Credit Research Institute
EMDC	Emerging Markets and Developing Countries
FE	Fixed Effects
FIH	Financial Instability Hypothesis
FSD	Financial System Deposits
FSI	Financial Stability Index
G20	Group of Twenty
GCIP	Global Consumption and Income Project
GDP	Gross Domestic Product
IMF	International Monetary Fund
INDIE	Individual Datasets from Individual Studies
ISS	International Social Survey
IV	Instrumental Variables
LAC	Latin America and the Caribbean
LIS	Luxembourg Income Study
LL	Liquid Liabilities
LPM	Linear Probability Model
M2	Broad Money Supply
MDGs	Millennium Development Goals
MENA	Middle East and North Africa
MG	Mean Group
MPC	Marginal Propensity to Consume
NA	North America
OECD	Organisation of Economic Cooperation and Development
OLS	Ordinary Least Squares
PCA	Principal Component Analysis

PMG	Pooled Mean Group
POVCAL	Poverty Calculator
PP	Phillip-Perron Test
RESET	Regression Specification Test
SA	South Asia
SADC	Southern African Development Community
SDGs	Sustainable Development Goals
SEDLAC	Socio-Economic Database for Latin America and the Caribbean
SILC	Survey of Income and Living Condition
SSA	Sub-Saharan Africa
SWIID	Standardised World Income Inequality Database
Sys-GMM	System Generalised Method of Moments
UNDP	United Nations Development Programme
VECM	Vector Error Correction Model
VIF	Variance Inflating Factor
WA	West Africa
WBGFD	World Bank Global Financial Development Database
WDI	World Development Indicators
WIDER	World Institute for Development Research
WYD	World Income Distribution

ABSTRACT

Income inequality stalls economic growth with undesirable socio-economic consequences. Despite measures targeted towards reducing the inequality gap, disparities in income distribution persists. The link between financial reforms and income inequality is still relatively unexplored in the literature. This study appraises the impact of financial reforms including credit growth on income inequality using a sample of twenty selected countries in Sub-Saharan Africa (SSA) from 1980 to 2015. The broad objective is to assess the financial reforms and credit growth nexus on income inequality and establish if the reform-credit-inequality nexus exists. To achieve this, the analytical structure is designed to (1) observe the state of the financial system after the reform, (2) evaluate if credit growth is stimulated by financial reforms and (3) if credit growth has an equalising effect on income inequality. This analytical approach (general-to-specific) is conducted on the broad sample, the four sub-regions (Central, East, Southern and West Africa) and four representative countries (Cameroon, Kenya, Nigeria and South Africa). Five estimation techniques pooled ordinary least squares (OLS), fixed effects (FE), dynamic fixed effects (DFE), system generalised method of moments (sys-GMM) and error correction model (ECM)) are used in evaluating these interactive relationships. In line with the theoretical and empirical literature, the real interest rate, deposit rate, domestic credit to the private sector and the Gini index are the respective proxies for financial reforms, credit growth and income inequality. For the broad sample, findings reveal that financial reforms exhibit an *indirect* relationship with income inequality. For instance, from the FE results a percentage point change in the real interest rate is associated with 0.9% increase in credit growth, and a percentage change in credit growth is associated with 0.045% decrease in income inequality, on average, *ceteris paribus*. Similarly, results from DFE show that a percentage change in credit growth is associated with 0.062% decrease in income inequality, on the average. Results across the four regions vary. Credit growth reduces inequality significantly in Southern Africa by 0.207% while it aggravates inequality in East Africa by 0.036%. For Cameroon, Nigeria and South Africa, credit growth exhibits equalising impact on income while the reverse is the case in Kenya. Hence, contribution is made to the literature by providing evidence that the reform-credit-inequality nexus exists in addition to validating both the McKinnon-Shaw (1973) hypothesis that at a higher interest rate, financial intermediation improves. Results also validate the extensive margin theory of Greenwood and Jovanovich (1990) that as credit is extended and made available to those initially excluded income inequality reduces. Another contribution made to the scholarship methodology is empirically unbundling the effect of financial reforms on income inequality. Given these findings, one of the recommendations is that financial reforms policies that drive financial intermediation be pursued by stakeholders as these will *indirectly* lead to a reduction in income inequality. In other words, the ability to stimulate credit growth may be one of the avenues to reducing the income inequality gap in SSA and in developing economies in general.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Income inequality is the uneven or inequitable distribution of income among a given population. In recent times, global policy debates about this menace have intensified with concerns about stemming the rising tide. The positioning of this research on Sub-Saharan Africa (SSA) may be motivated by the fact that the 2015 World Bank Report on the Millennium Development Goals (MDGs) reveals that extreme poverty had been decreasing in all regions of the world with the exception of SSA, in spite of the fact that the sub-region enjoyed more than two decades of growth resurgence (Asongu & Nwachukwu, 2017).

Despite the various measures targeted towards reducing the inequality gap, disparities in human development, health and education still persist with vast discrimination particularly in relation to indigenous peoples, those with disabilities and those resident in rural communities (Dabla-Norris, Kochhar, Suphaphiphat, Ricka & Tsounta, 2015). Consequently, in adopting the Sustainable Development Declaration in 2015, world leaders pledged to create a more equitable world by 2030. Perhaps, while taking cognisance of rising global income inequality, one of its goals (i.e. Goal 10) which is also linked to Goals 1, 2, 3, 4 and 8, is to reduce inequality within and among nations. Statistics and studies have shown growing inequality, thus policies addressing income inequality at the national level remain pivotal to economic growth and development.

Furtherance to situating this study on SSA, the UNDP (2017) Report confirms that SSA remains as one of the most unequal regions in the world even when its average unweighted Gini declined by 3.4 percentage points between 1991 and 2011. The Report further states that the region inhabits 10 of the 19 most unequal countries globally with seven outlier African countries (mostly located in Southern Africa) driving this inequality. Rising income inequality stalls economic growth and has undesirable socio-economic and political consequences, such as high crime rate, high mortality rate, distorted educational structures, corruption, and social unrest to mention a few (George, Olayiwola, Adewole & Osabuohien, 2013). Generally, high levels of income inequality have historically persisted across the globe with the most skewed income distributions found in Latin America and the Caribbean (LAC), sub-Saharan Africa (SSA) and South Asia (SA), with Europe having the lowest average inequality index (Dabla-Norris *et al.*,

2015). There is no doubt that income inequality is a deeply rooted and multifaceted problem, with both moral and economic aspects, which is why the topic spurs a continuous global discussion.

In general, income inequality is rising at the global level and particularly in developing economies relative to others (United Nations Development Programme-UNDP, 2011). However, according to UNDP (2013), income inequality increased the highest in the developed economies of Europe and the Commonwealth of Independent States (ECIS) by 35 percent. It increased by 13 percent in Asia and the Pacific region (A&P) while there was no noticeable change in the Arab States. Thus, despite having the second highest average Gini index¹ from the early 1990s to late 2000s, the SSA region is the only region with the highest decline in income inequality at 7 percent followed by LAC at 5 percent. Close examination of the data reveals that although inequality declined on average in SSA, there has been a mix of countries with rising and falling inequality within the region (Solt, 2009, 2014) suggesting that inequality differs across regions and time periods and that country/region specific-policies are likely to play vital significance in these variations.

According to UNDP (2013), for the group of high-income countries in the study, an increase of 9 percent occurred on household income inequality while those of low- and middle-income countries increased by 11 percent of which SSA is classified. Likewise, according to African Development Bank-AfDB (2012), Africa is also the world's second most unequal region after Latin America in addition to being one of the poorest regions in the world, (Solt, 2009; UNDP, 2011, 2013; United Nations, 2013; Milanovic, 2014) coupled with the fact that, on average, global inequality has not diminished over time (United Nations, 2013). Substantiating the above, in 2010, six out of the ten most unequal countries worldwide were in SSA, and the bulk of countries suffering from extreme high income inequality are concentrated in the sub-region of southern Africa (AfDB, 2012). A prominent feature in most African countries is that, when measured by the share of income that goes to the poorest, inequalities are striking because the wealthy-class appropriates the largest proportion of income.

¹In the early 1900s, the Italian statistician and sociologist Corrado Gini developed the Gini coefficient (*from the Lorenz (1905) curve*) which is a numerical statistic to measure income inequality in the society. The coefficient lies between 0 (perfect equality) and 1 (perfect inequality). The Gini index is simply the Gini coefficient multiplied by 100 and, by intuition, lies between 0 and 100. This study prefers to use the term 'Gini index' in its explanations and analyses.

On financial liberalisation, Schumpeter (1911), McKinnon (1973) and Shaw (1973) pioneered the work on the relationship between finance and economic growth. The authors consider financial liberalisation to be the backbone of economic reforms in lagging economies (Balassa, 1989; Levine & Rubinstein, 2009; Edo, 2012). They explained it to mean the creation of higher interest rates that equate the demand and supply for savings and opinionated that higher rates of interest will lead to increased savers (i.e. more deposits), increased financial activities (i.e. financial intermediation) as well as improving the efficiency of using savings (i.e. generating credits) (Balassa, 1989; Akinlo & Egbetunde, 2010; Ogundipe & Alege, 2014). Both McKinnon (1973) and Shaw (1973) agree that once the real rate of return falls below the equilibrium rate due to rising inflation rate, capital flight results. That is, domestic savers have no incentive to increase the stock of funds available for domestic investment (shifting preference for the acquisition of real assets) which in turn affects economic growth. However, while Schumpeter highlighted the importance of finance for economic growth, McKinnon and Shaw both acknowledged that finance and economic growth are positively correlated but refrained from ascertaining the direction of causality.

Earlier works on the finance-growth literature ‘birthed’ the supply-leading and demand-following relationships. The former states that causality goes from financial intermediation to economic growth (Schumpeter, 1911; Jao, 1976; Tun Wai, 1980; Lanyi & Saracoglu, 1983; Gelb, 1989) while the latter postulates that economic growth creates the demand for financial services (Robinson, 1962; Goldsmith, 1969). More recent works show that economists still disagree sharply on the role of finance in economic development more so on the direction of causality. The debate has taken an interesting dimension of the ‘chicken-egg’ analysis such that opinions and findings differ on whether finance causes economic growth or if economic growth creates the demand for financial services (Beck, Levine, & Loayza, 2000; Saibu, Bowale, & Akinlo, 2009; Adusei, 2013; Cubillas & González, 2014). Largely, finance influences the realisation of economic aspirations and the achievement of entrepreneurial goals, that is, who can start a business and who cannot. Osabuohien and Efobi (2013) analyse the impact of remittance inflows as a key source of finance to low-income households which is driven by the desire of nationals in the Diaspora to support their households who may be facing financial challenges.

The financial sector is an engine for economic growth of which, the empirical literature focuses on the importance of the finance-growth nexus for sustainable development. However, recent

studies have started a discourse about how financial reforms or financial liberalisation can have an effect on income inequality. Finance, inflows or credits shapes the gap between the rich and the poor and augments the extent to which that gap widens or contracts across dynasties. Also, credit shocks to some economic agents can affect the distribution of capital; adjust the rate of economic growth and the quest for production inputs (particularly labour) with adverse consequences on poverty and income distribution.

The first generation financial reforms, for most African countries, which took place in the early 1980s led to, among others, the abolishment of credit controls, relaxation of controls on international capital movements, the removal of state intervention on interest rate and bank credit allocation (Batuo, Guidi, & Mlambo, 2010). The second generation reforms took place in the 1990s and led to the strengthening of regulatory, legal, institutional and structural frameworks, restoration of bank confidence, and the rehabilitation of financial structures (Asongu, 2015b). Consequently, when financial systems are liberalised, several restrictive controls are removed and financial institutions are able to make credits more readily available. Hence, with increased access to credit, poor households are economically empowered and income inequality will decline (Johansson & Wang, 2013; Kus & Fan, 2015)

On what drives income inequality, the exogenous drivers are financial globalisation and technical change while the endogenous drivers are macroeconomic policies, labour market policies, fiscal policies and wealth inequality. In the same vein, some argue that inequality increases with inequitable government spending on social infrastructure/development (Chatterjee & Turnovsky, 2012); high unemployment rate (Østergaard, 2013) and trade openness (Dastidar, 2012), just to mention a few. In the light of the attendant consequences of income inequality, this study is motivated by three reasons: (1) where markets are underdeveloped, inequality inhibits growth through economic mechanisms (Barro, 2008; Dastidar, 2012); (2) where institutions of government are weak, inequality aggravates the problem of establishing and enforcing a government that is responsive to the needs of the people thereby increasing the likelihood of economic and social policies that hinder growth and poverty reduction (Dhongde & Miao, 2013; Saastamoinen & Kuosmanen, 2014); and (3) where social institutions are delicate, inequality further dampens the civic and social life that reinforces the effective collective decision-making that is necessary to the functioning of healthy societies (Chong & Gradstein, 2007; Dastidar, 2012).

Empirically, high or rising national income inequality can have negative effects on the rate of economic growth or the length of growth spells (Odedokun & Round, 2001; Cobham & Summer, 2013). Also, studies may have found that high or rising national income inequality is likely to be a drag on poverty reduction (UNDP, 2013; United Nations, 2013; Klasen, 2016). In the economic theory of crime, inequality encourages criminal behaviour (Merton, 1938; Shaw & McKay, 1942; Becker, 1968). Inequality encourages corruption (Owoye & Bissessar, 2012; Transparency International, 2015) and distorts the equitable allocation of resources (Ademu, 2013; Kato & Sato, 2014). In addressing the problem of income inequality, some studies theorise that inequality is reduced with increase in per capita gross domestic product (GDP) (van der Hoeven, 2010; Delis, Hasan, & Kazakis, 2014; Davtyan, 2016); improved human capital through equal access to quality education at all levels (Barro, 2008; Lo Prete, 2013); eradication of corruption and the existence of quality institutions (Kar & Saha, 2012; Li & Yu, 2014).

1.2 Statement of the Research Problem

Despite various measures (such as education reforms, health reforms, tax reforms and so on) undertaken by governments, global income inequality is still rising (UNDP, 2011, 2013; United Nations, 2013). However, between early 1990s and late 2000s, the average Gini index has been on the decline in LAC and SSA countries (UNDP, 2013; Klasen, 2016) howbeit with a mix of rising and falling within-country inequality in these regions. Measures proposed and deployed in combating income inequality include education (affordable or free education from primary to secondary levels), health reforms (necessitating free health care in some cases), transfer payments, subsidies, tax reforms, increased government expenditure on public utilities, trade reforms, finance and so on. This study aligns with the finance approach to reducing income inequality because while education, health or tax reforms may require a lag of time before the impacts are felt on income distribution, the distributive impact of access to finance is more instantaneous leading to economic empowerment and the reduction of income inequality.

This study builds on two theories of income inequality – the financial market imperfections theory and the extensive margin theory. The first explains that imperfect financial systems are necessary for sustaining a persistent class of poor cohorts. According to this theory, a perfect financial system implies that households have access to finance to cater for schooling, acquiring skills or setting up a business based only on individual talents and initiative, not on parental wealth (Becker, 1957; Becker & Tomes, 1979, 1986). Thus, a perfect financial market ensures

the equalisation of economic opportunities by reducing the emphasis placed on having ancestral wealth. From this perspective, financial development might exert a disproportionately positive influence on the poor. On the other hand, the extensive margin theory states that financial development might be broadened by increasing the disposal and use of financial services by individuals or small- and medium- scale entrepreneurs who had not been employing those services because of price or other impediments (Becker & Tomes, 1979, 1986; Greenwood & Jovanovic, 1990). Price, in this case, refers to interest rate charged on loans and advances and other ancillary charges. Other impediments can be discriminatory factors such as gender-related (i.e. financial intermediaries being more disposed to lending to males rather than females), demographic (those living in urban areas are favoured to have access to credits than those in the rural areas or being too old or young to file a loan application), health-related (those physically-challenged not often considered for credit-extensions), logistics (distance to the nearest financial intermediary) and so on (Bowale, 2011; Odhiambo, 2014; Orji, Aguegboh, & Anthony-Orji, 2015; Chiwira, Bakwena, Mupimpila, & Tlhalefang, 2016).

Also, evidences from several empirical studies show that financial reform is an income-equalising channel to addressing the problem of income inequality (Levine, 2008; Agnello, Mallick, & Sousa, 2012; Hamori & Hashiguchi, 2012; Rewilak, 2013; Li & Yu, 2014; Asongu, 2015c). Financial reform or liberalisation, hitherto, is carried out via various channels such as interest rate deregulation, maintaining credit ceilings and credit control, liquidity control, security markets deregulation, mergers and acquisition, free entry, banking supervision, and flexible international capital flow and so on. Meanwhile, credit growth, an outcome of financial reform is indicative of the success of any financial sector reform. This is because financial deregulation spurs the removal of various restrictive credit measures in the financial system thus, enabling financial institutions the mechanism to increase credit availability and access. Hence, financial development will magnify the economic opportunities of deprived groups and reduce the inter-generational tenacity of comparative incomes (Becker & Tomes, 1979, 1986; Greenwood & Jovanovic, 1990; Bae, Han, & Sohn, 2012; Batabyal & Chowdhury, 2015).

Financial reform in itself is not readily observable, but are captured using proxies and indicators such as the real interest rate, capital account liberalisation, maintaining credit ceilings and credit control, liquidity control, security markets deregulation, and so on. Each of the financial sector reforms is likely to impact all these proxies. For example, the liberalisation of interest rate could affect the real interest rate, the volume of intermediation and banking sector efficiency by permitting greater competition. There is also no necessary strict one-to-one relationship

between these proxies and the channel through which the financial system affects the real sector. For example, the level of the real interest rate would have an impact on the interest cost of capital, the volume of savings and possibly the distribution of funds through adverse incentives. By entering all the three proxies simultaneously, however, into the equations for economic growth and efficiency, it should be possible to distinguish somewhat better the importance of the difference channels. Thus, including the volume of intermediation and a measure of banking efficiency along the real interest rate in the estimation equations should allow the real interest rate term to primarily proxy the impact of financial system on the interest cost of capital, while the savings/investment effect would be reflected in the volume of intermediation and the allocative efficiency proxy.

Therefore, this study takes a new direction of inquiry which, to the best of knowledge, has not been sufficiently explored in empirical literature and in line with theoretical literature (McKinnon, 1973; Shaw, 1973), the financial reform variable is real interest rate while domestic credit is the proxy for credit growth. The approach is to investigate the *indirect* effect of financial reforms on income inequality through credit growth rather than analyse the direct effect of financial reforms on income inequality. This choice is motivated by the substantially documented evidence on surplus liquidity in the region which translates the inability of financial institutions to optimally transform mobilised deposits into credit (Asongu, 2014). That is, this study is concerned about how financial reforms via credit growth or increased access to credit can contribute to the falling trend in income inequality in SSA and also address the problem of high income inequality index. This is because financial reform influences the dissemination of income, as growing inequality is a reflection of the unequal access to productive opportunities (Batuo & Asongu, 2015). Also, it can improve the competence of the domestic financial structures by equalising access to credit and reducing the disparities associated with expected marginal returns (Abiad & Mody, 2005). In addition, it can lead to improved allocation of risk and socialisation of costs, which is needful during financial crises (Ugai, 2006; Claessens & Perotti, 2007). These outcomes, in turn, can help alleviate the burden of income inequality.

In the light of the above, the link that credit growth is an equalising mechanism has been corroborated empirically by several scholars who demonstrate that increased access to credit (that is, loans and advances) from the financial sector equalises income (Haber & Perotti, 2008; Benmelech & Moskowitz, 2010; Rajan & Ramcharan, 2011; Agnello & Sousa, 2012; Li & Yu,

2014). Likewise, when regulators direct that some minimum amount of bank lending be given to certain ‘priority’ sectors in order to promote developmental agendas, these policies are often detrimental because it contributes to aggravating income inequality. Similarly, income inequality worsens where reserve requirements are excessive since because financial legislation mandates financial intermediaries, most especially banks, to deposit a large percentage of liabilities as reserves to the central bank. This policy is likely to contribute to widening income inequality owing to decreased possibilities for financial access which is needed to boost social mobility and mitigate unemployment vulnerability. Given the above, this research examines financial reform and credit growth nexus on income inequality. It seeks to identify whether the reform-credit-inequality nexus exist for SSA countries.

1.3 Research Questions

The main research question of the study is, “to what extent financial reforms and credit growth nexus on income inequality hold sway in Sub-Saharan Africa (SSA)”? The sub-research questions include:

1. How stable is the financial sector after reforms in SSA?
2. In what ways have financial reforms affected credit growth in SSA?
3. How has credit growth impacted on income inequality in SSA?
4. How does the financial reform and credit growth nexus on income inequality differ across SSA sub-regions?

1.4 Objectives of the Study

The broad objective of the study is to assess the financial reform and credit growth nexus on income inequality in SSA. Towards achieving this, the following specific objectives are addressed. They are as follows, to:

1. ascertain the stability of the financial sector after reforms;
2. evaluate how credit growth is stimulated by financial reforms;
3. examine how credit growth impacted on income inequality in SSA; and
4. appraise how the financial reforms and credit growth nexus on income inequality differ across SSA sub-regions.

1.5 Research Hypotheses

In line with the research questions, the four (4) hypotheses stated in their null (H_0) and alternate (H_1) forms are:

- (i) H_0 : The financial sector is not significantly stable after financial reforms.
 H_1 : The financial sector is significantly stable after financial reforms.
- (ii) H_0 : Credit growth is not stimulated by financial reforms in selected SSA countries.
 H_1 : Credit growth is stimulated by financial reforms in selected SSA countries.
- (iii) H_0 : Credit growth has no equalising effect on income inequality in SSA.
 H_1 : Credit growth has equalising effect on income inequality in SSA.
- (iv) H_0 : The financial reforms and credit growth nexus on income inequality do not differ across SSA sub-regions.
 H_1 : The financial reforms and credit growth nexus on income inequality differ across SSA sub-regions.

1.6 Scope of the Study

The study scope is limited to a significant part of the financial system, the bank financial institutions and not the non-bank financial institutions, micro-credit and informal institutions basically due to two reasons: (1) the lack of comprehensive data to capture activities of the non-bank financial institutions and (2) the lax regulatory control on that segment of the financial sector. The bank financial institutions are composed of commercial banks, central banks, merchant banks, investment banks and development banks while building societies, hire purchase companies, discount houses, mortgage trusts, insurance companies, pension funds, and investment trusts generally comprise non-bank financial institutions globally. One of the reasons for concentrating on bank-financial institutions is that liabilities of the banking sector form part of the money supply, while those of non-bank financial institutions do not; for they are referred to as near money. Besides, the banking sector accommodates transactions from the larger population with the greater likelihood of affecting their income streams while a fraction of the population have dealings with non-bank institutions owing to their specialised functions. At some point, it is necessary to differentiate between formal and informal financial systems. Financial sector development includes contractual and institutional arrangements that reduce intermediation and information costs associated with valuating and monitoring of projects and managing risk (Levine, 2004, 2008; Demirgüç-Kunt & Levine, 2009). First, it is that part within the financial system that witnessed the most intermediation. Second, all countries have general

laws and regulations governing the banking sector, thus providing the most appropriate platform to analyse the effect of financial policies on income inequality. Third, when informal financial arrangements become parsimoniously applicable at a national level, they are migrated to the auspice formal regulations. Consequently, the focus of the study is the role played by formal financial sector policies in influencing income inequality.

In addition, the scope of this study which is from 1980 to 2015 is constrained not only by the measures of inequality data but because most SSA countries embarked on financial within the 1980s. For instance, the Gini index (income inequality measure) data sourced from Lahoti, Jayadev and Reddy (2016)² Global Consumption and Income Project ended in year 2015 for most of the 161 countries in the database. Other alternative sources are Solt (2014) Standardised World Income Inequality Database (SWIID)³ data but the years coverage ended at 2011, at the most, for SSA countries and Milanovic (2014) data is only up to 2014. Both Solt (2014) and Milanovic (2014) datasets have too many data gaps and because of these shortcomings, this study strictly uses the inequality data from Lahoti *et al.* (2016). To comprehensively address the research questions, a general (panel data of 20 countries) to specific approach (4 countries) is adopted. The 20 countries are Botswana, Burundi, Cameroon, Central African Republic, Chad, Comoros, Congo Republic, Gabon, Gambia, Kenya, Malawi, Mauritius, Namibia, Nigeria, Rwanda, Seychelles, Sierra Leone, South Africa, Swaziland and Tanzania, selected on the basis of having sufficient data on the Gini index, interest rate, and domestic credit volume. Likewise on the basis of population size and average gross domestic product, these countries are representative sample coverage for SSA. From this pool of countries, 6 are from Central Africa, 7 from East Africa, 4 from Southern Africa and 3 from West Africa (see Appendix Table A1). The specific 4 countries which represent each sub-region are Cameroon, Kenya, Nigeria and South Africa.

The choice of these selected countries is intuitive in addition to four criteria that are summarised below:

1. **Cameroon:** is in Central Africa with strong presence in its regional bloc, the Economic Community of Central African States (ECCAS). The country has made significant progress in regional integration, as evidenced by its trade volume with other Central African countries and the development of the transport system linking the country with other member countries

²Global Consumption and Inequality Project is one of the latest datasets on income inequality. Released in April 2016, it covers 161 countries from 1960 to 2015.

³The SWIID version 5.0 covers 172 countries from 1960 to 2011. Only a handful has coverage up to 2012 or 2013.

of the Economic and Monetary Union of Central Africa (CEMAC). However, the average Gini index for the period under review is 58.08⁴ (see Figure 3.4) which is classified as very high income inequality⁵ (UNDP, 2017).

2. **Kenya:** is a country that has shown tremendous improvement in most of its socio-economic indicators. A foremost player in the Eastern African region and in its regional bloc, the East African Community (EAC). The country has an average Gini index of 60.35 which by comparison is considered as very high.
3. **Nigeria:** is a dominant player in West African region with a formidable presence in the Economic Community of West African States (ECOWAS). Its average Gini index is 56.57 in its sub-region and currently experiencing high income inequality.
4. **South Africa,** a Group of Twenty (G20) member, is a dominant player in Southern African region and in its regional bloc, Southern African Development Community (SADC). In addition to having one of the highest average Gini index of 66.82, it also has the highest inequality rate in its sub-region and one of the highest in the world.

Thus, with each country's varying characteristics, heterogeneity and representing a sub-region, the choice of these countries makes comparative analysis relevant and intuitive in channelling a regional course of action in addressing the problem of income inequality.

1.7 Significance of the Study

The focus of this study is to address the socio-economic problem of income inequality using the finance-credit approach. Some efforts have been made by examining the link between income inequality and financial reforms. However, our direction of enquiry which to the best of our knowledge has not been explored in the light of challenges to Sustainable Development Goals (SDGs), is to attempt to link credit growth as an equalising mechanism to reducing income inequality. In an attempt to contribute to the literature, this study will deepen the empirical analysis by modifying the current scholarly methodology and show that credit growth is an outcome of financial reforms; thus financial reforms have an *indirect* relationship to income inequality. This approach corrects the endogeneity bias created with the inclusion of financial indicators variables and credit variables when explaining income inequality. Thus, leading to the cloudy effects of credit on income inequality. The outcome of this study is

⁴This figure is obtained by taking the *average value* of the Gini index from 1980 to 2015.

⁵The Gini index is further categorised as follows: 0 – 0.399 (very low inequality); 0.4 – 0.449 (low inequality); 0.45 – 0.529 (medium inequality); 0.53 – 0.599 (high inequality) and above 0.60 (very high inequality). Most developing economies are within the bracket of 'high' and 'very-high' income inequality.

relevant to monetary policy regulators as it shows the need to identify the necessary policy instrument and also engage in policy-mix that will not only lead to credit growth but also impacts on needy micro-units such as households and firms. To the households and firms, increased access to credit will create more economic opportunities and reduce the inequality gap. Since the larger percentage of SSA economies are still developing, the outcome of this study can be generalised such that researchers and other institutional stakeholders both in the region and other regions with similar features to Africa will find the outcome of this research relevant.

1.8 Method of Analysis

The study employs a three-equation model to establish the channel of influence by which financial reforms impact on income inequality through credit growth in addition to adopting a general-to-specific approach. The general approach involves a panel data analysis of 20 selected SSA countries from 1980 to 2015. The estimation structure further divides the sample into four sub-regions (Central, East, Southern and West Africa) to capture variation across the sub-regions and also divide the coverage years to four periods namely 1980-89, 1990-99, 2000-09 and 2010-15 to capture changes across these periods. The specific approach is the country-level analysis of the four selected countries (Cameroon, Kenya, Nigeria and South Africa). In total, five estimation techniques are used - four estimators used for the panel data analysis and one estimator for the country-level analysis. The panel data estimators are (1) pooled ordinary least squares which assumes that all the units are identical and does not account for heterogeneity; (2) fixed effects that accounts for the unobserved heterogeneity among the units; (3) dynamic fixed effects only used to analyse the credit-inequality relationship because it accounts for hysteresis or persistence in income inequality; and (4) system generalised method of moments which controls for endogeneity and for estimator robustness. The error correction model which explains how deviations from long-run equilibrium are corrected is used on each of the four selected countries.

1.9 Outline of the Study

The study is divided into six chapters. Apart from the introductory chapter, chapter two details the definitions on the three subject matters – income inequality, financial reform and credit growth, a detailed review of the theoretical, empirical and methodological literature summed up with the identified gaps. Chapter three entails the stylised facts. Using data, descriptive and comparative analysis on the historical trends of the Gini index (measure of income inequality)

are carried out on the global scale, SSA, Central Africa, East Africa, Southern Africa and West Africa. In addition to analyses on Cameroon, Kenya, Nigeria and South Africa.

Chapter four presents the methodology and the general-to-specific approach adopted for this work. The general approach is a panel data of 20 countries while the specific approach is on the four selected countries. Other areas covered are theoretical and analytical frameworks, modelling structures, estimation techniques, scope of study, sample sizes, variables description, sources, *a priori* expectations and issues with data compilation. Chapter five presents the results and their interpretations. The results for the general approach are highlighted first followed by those from the specific approach. Other results are those from pre- and post-estimations and the implications of findings. Lastly, Chapter Six concludes with policy recommendations, limitations of the study and areas that may require further research.

1.10 Operational Definition of Terms

- i. **Control variables:** Independent variables that are not of particular interest in the econometric models but have influence on the independent variable of interest.
- ii. **Credit growth:** Refers to the increase in the volume of loans and advances given out to borrowers by financial intermediaries with agreement on repayment at some future date with interest.
- iii. **Deposit rate:** The rate of interest paid by financial intermediaries on depositors funds
- iv. **Estimation technique:** The econometric method employed in analysing the data. In this study it is pooled ordinary least squares, fixed effects, dynamic fixed effects, system generalised method of moments, error correction model.
- v. **Financial reform:** The process of moving towards market-determined rates of interest, as well as market-determined prices, as opposed to government-regulated rates of interest (known as an interest rate ceiling). In this study, it is proxied by the real interest rate and the deposit rate.
- vi. **Gini coefficient:** The measure of income inequality. Ranges between 0 (perfect equality) and 1 (perfect inequality)
- vii. **Gini index:** The measure of income inequality. Ranges between 0 (perfect equality) and 100 (perfect inequality)

- viii. **Growth rate:** Percentage change in the variables employed in the analysis within specified time period. It is derived by dividing the difference between the past and the present value by the past value and then expresses the result in percentage.
- ix. **Income inequality:** The unequal distribution of household income across the various participants in an economy. It is measured by the Gini index in this study.
- x. **Lending rate:** The rate of interest charged by financial intermediaries on credits (loans and advances).
- xi. **Nexus:** An important connection or series of connections linking two or more things; a causal link or bond; a relationship.
- xii. **Real interest rate:** The rate of interest an investor, saver or lender receives (or expect to receive) after allowing for inflation
- xiii. **Robustness and sensitivity check** – Examining the regression co-efficient estimates obtained from a technique of analysis with another method of analysis for the purpose of confirming stability of the estimates.

CHAPTER TWO

LITERATURE REVIEW

This chapter borders on the review of the definitions of the three main issues underlying this research – income inequality, financial reforms and credit growth. These are closely followed by the theoretical review of literature on income inequality *vis-à-vis* empirical and methodological reviews on the finance-credit-inequality nexus. The section also summarises gaps identified in the literature.

2.1 Conceptual Issues

2.1.1 Income Inequality

The dialogue on inequality often makes a distinction between inequality of outcomes (measured by income, wealth, or expenditure) and inequality of opportunities (measured by health services, education, financial services and so on). When differences occur due to circumstances beyond an individual's control such as family background, ethnicity, gender or location of birth, such a situation is classified as inequality of opportunities. Likewise, inequality of outcomes is a combination of differences in opportunities and individual's efforts and talent (Dabla-Norris *et al.*, 2015). Out of the three components of inequality of outcomes, income inequality is the most cited because it is easily measurable unlike wealth or expenditure inequality that is subject to variations in individual incomes.

According to Piketty (2014), inequality is more severe in wealth than income and the plausible explanation for this include wage stickiness which makes it difficult for middle and low-income households to set aside money for savings, in addition to the lower propensity to consume by the upper class (Sheng, 2015a). In advanced countries, wealth inequality is driven by rising concentration of wealth by the top 1 percent (Piketty, 2014; Saez, 2014), while in emerging and advanced countries, it is driven by wealth polarisation between rural and urban dwellers (UNDP, 2013; Dabla-Norris *et al.*, 2015).

Following earlier studies, this study is limited to income inequality⁶. It measures how much of a country's income goes to the richest 10 or poorest 20 per cent of the population and how far

⁶The wordings 'income inequality' and 'inequality' are used interchangeably throughout this dissertation, unless something else is specifically stated.

each country lies from perfect income equality each year. It does not, however, estimate deprivation, disease or destitution. Nevertheless, the distribution of income provides information on a relevant conception of poverty. It is the measurement of the distribution that highlights the gap between the rich and poor. In addition, inequality is a relative term as it solely covers the degree of income disparities between people of a given population. To capture the extent of income inequality within or between countries, studies have used varying measures such as the Gini index, the Palma ratio, the Atkinson index, Theil index, purchasing power parity, income shares, variance of log-income, the Robin Hood index and the coefficient of variation. However, the most widely used measure by researchers and policy makers is the Gini index which is discussed in detail in the fourth chapter while other measures of income inequality are discussed herein:

Other Measures of Income Inequality

1) The Palma

The seminal work of Gabriel Palma in 2006 titled “Globalizing inequality: ‘Centrifugal’ and ‘centripetal’ forces at work” has inspired an alternative measure of income inequality – the *Palma* (Cobham & Summer, 2013) which measures the share of income of the richest 10% and the poorest 40%. This is a clear departure from the computation of Gini index which is more sensitive to changes in the share of income of middle-income groups. The Palma, on the other hand, emphasises more on the income changes at the top and bottom ends. Given that the Gini index captures the income share of the middle class which are often stable, that is, the least susceptible to change, this approach may not be totally helpful as it does not adequately provide information on the income share of the poor when there is a change in the income share of the rich, something the Palma directly measures. As shown by the study on the Palma, countries which reduce their Palmas have rates of progress thrice higher in reducing extreme poverty and hunger compared to countries with rising Palmas (Cobham & Summer, 2013).

Also, the Palma falls within a branch of “inter-decile ratios” for inequality measures. The most notably used is the ratio of the bottom 20% (B20) to the top 20% (T20), or the inverse. The Palma is the ratio of national income shares of the top 10% (T10) of households to the bottom 40% (B40). Thus, if the richest 10% in a country earn between them half of the national income, and the poorest 40% earn one-tenth of the national income, the Palma is 0.5 divided by 0.1, which is 5. However, this data is mostly available for developed economies and it is not readily

available for developing economies like SSA. Other less-commonly adopted measures of income inequality, perhaps due to the complexities in their measurements are:

2) Income Share Ratio

This measure of inequality is the closest alternative to using the Gini index by researchers and policy makers. These are ratios measuring the percentiles, deciles, or quintiles ratio in the income distribution. For instance, 90/10 ratio is the ratio of the average income of the richest 10% of the population divided by the average income of the bottom 10%. Similarly the 80/20 ratio compares the average income of the richest 20% to the poorest 20% of the population. The same rule applies for measuring the 90/50 and 50/10 ratios (d'Hombres, Weber, & Elia, 2012).

3) Atkinson Index

This index ranges between 0 and 1, with 0 indicating perfect equality and 1 maximum inequality. The index A_ε , is an inequality measure given by:

$$A_\varepsilon = 1 - \left[\frac{1}{n} \sum_{i=1}^n \left(\frac{y_i}{\bar{y}} \right)^{1-\varepsilon} \right]^{\frac{1}{1-\varepsilon}}$$

Where \bar{y} is the average income, y_i is the income of the individual/household i , n is the number of individual/households and ε indicates the degree of aversion to disparity. If $\varepsilon > 0$, then equality is preferred. Thus, as ε increases, more preference is given to income transfers to those at the lower end of the income distribution and less to those at the top of the distribution (d'Hombres *et al.*, 2012).

4) Robin Hood Index

This index ranges from 0 (complete equality) to 100 (complete inequality) and depicts the income that would have to be redistributed (taken from the richer half of the population and given to the poorer half) for the society to be perfectly equal. It is also based on the Lorenz Curve and is equivalent to the maximum vertical distance between the Lorenz curve, and the perfect equality line (diagonal). The Robin Hood index RH formula is as follows:

$$RH = \frac{1}{2} \sum_{j=1}^q \left| \frac{y_j}{y_{total}} - \frac{a_j}{a_{total}} \right|$$

Where q is the number of quantiles, a is the width of the quantile, y_j is the income in the quantile j and a_j is the number (absolute or relative) of income earners in the quantile. y_{total} is the sum

of incomes of all N quantiles and a_{total} is the sum of the income earners in all N quantiles (d'Hombres *et al.*, 2012).

5) Variance/Coefficient of Variation

The variance (σ^2) is a measure of how far each value in the data set is from the mean (dispersion) (d'Hombres *et al.*, 2012). Given as:

$$\sigma^2 = \frac{1}{n} \sum_{i=1}^n (y_i - \bar{y})^2$$

Where y_i is the individual/household income, \bar{y} is the average income and n is the number of individuals/households. It is thus possible to compute the coefficient of variation CV as follows:

$$CV = \frac{\sqrt{\frac{1}{n} \sum_{i=1}^n (y_i - \bar{y})^2}}{\bar{y}}$$

2.1.2 Financial Reforms

In line with McKinnon (1973) and Shaw (1973), financial reform is defined as a government initiative taken to stimulate borrowing, investment and consumption by way of easing pressure in the credit market (Chipote, Mgxeke, & Godza, 2014; Asongu, 2015a). It uses a combination of measures such as interest rate adjustments, regulating liquidity ratios, cash reserve requirements, credit ceilings, capital markets moderations, controlling international capital flows, banking supervision, branch expansion, mergers and acquisitions, microfinance banking regulations and so on. The essence of financial reforms is to achieve efficiency in the sector and foster financial access, deepening and intermediation (Obamuyi & Olorunfemi, 2011; Bae *et al.*, 2012; Edo, 2012; Asongu, 2013). The financial liberalisation process is often characterised by countries experiencing some financial crises such as various combinations of banking sector insolvency, inability to manage government deficits, currency depreciation, and reversal of foreign capital inflows (Law, Tan, & Azman-Saini, 2014; Agnello, Castro, Jalles, & Sousa, 2015).

The macroeconomic objectives of stabilising prices, maintaining full employment, ensuring high economic growth, and internal and external balances are the main goals of economic reforms, therefore financial reforms are an integral part of the country-wide economic reforms undertaken to shift any given economy (McKinnon, 1973; Shaw, 1973). Saddled with the responsibility of achieving this macroeconomic goal is the banking sector - often the targeted

sector within the financial system. The banking sector is expected to play its role in intermediation and be strong enough to be among equal players in international financial markets (Adelakun, 2010; Shittu, 2012; Kotarski, 2015). The evolution of financial reforms is as a result of proffering responses to challenges posed by developments in the financial system such as systemic crisis, globalisation, technological innovation and financial crisis. The deregulation of the banking system often provides the impetus for structural changes and a policy shift to a market-based financial system from direct control (Ikhide & Alawode, 2001; Olofin & Afangideh, 2008; Omankhanlen, 2012). In this vein, financial reforms result in new banking models intended to broaden the scope of financial services offered by banks leading to more efficient and disciplined financial systems.

In countries where the government own and control banks, the interest rates charged on loans are subject to ceilings or other forms of regulations while the distribution of credit is constrained and strictly regulated (Chipote *et al.*, 2014). Other features in such countries are that explicit or implicit taxation also weigh on the volume of financial intermediation (Abiad, Detragiache, & Tressel, 2010) in addition to entry restrictions and barriers to foreign capital flows which limits both domestic and foreign competition. From the 1980s, many economies have liberalised and relaxed their financial sectors, although the process is by no means complete and uniform across countries (Agnello *et al.*, 2012) and the International Monetary Fund (IMF) and the World Bank have played a major role in some countries advising the authorities about their various reform process. Thus, whether the economic crises have been fuelled by the liberalisation process, perhaps because of improper sequencing of reform policies or simply as a result of lack of sufficient supervisory infrastructure, are often discussed in policy circles.

2.1.3 Credit Growth

This research limits credit to ‘*domestic credit to the private sector*’ from the banking system without capturing public sector credits. This indicator is used because the inclusion of public sector credit bloats the volume of credit exposure in the economy and clouds the actual volume of credit extended to the private sector. The increase in credit is one of the probable outcomes of financial reforms and signifies the stability of any financial system (Balassa, 1989). Economic growth and development hinges on the extent to which households and firms have access to credit (Bae *et al.*, 2012). Thus, credit is defined as a contractual agreement in which a borrower receives something of value now and agrees to repay the lender at some date in the future, generally with interest. The term also refers to the borrowing capacity of an individual

or company and it is the amount of loans and advances made available by a bank or financial intermediary to a person or a firm. It is the sum of the amount of funds financial institutions are willing to provide to individuals or firms (IMF, 2010).

Most researchers (Adusei, 2013; Boateng & Abdulrahman, 2013; Frey & Volz, 2013; Chiwira *et al.*, 2016) capture credit growth by the volume of *domestic credit to the private sector* which is a function of several macroeconomic factors. As an economy witnesses rapid development of its financial sector, credit growth occurs (Iossifov & Khamis, 2009). However, in a bid to foster financial deepening is the risk of triggering a ‘credit boom’ which is defined as when some measure of credit experience extreme deviations from its trend, with the implicit supposition that such abnormalities are not supported by fundamentals (Iossifov & Khamis, 2009). An important outcome of the credit boom literature is that incidences of excessive credit growth tend to be synchronised across countries (IMF, 2010). Lastly, the observed growth rate of credit also depends on the development of the financial sector at its initial state in addition to being driven by the interaction of factors of demand and supply.

On the demand side, bank credit is determined by robust economic growth and falling lending rates. The robustness of real economic activity strengthens consumer confidence, increases business drive, driving up consumption demand and the need to secure more loans to finance investment expansion (Igan & Pinheiro, 2011). In addition, households demand credit in order to smoothen out consumption over their life-cycle while firms require finance to expand production lines to meet consumption. Accordingly, credit demand has a negative relationship with borrowing costs but is positively associated with individuals’ current income and wealth, borrowers’ expectations about future income and asset valuations, and the current and future rates of return on capital (Iossifov & Khamis, 2009; IMF, 2010; Central Bank of Nigeria, 2016).

On the supply side, credit growth is encouraged by both reduced liquidity ratios and cash reserve requirements, improved liquid liabilities and bolstered by the high system-wide capital adequacy ratios enabling banks the opportunity to expand their credit portfolios without contravening regulatory standards. So long as lending operations are expected to yield a rate of return on equity that is above the opportunity cost of shareholder funds, the supply of credit will be further driven by the profit-maximising behaviour of banks as this expands their credit profiles. It is appropriate to say that since the expected rate of return on bank lending depends on the interest rate differential between assets and liabilities, operating costs, and the probability

that contracts will be honoured, then the supply of credit is positively related to the rate of return on equity, disposable income, and the prices of assets that can be used as collateral. Therefore, changes in bank creditors' and bank shareholders' perception of the riskiness of their investments can also affect the supply of credit, by influencing the cost of borrowed funds and the opportunity cost of owned funds, respectively (Iossifov & Khamis, 2009; Igan & Pinheiro, 2011; Olusegun, Akintoye, & Dada, 2014; Central Bank of Nigeria, 2016).

2.2 Review of Theoretical Issues

This sub-section reviews several theories underlining the concept of income inequality. A key underpinning theory which influences other theories of persistent income inequality is the financial market imperfections theory. This theory explains how financial market imperfections affect cross-dynasty wage differences among individuals with the same human capital endowment. It states that imperfect market increases the ancestral disparities in human capital with corresponding implications for the persistence of dynastic differences in income and wealth (Becker, 1957; Becker & Tomes, 1979, 1986; Jacoby & Skoufias, 1997; Baland & Robinson, 2000). From this perspective, financial development might be disadvantageous to the poor. Imperfect financial market influences inter-generational persistence of inequality because with perfect credit market, the ability of people going to school increases, irrespective of parental wealth (Levine, 2008; Piketty & Saez, 2011; Piketty, 2014).

In furtherance are the extensive and intensive margin theories. The extensive margin theory borders on broadening the availability and use of financial services by individuals who had not been employing those services because of price or discriminations (Odhiambo, 2014; Orji *et al.*, 2015; Chiwira *et al.*, 2016). That is, financial development will increase the economic opportunities of those who are at a disadvantage and reduce the cross-dynasty persistence of relative incomes (Becker & Tomes, 1979, 1986; Greenwood & Jovanovic, 1990; Bae *et al.*, 2012; Batabyal & Chowdhury, 2015). On the other hand, the intensive margin theory states that finance can affect inequality through an indirect mechanism and directly by enhancing financial services of those already accessing them and these are usually high-networth individuals and well-established organisations (Chipote *et al.*, 2014; Olusegun *et al.*, 2014; Asongu & Tchamyou, 2015).

In the same vein, the shaping of persistent inequality through human capital accumulation is emphasised by human capital theory. It states that the decision of parents to invest in their children's human capital development determines whether there will be persistence in relative incomes across generations and that ability endowments and schooling are complements in the production of human capital (Becker & Tomes, 1979, 1986). Human capital is embodied in individuals while physical capital is not; thus the maximisation of economy-wide return to investment in human capital is by spreading this investment equally across all individuals, but this is not the case with spreading capital ownership across many individuals.

On education, Galor and Moav (2006) argue that unless the capitalists exert the political will to finance public education or the financial markets be developed to facilitate more human capital accumulation by poor families, inequality will persevere and the economy will stagnate. Lastly, the profit theory emanates from the premise that banks' profit maximising behaviour propel them to lend to wealthier firms and households and avoid lending to poor households with low levels of guarantee. This is because, it is assumed that it is riskier lending to them which might contradict a bank's incentive to earn maximum yields on risky assets leading to greater income disparity between the two groups.

Establishing the non-linear relationship is the Kuznets (1955) inverted-U hypothesis which states that income inequality initially increases at the early stages of economic development and thereafter falls. That is, as economic development progresses – in the early stages of economic development, financial markets are either non-existent or under-developed; as the economy grows financial superstructures begin to develop. At this stage the growth and savings rate increase and inequality widens. However, as the economy reaches its final developmental stage, the distribution of income in the economy stabilises, the savings rate falls and the economy converges. Thus, it is expected that inequality will rise at the onset of financial reforms and thereafter falls as the reforms take effect (Greenwood & Jovanovic, 1990; Banerjee & Newman, 1993; Galor & Zeira, 1993). Goldsmith (1969) also theorise that financial superstructures of an economy speed-up economic growth and enhance economic performance to the best that they help in facilitating funds from the surplus to needy areas where such funds will yield the maximum social return and income inequality reduces.

Another is the liquidity constraints theory which states that liquidity constraints impede the business opportunities of the poor thus exacerbating income inequality among economic agents (Evans & Jovanovic, 1989; Holtz-Eakin, Joulfaian, & Rosen, 1994; Black & Lynch, 1996;

Blanchflower & Oswald, 1998; McKenzie & Woodruff, 2006). Closely related is the investment opportunity theory which states that finance can affect cross-dynasty returns to investment. That is when individual investments are constrained by parental wealth, it can create another convexity that fosters persistence inequality (Demirgüç-Kunt & Levine, 2009) and that better access to finance enables the wealthy to invest either through entrepreneurship or in higher-return projects to earn additional income in the form of interests or dividends.

Recently, Sheng (2015b) propounded the savings rate theory by extending the post-Keynesian model that introduces household leverage. The theory states that income inequality is positively associated with the savings rate if savers' funds are allocated to investing firms for production and it is negatively associated with the savings rate if savers' funds are lent to spending households via financial intermediation for consumption (creating income illusion and consumption constraint). With poor households having a higher marginal propensity to consume and a lower marginal propensity to save relative to wealthy households, there is always the need by the former to borrow from the latter to satisfy consumption needs thereby exacerbating income inequality (Scott & Pressman, 2013; Berisha, Meszaros, & Olson, 2015; Sheng, 2015a). Also, in relation to financial globalisation, the negative association between income inequality and savings rate is caused by habitual consumer credit use for deficit spending which aggravates bubble speculation occasioned by lower interest rates (Lambie, 2009; Sheng, 2011).

Lastly, the discrimination theory of Becker (1957) states that discrimination can contribute to inter-generational persistence of inequality. It could be on race, colour, religion, sex, and ethnicity and so on. Discrimination is easily entrenched when little competition exists, but competed away if the barriers of entrance of new firms are sufficiently low. Financial reforms will spur more intermediation resulting in banks seeking-out the best firms to lend to rather than simply granting credit to acquaintances. Therefore, financial system reforms that deepen competition reduce segregation and expand the economic opportunities of excluded groups thereby reducing income inequality. Table 2.1 summarises the theoretical literature on finance and income inequality.

Table 2.1: Main Theoretical Construct on Finance and Income Inequality

S/No.	Theory	Explanation
1	Discrimination Theory Becker (1957)	When there is little competition, discrimination is enforced, but such is competed away if the barriers of entrance of new firms are sufficiently low. Thus, any financial sector reforms that intensify competition will lead to the reduction discrimination and expand the economic opportunities of disadvantaged groups thereby reducing income inequality.
2	Extensive Margin Theory Becker and Tomes (1979, 1986) Greenwood and Jovanovic (1990)	When financial services are increased and made available to those initially excluded due to price, cost of funds or other impediments, income inequality falls.
3	Financial Imperfection Theory Jacoby and Skoufias (1997) Baland and Robinson (2000)	Imperfect market increases the cross-generational differences in human capital with corresponding implications for the continuation of wealth and income inequality across dynasties.
4	Human Capital Theory Becker and Tomes (1979, 1986)	The decision of parents to invest in their children's human capital development determines the extent of persistence of relative incomes across generations.
5	Intensive Margin Theory Becker and Tomes (1979, 1986) Greenwood and Jovanovic (1990)	Finance can affect inequality through an indirect mechanism and directly through the enhancement of financial services of those already accessing the financial system.
6	Inverted-U Hypothesis Kuznets (1955)	Income inequality initially increases at the early stages of financial reforms and thereafter falls as the reforms takes effect.
7	Investment Opportunity Theory Demirgüç-Kunt and Levine (2009)	Finance can affect cross-dynasty returns to investment. That is when individual investments are constraint by parental wealth, it can create another convexity that fosters persistence inequality.
8	Liquidity Constraints Theory Evans and Jovanovic (1989) Holtz-Eakin <i>et al.</i> (1994) Black and Lynch (1996) Blanchflower and Oswald (1998) McKenzie and Woodruff (2006)	Constraints on liquidity hinder the business opportunities of the poor thus exacerbating income inequality among economic agents.
9	Savings Rate Theory Sheng (2015)	Income inequality is positively associated with the savings rate if savers' funds are allocated to investing firms for production and negatively associated with the savings rate if savers' funds are lent to spending households via financial intermediation for consumption (income illusion and consumption constraint).

Source: Researcher's Compilation

2.3 Review of Empirical and Methodological Issues

There remains no general consensus on how best to model the finance-credit-inequality nexus as the empirical evidence varies substantially. While some studies use the computable general equilibrium modelling approach, some analyses are based on natural experiments, firm- and household-level surveys, as well as cross-country regressions. Scholars focus on the microeconomic apparatuses connecting finance and economic opportunity as well as the macroeconomic assessments of an economy's income distribution. Studies also differ in the

empirical approaches, the extent to which they assess causal relationships, and the empirical representations with which income inequality and access to finance are captured. However, each methodological approach has its own weaknesses.

Much of empirical literature investigate the relationship between finance and income inequality using instruments (channels) of financial reforms as indicators with focus *mostly* on developed and emerging economies with very sparse scholarly focus on the effect of credit on income inequality even in these economies. Exclusive studies on SSA are also few due to poor data availability constraints. Thus, this empirical review will be a blend of various reviews on income inequality as it pertains to financial reforms, financial deepening, financial crises and micro-credits. Also, owing to different measures of inequality, methodologies, sample size, geographical coverage and different instruments of finance, there are conflicting results as to the impact of these variables on income inequality.

A strand of the empirical literature has established the determinants of credit growth or bank lending (proxied by domestic credit to the private sector) to be liquid liabilities, non-performing loans, liquidity ratio, cash reserve requirements, banks' capital structure, cyclicity, business cycles, lending rates/interest spread, loan-to-deposit ratio amongst others (Tomak, 2013; Eze & Okoye, 2014; Raunig, Scharler, & Sindermann, 2014; Cucinelli, 2015; Chimkono, Muturi, & Njeru, 2016; Moussa & Chedia, 2016). With particular reference to the banking sector, these studies establish the relationship between credit to the private sector and its determinants and further conclude that movements in the variation of credit volume or bank lending are explained by these factors. That is, the extent to which banks lend is dependent on the performance of the aforementioned determinants.

In the same vein, another branch of empirical literature establishes the existence of a strong and *direct* relationship between finance and income inequality as there are grounds for assuming both beneficial and harmful effects. That is, countries with more developed financial sectors typically grow faster, notably because of improved efficiency in the sector and better allocation of capital, which result in an income-equalising effect (Agnello *et al.*, 2012; Bordo & Meissner, 2012; Asongu, 2013; Delis *et al.*, 2014; Lee, 2014; Anyanwu, Erhijakpor, & Obi, 2016). These studies in their analyses, include domestic credit to the private sector with other financial sector variables – interest rate, entry requirements, cash reserve requirements, broad money supply (M2), liquidity ratio and so on – in explaining this relationship. This is the gap identified in the

literature. That is, the inclusion of domestic credit to the private sector with other financial sector indicators in explaining variations in income inequality, creates an estimation problem resulting in endogeneity bias.

Given the two strands of scholarship (the credit determinants and income inequality theses) and the identified gap, this study conjectures that credit growth is a direct outcome of financial reforms and that financial reform may not have a direct but an *indirect* relationship with income inequality through its influence on credit growth. This modification shows that, given favourable reform indicators, the likelihood of credit volume increasing is high, and with the increase in credit, income inequality declines, *ceteris paribus*. To address the research hypotheses, the impact of financial reform on financial system stability will be examined first because stability is an important factor for any financial system to evaluate the transitory impact on financial reforms on other aspects of the financial market.

The next is the examination of the effects of financial reform on credit growth and thereafter the effect of credit growth on income inequality. In addressing the major arguments of credit growth and income inequality, the combination of financial and some control variables is employed as explained in the data section. To explain the determinants of credit growth while controlling for the effects of GDP growth and inflation rate are liquidity ratio, cash reserve ratio, number of bank branches, liquid liabilities, interest rate spread, and loan to deposit ratio. It is hypothesised that positive movements in these variables will lead to an increase in credit.

Abiad and Mody (2005) pursue a political economy approach in explaining the timing, pace and extent of financial sector reforms since large literatures examine only the consequences of financial sector reforms while the causes of reforms receive less attention. Using an ordered logit estimation technique on 35 countries from 1973 to 1996, they find that international interest rate and balance of payment crises trigger reforms, banking crises have negative impact on reforms, highly repressed economies remain unchanged but once reforms occur they gain momentum overtime, legal systems do not hinder reforms, ideology and structure seem to have less influence on the reform process, left-wing governments are no less reform-oriented than right-wings, presidential and parliamentary governments are also inclined to reforms and greater trade openness appear to increase reform where the level of liberalisation is low. They conclude that countries with a repressive financial systems have the strongest tendency to stay repressed such as Japan, a country is prone to reform the greater the disparity from the region's

reform level, shocks alter status quo through both reforms and reversals, IMF programme conditionality appears to have a strong influence under conditions of high repression with a declining effects thereafter. The paper, though, one of the earliest works on the finance-inequality dynamics, omitted the effects of traditional finance variables such as liquidity ratio, reserve requirements and domestic credit on income inequality.

Similarly, Demirgüç-Kunt and Levine (2009) critique of the theories and evidence on finance and income inequality use the human capital approach of intergenerational ability, education and wealth. They conclude that given theoretical and empirical research, there are potentially high returns on the impact of finance on economic opportunity. According to them, other factors that affects the degree to which an individual's future income is the result of talent and good investment ideas or inherited income are the intergenerational persistence of relative incomes, the distribution of income, improvements in financial markets, contracts, and intermediaries. These reduce income inequality because of financial development. In addition, the ability of parents to invest in their children's education has a positive impact on the child's future income.

Following the econometric pattern of Beck *et al.* (2000) and Calderón and Servén (2004), Batuo *et al.* (2010) examine financial development and income inequality in 22 African countries. Using the system generalised method of moments (Sys-GMM) technique, they find no evidence of Kuznets hypothesis in the data (Clarke, Xu, & Zou, 2003), but that inequality reduces with index of financial reform, broad money (M2), liquid liabilities and domestic credit to the private sector (Banerjee & Newman, 1993; Galor & Zeira, 1993); increases with primary education (Barro, 2000). Their findings also establish that the relationship between financial development and inequality is both correlative and causal and that causality may run in both ways. The identified gap is that the 22 countries were not grouped regionally to give the inequality level on a region-basis.

Agnello and Sousa (2012) also analyse the impact of banking crises on income inequality. Using the Gini index as the inequality variable, they conduct a dynamic panel data analysis with instrumental variables general method of moments (IV-GMM) estimation method on 62 Organisation of Economic Cooperation and Development (OECD) and non-OECD countries from 1980 to 2006 and find that in OECD countries, access to the banking sector helps to reduce inequality and that inequality rises in some periods before a banking crisis and declines afterwards (Kuznets, 1955). Also, inequality is a very persistent variable, which reflects that

changes in the income distribution within the country do not often occur. A major gap in the paper is that the composition of non-OECD countries is unknown thus creating the problem of knowing how many SSA countries are captured in the study.

In the same vein, Agnello *et al.* (2012) extend the works of Abiad *et al.* (2010) by analysing the impact of financial reforms on income inequality with an unbalanced panel data on 62 countries from 1973 to 2005. Using the fixed effects (FE) estimation technique, they find that removing policies toward directed credit, removing or reducing excessive high reserve requirements, improving the securities markets, making the expansion of bank branches easier, having wider banking services and lowering regulation in more democratic societies reduce income inequality. Thus corroborating the works of political-economy researchers (Haber & Perotti, 2008; Benmelech & Moskowitz, 2010; Rajan & Ramcharan, 2011) while the existence of minimum amount of lending to certain 'priority' sectors and trade openness exacerbates income inequality. In spite of the subtlety of the study, only five SSA countries are included and this is not a strong representation of the continent.

Delis *et al.* (2014), using the poverty rate and three typologies of inequality - the Gini index, Theil index, and income percentiles examine how banking regulations affect the distribution of income in some selected countries. The study acknowledges that previous literatures on the relationship between finance and income inequality did not explicitly account for the dynamic nature of regulatory policies relating to the banking sector. They also did not address the specific characteristics of banking regulations in different countries and the evolution of these regulations as a source of income inequality and thus, claim to be the first to analyse this relationship. Using a dynamic unbalanced 3-year average country-level panel data on 87 countries from 1973 to 2005 and while adopting the Sys-GMM and two-stage least squares instrumental variables (2SLS-IV) estimation techniques, they conclude that economic and institutional developments are a precondition for reforms to have a positive effect on the real economy following Laffont (2005). On the Gini index they find that banking deregulation, bank liquidity, overall liberalisations, eliminating credit and interest rate controls, removing entry barriers, enhancing privatisation laws and liberalisation of international capital flows increase the income share of both rich and poor, thus reducing income inequality confirming earlier findings (Greenwood & Jovanovic, 1990; Agnello *et al.*, 2012; Asongu, 2013; Eriemo, 2014) while trade openness, inflation rate, liberalisation of equity market increases inequality. Results from other inequality variants are divergent.

On the impact of income inequality on financial systems, Kaboub, Todorova, and Fernandez (2010) analyse how income inequality led to the US financial crises of 2007-2009. The paper uses Minsky's financial instability hypothesis (FIH) to analyse the sub-prime mortgage crisis and for introducing adequate reforms to restore economic stability. According to Minsky and Whalen (1996), structural inequality leads to financial instability such as real wage income stagnation, increasing real estate prices mean that poor households will never be able to buy a home, and such will only buy homes if real income rises, or if real estate prices decline or government subsidies via down-payment assistance or through low fixed interest rates. The study gives a chronology of the disparity of the income distribution in the US vis-à-vis unethical banking activities in the sub-prime mortgage sector that eventually led to a financial meltdown. Considering the spill-over effects of the US financial crises, perhaps this study should have been extended to analyse the impact of the financial crises on the global economy including SSA countries.

Kaboub *et al.* (2010) and Rajan (2010) attributes the 2007 US financial crisis to rising inequality in the past 30 years while Kregel (2008) attributes it to a failing banker-borrower relationship and the absence of lenders' ability to evaluate risk. Since 1980, persistent economic inequality has intensified in the US and the Gini index has been on a steady rise. Between 1980 and 2004, real hourly wage was \$15.68/hour and for the same period worker productivity increased by 68 percent (United for a Fair Economy, 2006). In 2007, the Federal minimum wage level was 57 percent of the living wage, down from 81 percent in 1979 and 94 percent in 1964 (United for a Fair Economy, 2006). From 1979 to 2006, real average family income barely changed for the poorest 20 percent but income for the richest 20 percent increased by 57 percent and the richest 5 percent by 87 percent (United for a Fair Economy, 2006). Also, since 1980, tax policy took a regressive turn for the poor households: capital gains tax fell by 31 percent; estate tax dropped by 46 percent while payroll tax increased by 25 percent (United for a Fair Economy, 2006). In all these, the Federal Reserve failed to see the destabilizing impact of economic inequality and saw the situation as a way of keeping workers in-check and preventing inflationary pressures.

On the credit-finance-inequality nexus, Bordo and Meissner (2012) use banking and credit data on a study of 14 advanced countries from 1920 to 2008 to analyse the impact of credit boom on financial crisis and secondly, the impact of income inequality on credit growth. The study deploys a mixture of econometric methods ordinary least squares (OLS), linear probability (LPM) and logit models to conclude among others that economic growth drives credit boom

and not inequality. Their results show that a fall in short-term interest rates can lead to a credit boom (Borio & White, 2003; Lambie, 2009; Sheng, 2011); income inequality is not a significant determinant of credit boom and there exist a positive relationship between credit boom and banking crisis (Mendoza & Terrones, 2008; Kaboub *et al.*, 2010; Rajan, 2010). The gap in the literature is the inability to show that inequality can lead to financial crises (Iacoviello, 2008). That is, a widening gap in the income distribution can stimulate reforms in the financial sector that will lead to more financial deepening and efficiency.

In addition, Kumhof and Rancière (2011) using the dynamic stochastic general equilibrium (DSGE) model find that households in the lower deciles borrow to maintain consumption growth due to rising income inequality and stagnant incomes and the increase in debt eventually leads to financial crisis (Sheng, 2015a). According to Atkinson and Morelli (2010), the evidence that income inequality leads to financial crisis is inconclusive. On the widening inequality in the US, McCarthy, Poole, and Rosenthal (2006) point out that the polarised political system has not been able to use the tax structure to redistribute income and fix the educational system thus further exacerbating inequality. Pursuing a similar argument, rising inequality in the US since 1970s is largely due to problems in the educational sector (Goldin & Katz, 2008; Demirgüç-Kunt & Levine, 2009; Rajan, 2010). However, in analysing the US financial crisis, Goldin and Katz (2008) attribute rising inequality to the following factors. First is the stagnating wages and income for lower deciles in the US; second, the median wage has not risen for male workers since 1973; and third, public education has failed to provide the type of training required to get skilled jobs which would have boosted real income and reduced the inequality gap.

Furthermore, Asongu (2013) introduced the concepts of formalisation, semi-formalisation and informalisation and draws motivation from the increasing phenomenon of knowledge economy (Asongu, 2015c) and soaring mobile banking activities (Asongu, 2012) mostly captured by the informal financial sector. The study investigates how financial reforms address the problem of income inequality in Africa through financial sector competition and informal sector inclusion (known as financial inclusion). Using 2SLS-IV technique and panel data on 28 African countries from 1996 to 2010, he finds that improvement of the formal financial sector reduces inequality, improvement of the semi-formal financial sector increases inequality, improvement of the informal financial sector reduces inequality and improvement of the non-formal financial sector reduces inequality.

Other findings are that while formal financial development decreases inequality (Kai & Hamori, 2009; Batuo *et al.*, 2010; Beck, Levine, & Levkov, 2010) financial sector formalisation increases it. Whereas semi-formal financial development increases inequality, the effect of financial semi-formalisation is unclear; both informal financial development and financial informalisation have an income equalising effect and non-formal financial development is pro-poor. Also, the study noted that a large chunk of the monetary base in developing countries does not transit through formal financial institutions; thus the equation of financial depth in the perspective of money supply to liquid liabilities has substantially placed a huge gap in the financial development literature (Asongu, 2015c).

In addition, Lee (2014) investigates the effects of financial globalisation on long-run income inequality and poverty across countries from 1976 to 2004, using cross-country regressions. In similar studies, trade openness is the most commonly used variable for globalisation (Milanovic & Squire, 2005; Epifani & Garcia, 2008) and claims to be the first to use financial integration as a proxy for financial globalisation in inequality models. Using the Gini index data from the World Development Indicators (WDI) and the OLS empirical technique, the results show that financial integration increases income inequality while trade openness, education, natural resources and socialism have income-equalising effects. On critically reviewing the paper, it is observed that the study covers some low and lower middle income countries while the exact number of sub-Saharan countries is not indicated. Also, a composite financial integration variable (i.e. the total foreign liability + assets/GDP) is used in addition to domestic credit to the private sector. While the former shows that it exacerbates inequality the latter is not statistically significant. Thus, there is the need to include more financial indicators such as liquidity ratios, interest rates, cash-reserve requirements, level of broad money (M2) and so on, to test their impact on income inequality.

In analysing the key drivers of income inequality in 17 West African countries from 1970 to 2011, Anyanwu *et al.* (2016) adopt a dynamic sys-GMM on an unbalanced panel and find evidence of existence of the Kuznets curve in the sub-region, which proposed that inequality may rise with the initial increase in per capita income but declines subsequently. Key drivers of inequality in the region are identified to be past levels of income inequality, level of economic development, demographic variables, human capital, natural resources, domestic investment rate, government size, globalisation, democracy, unemployment, foreign aid and civil war. The study omits finance as a key determinant of inequality. That is, credit access to

those in lower- and middle-income groups to consume an array of products and services that they hitherto would not be able to afford. The financial sector is an important aspect of any economy such that lack of access to credit and financial services (financial exclusion) for the low- and middle-income groups further widens the inequality gap. This is because poor households (micro-entrepreneurs) are not availed the necessary financial opportunities required to improve their businesses and earnings/income.

Investigating the effect of credit on citizens' support for redistributive policies, Kus and Fan (2015) using data from the International Social Survey (ISS), the OECD and the European Credit Research Institute (ECRI) find a negative association between citizen support for redistribution and credit use. The study submits to the assertion that attitudes towards redistribution is shaped by credit. That is, the extent by which lower-income households can consume is significantly affected by it and mitigates the impact of income inequality. Since the study is limited to only 17 OECD countries the results may not be generalisable to developing economies. It is therefore imperative to test the hypothesis on low- and middle-income economies such as SSA countries.

In the same vein, Malinen (2013) uses data on the income share of top 1% income earners and bank loans on eight developed economies to analyse the relationship between income inequality and bank credit in a panel co-integration framework and finds that they have a long-run dependency relationship – estimating the relationship between income inequality and credit as a percentage of the real GDP from 1959 to 2008. Results indicate that both the top 1 percent income share and the share of bank loans are driven by stochastic trends and that income inequality has contributed to the increase of bank credit in developed economies after the Second World War. The study shows that credit fluctuations are driven by income inequality; however given the sample size of only eight advanced countries, this outcome may not be easily generalised.

Johansson and Wang (2013) analyse the relationship between oppressive financial policies and inequality across countries. The study shows that financial oppression increases income inequality because it disproportionately affects economic opportunities across a country's population. The study points out that if an economy is financially repressed, its wealthy individuals will have better access to financial support while the poor are inhibited by limited economic opportunities due to constraints in the financial system, often resulting in widening

inequality gap. Argued is the fact that planning authorities often devise and adopt suppressive financial policies, such as interest rate restrictions, credit allocation regulations, capital account controls, and ensuring barriers to entry in the banking sector in order to achieve faster economic growth (Hellmann, Murdock, & Stiglitz, 1998, 2000; Chipote *et al.*, 2014). Likewise, in the presence of incomplete information, such policies can be Pareto-inefficient by providing a direct allocation of limited financial resources, thereby at least partly solving the problems of market failure and financial instability.

Analysing the causes and impact of income inequality from a global perspective, Dabla-Norris *et al.* (2015) investigate the drivers of income inequality using a broad sample of 162 advanced economies, emerging markets and developing countries (EMDC). The empirical approach of pooled OLS and FE estimation techniques is based on a simple model of within-country variation in inequality. They also controlled for disparities in income levels across countries using a panel of five-year data averages over the period 1980 to 2012. They find among other things that in advanced economies, increase in the skill premium exacerbates market income inequality, reflecting the fact that education gains accrue more to those at the higher end of the income chain. Also, relaxation of labour market conditions is linked to higher market inequality and increase the income share of the top 10 percent. Increase in government redistributive spending relative to total spending is associated with a decrease in income inequality.

The study further shows that the income share of the poor and the middle class irrespective of the level of economic development of a country is raised from better access to education (as captured by declining educational inequality), improved health outcomes, and redistributive social policies. Relative to what obtains in emerging economies (EMDCs), financial deepening raises the income shares of the poor and the middle class in advanced economies. This is probably a reflection of the differences in credit allocation and the extent of financial inclusion. The authors conclude that financial deepening in EMDCs must be supported by greater integration in order to close the inequality gap. Central governments must play a central role in alleviating impediments to financial integration with the creation of necessary legal and regulatory frameworks, supporting the information environment by promoting credit information-sharing systems.

The report on income inequality using trade globalisation, financial globalisation and technical change as drivers of inequality shows a rising trend from the early 1990s to the late 2000s in

most countries (United Nations, 2013). From a study of 116 countries, household income inequality increased by 9 percent for the group of high-income countries and by 11 percent for low- and middle-income countries. According to the report, Africa is the region with the largest average decline in inequality about 7 percent, followed by Latin America and the Caribbean, with a decrease of 5 percent. Of particular interest is the impact of financial globalisation and, to a certain extent, skills-based technical change, as important exogenous drivers of inequality. These drivers have in various cases fostered existing patterns of inequality through a stubbornly high-wealth inequality. Likewise, inequality has been aggravated in the past three decades by the adverse effect of exogenous drivers, such as financial and trade globalisation.

In like manner, Kotarski (2015) investigates the evidence of the Kuznets hypothesis on financial deepening and income inequality in China. He finds that China's political economy combines both elements of financial repression, such as the frequent use of reserve ratios to adjust the monetary system. It also uses a repressive deposit rate, and enforces capital allocation to selected policy initiatives to compensate certain social and political agents. This selective monetary policy approach raises income inequality and supports the claim that the financial repression hinders the majority of population from using the benefits of financial deepening. This unequal access does not only translate into economic constraint but is also upheld as a political constraint by insider elite to preserve the existing distribution of political and economic power. Also, in relation to financial deepening, a distinction is made between productive and speculative credit and their impact on income distribution. Overall, the author finds no evidence of the Kuznets hypothesis and concludes that income inequality is predominantly high in China and takes a U-shape.

Using time series analysis, Chukwu and Agu (2009) adopt the Granger causality approach to find out if there is a two-way causality flow between inequality and poverty in Nigeria. While many studies have examined the relationship between inequality and poverty (Aigbokhan, 2000; Beck, Demirgüç-Kunt, & Levine, 2004; Aigbokhan, 2008), the question of whether a causal relationship exists between, inequality and poverty, has received less attention, particularly for African countries, the direction of the causality and any other possible variable that may be found in the linkage. The study adopts the cointegration technique on national poverty index measured by head count index, inequality captured by Gini coefficient, adult literacy rate and unemployment rate for the period 1980 to 2010. They find that there is a bi-directional causality between poverty and inequality in Nigeria at the 5 percent level of

significance and conclude that policy measures toward the reduction of poverty in Nigeria should not only concentrate on poverty but also incorporate policies of equitable distribution to reduce inequality through progressive taxes and subsidies on basic necessities.

Similarly, Berisha *et al.* (2015) employ the Johansen and Engle–Granger methodology to determine if there is a cointegrating relationship between household debt and income inequality in the United States over the time period 1919 to 2009. The results suggest that household debt and income inequality have a cointegrating relationship. Thus, there is evidence to the idea of a ‘debt channel’ of income inequality, in addition to the well-documented channels in the existing literature. These results support the recent academic work by Rajan (2010) demonstrating a significant increase in income inequality in the United States due to the increase in household debt. In line with this, household debt exacerbates inequality as the poor have a higher marginal propensity to consume (MPC) relative to the rich and often have to resort to borrowing (ironically from the rich who mobilise funds for lending) to smoothen-out consumption (Berisha *et al.*, 2015; Sheng, 2015b, 2015a).

Likewise, Nwachukwu and Besong (2015) provide an assessment of how differences in income inequality may influence the relationship between finance and changes in the overall United Nations Development Programme (UNDP) weighted index of human welfare on 29 SSA countries. More specifically, the study aims to complement the large literature on the finance-growth nexus by examining whether an interaction between changes in the financial sector and income distribution produces any discernible impact on human welfare. It adopts a dynamic panel data framework using the conventional Johansen’s maximum likelihood co-integration approach with the associated vector error correction model (VECM). They argue that countries where inequality in income distribution is relatively high, economic agents in all income strata are incentivised to divert a larger percentage of savings to long-term risky projects. The anticipated higher returns to capital results in a divergence in human welfare, with residents of those states where the average Gini index is greater than 45 percent forging ahead of their peers in the more equal countries. They report that the size of deposit intermediaries fuels greater rate of improvement in wellbeing in the high inequality countries rather than financial deepening.

In a budding strand of empirical literature, Agnello *et al.* (2015) investigate causes of financial reforms via fiscal consolidation. They used the probit and logit models on annual data for a panel of 17 OECD countries over the period 1980 to 2005 to find that financial reforms is

promoted by large austerity plans, mainly implemented through spending cuts rather than tax hikes. Also, when fiscal adjustments are put in place there is the tendency that reforms in the banking sector are more likely to occur. Similarly, while banking sector reforms are mainly prompted during periods of tax drive consolidations, spending cuts driven consolidation packages seem to propel the implementation of domestic finance reforms. Lastly rising inflation, lower degree of trade openness, worsening financial conditions and, to some extent, a fall in the degree of competitiveness raises the likelihood of financial reforms. That is, in such situation, fiscal adjustments can pave the way for important reforms of the banking sector.

von Ehrlich and Seidel (2015) analyse the regional implications of financial market development, industry location and income inequality by developing a heterogeneous-firms model with trade in goods, labour mobility and credit constraints due to moral hazard. The study builds a hypothetical framework of two regions and two sectors. They show that better access to external funds reduces the incentives for mobile workers to cluster in one region such that economic activity is dispersed and income is more equally distributed. This result stands in contrast to previous research in the finance and inequality literature where globalisation of financial markets is shown to cause more inequality (Atif, Srivastav, Sauybekova, & Arachchige, 2012; United Nations, 2013).

On the other hand, Hermes (2014) uses a sample of 70 developing countries to address the question of whether participation of the poor in microfinance contributes to reducing a country's level of income inequality. The Gini index is the inequality variable while microfinance intensity as measured by the number of active borrowers relative to total population ranges from 2.9 percent in Asia, to 1.9 percent in Latin America, 1.6 percent in Europe and only 0.8 percent in Africa. Relatively, Africa has the lowest proportion of population with access to micro-credit. 41 percent of countries in the study are from Africa. Employing the OLS and instrumental variables (IV) estimation techniques, the study shows that higher levels of microfinance participation are indeed associated with a reduction of the income gap between the rich and poor. The analysis supports the suggestion that microfinance is an appropriate tool to reducing the income gap between the rich and poor in developing countries. This in effect have the potential to directly help the poor since it enables them to engage in self-employment and play an active role in the economy giving them the opportunity to smoothen consumption, increase their relative incomes, expand their asset base and break-

out of poverty. The study acknowledges that data do not cover all microfinance institutions in the countries in the sample.

In the same vein, Kasali, Ahmad, and Ean (2015) use a sample of 1,134 microfinance loan beneficiaries and non-beneficiaries from three states in South-West Nigeria to analyse the relationship between microfinance loan and the income of the rural poor. Primary data collected include the demographic characteristics of the respondents, business and owner's profile, consumption expenditure, loan procurement procedure, assets and business management among others. In addition, operators of microfinance institutions in the study area were also interviewed on their mode of operations, problems faced on the clientele and the assistance required from the government. Using descriptive statistics and multiple regression models, the results reveal that microfinance has negligible income effects on the rural poor. This negligible impact is due to the poor enabling environments of microfinance institutions from functioning effectively and efficiently.

Adeleye, Osabuohien, Bowale, Matthew, and Oduntan (2017) conduct a more recent study on the relationship between financial reforms and credit growth in Nigeria from 1980 to 2016. Using secondary data from World Bank (2016) and the autoregressive distributed lag model, error correction model, and bounds testing approaches, the study finds evidence supporting the McKinnon-Shaw hypothesis which states that at higher real interest rates financial intermediation evidenced by credit growth increases. Other findings show that in the long-run, financial system deposits, inflation rate and per capita GDP have strong asymmetric impacts on credit growth and real interest rates (the financial reform indicator). Results also indicate that a long-run cointegration relationship exists between domestic credit and other covariates and likewise between the real interest rate and its regressors.

Lastly, using a combination of time series analyses and macro-panel regressions, the UNDP (2017) Report highlights the different dimensions of income inequality and clarifies its equalising and dis-equalising factors. Among the factors that equalises the income distribution are subsidies and transfers, in SSA. The study finds, among others that secondary education, direct taxation and efficiency of tax administration, well-targeted social expenditure and enhanced agricultural productivity which has helped reduce rural poverty gaps and inequality. The inequality-aggravating factors include rising foreign direct investments (FDI) in extractive industries and a surge of terms of trade in resource-rich countries, which polarise income

disparities, a suboptimal structural transition of the economy from a low-inequality crop agriculture to high-inequality sectors such as livestock production, commerce, transport, and formal and informal services in both urban and rural areas, which drives inequality in a number of countries and an unequal distribution of socioeconomic and physical facilities between rural and urban areas and across regions, which drives income disparities, among others. Table 2.2 presents a summary of schedule in the empirical and methodological review of literature.

2.4 Summary of Gaps Identified in Literature

Based on the reviewed literature, the gaps identified are itemised as follows: (1) there is sparse (but growing) literature on the exclusive study of income inequality in SSA. Only few countries are often included among a broader sample of developed, emerging or transition economies; (2) there is not much examination about the stability of the financial sector after a financial reform; (3) the inability of studies to separately analyse the impact of financial reform on credit growth and the inability to separate the effect of credit growth from other financial reform indicators on income inequality; and (4) in analysing the relationship between finance and income inequality, *domestic credit to the private sector/GDP* (proxy for credit growth and a measure of financial depth) is often included among the explanatory variables; thus, masking its impact on income inequality in addition to causing endogeneity bias among the explanatory variables. Thus, one might conclude that the relevance of credit growth on income inequality is contingent on financial reforms. In essence, the extant literature for the most part, has not explored the complex link, which this study intends to address.

Table 2.2: Summary of Studies on Financial Reforms and Income Inequality

S/No.	Author(s)/Paper	Year	Methodology/Data	Outcome
1	Adeleye <i>et al.</i> Financial Reforms and Credit Growth In Nigeria: Empirical Insights from ARDL and ECM Techniques	2017	Methodology: Autoregressive distributed lag (ARDL) model, error correction model (ECM) and Bounds testing Data: Nigeria (1980 - 2015)	1) Financial reforms (proxied by the real interest rate), inflation rate and financial system deposits are positive predictors of credit growth in the long-run while investment positively predicts same in the short-run. 2) GDP per capita growth has a negative impact on credit growth in the long-run. 3) Findings provide evidence to the McKinnon (1973) and Shaw (1973) hypotheses.
2	UNDP	2017	Methodology: Time series and panel regressions Data: 29 African countries (1991 - 2011)	1) Factors mitigating income inequality: subsidies and transfers, secondary education, direct taxation and efficiency of tax administration, social expenditure and enhanced agricultural productivity. 2) Factors aggravating inequality: rising foreign direct investments (FDI) in extractive industries, a suboptimal structural transition of the economy from a low-inequality crop agriculture to high-inequality sectors
3	Anyanwu <i>et al.</i> Empirical Analysis of the Key Drivers of Income Inequality in West Africa	2016	Methodology: Dynamic System GMM Data: 17 African countries (1970-2011)	1) Population density, natural resource dependence, unemployment, domestic investment rate, government consumption expenditure, trade openness, inward foreign direct investment, international remittances, and civil conflicts increase inequality while human capital, democracy reduces it. 2) Evidence of the Kuznets curve.
4	Kus and Fan Income Inequality, Credit and Public Support for Redistribution	2015	Methodology: Multilevel Regression Technique Data: 17 OECD countries (1970-2011)	Finds a negative association between credit use and citizen support for redistribution.

S/No.	Author(s)/Paper	Year	Methodology/Data	Outcome
5	Dabla-Norris et al. Causes and Consequences of Income Inequality: A Global Perspective	2015	Methodology: Ordinary least squares (OLS) and fixed effects models Data: 162 countries (1980-2012)	1) In advanced economies, increase in the skill premium exacerbate market income inequality. 2) Easing of labour market regulations is associated with higher market inequality and increase the income share of the top 10%. 3) Increase in government redistributive spending relative to total spending is associated with a decrease in income inequality. 4) Better access to education, improved health outcomes, and redistributive social policies help raise the income share of the poor and the middle class irrespective of the level of economic development of a country. 5) Financial deepening raises the income shares of the poor and the middle class in advanced economies.
6	Kotarski Financial Deepening and Income Inequality: Is There any Financial Kuznets Curve in China? The Political Economy Analysis	2015	Methodology: Historical institutionalism approach, Hukou System Data: China (1980 - 2011)	1) Income inequality is predominantly high in China and takes a U-shape. 2) No evidence of the Kuznets hypothesis.
7	Berisha et al. Income Inequality and Household Debt: A Cointegration Test	2015	Methodology: Johansen and Engle-Granger Cointegration Data: United States (1919-2009)	1) Household debt and income inequality have a cointegrating relationship. 2) Household debt exacerbates inequality.
8	Nwachukwu and Besong Financial Intermediation, Income Inequality and Welfare in Sub-Saharan Africa	2015	Methodology: VECM Data: 29 African countries (1990-2010)	Evidence of a long-run equilibrium relationship between the aggregate human welfare and the chosen indicators of financial development and income inequality, after controlling for other ancillary variables.
9	Agnello et al. Fiscal Consolidation and Financial Reforms	2015	Methodology: Logit and Probit Data: 17 OECD countries (1980-2005)	1) Large austerity plans, mainly implemented through spending cuts rather than tax hikes, promote financial reforms. 2) Banking sector reforms and domestic finance reforms are more likely to occur when fiscal adjustments are put in place.
10	von Ehrlich and Seidel Regional Implications of Financial Market Development: Industry Location and Income Inequality	2015	Methodology: Heterogenous-firm Model	Better access to external funds reduces the incentives for mobile workers to cluster in one region such that economic activity and thus income is more equally distributed.

S/No.	Author(s)/Paper	Year	Methodology/Data	Outcome
11	Kasali et al. What Impact does Microfinance Loan Have on Incomes of the Rural Poor in Nigeria?	2015	Methodology: Descriptive Statistics and Multiple Regression Model Data: South-West Nigeria	Due to the poor enabling environment, microfinance has negligible income effects on the rural poor.
12	Delis et al. Bank Regulations and Income Inequality: Empirical Evidence	2014	Methodology: dynamic unbalanced panel data, system-GMM and 2SLS-IV Data: 87 countries (1973-2005)	1) Reduce inequality: banking deregulation, overall liberalisation, abolishing credit and interest rate controls, abolishing entry barriers, bank liquidity, enhancing privatization laws and liberalisation of international capital flows, GDP per capita, education. 2) Increase inequality: liberalisation of equity market, inflation, trade openness.
13	Lee Globalization, Income Inequality and Poverty: Theory and Empirics	2014	Methodology: Ordinary least squares (OLS) Data: No of countries not stated (1976-2004)	1) Financial integration increases inequality while trade, education, natural resources and socialism reduces inequality. 2) Evidence of Kuznets' hypothesis.
14	Hermes Does Microfinance Affect Income Inequality?	2014	Methodology: Ordinary least squares (OLS) and Instrumental variables (IV) Data: 70 developing countries	Higher levels of microfinance participation are associated with a reduction of the income gap between the rich and poor.
15	Asongu How Do Financial Reforms Affect Inequality Through Financial Sector Competition? Evidence From Africa.	2013	Methodology: Two stage least squares instrumental variables (2SLS-IV) Data: 28 African countries (1996-2010)	Improvement of the formal financial sector, semi-formal financial sector, informal financial sector, non-formal financial sector reduce income inequality.
16	Malinen Does Income Inequality Contribute to Credit Cycles?	2013	Methodology: Panel Cointegration Framework Data: 8 countries (1959-2008)	1) Both the top 1% income share and the share of bank loans are driven by stochastic trends. 2) Income inequality has contributed to the increase of bank credit in developed economies.
17	Johansson and Wang Financial Sector Policies and Income Inequality	2013	Methodology: Instrumental variables (IV), Modeling Average Method and generalised method of moments (GMM) Data: 90 countries (1981-2005)	Financial repression tends to increase income inequality
18	Agnello and Sousa How do Banking Crises Impact on Income Inequality?	2012	Methodology: dynamic panel data using IV-GMM Data: 62 OECD/non-OECD countries (1980-2006)	1) Access to banking sector helps to reduce inequality. 2) No evidence of Kuznets hypothesis.

S/No.	Author(s)/Paper	Year	Methodology/Data	Outcome
19	Agnello <i>et al.</i> Financial Reforms and Income Inequality	2012	Methodology: unbalance panel data; fixed effects model Data: 62 countries (1973-2005)	Reduce inequality: removal of policies toward directed credit, removal of excessive high reserve req., improvements in the securities market; easiness of expansion of bank branches; wider banking services; lower regulation in more democratic societies.
20	Bordo and Meissner Does Inequality Lead to a Financial Crisis?	2012	Methodology: Linear probability model, logit, OLS Data: 14 advanced countries (1988-2008)	1) Economic growth drives credit boom and not inequality; 2) Fall in short-term interest rates lead to a credit boom; 3) Income inequality is not a significant determinant of credit boom; 4) Positive relationship between credit boom and banking crisis.
21	Kumhof and Rancière Inequality, Leverage and Crises	2011	Methodology: Dynamic stochastic general equilibrium (DSGE) model	Households in the lower deciles borrow to maintain consumption growth due to rising income inequality and stagnant incomes and the increase in debt eventually lead to financial crisis.
22	Batuo <i>et al.</i> Financial Development and Income Inequality: Evidence from African Countries	2010	Methodology: System-GMM Data: 22 African countries (1973 - 1996)	1) Inequality reduces with index of financial reform, M2, liquid liabilities and domestic credit to the private sector and increases with primary education. 2) No evidence of Kuznets hypothesis.
23	Kaboub <i>et al.</i> Inequality-Led Financial Instability	2010	Methodology: Minsky's Financial Instability Hypothesis (FIH) Data: United States (2007-2009)	Real wage income stagnation led to financial crises through the sub-prime mortgage sector.
24	Rajan Fault Lines: How Hidden Fractures Still Threaten the World Economy	2010	Methodology: Analytical Review of US Financial Crisis Data: United States (2007-2009)	Rising income inequality in the past 30years and stagnant real wage income of the lower and middle class led to the 2007 US financial crisis.
25	Demirgüç-Kunt and Levine Finance and Inequality: Theory and Evidence	2009	Methodology: Human capital approach	The intergenerational persistence of relative incomes, the distribution of income, improvements in financial markets, contracts, and intermediaries reduce income inequality.
26	Chukwu and Agu Multivariate Causality Between Financial Depth and Economic Growth in Nigeria	2009	Methodology: Granger-Causality Approach Data: Nigeria (1980-2010)	Bi-directional causality between poverty and inequality exists.
27	Abiad and Moody Financial Reform: What shakes it? What shapes it?	2005	Methodology: Ordered Logit Data: 35 countries (1973 - 1996)	1) International interest rates, balance of payment crises, trade openness trigger reforms; 2) Banking crises set reforms back; 3) Highly repressed economies remained that way but once reforms occurred it gained momentum overtime.

CHAPTER THREE

STYLISTED FACTS

This chapter discusses factual evidence on the extent and behaviour of income inequality (represented by the Gini index) from four standpoints: the global trend, the trend in SSA, trends across the four sub-regions in SSA and lastly the trends specific to Cameroon, Kenya, Nigeria and South Africa, the countries of focus. Although, these four countries may not adequately represent the continent given its diverse socio-economic heterogeneity, as earlier substantiated, their choice is intuitive for three reasons: each represents a sub-region; they are dominant players in the continent particularly in their respective regional economic blocs; and their trends of inequality differ which makes comparative analysis relevant.

3.1 Global Income Inequality

In reference to income distribution, and using traditional Gini measures, Africa is the second most unequal region in the world after Latin America (Milanovic, 2014; Klasen, 2016). This finding is not new probably because it is also the result of the congenital inequality Africa obtained from colonialism upon attaining independence (Leibbrandt, Finn, & Woolard, 2012; Piraino, 2015). However, what is less clear is the extent to which the level of income inequality has changed since independence and in this respect there is certainly variation across countries. After a decade of high growth, a new plot of hopefulness has taken hold of SSA and its economic prospects. Given encouraging growth rates, there has been some poverty reduction and some positive advancement in sectors such as health and education (United Nations, 2010; Klasen, 2016).

There is growing general acknowledgement that inequality is the issue of our time as there is little definitive analysis of income inequality trends on the continent. Income inequality impedes progress in different ways. This is demonstrated, particularly, by research in developed countries, where it has been found that more equal societies do better on a whole host of health and social indicators (Wilkinson & Pickett, 2010). From the Afro-pessimism regularly expressed during the 1980s and 1990s, the continent has become the subject of increasing optimism in some quarters, based on the booming economy (AfDB, 2012; Africa Tax and Inequality Report, 2014). This is commonly noted by mainstream economic commentators, who see that many of the world's fastest growing economies are in SSA. Many are therefore asking how the proceeds of growth are being shared. Is growth accompanied by decreasing

inequality, with a greater share of income going to the poor? Or is income inequality increasing across the region? It is intuitive analysing SSA’s inequality behaviour within the context of a global perspective. Thus, using the Gini index data from Lahoti *et al.* (2016) which covers 161 countries (of which 43 are in SSA), statistics reveal that SSA is the most unequal region with an average Gini index of 60.23, while ECA has the lowest average index of 33.39. Figure 3.1 shows the global average Gini index across the seven regions⁷.

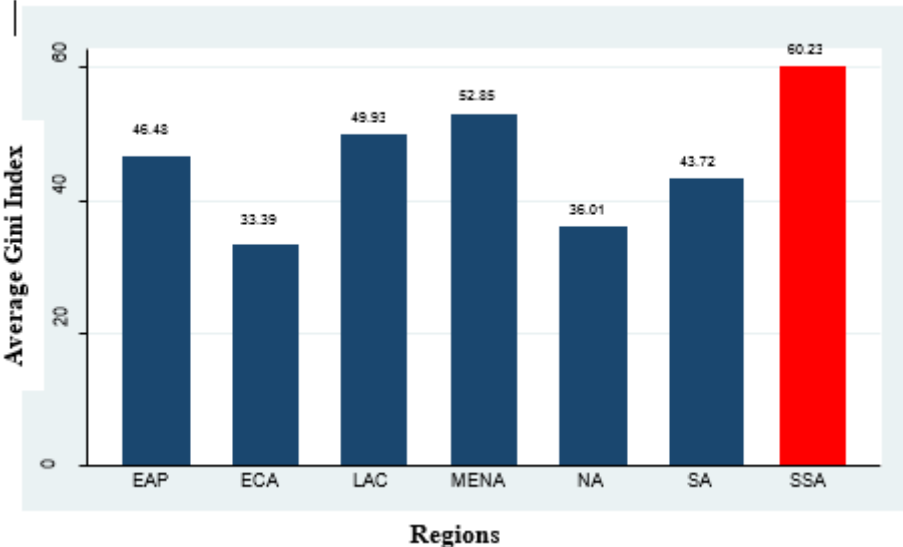


Figure 3.1: Gini Index, Global (1980 – 2015)
Note: Europe and Central Asia (ECA), East Asia and the Pacific (EAP), Latin America and the Caribbean (LAC), Middle East and Northern Africa (MENA), North America (NA), South Asia (SA) and Sub-Saharan Africa (SSA)
 Source: Researcher’s Computation from Lahoti *et al.* (2016)

However, using a two-period analysis and despite having the highest average inequality index, the trend analysis shows that the SSA region has the highest percentage decline (-4.06) in income inequality followed by SA (-2.35) and LAC (-1.85). As shown in Table 3.1, and in line with UNDP (2013) findings, statistics reveal increasing inequality in the developed economies of Europe and North America with 15.84 percent and 5.89 percent respectively while globally and on average, inequality increased slightly by 0.85 percent. The global trend further shows that household income inequality has been falling in SSA and SA since the late 2000s.

⁷In line with the United Nations demographic structures, countries are grouped across seven (7) regions: Europe and Central Asia (ECA), East Asia and the Pacific (EAP), Latin America and the Caribbean (LAC), Middle East and Northern Africa (MENA), North America (NA), South Asia (SA) and Sub-Saharan Africa (SSA).

Table 3.1: Change in Gini Index, Global (1980 – 2015)

Region	Countries	1980 - 2015	1980 - 1999	2000 - 2015	% Change
Europe and Asia Pacific	21	46.48	46.14	46.91	1.67
East and Central Asia	49	33.39	31.18	36.12	15.84
Latin America and The Caribbean	27	49.93	50.34	49.41	-1.85
Middle East and North America	11	52.85	53.1	52.54	-1.05
North America	2	36.01	35.09	37.16	5.89
South Asia	8	43.72	44.17	43.13	-2.35
Sub-Saharan Africa	43	60.23	61.32	58.83	-4.06
SSA	161	46.08	45.91	46.3	0.85

Note: Percentage change is computed as: $\left[\frac{(\text{period } 2000 \text{ to } 2015) - (\text{period } 1980 \text{ to } 1999)}{(\text{period } 1980 \text{ to } 1999)} \times 100 \right]$

Source: Researcher's Computation from Lahoti *et al.* (2016)

3.2 Income Inequality in Sub-Saharan Africa

The African Development Bank report on income inequality in Africa, AfDB (2012) finds that: “In the 2000s, six of the world’s ten fastest-growth countries were in Africa, but this has not significantly helped to equal incomes or to redistribute wealth” (pp. 2). Could the type of growth being experienced in the region itself be driving inequalities? Very little information and analysis are available to answer these questions. By 2010, six of the ten countries in the world with the most unequal income distribution were in the region (AfDB, 2012), and the countries with the most unequal income distribution include Namibia, Comoros, South Africa, Angola, Botswana, Lesotho and Swaziland, with the sub-region of Southern Africa showing a striking concentration of countries which suffer from remarkably high income inequality levels. Graphically, the trend of the Gini index for SSA as shown in Figure 3.2 reveals that the Gini index began a downward slide from 61.04 in 1980 to 58.89 in 2006 from where it rose slightly to 59.00 in 2007 and thereafter dropped to 57.74 in 2015.

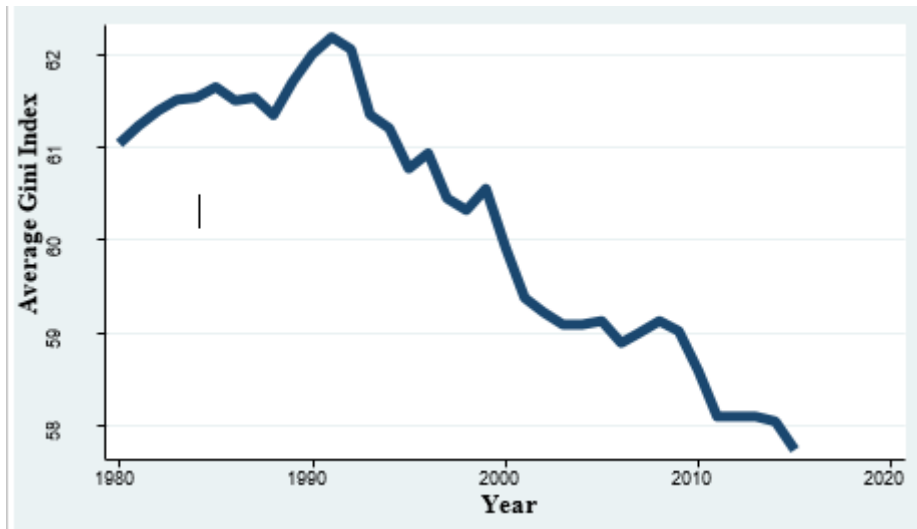


Figure 3.2: Gini Index, SSA (1980 – 2015)
 Source: Researcher’s Computation from Lahoti *et al.* (2016)

On the global scale, SSA has the highest average Gini index and the highest declining rate of income inequality. Given these mix of statistics, it is evident that the region is witnessing a blend of countries experiencing rising and falling inequality. Comparatively, Figure 3.3 shows the sub-regional breakdown of the average Gini index. The average index in East Africa (58.49) and Central Africa (59.34) are slightly below the regional average of 60.10⁸ while that of West Africa (60.93) and Southern Africa (64.39) are above same.

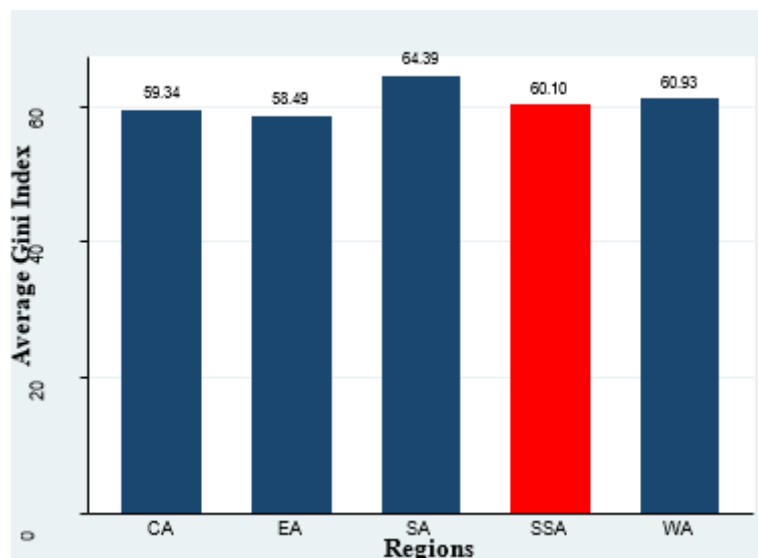


Figure 3.3: Gini Index, SSA Sub-regional Averages (1980 – 2015)
 Source: Researcher’s Computation from Lahoti *et al.* (2016)

⁸Slight differences in SSA average is due to approximations

Table 3.2 shows the within-region variation of the Gini index and that all the sub-regions witnessed declining index with West Africa having the highest (-8.37) followed by Southern Africa (-2.38).

Table 3.2: Change in Gini Index, SSA (1980 – 2015)

Region	Countries	1980 - 2015	1980 - 1999	2000 - 2015	% Change
Central Africa	8	59.33	59.7	58.86	-1.41
East Africa	14	58.49	58.74	58.18	-0.95
Southern Africa	5	64.39	65.06	63.51	-2.38
West Africa	16	60.93	63.23	57.94	-8.37
SSA	43	60.19	61.32	58.79	-4.13

Note: Percentage change is computed as: $\left[\frac{(\text{period 2000 to 2015}) - (\text{period 1980 to 1999})}{(\text{period 1980 to 1999})} \times 100 \right]$

Slight disparity in average Gini index for SSA is due to rounding up.

Source: Researcher’s Computation from Lahoti *et al.* (2016)

Having established that the SSA region has the highest inequality index at 60.10 amidst a negative change in inequality by 4 percent indicating that inequality is declining in the region, the study of inequality merits attention in a bid to proffer remedial solutions. In view of this, the next section will be to examine the trends of income inequality in the selected economies which are a mix of varying inequality levels all of which are classified as having very high income inequality.

3.2.1 Income Inequality in Cameroon

According to the United Nations Economic Commission for Africa (2015) report, the possibility of Cameroon achieving the goal of eradicating extreme poverty and hunger including reaching a poverty level of less than 25.1 percent is uncertain given its current level of economic growth. Despite being one of the richest countries in SSA, poverty remains a serious problem in Cameroon (Lynch, 1991; Fambon *et al.*, 2014; Fambon, 2017). Different colonial experiences between the western and eastern regions of the country have left different legacies of education, infrastructure, and economic opportunity. The country exhibits ample regional disparities in income and living standards. The noticeable differences in income between urban and rural households, and the disproportionate number of subsistence oriented farmers who are poor, begin to provide a basis of orienting policy and targeting programs to alleviate poverty (Baye Menjo & Fambon, 2002; Fambon, 2017).

The need to bridge the widening inequality gap has motivated the suggestion of various options that may be available to policymakers such as structural reforms in the forestry sector (OECD, 2002; Makoudjou, Levang, & Tieguhong, 2017), including the importance of efficient financial intermediation (Fambon, 2017). Despite some improvements, inequalities between men and women persist while in general, inequalities are more pronounced in rural areas (Lynch, 1991; Fambon *et al.*, 2014). From Figure 3.4, the average income inequality index is 58.08 and the country is classified to be experiencing very-high income inequality. The trend of the country’s inequality index reveals that the index was stable from 1980 to 1998 from where it begins a steady ascent from 58.13 in 1999 to 58.80 in 2015.

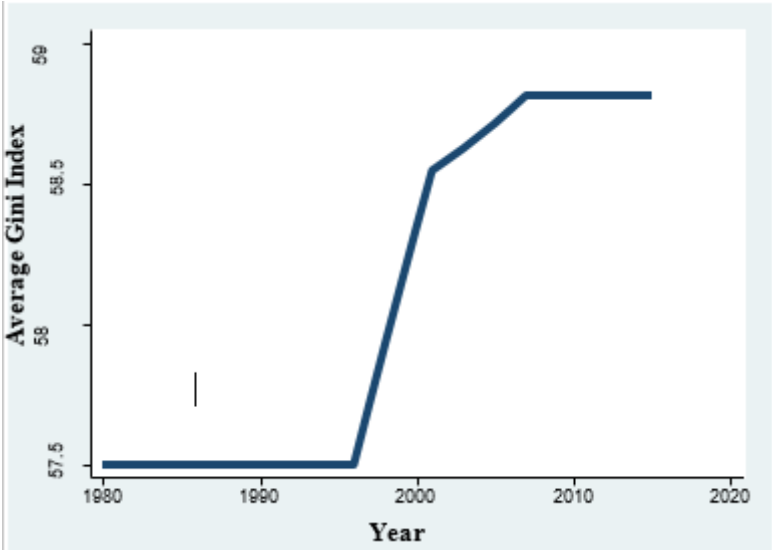


Figure 3.4: Gini Index, Cameroon (1980 – 2015)
 Source: Researcher’s Computation from Lahoti *et al.* (2016)

3.2.2 Income Inequality in Kenya

According to Africa Tax and Inequality Report (2014), despite Kenya’s steady growth in recent years, the remains one of the most unequal societies in the world and hosts one of the world’s biggest slums. An estimated 38% of total income remains in the hands of the top 10% of the population, while the bottom 10% controls only 2% of income. In Nairobi, about 60% of the population lives in slums on about 5% of the land area, which has negative implications for both human security and economic development. Inequality has been rising in Kenya since 1994, but as newly published data shows, has begun to reduce somewhat since 2005. World Bank data, discussed earlier, showed clearly that as income inequality was rising the rich were getting richer and the poor were getting poorer. The richest 10% of society increased their income share by 16% between 1994 and 2005, while the poorest 40% saw their share of income

fall by 14%. The richest decile was reported in 2005 to hold 38% of national income, compared to only 2% for the poorest decile, a huge disparity. It is also widely recognised that the high income inequality level is holding back progress in poverty reduction, with particularly negative impacts on the high rural poverty rates. This poor performance is all the more disappointing given that Kenya is economically stable, has enjoyed good growth rates and benefits from a relatively efficient tax collection system and moderate levels of tax revenue. The average income inequality index is 60.35 and the country is also classified as experiencing very-high income inequality. The trend of its inequality index shown in Figure 3.5 indicated that the country’s index began a steady rise from 57.30 in 1980 to 63.59 in 1992, and then witnessed a steady decline to 59.9 in 1999. It rose slightly to 60.03 in 2000 and maintained a steady pace to 60.50 in 2015.

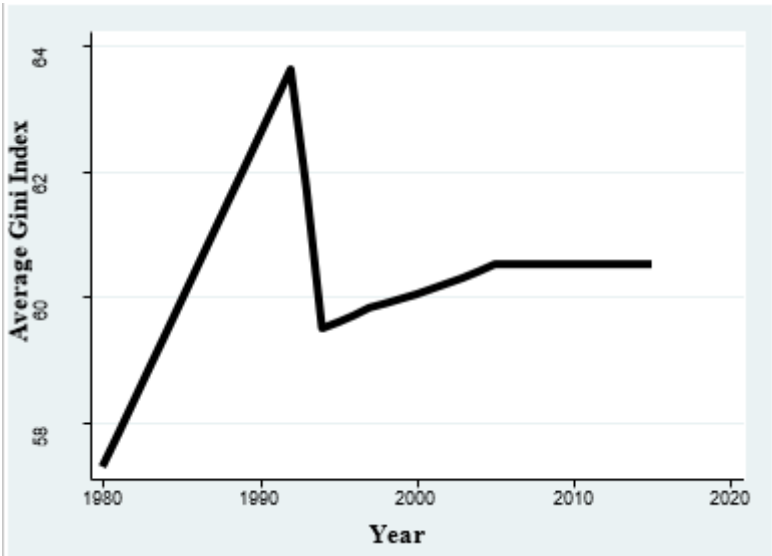


Figure 3.5: Gini Index, Kenya (1980 – 2015)
 Source: Researcher’s Computation from Lahoti *et al.* (2016)

3.2.3 Income Inequality in Nigeria

Income inequality is rising strongly in Nigeria. Between 1986 and 2010, there has been a 75% increase in the concentration of income in the country. It is also clear that this trend is not just a result of the rich getting richer. There is clear evidence that this is at the expense of the poor who are also getting poorer, and are therefore actively impoverished in this process. rising inequality is leading to less stable and more violent and conflictive societies with protests centred around issues such as corruption, rising utility prices, growing inequality and the visibly-increasing concentration of economic power in multinationals (Africa Tax and Inequality Report, 2014). Relative to the studies on poverty levels, there have been sparse

studies on the subject of income inequality in Nigeria (Aigbokhan, 2000, 2008; Osahon & Osarobo, 2011; Nuruddeen & Ibrahim, 2014; Kolawole, Omobitan, & Yaqub, 2015; Ogbeide & Agu, 2015). Considered as one of the fastest growing economies in the world (AfDB, 2012; Africa Tax and Inequality Report, 2014; World Bank, 2015) and given the abundant human and natural resources, the country is witnessing an increasing rate of socio-economic inadequacies. These include: a high rate of poverty both at the regions and at the national level, high unemployment rate, high income inequality, low quality human capital, high percentage of population on welfare and high emigration in the face of harsh economic realities (Odedokun & Round, 2001; Ogbeide & Agu, 2015). Figure 3.6 reveals the pattern of income inequality in Nigeria. In 1980, the Gini index was 50.61 and rose to 60.07 in 1992, dipped slightly to 58.77 in 1996, climbed again to 58.87 in 2009 before a downward trend to 48.83 in 2015.

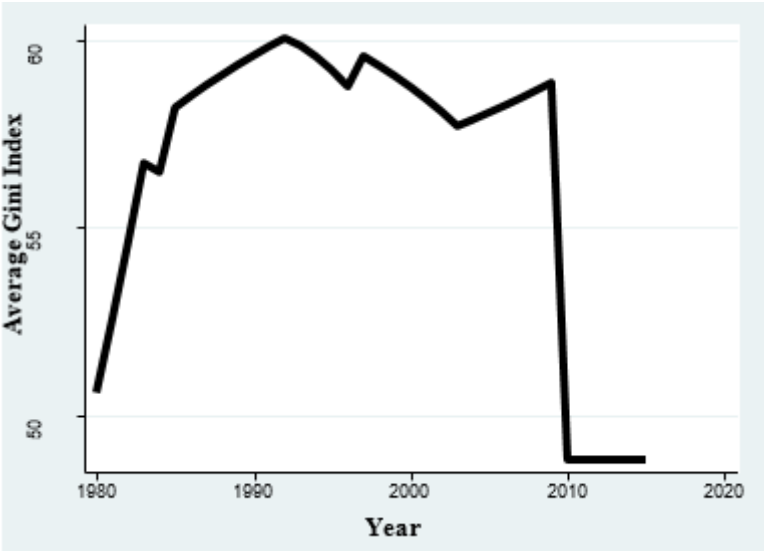


Figure 3.6: Gini Index, Nigeria (1980 – 2015)
 Source: Researcher’s Computation from Lahoti *et al.* (2016)

3.2.4 Income Inequality in South Africa

As mentioned earlier, the Southern African countries constitute the larger percentage of unequal countries in the world. In particular, income inequality is extremely high in South Africa – one of the highest rates in the world – and, according to the country’s household surveys, consistently increasing. Income inequality also has a clearly racial dimension. Poverty and unemployment continue to determine the limits of transformation, and macro-economic policy choices have not had any significant positive impact on poor people since 1994 (Africa Tax and Inequality Report, 2014). There are several studies on inequality in South Africa which

emphasises the country’s colonial history and the practice of apartheid, as a result, income inequality has a strong ethnic dimension (Leibbrandt *et al.*, 2012; Harris & Vermaak, 2014; Piraino, 2015; Wittenberg, 2015; Akanbi, 2016). Several attempts have been made to redressing this scenario since the end of apartheid, with various economic development strategies including black economic empowerment initiatives and land reforms but these are seen as piecemeal and relatively ineffective. From Figure 3.7, the Gini index was 62.94 in 1980 and rose to 70.69 in 1994 which represents a significant 12.31 percent increase in the inequality index. It dipped slightly to 64.52 in 1995 and maintained a wobbly pattern to 63.98 in 2001 from where it maintained a steady rise to 66.24 in 2015.

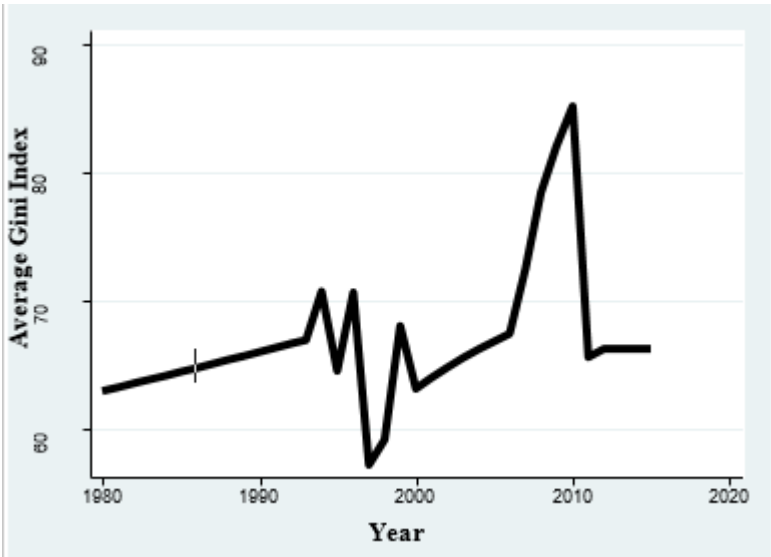


Figure 3.7: Gini Index, South Africa (1980 – 2015)
 Source: Researcher’s Computation from Lahoti *et al.* (2016)

3.3 Countries’ Comparison and Representation

Table 3.3 shows the within variations of the Gini index across the four countries. While that of Nigeria declined in inequality in the 2000s by over 5 percent that of Kenya, Cameroon and South Africa worsened by about 0.2, 2 and 6.5 percent respectively within the same period. This statistics is important because it shows each country’s contribution to the region’s inequality index and confirms that indeed some countries witnessed rising and falling inequality indexes. For instance, the regions’ negative decline of 4.13 percent can be attributed largely to the 5.57 percent decrease from Nigeria and the increase of 6.5 percent from South Africa, among others.

Table 3.3: Change in Gini Index, Countries (1980 – 2015)

Country	1980 - 2015	1980 - 1999	2000 - 2015	% Change
Cameroon	58.07	57.56	58.72	2.02
Kenya	60.35	60.29	60.41	0.20
Nigeria	56.56	58.00	54.77	-5.57
South Africa	66.82	64.95	69.15	6.47
SSA	60.19	61.32	58.79	-4.13

Note: Percentage change is computed as: $\left[\frac{(\text{period 2000 to 2015}) - (\text{period 1980 to 1999})}{(\text{period 1980 to 1999})} \times 100 \right]$

Slight disparity in average Gini index for SSA is due to rounding up.

Source: Researcher's Computation from Lahoti *et al.* (2016)

This section concludes with a justification on why the four selected countries represent their sub-regions. The selection is primarily based on their average Gini index since the crux of this thesis is to investigate measures that will tackle the high inequality index. Figure 3.8 shows that relative to SSA average, Nigeria has the lowest inequality index of 56.57, followed by Cameroon at 58.08, Kenya at 60.35 and South Africa with 66.82. In comparison to their respective sub-regional averages, the averages from these representing countries hovers around that of their sub-region which are 59.33 for Central Africa, 58.49 for East Africa, 64.39 for Southern Africa and 60.19 for West Africa. The relevance of this analogy is that policies that will cause a reduction in the representing countries' inequality index may have impact in the reduction of the inequality index relating to their respective sub-regions.

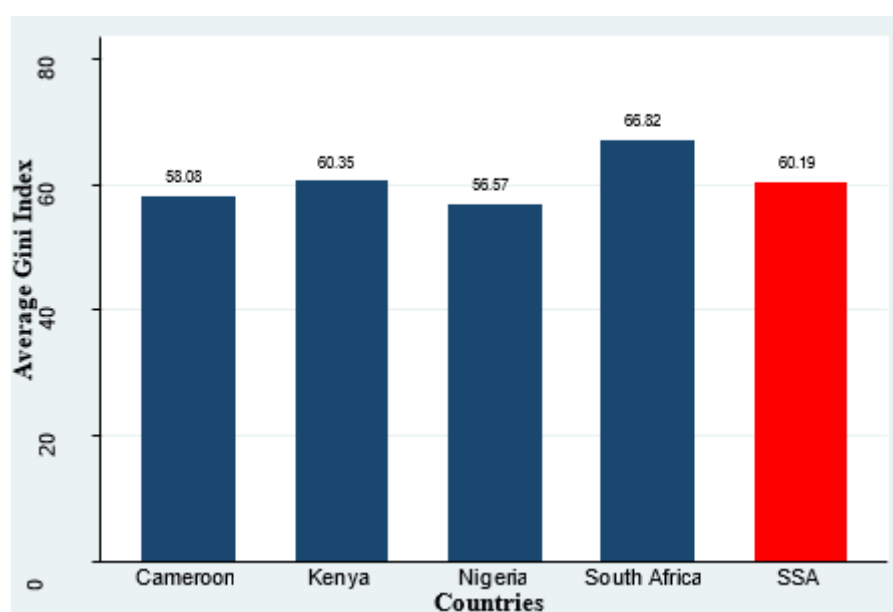


Figure 3.8: Comparative Statics (1980 – 2015)

Source: Researcher's Computation from Lahoti *et al.* (2016)

3.4 Summary of the Stylised Facts

Using the Gini index as the measure of income inequality, and a two-period analysis, statistics reveal that global income inequality is on the rise at the rate of 0.85 percent. With the classification of Gini indexes as low inequality (20 to 29.9), medium inequality (30 to 39.9), high inequality (40 to 49.9) and very high inequality (above 50), none of the regions is experiencing low inequality, two (ECA and NA) are within the medium inequality bracket, three (EAP, LAC and SA) are classified high inequality bracket and two (MENA and SSA) are categorised very high inequality. Among them, SSA has the highest inequality (60.23) index but ironically contributes the highest decline (-4.06 percent) to global inequality. Similitude to a paradox, the region with the highest index contributes the highest decline to global inequality while that with the lowest inequality index (ECA at 33.33) contributes the highest increase (ECA at 15.54 percent) to global inequality.

With particular reference to SSA region, all the four sub-regions have Gini indexes above 50 and are classified as witnessing very high income inequality. Among them, Southern Africa region has the highest at 64.39 while the lowest is East Africa (58.49). Using a two-period analysis, data analytics further reveal that West Africa contributes the highest decline to the region's inequality index (-8.37 percent) followed by Southern Africa (-2.38 percent) while the lowest contributor is East Africa (-0.95 percent). These facts reveal that across the sub-regions and the representing countries, the average Gini index is categorised as very high which implies that even though the region's inequality index is falling, individual countries are burdened by wide disparities in income distribution.

Lastly, all the representative countries have inequality indexes above 50 and therefore categorised as experiencing very high inequality. Among which Nigeria has the lowest (56.56) and South Africa the highest (66.82). The total decline of -4.06 percent contributed to global inequality by SSA emanates from the combination of SSA countries experiencing rising and falling inequality indexes within the study scope. For instance, among the representing countries, Nigeria contributes the highest decline (-5.57 percent) and South Africa the highest increase (6.47) to regional inequality. A cursory look at the sub-regions and the countries' representation reveals a somewhat interesting pattern. That is, the average inequality indexes prevalent in these sub-regions are quite close to those evident in the four countries. For instance, the average index in Central Africa is 59.34 while that of Cameroon is 58.07, East Africa is 58.49 while Kenya has 60.35, West Africa is 60.93 while Nigeria has 56.56 and Southern Africa

is 64.39 while South Africa has 66.82. Thus, statistics support the argument that the four countries are quite representative of their sub-regions since the average index in each country and its sub-region are very close such that policies that will correct income inequality in these countries will do likewise in the respective sub-regions and vice-versa.

CHAPTER FOUR

METHODOLOGY

This chapter is divided into six sections. The first section discusses the theoretical framework of financial reforms and income inequality by showing the distributive effects of how imperfect financial markets engender income inequality. The second section shows the analytical model which illustrates how imperfect financial markets exacerbate cross-generational income inequality. The third section is the model specification from where the study's empirical model (which is a modification of existing models) is derived. The fourth section details the estimation techniques on panel data and country-level analyses. These estimators are within the frameworks of ordinary least squares, fixed effects, heterogeneous panel and the autoregressive distributed lag (ARDL) (p, q) models. Variables, scope, measurements and sources are discussed in the fifth section while issues relating to data sourcing are discussed in the sixth section.

4.1 Theoretical Framework

Finance plays a critical role in most theories of persistent inequality as it shapes the gap between the rich and the poor. It affects the extent to which that gap widens or contracts across generations. Thus, the finance-inequality theory illuminates a variety of direct and indirect mechanisms through which changes in the operation of the financial sector can exacerbate or reduce the inequality of pecuniary opportunity. For instance, credit shocks to some economic agents can affect investments in human capital, distribution of physical capital accumulation; distort the rate of economic growth and the demand for production inputs (particularly labour) with adverse consequences on poverty and income distribution (Beck, Demirgüç-Kunt, & Levine, 2007; Levine, 2008; Demirgüç-Kunt & Levine, 2009).

The theoretical framework is bound within the financial markets imperfections theory (Loury, 1981; Galor & Zeira, 1993) and the extensive margin theory (Becker & Tomes, 1979, 1986; Greenwood & Jovanovic, 1990). Both theories give the propositions that (1) imperfect financial systems exert highly skewed cross-generational income inequality which disproportionately favours the rich due to ancestral wealth regardless of innate abilities or entrepreneurial abilities of households; and (2) by extending credit, to those economic agents that had hitherto been denied, will increase the probability of these groups engaging in economic opportunities leading

to a reduction in the income inequality gap (Bourguignon, 1981; Banerjee & Newman, 1993; Galor & Moav, 2004).

The financial system shapes the extent to which economic opportunities are moulded by natural endowments (abilities) rather than by parental wealth. Finance influences cross-generational income inequality through human capital investment and entrepreneurial opportunities and the theoretical model shows that income inequality is exacerbated when financial markets are imperfect (Galor & Zeira, 1993; Levine, 2008; Demirgüç-Kunt & Levine, 2009). From these assertions, it is suggested that with perfect financial markets, individuals will have access to credit (which is a function of interest rate) to fund education, acquire skills or start a new business venture based only on individual talent and initiative, and not on parental or hereditary wealth. From these theories, perfect financial markets equate opportunities of poor and rich households by reducing the relevance of residual assets of the wealthy class on the assumption that the credit market is accessible. From this perspective, financial development might exert a favourable positive influence on the poor.

This study expounds these theories, by hypothetically assuming that a generation i 's total income in period t , Y_{it} , is a function of wages (w) earned from human capital (H) which might be dynasty-specific and rentals (r) from inheritance (i.e. physical capital accumulation, M) that may vary by dynasty. Such that:

$$Y_{it} = f(H_{it}, M_{it}) \quad [4.1]$$

This modest framework shows that if the legacy motive that transfers savings from the present (t) to future generation ($t + 1$) is a convex function of parental wealth, so that the legacy rate rises with wealth (i.e. $M' > 0$ and $M'' > 0$), then (1) dynastic wealth will not converge in equilibrium, (2) wealth differential will persist in the long run, and (3) the long-run distribution of wealth will depend on the initial distribution of wealth (Levine, 2008; Demirgüç-Kunt & Levine, 2009). In furtherance, the theories concerning the behaviour of each component of equation [4.1] are discussed herein detailing how each of the behaviours affects the distribution of income and how imperfect financial markets widen income inequality across generations.

On the first component, parental decision to invest in the human capital of their children determines the persistence of inter-generational relative income. Furthermore, we assume that

human capital is a positive function of an individual's dynastic-endowment of innate abilities or natural skills (b) and the opportunity of accessing quality education (s) (i.e. schooling), that is:

$$H_{it} = f(b_{it}, s_{it}) \quad [4.2]$$

Such that $b', s' > 0$ because an individual with more innate ability or more education is likely to get more productive engagements. Also, ability and schooling are complementary human capital production inputs, $\partial^2 H / \partial b \partial s > 0$ since individuals with more abilities are likely to get more education and such will have access to more productive opportunities – this is a socially efficient outcome. Also, because relative differences of abilities tend to wane from generations to generations, brains are not strongly persistent across lineages within a dynasty, that is, ability is mean-reverting (Loury, 1981; Bardhan, Bowles, & Gintis, 2000), it is therefore necessary that individuals get adequate schooling to earn economic opportunities that will increase their household incomes. So, from equation [4.2] with perfect credit systems, it is socially efficient that children with innate abilities have access to credit (CR) in order to acquire education irrespective of ancestral wealth; so that human capital is a function of brains and access to credit. Thus, an individual's economic opportunities are determined by:

$$H_{it} = f(b_{it}, CR_{it}) \quad [4.3]$$

and credit is a function of the prevailing interest rate (int),

$$CR_{it} = f(int_t) \quad [4.4]$$

Due to financial reform, the borrowing interest rate drops and since ability regresses to the mean, with perfect capital markets, individuals can access credit to finance for schooling ($\partial H / \partial CR > 0$) or engage an economic opportunity such as setting up a business and as such, initial dynastic wealth differences does not tend to persist. However, with imperfect financial markets, human capital is now jointly determined by brains and ancestral wealth (M) such that only the rich who has the wealth to collateralise their loans can access credit to fund the education of their children. That is:

$$H_{it} = f(b_{it}, M_{it-1}) \quad [4.5]$$

And as such access to credit is dependent on both the prevailing interest rate and the ancestral wealth of the borrower, that is:

$$CR_{it} = f(int_{it}, M_{it-1}) \quad [4.6]$$

From [4.6], there will be a slower reduction in cross-dynasty human capital differences if access to schooling is constrained by parental wealth because dumb kids from wealthy backgrounds can have access to schooling compared to kids with high-abilities but from poor backgrounds. Extending this model shows that in the event of credit shocks, poor families will have to pull-out their kids from schools and engage them into menial jobs thus, thwarting the ability of poor families to develop the educational needs of their children. The effect of this is that: (1) cross-generational income inequality will persist; (2) the socially efficient allocation of resources will be altered with adverse effects on the economy and (3) the economic prospects of individuals born into poor dynasties will continually reduce (Galor & Zeira, 1993; Galor & Tsiddon, 1997). On the second component of equation[4.1], finance can also affect cross-generational returns on entrepreneurial engagement or investment opportunities. Individuals are endowed with different levels of investing abilities or skills (V) and the returns (r) to opening a business depends positively on it:

$$r_{it} = f(V_{it}) \quad [4.7]$$

When markets are perfect, entrepreneurs with the most investment ability gets access to credits at the borrowing rate such that entrepreneurial activity (Z) is a function of investing skills, and not dynastic wealth. Such that enterprise is influenced by skills through the rate of return. That is:

$$Z_{it} = f(r_{it}) \quad [4.8]$$

In essence, society's pooled savings are funnelled to those with the most investment abilities and not those with ancestral wealth (Levine, 2004, 2008; Demirgüç-Kunt & Levine, 2009; Rewilak, 2013). On the other hand, with imperfect financial markets, credit will not simply flow to those with business skills as lenders will demand collateral, that is:

$$CR_{it} = f(int_{it}, M_{it-1}) \quad [4.6]$$

and large injections of funds by the ‘borrower’ before the business proposal is funded. Thus, the ancestral wealth will influence lending decisions and the ability of that dynasty to attract external funding and to run a new business venture. That is:

$$Z_{it} = f(V_{it}, CR_{it}) \quad [4.9]$$

Such that $\partial Z / \partial CR > 0$; $M' > 0$ and equation [4.6] can be interpreted to mean: (1) society’s pooled resources are not only channelled to those with business skills but also with the most assets; (2) a poor individual might not get access to credit while a wealthy individual with a run-of-the-mill idea might have easier access to credit due to his parental wealth and (3) with imperfect credit markets, the initial distribution of wealth sways which dynasty can obtain external finance and which ones are essentially cut-off from business endeavours. Interestingly, the model rolls into financial liberalisation definition as given by McKinnon (1973) and Shaw (1973), which implies the highest rate of interest that equates the demand for (*credits*), and supply of (*deposits*) loanable funds (Balassa, 1989). Such that *credit* is a function of interest rate (the financial reform indicator):

$$CR_{it} = f(int_t) \quad [4.10]$$

The protagonists of the *financial markets imperfections theory* and the *extensive margin theory* (Becker, 1957; Stiglitz, 1969; Becker & Tomes, 1979; Bourguignon, 1981; Becker & Tomes, 1986; Greenwood & Jovanovic, 1990; Galor & Zeira, 1993) posit that by increasing the availability and use of financial services to households and firms who had not been engaging those services because of price, impediments or discriminatory factors, expand the economic opportunities of these groups and reduce the cross-dynasty persistence of income inequality. The theories also point to the fact that allocation of credit can affect inequality via indirect mechanisms. That is, credit shocks can influence both output production and employment of labour which may alter the demand for low- and high-skilled labour with associated impacts on income distribution. For instance, credit allocation improvement will boost the demand for low-skilled labour thus equalising economic opportunities and tightening the inequality gap (Demirgüç-Kunt & Levine, 2009).

Finance plays a critical role in most theories of tenacious income inequality, yet, there is a dearth of theoretical and empirical research on the potentially enormous impact of formal

financial sector policies, such as banking regulations (i.e. reserve requirements, loans portfolio, interest rate ceilings and so on) on persistent inequality (Levine & Rubinstein, 2009; Delis *et al.*, 2014). In this section, an attempt is made to model the *indirect* relationship between finance and the Gini index (the measure of income inequality) contrary to the direct relationship postulated in empirical literature (Asongu, 2013; Li & Yu, 2014; Batuo & Asongu, 2015; Kotarski, 2015). From the finance-inequality literature, the theoretical model is given as:

$$INEQ_{it} = f(X_{it}) \quad [4.11]$$

where $INEQ_{it}$ is the measure of income inequality and X_{it} is a set of variables characterising financial sector regulations occasioned by financial reforms or liberalisation – of which domestic credit to the private sector is often grouped with. From equation [4.11], the probable influence of financial reforms on income inequality seems less challenging to predict. That is, the reforms given by regulatory policies enhance financial liquidity and increase the volume of lending (*credit*) which in line with the theoretical literature would allow individuals at the lower end of the income distribution to have easier access to capital, and to fund their business investment ideas more efficiently and at a reduced cost. Therefore, equation [4.11] is modified to reflect that channel of influence through which financial reforms impact on the Gini index which is through credit growth (a measure of financial depth and stability) because increase in credit access accompanies financial liberalisation (Gine & Townsend, 2004). Thus, equation [4.11] modifies into a two-equation model:

$$CR_{it} = f(int_t, X_{it}) \quad [4.12]$$

and

$$INEQ_{it} = f(CR_{it}) \quad [4.13]$$

Empirical evidence reveals that regulatory policies (such as interest rate liberalisation, reserve requirements, removal of entry barriers and so on) reduce credit market constraints and enhance the rate of both human and physical capital accumulation of poor households (Galor & Zeira, 1993; Galor & Tsiddon, 1997; Beck *et al.*, 2000; Beck *et al.*, 2004, 2007; Beck *et al.*, 2010).

In the light of the theoretical framework, an analytical approach for considering the joint and endogenous evolution of finance, credit and income inequality is constructed where the

transmission mechanism through which financial reforms impact income inequality is shown. Following Li and Yu (2014) which is a modification of Loury (1981) and Galor and Zeira (1993), we adopt a Cobb-Douglas function to show the indirect impact of financial reforms on income inequality through credit. An attempt is made to show that as individuals have access to credit in a bid to invest in human capital (that is, gain expertise) so as to earn higher income or become an entrepreneur (operate a business successfully), the income inequality gap reduces.

4.2 The Analytical Model

The analytical approach is based on the assumptions of two individuals in a given economy, where one is an experienced worker and the other an amateur. Each person is the same with the exception of the amount of ancestral inheritance (assets) they possess. Both live for two periods and can choose to invest in education in the first period in order to work as a skilful worker in the second period, or he/she can choose to be an unskilful worker in both two periods. Individuals can borrow unlimited amounts to finance schooling in the first period in order to gain the expertise required for higher income levels in the second period. Both derive utilities from consumption and bequest motive that can only happen in the second period.

For the amateurish worker, the income function is given as:

$$Y_t^a = w^a L_t^a \quad [4.14]$$

while that of the experienced individual:

$$Y_t^e = A(L_t^e)^\alpha (K_t)^{1-\alpha} \quad [4.15]$$

where Y_t^a and Y_t^e represent the total incomes of the amateurish and experienced individual respectively in period t ; w^a is the wage rate earned per unit labour for the amateur (i.e. the marginal productivity); A represents expertise which is an outcome of education; L_t^a and L_t^e denote labour hours for both individuals, respectively; and K_t is physical capital stock (assuming no depreciation) employed at period t . Given that A is a function of human capital investment stock in the economy, (H^φ) such that $\varphi \geq 1$, the wage of the experienced worker in period t equals its marginal product, that is:

$$w_t^e = Y_L(L_t^e, K_t) = H^\varphi \propto \left(\frac{K}{L}\right)^{1-\alpha} \quad [4.16]$$

An individual's utility is derived from his consumption (p) and bequest motive (q) to his children which are functions of the total wealth (T) in his entire life:

$$\begin{aligned} U_{i,t} &= \delta \log p + (1 - \delta)q \\ &= \delta \log \delta T + (1 - \delta) \log(1 - \delta)T \end{aligned} \quad [4.17]$$

So, if the amateur decides not to invest in schooling (will continue to earn low wages) and augments livelihood with his inheritance, his utility would be:

$$U^a(M) \log = [w^a + (M + w^a)(1 + r)] + \mu \quad [4.18]$$

Where μ is the error term

The amateur then bequest his offspring an amount of:

$$b^a(M) \equiv (1 - \delta)T = (1 - \delta)[w^a + (M + w^a)(1 + r)] \quad [4.19]$$

The cost of acquiring schooling is s , and if the amateur with an inheritance $M > s$ chooses additional education in order to gain more expertise and earn higher income in the second period, his utility is:

$$U^e(M) = \log[w^e + (M - s)(1 + r)] + \mu \quad [4.20]$$

and he bequeaths

$$b_t^e(M) \equiv (1 - \delta)T = (1 - \delta)[w_t^e + (M - s)(1 + r)] \quad [4.21]$$

Lastly, if an individual with $M < s$ chooses to invest in education, such will have to borrow funds from the financial market; and his utility becomes:

$$U_t^e(M) = \log[w_t^e + (M - s)(1 + i)] + \mu \quad [4.22]$$

Where i denotes the borrowing rate and leaves a bequest of:

$$b_t^e(M) \equiv (1 - \delta)T = (1 - \delta)[w_t^e + (M - s)(1 + i)] \quad [4.23]$$

From above, it can be seen that an individual with $M > s$ will be incentivised to get more schooling if $[4.20] \geq [4.18]$. That is,

$$w_t^e \geq s(1 + r) + (2 + r)w^a \quad [4.24]$$

Also, individuals who will recourse to borrowing to finance schooling will only make the investment if [4.22] \geq [4.18]. That is,

$$w_t^e \geq (s - M)(1 + i) + M(1 + r) + (2 + r)w^a \quad [4.25]$$

Clearly, if [4.25] holds then [4.24] holds automatically, since $s > M$ for borrowers. That is:

$$(s - M)(1 + i) + M(1 + r) + (2 + r)w^a > s(1 + r) + (2 + r)w^a$$

From [4.25], we know that for any individual j who accesses the credit market for funds, such will choose to work as an experienced person in the second period if:

$$w_t^e \geq (s - M_j)(1 + i) + M_j(1 + r) + (2 + r)w^a \quad [4.26]$$

As a result of financial reform, the borrowing rate (i) falls and more individuals are able to access credit to fund schooling which increases human capital stock in the economy. Thus, supply curve for borrowers' slopes upwards since higher wages (w^e) is the precursor that attracts more borrowings.

This study concludes the framework by depicting income inequality ($INEQ$) as:

$$INEQ = \frac{w_t^e}{w^a} \equiv \frac{H^\varphi \alpha \left(\frac{K}{L}\right)^{1-\alpha}}{w^a} \quad [4.27]$$

which is the initial income position with respect to human capital stock. However, as individuals have access to credit to fund more schooling to gain expertise, and borrowing rate falls, the stock of human capital increases (to L') and [4.27] becomes:

$$INEQ = \frac{w_t^e}{w^a} \equiv \frac{H^\varphi \alpha \left(\frac{K}{L'}\right)^{1-\alpha}}{w^a} \quad [4.28]$$

The decline in income inequality ($INEQ^D$) is given by:

$$\begin{aligned} INEQ^D &= \frac{w_t^e}{w^a} \equiv \frac{H^\varphi \alpha \left(\frac{K}{L}\right)^{1-\alpha}}{w^a} - \frac{H^\varphi \alpha \left(\frac{K}{L'}\right)^{1-\alpha}}{w^a} \\ &= \frac{H^\varphi \alpha K^{1-a} L^{a-1}}{w^a} - \frac{H^\varphi \alpha K^{1-a} L'^{a-1}}{w^a} \end{aligned} \quad [4.29]$$

$$= \frac{H^\varphi \alpha K^{1-a}}{w^a} [L^{a-1} - L'^{a-1}] \quad [4.30]$$

Equation [4.30] shows that $INEQ^D > 0$ implying that income inequality can be reduced by financial reform (signified by low borrowing rate) as individuals are able to access credit used to fund education which invariably increase more earning capacities in subsequent periods in addition to increasing the stock of human capital investment.

Also, from equation [4.30], taking the derivative of $INEQ^D$ with respect to H , gives:

$$\frac{\partial INEQ^D}{\partial H} = \frac{\varphi H^{\varphi-1} \alpha K^{1-a}}{w^a} [L^{a-1} - L'^{a-1}] \quad [4.31]$$

Therefore, $INEQ^D$ is a decreasing function of H since $\varphi \geq 1$. This implies that at higher levels of credit access (due to fall in borrowing rate) income levels converge in steady-state. That is, the human capital stock increases as financial reform shapes credit access and income inequality reduces, *ceteris paribus*. Conceptually, the direction of the finance-credit-inequality nexus is ambiguous. On the one hand, there are grounds for a pro-equity impact of financial development. More specifically, financial development can improve the access of the poor to financial services enabling them to become more productive, for example by opening-up new businesses (Saibu *et al.*, 2009; Bowale & Akinlo, 2012). On the other hand, financial development may increase inequality if it takes the form of more and better financial services for the better-off and delivers higher returns to their capital without significant improvement in access for the poor thus, widening the gap between the rich and the poor. Therefore, the impact of financial development on income inequality is ultimately an empirical issue (Park & Shin, 2015). As conjectured from the *extensive margin theory*, the increase in credit while controlling for GDP per capita, government expenditures, trade openness, age-dependency ratio, secondary education enrolment rate, corruption and the rule of law index is expected to lead to a reduction in income inequality, *ceteris paribus*.

4.3 Model Specification

Thus, following both theoretical and empirical literature and aligning with this study's analytical approach, the empirical model modifies the existing model as used by Agnello *et al.* (2012), Asongu (2013), Batuo and Asongu (2015) and other related works such as the more recent one by Adeleye *et al.* (2017). In order to address the research hypotheses and allow comparativeness across the four sub-regions, a three-equation model is designed having dummy variables. For the panel data analysis, these equations are stated as:

$$FSI_{it} = \varphi_{0it} + \delta_1 r_{it} + \beta'_i X_{it} + CA + EA + SA + \varepsilon_{it} \quad [4.32]$$

$$CR_{it} = \omega_{0it} + \phi_1 r_{it} + \theta'_i Z_{it} + CA + EA + SA + \varepsilon_{it} \quad [4.33]$$

$$GINI_{it} = \lambda_{0it} + \zeta_1 \widehat{CR}_{it} + \Psi'_i K_{it} + CA + EA + SA + \varepsilon_{it} \quad [4.34]$$

where: *FSI* is the financial stability index; *r* is the interest rate⁹ (financial reform indicator); *CR* is credit growth; \widehat{CR} is the predicted value of credit growth; *GINI* is the Gini index (measure of income inequality); φ, ω, λ are constant terms; δ, ϕ, ζ are parameters; *i*, countries, 1, 2, …, N; *t*, time, 1, 2, …, T, $\beta'_i X_{it}, \theta'_i Z_{it}, \Psi'_i K_{it}$ are vectors of observed time-variant control variables and their regression coefficients. *CA, EA and SA* are sub-regional dummies¹⁰ having 1 for countries in that sub-region and 0, otherwise. *WA* is the base dummy.

Equation [4.32] explains the impact of financial reforms on the financial sector. It seeks to address the issue of financial system stability after a financial reform. Using the real interest rate as the reform variable and a composite index for financial system stability, this study shows that the financial sector stabilises after a reform has taken place even though some distortions may be felt within the early periods of reforms. Equation [4.33] addresses the issue of whether credit growth is stimulated by financial reforms. With domestic credit as the proxy for credit growth, this study seeks to show that financial reforms positively stimulate credit growth. Lastly, equation [4.34] addresses the crux of this thesis which is to show if credit growth has an equalising effect on income inequality. To achieve this, the predicted value of domestic credit (rather than the level of domestic credit) which is generated from equation [4.33] is used as the proxy for credit growth (the explanatory variable) for the panel data analysis (Gujarati & Porter, 2009; Wooldridge, 2009, 2010) while the level of domestic credit is used for the time series analyses. The intuition for using this approach is to connect the second and third hypotheses together in establishing the nexus. Lastly, the inclusion of control variables¹¹ is to determine whether the effect of the main explanatory variables on the dependent variables still holds true after considering the effects of these covariates on inequality.

⁹Since financial reform in itself is not readily observable, but captured using proxies and indicators such as the interest rate, capital account liberalisation etc. The choice of using the interest rate as the financial reform variable is in line with the McKinnon-Shaw (1973) hypothesis which states that creation of higher interest rates equate the demand and supply for savings leading to increased savers and increased financial intermediation.

¹⁰The dummy variables are only included in the pooled OLS estimations.

¹¹See Table 4.1 for full variables list.

For the time series analysis, an autoregressive distributed lag (ARDL) model is specified in order to control for the inherent endogeneity in the data and the non-integration of variables of the same order. Thus, following Kripfganz and Schneider (2016), the generalised ARDL (p, q, \dots, q) three-equation model is stated as:

$$FSI_t = \varphi_{0i} + \sum_{i=1}^p \delta_i FSI_{t-i} + \sum_{i=0}^q \delta_i r_{t-i} + \sum_{i=0}^q \beta'_i X_{t-i} + \varepsilon_t \quad [4.35]$$

$$CR_t = \omega_{0i} + \sum_{i=1}^p \delta_i CR_{t-i} + \sum_{i=0}^q \phi_i r_{t-i} + \sum_{i=0}^q \theta'_i Z_{t-i} + \varepsilon_t \quad [4.36]$$

$$GINI_t = \lambda_{0i} + \sum_{i=1}^p \delta_i GINI_{t-i} + \sum_{i=0}^q \zeta_i \widehat{CR}_{t-i} + \sum_{i=0}^q \psi'_i K_{t-i} + \varepsilon_t \quad [4.37]$$

Where the dependent and explanatory variables are allowed to be purely $I(0)$ or $I(1)$ or co-integrated; p, q are optimal lag orders; ε_t is a vector of the error terms - unobservable zero mean white noise vector process (serially uncorrelated or independent). The other particulars in the equations are as defined in equations [4.32] to [4.34]. It is important to state that the model for each country is augmented by using specific control indicators and not ‘generalised’ indicators. This is to reduce the bias that might be created from the use of ‘generalised’ control variables. It is also important to note that a distinctive feature between equation 4.34 and equation 4.37 is that the latter accounts for hysteresis or persistence in income inequality, which is consistent with the discussed theoretical and empirical literature.

4.4 Estimation Techniques

For the panel data analysis, the estimation techniques are pooled OLS, fixed effects estimator (outcome of the Hausman test), dynamic fixed effects estimator (from the heterogeneous dynamic panel model) and system generalised method of moments (for estimator robustness check) while the error correction representation of the autoregressive distributed lag model is adopted for the time series analysis of 4 countries.

4.4.1 Pooled OLS Estimator

The ordinary least squares (OLS) analysis captures not just the variations in time or space, but the variation in both of these dimensions at the same time. The pooled OLS model, rather than testing a cross-sectional model for all countries at one point in time or testing a time series model for one country using time series data, pools and tests all countries through time (Pennings, Keman, & Kleinnijenhuis, 2006). With the easiness to analyse all units (firms,

countries, individuals etc.) at the same time, the pooled OLS gained an advantage which has become central in quantitative studies of comparative economics. An accumulating body of research has utilised pooled models to provide answers to classical questions of the discipline (Alvarez, Garrett, & Lange, 1991; Hicks & Swank, 1992). Furthermore, given the structure of the empirical model, White (1980) robust and homoscedasticity-consistent standard errors is used to correct for the possible existence of heteroscedasticity and to remove the effect of outliers. Moreover, the log-transformation of the dependent variable can serve to mitigate problems of heteroscedasticity of the error term and reduce the impact of outliers in the data. The generalised baseline pooled OLS linear model is given as:

$$\ln Y_{it} = \alpha + \beta X'_{it} + \partial_t + (\eta_i + \varepsilon_{it}), \quad [4.38]$$

where, ε_{it} , denotes the unobserved random error term, $\ln Y_{it}$ denotes natural logarithm of the dependent variable (which could either be financial stability index or natural logarithm of credit growth or the natural logarithm of Gini index), α , the constant term; i , countries, $1, 2, \dots, N$; t , time, $1, 2, \dots, T$, $\beta X'_{it}$, vector of observed time-variant factors and their regression coefficients and η_i denotes unobserved country-specific effects.

4.4.2 Fixed Effects Estimator

In the case where η_i is expected to correlate with one or more of the explanatory variables in the above model, when $E(\eta_i | X_{it}) \neq 0$, the fixed effects model is needed. In this case η_i has to be removed prior to estimation or it will result in biased estimates and since η_i is country-specific and assumed to be fixed over time, the effect can be “differenced” away. This transformation removes the country-specific effects η_i and equation [4.38] becomes:

$$\ln(Y_{it} - \bar{Y}) = (\alpha - \alpha) + \beta(X'_{it} - \bar{X}) + (\eta_i - \eta_i) + (\varepsilon_{it} - \bar{\varepsilon}) \quad [4.39]$$

and this reduces to:

$$\ln(Y_{it} - \bar{Y}) = \beta(X'_{it} - \bar{X}) + \partial_t + (\varepsilon_{it} - \bar{\varepsilon}) \quad [4.40]$$

where: ∂_t , denotes a time dummy to control for temporal variation in the dependent variable; thus, the application of OLS to [4.35] provides unbiased and consistent estimates for the covariates of interest.

However, in determining the appropriateness between the random and fixed effects model, a statistical test is implemented. The Hausman (1978) test compares the random effects estimator to the ‘within’ estimator. If the null is rejected, this favours the ‘within’ estimator’s treatment of the omitted effects (i.e., it favours the fixed effects but only relative to the random effects). The use of the test in this case is to discriminate between a model where the omitted heterogeneity is treated as fixed and correlated with the explanatory variables, and a model where the omitted heterogeneity is treated as random and independent of the explanatory variables. If the omitted effects are uncorrelated with the explanatory variables, the random effects estimator is consistent and efficient. However, the fixed effects estimator is consistent but not efficient given the estimation of a large number of additional parameters (i.e., the fixed effects). If the effects are correlated with the explanatory variables, the fixed effects estimator is consistent but the random effects estimator is inconsistent. The Hausman test provides the basis for discriminating between these two models (Greene, 2003; Baltagi, 2005; Wooldridge, 2010). The matrix version of the Hausman test is expressed as:

$$[\beta_{RE} - \beta_{FE}][V(\beta_{RE}) - V(\beta_{FE})]^{-1}[\beta_{RE} - \beta_{FE}]' \sim \chi_k^2 \quad [4.41]$$

where k is the number of covariates (excluding the constant) in the specification, and β_{RE}, β_{FE} are the regression beta coefficients. If the random effects are correlated with the explanatory variables, then there will be a statistically significant difference between the random effects and the fixed effects estimates. The null and alternative hypotheses are expressed as:

H_0 : Random effects are independent of explanatory variables

H_1 : H_0 is not true.

The null hypothesis is the random effects model and if the test statistic exceeds the relevant critical value, the random effects model is rejected in favour of the fixed effects model. In finite samples the inversion of the matrix incorporating the difference in the variance-covariance matrices may be negative-definite (or negative semi-definite) thus yielding non-interpretable values for the chi-squared (Greene, 2003; Baltagi, 2005; Wooldridge, 2010).

4.4.3 Heterogeneous Dynamic Panel Model Estimators

The empirical approach adopted for this study differs a bit from the approach adopted by similar studies on finance-inequality relationship. It adopts the heterogeneous dynamic model which is suitable given that there are twenty (20) countries (N) covering 1980 to 2015 (T) which is 36 years, hence $N < T$. Roodman (2006, 2014) states where $N > T$, the suitable estimators are the difference-GMM estimator proposed by Arellano and Bond (1991) and the sys-GMM estimator propounded by Arellano and Bover (1995) and Blundell and Bond (1998). Roodman (2006) further argues that where $N < T$, the application of the GMM estimators will result in spurious outcomes for two reasons. Firstly, the small size of N might produce some unreliable autocorrelation test and secondly, the number of instruments will increase as the time span of the data increases affecting the validity of the Sargan test of over-identifying restrictions which may cause the rejection of the null hypothesis. This will cast doubt on the reliability and consistency of results obtained using GMM when $N < T$. Therefore, applying the GMM estimators to a model where $N < T$ will likely yield inconsistent and misleading long-run coefficients unless the slope coefficients are indeed identical (Pesaran & Smith, 1995; Pesaran, Shin, & Smith, 1997; Pesaran, Shin, & Smith, 1999). Based on Pesaran *et al.* (1999), the dynamic heterogeneous panel regression is incorporated into the error correction model using the autoregressive distributed lag ARDL (p, q, q, \dots, q) technique stated as follows:

$$\Delta \mathbf{y}_{it} = \phi_i [y_{it-1} + \beta'_{ij} \mathbf{x}_{it}] + \sum_{j=1}^{p-1} \gamma^*_{ij} \Delta \mathbf{y}_{it-j} + \sum_{j=0}^{q-1} \delta^{*'}_{ij} \Delta \mathbf{x}_{it-j} + \mu_i + e_{it} \quad [4.42]$$

where $i = 1, 2, \dots, N; t = 1, 2, \dots, T; \phi_i = -(1 - \sum_{j=1}^p \gamma_{ij})$; $\beta_i = \sum_{j=0}^q \delta_{ij}$; $\gamma^*_{ij} = -\sum_{m=j+1}^p \gamma_{im}$, ($j = 1, 2, \dots, p-1$) and $\delta^{*'}_{ij} = -\sum_{m=j+1}^p \delta_{im}$, ($j = 1, 2, \dots, q-1$).

The ARDL (p, q, q, \dots, q) model assumes that firstly, the errors e_{it} are independently distributed across i and t , with means 0, and variances $\sigma_i^2 > 0$. Secondly, is the stability in its roots lie outside the unit circle given by: $\sum_{j=1}^p \gamma_{ij} z^j = 1$, ($i = 1, 2, \dots, N$) and this assumption ensures that $\phi_i < 0$ to establish the long-run relationship between y_{it} and \mathbf{x}_{it} which is defined by: $y_{it} = -\left(\frac{\beta'_i}{\phi_i}\right) \mathbf{x}_{it} + \varphi_{it}$ for each $i = 1, 2, \dots, N$ where φ_{it} is a stationary process. Lastly, the model assumes long-run homogeneity across groups. That is the long-run coefficients on \mathbf{x}_i defined by $\theta_i = -\left(\frac{\beta'_i}{\phi_i}\right)$ are the same across groups such that $\theta_i = \theta$, ($i = 1, 2, \dots, N$)

The long-run growth regression is the term in the square brackets. Equation [4.41] can be estimated by three different estimators: the mean group (MG) model of Pesaran and Smith (1995), the pooled mean group (PMG) estimator of Pesaran *et al.* (1999), and the dynamic fixed effects estimator (DFE). These estimators allow for the long-run equilibrium and the heterogeneity contained in the dynamic adjustment process (Demetriades & Law, 2006) which are computed by maximum likelihood. Pesaran and Smith (1995), Pesaran (1997) and Pesaran and Shin (1999) present the autoregressive distributed lag (ARDL) model in an error correction form as a relatively new cointegration test bearing in mind that the emphasis is importance of having consistent and efficient estimates of the parameters in a long-run relationship.

According to Johansen (1995), only variables with the same order of integration can be said to exhibit some forms of cointegration and hence have a long-run relationship. However, Pesaran and Shin (1999) argue that the panel autoregressive distributed lag (ARDL) model can be used even with variables with different orders of integration irrespective of whether the series are $I(0)$ or $I(1)$. In other words, both the short-run and long-run effects can be estimated at the same time from a data set with large N and T . Finally, due to the inclusion of lags of both the dependent and the explanatory variables, the ARDL model, especially PMG and MG estimators, provide consistent coefficients despite the possible presence of endogeneity (Pesaran *et al.*, 1999). To understand the key features of the three different estimators in the dynamic panel framework, their assumptions are explained briefly below.

Mean Group (MG) Estimator

Pesaran and Smith (1995) introduced the mean group (MG) estimator which allows for the estimation of separate regressions for each country and calculating the coefficients as un-weighted means of the estimated coefficients for the individual countries. No restrictions are imposed by this estimator and it allows that all coefficients vary and be heterogeneous in the long-run and short-run. However, for the estimator to be consistent and its results valid, the necessary condition is to have a sufficiently large T (that is, large time dimension in the data).

Pooled Mean Group (PMG) Estimator

The PMG on the other hand, allows for short-run coefficients, including the intercepts, the speed of adjustment to the long-run equilibrium values, and error variances to differ across countries, while the long-run slope coefficients are restricted to be the same for all countries. This assumption is particularly useful when there are reasons to expect that in the long-run, the

countries may exhibit the same features or are likely to respond in the same manner. However, due to the widely different impact of the responsiveness to financial and external shocks, stabilisation policies, monetary policy etc. the short-run adjustment is allowed vary by country. Nevertheless, for this approach to be consistent and its results valid, there are certain requirements. Firstly, it is required that the coefficient of the error–correction term be negative to establish the existence of a long-run relationship among the variables of interest. Secondly, the resulting residual of the error-correction model must not be serially correlated and the explanatory variables can be treated as exogenous. These conditions can be fulfilled with the inclusion of (p, q) lags for the dependent (p) and independent variables (q) in error correction form in the ARDL model. Lastly, the relative size of T and N is crucial. If both are large, this allows the use of the dynamic panel technique and helps prevent some bias in the use of the estimators and addresses the problem of heterogeneity. Hence, the PMG will produce inconsistent estimates if these conditions are not met.

Dynamic Fixed Effects (DFE) Estimator

The operation of the dynamic fixed effects estimator (DFE) is quite similar to that of PMG estimator. The slope coefficients and error variances are homogenous for all countries in the long-run in addition to the speed of adjustment coefficient and the short-run coefficient which are restricted to be the same too. However, the model allows for different country-specific intercepts. Nevertheless, Baltagi, Griffin, and Xiong (2000) point out that this model is subject to a simultaneous equation bias due to the endogeneity between the error term and the lagged dependent variable in case of small sample size but this does not negate the usefulness of this technique in empirical studies. Therefore, given the distinct features of these estimators, this study uses that of the DFE because it aligns with generalising the reform-credit-inequality nexus in SSA. The “general” approach corresponds with some basic features of the DFE estimator amongst which are that in the long-run, the slope coefficients, error variances are the same across all countries in the sample. If these differ across countries, as it is in the case of the PMG, obtaining long-run coefficients that may represent an overview of SSA countries will become impossible, thus, defeating the essence of this study.

4.4.4 Autoregressive Distributed Lag (ARDL) Estimator

A substantial time-series literature examines the finance-growth relationship using a variety of time-series techniques. These studies frequently use Granger-type causality tests and vector autoregressive (VAR) procedures to examine the relationships between macroeconomic

variables and economic growth (Alege & Osabuohien, 2013; Alege & Ogundipe, 2014; Alege & Okodua, 2014), or specifically the nature of the finance-growth relationship (Edo, 2012, 2014). VAR models in economics were made popular by Sims (1980) while the definitive technical reference for VAR models with updated surveys of VAR techniques is given in Lütkepohl (2005), applications of VAR models to financial data given in Alege (2010), Edo (2011), Ogundipe and Alege (2014) and Davtyan (2016) to mention a few. However, research has progressed by using better measures of financial development, employing more powerful econometric techniques, and by examining individual countries in much greater depth (Shan, 2003; Shan & Jianhong, 2006; Soutanaeva, 2010).

Thus, extending the works of Edo (2012) in relation to financial development and Davtyan (2016) who used the vector autoregression (VAR) approach, this study examines the interactions of these variables within the framework of the ARDL model specified in equations [4.35] to [4.37] in four SSA countries (Cameroon, Kenya, Nigeria and South Africa) while controlling for the effects of other macroeconomic factors. The dynamics of the reforms-credit-inequality relationship is analysed whilst avoiding the pitfalls of endogeneity and integration of the variables. Inevitably, a time series analysis has its own limitations. The foregoing arguments of this study (framed in three hypotheses) are that firstly, the stability of the financial system is important in measuring the extent of credit growth and then income inequality. Secondly, it analyses the impact of financial reform on credit growth and thirdly investigates the reforms-credit-inequality nexus. Each model is estimated using the error-correction parameterisation of the ARDL framework wherein both the long- and short-run relationships are established.

4.4.5 System Generalised Method of Moments (Sys-GMM) Estimator

For robustness of estimators and to control for the possible presence of endogeneity amongst others, the system generalised methods of moments estimator is used. The Arellano and Bond (1991), Arellano and Bover (1995) and Blundell and Bond (1998) dynamic panel estimators are designed for situations with (1) “large N ” “small T ”, panels, meaning many groups and few years coverage; (2) a linear functional relationship; (3) one left-hand-side variable that is dynamic, depending on its own past realisations; (4) independent variables that are not strictly exogenous, meaning they are correlated with past and possibly current realisations of the error term; (5) fixed individual effects; and (6) heteroscedasticity and autocorrelation within individuals but not across them (Roodman, 2006, 2014). Arellano–Bond (1991) estimation begins with the transformation of all regressors by usually by differencing, and uses the

generalised method of moments (GMM) (Hansen, 1982; Holtz-Eakin, Newey, & Rosen, 1988) which is known as difference GMM.

Subsequently, the Arellano–Bover and Blundell–Bond estimator augments Arellano–Bond by making an additional assumption that first differences of instrument variables are uncorrelated with the fixed effects allowing for the introduction of more instruments and which can dramatically improve efficiency. This approach builds a system of two equations - the original equation and the transformed one - and is known as system GMM. One of Arellano and Bond (1991) contributions is a test for autocorrelation appropriate for linear GMM regressions on panels, which is especially important when lags are used as instruments. In addition, the consistency of the sys-GMM estimator is assessed by two specification tests. The Hansen test of over identifying restrictions tests for the overall validity of the instruments and the second test examines the null hypothesis that the error term is not serially correlated. Failure to reject both null hypotheses gives support to the model (Arellano & Bond, 1991; Arellano & Bover, 1995; Blundell & Bond, 1998; Sghaier & Abida, 2013; Alege & Ogundipe, 2014). However, a weakness of difference and system GMM is that they are complicated and so can easily generate invalid estimates.

Given the structure of the empirical model, 20 countries¹² are analysed across 4 different time dimensions, that is, 1980 to 1989 (10 years), 1999 to 2000 (10 years), 2000 to 2009 (10 years) and 2010 to 2015 (6 years). This justifies the use the sys-GMM which is strictly designed for panels with short time dimension, T (Roodman, 2006, 2014). In addition to controlling for dynamic panel bias, (or the persistent nature of inequality), the estimation strategy addresses the problems of endogeneity, country-specific heterogeneity, measurement error and omitted variables and captures the short and long-run impacts of the regressors on the dependent variable which may not be adequately captured in a static model. In addition, the system GMM approach is used when the dependent variable is persistent. For example, this might be the case where habit persistence is known to be strong in the model. In this thesis, income inequality is a persistent variable and therefore, equation [4.38] is modified as:

$$\ln Y_{it} = \phi \ln Y_{it-1} + \beta X'_{it} \gamma Z_{it} + \eta_i + \partial_t + \varepsilon_{it}. \quad [4.43]$$

¹²Botswana, Burundi, Cameroon, Central African Republic, Chad, Comoros, Congo Republic, Gabon, Gambia, Kenya, Malawi, Mauritius, Namibia, Nigeria, Rwanda, Seychelles, Sierra Leone, South Africa, Swaziland and Tanzania

where, $\ln Y_{it-1}$ is the lag of natural logarithm of the Gini index.

4.5 Variables, Measurements and Sources

This section outlines the variables, their definitions, measurements, and the rationale for their inclusion as well as related data sources. Unless otherwise stated, the variables' scope are from 1980 to 2015 and they are downloaded from Lahoti *et al.* (2016) Global Consumption Income Project Dataset, World Development Indicators of the World Bank (2016) and Global Financial Development Datasets of the World Bank (2015). As a result of the structure of the empirical model and due to the considerations given to each of the representing country's distinct heterogeneities¹³, a total of 22 variables are used. Table 4.1 shows the variables, measurements and their sources. The three outcome variables are financial stability index (computed via principal component analysis using the macroeconomic measures of financial stability), credit growth (proxied by domestic credit) and the Gini index (measure of income inequality). All the variables are as shown in Table 4.1, their relevance in the model and their *a priori* expectations are discussed in brief. Since there are three distinct models (financial stability, credit growth and income inequality), explanations adduced to each variable is model-specific.

¹³For instance, a total of 20 variables are used across the four countries. Cameroon has 14 variables, Kenya has 14, Nigeria has 11 and South Africa has 13 with 6 variables common to all of them.

Table 4.1: Variables, Definitions and Sources

S/No.	Variables and Measurements	Short Description	Source
1	Age dependency ratio (% of working-age population)	Age dependency ratio is the ratio of dependents (people younger than 15 or older than 64) to the working-age population (those ages 15-64)	WDI (2016)
2	Bank liquid reserves to bank assets ratio (%)	This is the proxy for loan-to-deposit ratio	WDI (2016)
3	Broad money (% of GDP)	Broad money (M2) is the sum of currency outside banks; demand deposits other than those of the central government; the time, savings, and foreign currency deposits of resident sectors other than the central government; bank and traveler's checks; and other securities.	WDI (2016)
4	Broad money growth (% , annual)	The growth rate of broad money.	WDI (2016)
5	Deposit interest rate (%)	The rate paid by commercial or similar banks for demand, time, or savings deposits.	WDI (2016)
6	Domestic credit provided by financial sector (% of GDP)	Credit to the private sector by financial institutions. This serves as the proxy for credit growth. It excludes credit to the public sector.	WDI (2016)
7	Domestic credit to private sector (% of GDP)	Credit to the private sector. This serves as the proxy for credit growth. It excludes credit to the public sector.	WDI (2016)
8	Dummy variables	For each of the four sub-regions. 1 (if in that sub-region) and 0 (if otherwise).	Constructed by Researcher
9	Financial stability index	This is a measure of financial stability	Researcher's Computation
10	Financial system deposits (% of GDP)	Demand, time and saving deposits in deposit money banks and other financial institutions as a share of GDP. It is a measure of financial depth.	WBGFD (2016)
11	GDP (current US\$)	GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products.	WDI (2016)
12	GDP growth (% , annual)	The growth rate of the GDP.	WDI (2016)
13	GDP per capita (current US\$)	GDP per capita is gross domestic product divided by midyear population.	WDI (2016)
14	GDP per capita growth (% , annual)	Annual percentage growth rate of GDP per capita based on constant local currency.	WDI (2016)
15	Gini index	The measure of income inequality. Ranges between 0 (perfect equality) and 100 (perfect inequality)	Lahoti <i>et al.</i> , (2016)
16	Govt. expenditures (% of GDP)	General government final consumption expenditures include all government current expenditures for purchases of goods and services.	WDI (2016)
17	Gross fixed capital formation (% of GDP)	Gross fixed capital formation (formerly gross domestic fixed investment).	WDI (2016)

S/No.	Variables and Measurements	Short Description	Source
18	Gross fixed capital formation gr. (% , annual)	Average annual growth of gross fixed capital formation based on constant local currency.	WDI (2016)
19	Inflation (consumer prices) (% , annual)	Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly.	WDI (2016)
20	Liquid liabilities (% of GDP)	Liquid liabilities are also known as broad money, or M3. It is a measure of financial depth.	WBGFD (2016)
21	Total natural resources rents (% of GDP)	This is the proxy for natural resources. Mineral rents are the difference between the value of production for a stock of minerals at world prices and their total costs of production.	WDI (2016)
22	Primary enrolment (% total)	Percentage of primary enrolment to total enrolment.	WDI (2016)
23	Real interest rate (%)	Real interest rate is the lending interest rate adjusted for inflation as measured by the GDP deflator.	WDI (2016)
24	Trade (% of GDP)	Trade is the sum of exports and imports of goods and services measured as a share of gross domestic product.	WDI (2016)

Note: WBGFD: World Bank Global Financial Development Database, WDI: World Development Indicators
Source: Researcher's Compilation

1. Financial Stability Index

This is a dependent variable. The principal component analysis (PCA) method involves a mathematical procedure that transforms a number of correlated variables into a small number of uncorrelated variables called principal components (Tchamyu, 2016). The first component captures most of the common variance and the following orthogonal components contain less and less information than the preceding components (Creel, Hubert, & Labondance, 2014). Given that there are many indicators of financial system stability with each indicator having a commensurable influence on financial system activities and to avoid the problem of multicollinearity, it becomes imperative to derive an index measuring financial system stability. Thus, the main reason for building a composite index is to avoid the problem of multicollinearity that occurs when introducing several financial stability variables at the same time that are highly correlated amongst themselves (Batuo, Mlambo, & Asongu, 2017). Howbeit, there is no consensus as to what variables make up the financial stability index, researchers in related field have used different indicators classified into microeconomic and macroeconomic dimensions into computing this index.

In addition, there is no consensus as to whether the indicator is called “financial *stability* index” or “financial *instability* index”. For instance, Creel *et al.* (2014) computed financial *stability* index using both microeconomic and macroeconomic dimensions which are: ratio of non-performing loans to gross loans which is relevant as a warning signal for systemic banking insolvency, the banking Z-score, stock market volatility, bank capital to total assets, net interest margin, bank non-performing, loans to gross loans, stock market capitalization growth rate, return on assets, return on equity, and liquid assets to deposits and short-term funding, total of credit to the private sector by deposit banks and other financial institutions and stock market turnover ratio. Batuo *et al.* (2017) on the other hand, computed financial *instability* index using the macroeconomic dimension which are composites of indicators gleaned from the balance sheet of the banking system such as: domestic credit provided by banks, credit provided to the private sector, liabilities liquidity, money and quasi money (M2) as a percentage of GDP, the real interest rate, and interest rate spread. Thus, depending on the researcher’s line of thought or argument, either connotation is applicable.

2. The Gini Index

This is a dependent variable. Income inequality is the major value-added of this study and the Gini index is a useful summary indicator of income inequality. It is the most used measure of income equality and ranges from 0 (perfect income equality) to 100 (perfect income inequality). It takes its cue from the Lorenz (1905) curve as shown in Figure 4.1 and it is a graphical distribution of nations’ wealth. On the graph, a straight diagonal line (45°) represents perfect equality while the Lorenz curve lies beneath showing the reality of wealth distribution. Thus, the coefficient is the difference between the straight and curved line measuring the amount of inequality in wealth distribution. Countries with Gini indices closer to 0 (European countries) are more equal than those closer to 100 i.e. Latin American and African countries (UNDP, 2011, 2013).

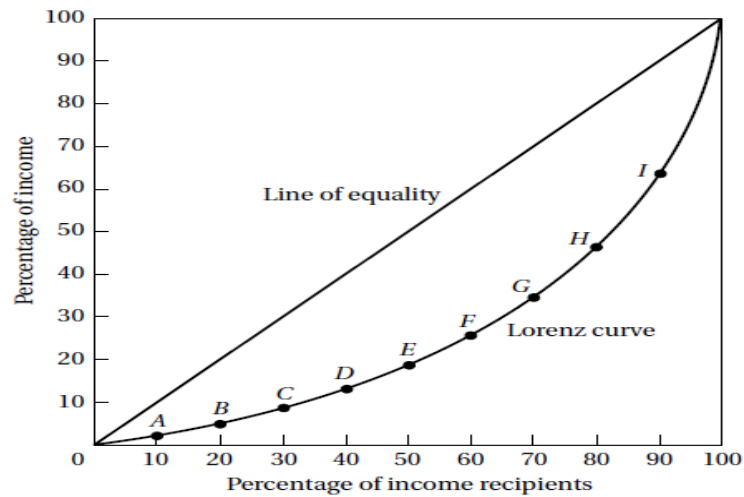


Figure 4.1: The Lorenz Curve from Lorenz (1905)
Source: Todaro and Smith (2012)

According to The Conference Board of Canada (2011), countries with Gini indices within 20 – 29.99 are said to be experiencing low inequality; those within 30 – 39.99 are having medium inequality; those within 40 – 49.99 are experiencing high inequality while those above 50 are said to have very-high inequality. Most developing economies are in the region of ‘high’ and ‘very high’ income inequality and Sub-Saharan Africa (SSA) falls into this category. The Gini index is widely used perhaps due to the fact that it is easily computable and the data is readily available relative to other income measures. The index can be measured using gross income or net income, income or expenditure, data per capita or data per household (Milanovic, 2014; Solt, 2016). However, variations in defining the measure of the Gini index itself can undermine international and intertemporal comparability of any data (Deininger & Squire, 1996; Milanovic, 2014; Solt, 2014; Lahoti *et al.*, 2016). The undermining may be as a result of different income definitions (gross income or net income) used across or even within countries and different reference units. The Gini index based on net income is used in this study.

3. Domestic Credit to the Private Sector

This is a dependent variable and the proxy for credit growth; it is also the key explanatory variable in the inequality model. It captures the financial resources provided to the private sector by financial corporations, such as through loans, purchases of non-equity securities, and trade credits and other accounts receivable, that establish a claim for repayment. It is measured as a percentage of GDP and excludes credit to the public sector (World Bank, 2016) and represents the volume of funds available for lending. It is also the key explanatory variable in the inequality equation. Empirical findings support the argument that the removal of bureaucratic

controls towards directed credit and excessively high reserve requirements in addition to improvements in the securities market greatly reduce inequality. This further corroborates the findings of other political economy scholarship, which emphasises that access to credit amidst banking sector reforms reduces income inequality (Agnello *et al.*, 2012; Kotarski, 2015; Park & Shin, 2015). Thus, a negative coefficient is expected.

4. Interest rates

Both the real and deposit interest rates are used to measure financial reforms. The deposit rate is the rate paid to depositors while the real interest rate is the lending rate adjusted for inflation and both rates enhance competition and efficiency in the financial sector. Such that, when the economy is booming, it pushes up demand for loanable funds (deposits) and therefore banks have incentive to increase deposit rates to savers. However, with respect to operating cost and credit risk, an increase in the cost of financial intermediation (which includes the increased deposit interest rate) leads to higher lending rates as banks attempt to recoup the costs. These include costs incurred in assessing the risk profile of borrowers, monitoring of the various projects for which loans have been advanced and expansion of branch network. On the other hand, an increase in the volatility of the money market interest rate drives up both deposit and lending rates (Were & Wambua, 2014). Therefore, Balassa (1990) considers financial liberalisation to be the backbone of economic reforms in lagging economies and explains it to mean the creation of higher interest rates that equate the demand and supply for savings and opinionated that increased rates of interest will lead to increased saving, increased financial activities as well as improving the efficiency of using savings (Adeleye *et al.*, 2017). Given these, positive coefficients are expected in both the financial stability and credit growth models.

5. Control Variables

To ascertain whether the significance of key explanatory holds, they are controlled for using these variables. The *GDP* and its *growth rate* represent economic size. They are used only in the inequality model and it is expected that as they increase, income inequality falls. Therefore, a negative coefficient is expected. Likewise, the *per capita GDP* and its *growth rate* are expected to enhance financial stability, stimulate financial intermediation and hence reduce income inequality. However, some studies reveal that an increase in GDP deteriorates income distribution (van der Hoeven, 2010; Huhta, 2012). Hence, the underlying expected signs are contingent on the equal distribution of the *fruits of economic prosperity* across the population in the country. *Broad money*, its *growth rate*, *financial system deposits* and *liquid liabilities*

represent the pool of loanable funds which enhances financial system stability, stimulate credit and expected to reduce income inequality (as applicable to the model in which they appear). That is, an increase drives the need to avail credit (Akinboade & Makina, 2010; Jegede, 2014; Ajibike & Aremu, 2015; Bassey & Moses, 2015; Adeleye *et al.*, 2017). The *inflation rate* is expected to have a positive relationship with *credit growth* and a negative relationship with *financial stability* as rising inflation causes the real rate of return to fall which weakens the efficiency of the financial sector.

Similarly, *trade openness* is included to test for potential effects of globalisation, which through Stolper-Samuelson effects can be hypothesised to potentially impact on economic development. At the same time, if openness to trade is a stimulus of economic development, then it could go hand-in-hand with development of financial institutions and hence stimulate financial intermediation. Hence, a positive coefficient is expected. *Government consumption expenditure* represents an important mechanism through which income can be redistributed across societal strata. It is both an engine of growth and a determinant of the distributions of wealth, income, and welfare. Government public investment increases wealth inequality over time, regardless of its financing. The time path of income inequality is, however, highly sensitive to financing policies, and is often characterized by sharp inter-temporal trade-offs, with income inequality declining in the short run but increasing in the long run (Chatterjee & Turnovsky, 2012). The expected sign on income inequality is indeterminate but positive coefficients are expected for the financial stability and credit growth models. *Gross fixed capital formation* (proxy for investment) and its *growth rate* also enhance financial stability and stimulate lending. Hence a positive coefficient is expected but the impact of expenditures on income inequality is indeterminable. Equally, the *loan-to-deposit ratio* is expected to reduce income inequality as the proportion of loans increase.

Likewise, the education variable *primary enrolment* tests the impact of education on income inequality. This is the school enrolment ratio, and it is expected to feature with a negative coefficient although empirical literature have mixed views as to the impact on income distribution. Furthermore, as noted by Witt, Clarke, and Fielding (1999); Lochner (2004) schooling generates benefits beyond the private return received by individuals. Some other studies find that primary and secondary education are equalising variables (De Gregorio & Lee, 2002; Perugini & Martino, 2008) while higher education further widens the inequality gap (Lochner, 2004; Lochner & Moretti, 2004; Lo Prete, 2013). Also, the *age-dependency ratio*

captures the ratio of non-income earners to the working-age population, and as the proportion rises, income inequality is expected to rise. A high ratio indicates that a large proportion of youths are employed while a lower ratio can still be seen as a positive sign, especially for young people, if it is caused by an increase in their education.

Furthermore, *natural resources* capture economic wealth. This variable will be used only in the inequality model as it is included to test if the abundance of natural resources influences income inequality. While natural resources have the potential to generate huge income for a country, the key issues whether the generated wealth trickles down to the lower members of society, or if it is kept exclusively by a small elite. It is expected that inequality should reduce in countries naturally-endowed but since natural resources are relative to regions and countries, the expected sign is indeterminable (Adeleye, 2014). Lastly, four *dummy variables* are constructed to capture variations across the four sub-regions. *1* indicate the respective sub-region and *0* if otherwise. The summary of the *a priori* expectations are shown in Table 4.2.

Table 4.2: Variables' *a priori* Expectations

S/No.	Variables	Models			Sample:
		FSI	CR	Gini	
1	Age dependency ratio			positive	SSA
2	Broad money		positive	negative	K, S
3	Broad money growth	positive	positive	negative	SSA, C, K, N, S
4	Deposit interest rate	positive	positive		C, K, N, S
5	Domestic credit			negative	SSA, C, K, N, S
6	Financial system deposits		positive		N
7	GDP (US\$)			negative	K
8	GDP growth (% , annual)			negative	SSA
9	GDP per capita	positive	positive		SSA, C, K, N, S
10	GDP per capita growth (% , annual)	positive	positive	negative	SSA, C, N, S
11	Govt. expenditures	positive	positive	undetermined	SSA, C, K, S
12	Gross fixed capital formation	positive	positive		SSA, C, K, N, S
13	Gross fixed capital formation gr.	positive	positive		C, S
14	Inflation (consumer prices)	negative	positive		C, K, N, S
15	Liquid liabilities			negative	C, K
16	Loan-to-deposit ratio			negative	S
17	Natural resources			negative	SSA, C
18	Primary enrolment			negative	K, N, S
19	Real interest rate	positive	positive		SSA, C
20	Trade	positive	positive		SSA

Note: FSI: Financial stability index, CR: Credit growth, Gini: Gini index, SSA: Sub-Saharan Africa, C: Cameroon, K: Kenya, N: Nigeria, S: South Africa,
Source: Researcher's Compilation

4.6 Handling Data Issues

To obtain the desired dataset, it has been necessary to choose from already existing datasets and databases. Even though data has become increasingly available for most indicators, it is still important to be very critical towards the quality of the data being collated. Much of the data coming out of most regions, aside Europe, suffer from inconsistencies in the numbers and methodology, both across countries, within countries and cross time (Meschi & Vivarelli, 2009; Lo Prete, 2013; Milanovic, 2014; Ravallion, 2014).

Acknowledging the above challenges, only data from accredited sources, of which most have been previously used in the literature, are included. Ideally, the dataset will be a representative

longitudinal sample across all regions of Sub-Saharan Africa containing prominent indicators believed to have influence on credit growth and income inequality. The data collection and selection process involved combining similar datasets, while taking into consideration the units of measurements, thus yielding a meaningful time series data (Dollar & Kraay, 2004).

Due to the issue of missing values, particularly on the Gini index, the study coverage is scaled down to 20 countries. Priority is given to the availability of substantial data points on the Gini index, real interest rate, deposit rate and domestic credit. Thus, countries without these are dropped to minimise 'holes' in the data and also to balance the 'trade-off' between sample size, richness and power of the explanatory variables (Barro, 2000). Finally, on a different note, it is hoped that the compiled dataset will serve as a secondary outcome of this research. Even though the dataset is mainly compiled for the purpose of this specific study, it may be useful in other respects as well.

On the challenges encountered in obtaining the Gini index (the main argument of this study), a choice was made between the two renowned sources often referenced among researchers, they are: Lahoti *et al.* (2016), Solt (2014) Standardised World Income Inequality Database (SWIID) and World Bank (2013) Gini Datasets¹⁴. Lahoti *et al.* (2016) covers 1960 to 2015 and available for 161 countries of which 44 are in SSA. The index is calculated from actual household surveys with a total 2218 'standardised' number of Gini coefficients. The database is a representation and adaptation of Gini indices retrieved from nine (9) sources in order to create a single 'standardised' Gini variable. The sources are: LIS, SEDLAC, SILC, ECA, WYD, POVCAL, WIIDI, CEPAL and INDI¹⁵. Solt (2014) on the other hand, provides the SWIID which gives comparable estimates of the Gini index of net- and market-income inequality for 174 countries of which 45 are African countries for as many years as possible from 1960 to 2011 (or 2012 and 2013, for very few countries), as well as measures of absolute and relative redistribution.

¹⁴The World Bank (2013) data source in its entirety is not useable for this study. The reason is because the data on Gini indices for Sub-Saharan Africa is very sparse with only a trickle of data points available.

¹⁵LIS: Luxembourg Income Study dataset covers 1967-2010' includes 40, mostly developed, countries; 232 Gini observations. SEDLAC: Socio-Economic Database for Latin America and the Caribbean covers 1974-2012; includes 23 Latin American and Caribbean countries; 301 Gini observations.

SILC: Survey of Income and Living Condition includes years 2005-2008 with 29 countries; 103 Gini observations.

ECA: World Bank's Eastern Europe and Central Asia database covers 1990-2011, includes 30 countries; 257 Gini observations.

WYD: World Income Distribution dataset covers 1980-2012; includes 152 countries; 631 Gini observations.

POVCAL, World Bank-based dataset covers the period 1978-2011; includes 124 countries; 798 Gini observations.

WIIDI: World Institute for Development Research (WIDER) dataset covers 1950-2012; includes 159 countries; 1490 Gini observations.

CEPAL. Historical data on Latin American countries obtained from published documents by CEPAL; covers 1950-1987; include 6 countries; 29 Gini observations.

INDIE: Individual data sets taken from individual studies.

The SWIID was introduced in 2008 to provide researchers with income inequality data that maximise comparability for the broadest possible sample of countries and years (Solt, 2009). The SWIID made use of five sources¹⁶ and has more than 10,000 Gini indices calculated on the basis of eleven different combinations of welfare definitions and income scale. Therefore, given the longer period coverage, this study makes use of the Gini dataset from Lahoti *et al.* (2016).

Another major issue that may arise from multivariate models is multicollinearity which explains the degree of dependence between regressors. If there is perfect or near-perfect multicollinearity, it indicates that variation in one regressor can be completely explained by another regressor because both variables cannot be distinguished from one another, thus resulting in biased estimates even though OLS estimators are still best linear and unbiased estimators (BLUE). One of the ways¹⁷ to test for multicollinearity is via the tolerance level and variance-inflating factor (VIF)¹⁸. The tolerance level is percentage of unaccounted variance in an explanatory variable by other explanatory variables. It is mathematically stated as $1 - R^2$ (where R^2 is that obtained from regressing an explanatory variable on other regressors). The unaccounted variance is the tolerance level. The tolerance level of 0.10 is often accommodated, such that any percentage below that evidences the presence of multicollinearity.

The VIF is the inverse of the tolerance level and it is the speed at which variances and co-variances increase and shows how the variance of an estimator is inflated by the presence of multicollinearity (Gujarati & Porter, 2009). As the coefficient of correlation, r between the regressors' approaches 1, the VIF approaches infinity. The implication of this is that, as the extent of collinearity increases, the variance of an estimator increases, and in the limit it can become infinite. Thus, if there is no collinearity between regressors, the VIF will be 1 (Gujarati & Porter, 2009). In the three specified models, multicollinearity is prevented by avoiding the inclusion of highly collinear variables in the same model. Further testing is done to ascertain that multicollinearity does not exist using the VIF. These are shown in the diagnostic checks in Tables 5.22, 5.24, 5.26 and 5.28.

¹⁶LIS, Milanovic (2013), SEDLAC, WIDER (2008, 2013) and Deininger and Squire (1996).

¹⁷Multicollinearity can also be tested with the coefficient of correlation, r . If $r = 1$, then multicollinearity or collinearity exists between explanatory variables.

¹⁸ $VIF = \frac{1}{(1-r_{nk}^2)}$, where r_{nk}^2 is the coefficient of correlation between regressor n and k ,

CHAPTER FIVE

RESULTS AND DISCUSSION

To address the stated hypotheses and achieve the objectives of the study, the empirical strategy and results are presented and discussed in two parts. The first which is the general approach comprises a panel dataset of 20 countries while the second part which is the specific approach involves time series analyses of 4 countries – Cameroon, Kenya, Nigeria and South Africa, with each representing a sub-region. The distinct heterogeneity of each of the four countries representing a sub-region is taken into consideration. The time span for both analyses is from 1980 to 2015 and variables used are as discussed in section 4.5 (shown in Table 4.1). For the panel data, the empirical techniques of pooled ordinary least squares (OLS), fixed effects (FE), dynamic fixed effects (DFE) and system GMM (for estimation robustness) are used while the error-correction model of the autoregressive distributed lag (ARDL) framework is used for the time-series data. All estimations are carried out using Stata13 analytical software.

5.1 The General Approach – Panel Data Analysis

The reason for adopting a general approach is because a broader perspective on the issues bordering on the menace of income inequality is required to enable proffering a corrective course of action as it relates to Sub-Sahara Africa. To achieve this, 20 countries are selected from the region based on data availability. They are: Botswana, Burundi, Cameroon, Central African Republic, Chad, Comoros, Congo Republic, Gabon, Gambia, Kenya, Malawi, Mauritius, Namibia, Nigeria, Rwanda, Seychelles, Sierra Leone, South Africa, Swaziland and Tanzania. From this pool of countries, 6 are from Central Africa, 7 from East Africa, 4 from Southern Africa and 3 from West Africa. Given the time dimension of 36 years, analyses is done by dividing the sample into a 10-year non-overlapping window in order to understand variations in the data vis-à-vis the 4 sub-regions. The empirical techniques employed are the pooled OLS, FE, DFE and sys-GMM estimators.

5.1.1 Computing Financial Stability Index

Financial system stability has no established aggregate indicator that can be used as a measure of financial instability but most studies either use proxies or compute an index of financial stability (Geršl & Heřmánek, 2006; Creel *et al.*, 2014; Batuo *et al.*, 2017). Since the objective of financial stability indicators is to provide users with a rough idea of the soundness of the financial sector as a whole, this study aligns with the general school of thought by computing a

financial stability index using the principal component analysis (PCA) method. The justification for the PCA is that there are many indicators of financial stability which often leads to not knowing which of these indicators best capture financial stability or which is most appropriate for an empirical analysis, coupled with the fact that there often exists a high correlation among them. The computation of a financial stability index can be done by either using macroeconomic or microeconomic financial indicators (Creel *et al.*, 2014).

Thus, due to paucity of data on the microeconomic measures of financial stability for all SSA countries, particularly from 1980 to 1995, this study adopts the macroeconomic measures in computing the financial stability index for the panel of countries. The variables used are domestic credit to the private sector, domestic credit to the private sector by banks, domestic credit provided by financial institutions, financial system deposits, liquid liabilities and broad money all of which are in percentage of GDP. Interestingly, these measures capture both the assets (domestic credit to the private sector, domestic credit to the private sector by banks and domestic credit provided by financial institutions) and liabilities (financial system deposits, liquid liabilities and broad money) components of the financial system in the balance sheet of financial intermediaries thus substantiating their relevance in the composition of the index in addition to the fact that they remain strongly correlated.

Therefore, following Batuo *et al.* (2017), the “change” rather than the “level” of each variable is used in the computation of the index, which is a linear combination of the six preceding variables maximising the common variance explained between them. Consequently, to justify the use of PCA, it is observed from the data that the correlation between change in domestic credit provided by banks and change domestic credit to the private sector is 0.9003, and that between change in liquid liabilities and financial system deposits is 0.9413. The correlation between FSI and other measures of financial stability is shown in Table 5.1. The financial stability index (FSI) is strongly and positively correlated with all variables of financial stability, an indication that the FSI best explains these variables simultaneously. Likewise, the strong correlation among the indicators is evidenced. It further shows that when the FSI increases, financial system stability improves.

Table 5.1: Correlation Matrix (FSI and Financial Stability Variables), SSA

Variables	<i>FSI</i>	ΔDCF	ΔDC	ΔDCB	ΔFSD	ΔLL	ΔBM
Financial stability index (FSI)	1.000						
Change in domestic credit by fin. inst.	0.632	1.000					
Change in domestic credit	0.750	0.521	1.000				
Change in domestic credit by banks	0.785	0.479	0.900	1.000			
Change in financial system deposits	0.780	0.289	0.290	0.350	1.000		
Change in liquid liabilities	0.798	0.302	0.308	0.363	0.941	1.000	
Change in broad money	0.773	0.382	0.396	0.464	0.595	0.632	1.000

Note: *FSI*: financial stability index; ΔDCF .: change in domestic credit by financial institutions; ΔDC .: change in domestic credit; ΔDCB .: change in domestic credit by banks; ΔFSD .: change in financial system deposits; ΔLL .: change in liquid liabilities and ΔBM .: change in broad money
Source: Researcher's Computations

In computing the financial stability index, the first component has an eigenvalue (the variance of the component) of 3.4193 (a value greater than one means that the component captures more variance than its nominal share of the total variance of the variables) and explains 56.99% of the common variance of the series while the second component has an eigenvalue of 1.3703 and explains 22.84% of the variation. Only the first component is used in this case and the scree plot is shown in Appendix Figure A5.1. The Kaiser-Meyer-Olkin (KMO) index is the measure of sampling adequacy and it compares the partial correlations and correlations between variables. A value above 0.50 justifies the use of PCA (Creel, Hubert, & Labondance, 2014). Therefore, with a KMO of 0.6976, the use of PCA is validated. Table 5.2 shows some salient features from the computation of financial stability index.

Table 5.2: PCA and Eigenvectors, SSA

Variables	SSA
PCA eigenvectors (highest)	3.4193
Proportion explained	0.5699
Kaiser-Meyer-Olkin	0.6976

Source: Researcher's Computation

5.1.2 Descriptive Statistics and Correlation Matrix, SSA

The descriptive analysis is conducted on a sub-regional basis in comparison with the full sample. From Table 5.3, the average Gini index for the 20 selected countries is 60.68 while among the sub-regions, Southern Africa has the highest average income inequality index of 64.63. Generally, all the sub-regions in SSA exhibit high inequality index. Ironically, the Southern Africa region has the highest volume of domestic credit (47.122) the bulk of which

comes from South Africa. In the same vein, Southern Africa has the lowest real interest rate (4.438) relative to the full sample (7.09) and across other sub-regions. Likewise on per capita GDP, Southern Africa recorded the highest average of 3,146.64 followed by East Africa relative to the full sample (1,897.58) and other sub-regions just to mention a few.

Table 5.3: Data Properties and Descriptive Statistics, SSA (1980-2015)

Variables	[Full Sample]		[Central Africa]		[East Africa]		[Southern Africa]		[West Africa]	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Financial Stability Index	0.000	1.849	-0.158	1.284	0.136	1.811	0.134	1.975	-0.164	2.528
Gini index	60.680	4.425	60.019	2.416	58.544	2.636	64.625	4.612	61.742	6.452
Domestic credit	21.127	26.075	11.535	6.661	20.002	18.841	47.122	43.635	10.565	6.913
Real interest rate	7.090	11.313	10.290	12.046	7.510	7.864	4.438	5.643	4.687	18.041
GDP growth	3.644	5.916	3.046	6.389	3.891	5.839	4.467	4.169	3.188	6.913
per capita GDP	1,897.579	2,547.971	1,593.815	2,161.410	2,022.679	3,320.318	3,146.637	1,780.419	557.067	586.234
per capita GDP growth	1.124	5.706	0.282	6.096	1.575	5.739	2.165	3.896	0.405	6.528
Broad money growth	16.087	15.361	9.884	15.715	17.341	12.243	16.219	12.861	25.317	18.582
Investment	19.575	8.533	20.035	10.134	20.160	7.258	22.075	6.246	13.928	8.006
Trade	73.551	37.395	70.162	31.670	68.128	41.975	98.527	34.762	59.128	23.052
Primary enrollment	96.398	24.305	97.469	28.110	96.911	25.819	103.935	10.568	81.046	19.407
Govt. expenditures	16.335	7.035	14.004	5.682	17.786	7.375	20.904	3.724	11.547	7.416
Age-dependency ratio	86.029	15.747	90.715	8.496	83.891	20.984	79.308	15.772	90.608	4.335
Natural resources	12.810	15.997	22.604	20.681	6.826	7.156	4.023	5.024	17.790	16.393

Note: Std. Dev: Standard Deviation

Source: Researcher's Computations

Next is the standard deviation which tells how the calculations for a group are spread out from the average (mean), or expected value. A low standard deviation implies that most of the numbers are very close to the mean value while a high standard deviation means that the numbers are spread out. For instance, the standard deviation of 4.425 for the Gini index for the full sample indicates that most of the countries in the sample exhibit high inequality indexes. That is, very close to the sample average. Also, the standard deviation of 1,780.42 for per capita GDP for Southern Africa indicates that most countries in that sub-region are greatly dispersed from the average group mean implying huge disparities in the per capita incomes of countries located in Southern Africa. In the same vein, the standard deviation of 18.04 for the real interest rate for West Africa indicates that most countries in the sub-region are greatly dispersed from the average rate of 4.69.

On the correlation among the variables, it is important that the variables used in each equation do not exhibit perfect collinearity (that is, when the variation in one explanatory variable can be completely explained by movements in another explanatory variable) as this will give rise to biased estimates. Although still best linear unbiased estimator (BLUE), the obtained OLS

estimates will have large variances and co-variances making precise estimation difficult (Wooldridge, 1995; Gujarati & Porter, 2009; Wooldridge, 2009, 2010). The correlation analysis shown in Table 5.4 reveals the relationships existing between and among the variables. Although there is no consensus on the exact level of dependence for one to become wary of the presence of multicollinearity, but it is generally agreed that any figure from 0.8 and above should be cautiously looked at.

Table 5.4: Correlation Matrix for SSA

<i>Variables</i>	<i>FSI</i>	<i>Gini</i>	<i>DC</i>	<i>RR</i>	<i>GDPGr.</i>	<i>PC</i>	<i>PCGr.</i>	<i>BMGr.</i>	<i>GFCF</i>	<i>Trade</i>	<i>Pry.</i>	<i>Exp.</i>	<i>Age</i>	<i>Nat</i>
Financial stability index	1.000													
Gini index	-0.051	1.000												
Domestic credit	0.174	0.233	1.000											
Real interest rate	0.388	-0.099	-0.011	1.000										
GDP growth	-0.139	-0.065	-0.045	0.050	1.000									
GDP per capita	0.138	-0.003	0.489	-0.003	-0.003	1.000								
GDP per capita growth	-0.110	-0.079	0.041	0.040	0.978	0.114	1.000							
Broad money growth	0.207	0.091	-0.086	-0.389	0.133	-0.133	0.123	1.000						
Gross fixed capital formation	0.116	-0.107	0.080	0.030	0.129	0.411	0.149	-0.066	1.000					
Trade	0.032	0.112	0.072	-0.038	0.149	0.530	0.214	0.006	0.495	1.000				
Primary enrollment	0.082	-0.125	0.169	0.024	0.087	0.324	0.129	0.006	0.407	0.291	1.000			
Government consumption exp.	0.115	0.253	0.157	-0.004	-0.071	0.408	-0.045	-0.108	0.355	0.391	0.285	1.000		
Age dependency ratio	-0.208	0.048	-0.587	0.020	0.005	-0.786	-0.140	0.065	-0.281	-0.414	-0.295	-0.270	1.000	
Natural resources	-0.107	-0.219	-0.207	-0.141	-0.013	-0.168	-0.050	0.112	0.046	-0.046	0.144	-0.257	0.213	####

Note: *FSI*: financial stability index; *DC*: Domestic credit; *RR*: Real interest rate; *PC*: per capita GDP; *PCGr*: per capita GDP growth; *BMGr*: Broad money growth; *GFCF*: Gross fixed capital formation; *Pry*: Primary enrollment; *Exp*: Government expenditures; *Age*: Age dependency ratio; *Nat*: Natural resources

Source: Researcher's Computation

From Table 5.4, only two relationships exhibit strong correlation (that is, strong linear dependence). They are per capita GDP growth/GDP growth (0.978) and age-dependency ratio/per capita GDP (-0.786). However, since these collinear regressors are not included together in the same models, the problem of multicollinearity is averted.

5.2 Estimation and Results – Panel Data

The approach taken is to address each research hypothesis and display the results from the various empirical techniques used. The pooled OLS estimation is simply the OLS method run on a panel dataset which ignores individual fixed effects. Although the pooled OLS does not differentiate between time and cross-sections, its essence in this study is to capture the sub-regional variations in the data. Hence, the dataset is divided into 4 sub-regions – Central Africa (CA), East Africa (EA), Southern Africa (SA) and West Africa (WA) with WA as the base sub-region. On the other hand, the fixed effects model chosen on the basis of the Hausman test result (see Table 5.5) eliminates all unobserved heterogeneity (individual fixed effects) in the data.

Table 5.5: Hausman Test Result

Test: Ho: difference in coefficients not systematic

$$\begin{aligned}\chi^2(39) &= (b-B)'[(V(b)-V(B))^{-1}](b-B) \\ &= 77.84\end{aligned}$$

$$\text{Prob} > \chi^2 = 0.0003$$

(V(b)-V(B) is not positive definite)

Source: Researcher's Computations

Likewise the dynamic fixed effects (DFE) model is used only in addition to other techniques to address the third research question due to the dynamic nature of income inequality. This dynamic character is articulated by the introduction of a lagged dependent variable as an explanatory variable. In addition, a 10-year non-overlapping window is used to further capture variations across the different time periods (pre-reform, reform and post-reform periods). This study is unable to clearly separate the pre- and reform periods since most countries embarked on financial reforms between mid-1980s to the late 1990s. Therefore for simplicity and to prevent unnecessary ambiguity, periods before year 2000 are classified as reform periods. In addition, the inclusion of year dummies is to capture the influence of aggregate (time-series) trends. Including dummies for each year allows the model to attribute some of the variation in the data to unobserved events that took place during each year, or otherwise characteristic features of that year besides specific events. Lastly, to check the robustness of estimators and control for endogeneity, the system GMM estimator is used.

5.2.1 Pooled OLS Results

The pooled OLS for all the hypotheses are displayed and discussed in this section. Firstly, in addressing whether the financial system is stable after a reform (Equation 4.32), results displayed in Table 5.6 show that across all specifications, the real interest rate is a positive and significant predictor of financial sector stability at the 1% level. Similarly, the coefficients of per capita GDP and broad money growth are positive and statistically significant across all specifications at the 1% and 5% levels respectively.

Table 5.6: Pooled OLS: Financial Reforms and Financial Stability

Variables	[1980 - 1989]	[1990 - 1999]	[2000 - 2009]	[2010 - 2015]
Constant	-2.913 ^b (-2.60)	-3.424 ^a (-3.54)	-0.899 (-0.62)	-7.384 ^a (-2.87)
Real interest rate	0.105 ^a (8.36)	0.079 ^a (7.51)	0.099 ^a (6.89)	0.215 ^a (4.79)
per capita GDP (log)	0.487 ^a (2.94)	0.471 ^a (4.21)	0.500 ^a (2.71)	0.552 ^b (2.11)
per capita GDP gr.	-0.078 ^a (-3.38)	-0.092 ^a (-3.88)	-0.078 ^a (-2.82)	-0.095 (-1.42)
Broad money growth	0.054 ^a (6.83)	0.049 ^a (5.84)	0.059 ^a (4.82)	0.076 ^b (2.33)
Investment (log)	-0.077 (-0.21)	0.269 (1.34)	-0.290 (-1.11)	0.777 (1.23)
Trade (log)	-0.404 ^c (-1.83)	-0.393 ^c (-1.71)	-0.661 ^c (-1.69)	-0.748 (-1.01)
East Africa	0.203 (0.64)	0.467 (1.17)	0.171 (0.52)	1.292 ^b (2.43)
Central Africa	-0.167 (-0.48)	-0.648 (-1.46)	-0.061 (-0.20)	2.937 ^a (4.29)
Southern Africa	-0.131 (-0.31)	0.218 (0.48)	0.589 (1.10)	1.573 ^c (1.88)
No. of observations	132	172	184	71
Year dummies	Yes	Yes	Yes	Yes
R-Squared	0.539	0.512	0.377	0.668
F-Statistic	6.971	8.344	4.366	.

Note: Dependent variable: Financial Stability Index; Numbers in parentheses are t-statistics based on White heteroscedasticity-consistent standard errors. Statistical significance: ^{a, b, c} indicate 1%, 5% and 10% levels respectively.

Source: Researcher's Computations

Also observed from Table 5.6 is the negative and significant effect of per capita GDP growth at the 1% and 5% levels with the exception of year 2000 to 2015. Likewise trade openness has a significant but negative impact in periods 1980 to 1989, 1990 to 1999, and 2000 to 2009 at the 10% level. On the sub-regions, the results show that it is only in time period 2010 to 2015 that the financial sectors in Central Africa, East Africa and Southern Africa are significantly more stable than those in West Africa (base sub-region). On some particulars of the four specifications, the R-squared reflects the percentage of variation in the dependent variable explained by the regressors while the *F*-statistic gives the joint significance of the regressors and there is no evidence of multicollinearity (the variance inflation function is 1.43).

Secondly, in addressing the financial reforms and credit growth relationship (Equation 4.33), results shown in Table 5.7 reveals that the positive and statistical significance of the real interest rate on credit growth is evident only in periods 1980 to 1989 at the 5% level contrary to the positive significance of per capita GDP across the 5 specifications at the 1% level. This result is in line with *a priori* expectations that financial reforms stimulate credit growth (Khalaf, 2011; Adeleye *et al.*, 2017). Also, the per capita GDP growth rate on the other hand is negative across all specifications but it is statistically significant in periods 1980 to 1989, and 1990 to 1999 at

the 1% and 5% levels. Likewise, broad money growth rate has a negative and statistically significant impact in period 2010 to 2015 at the 10% level and trade openness has a negative and statistically significant impact in periods 2000 to 2009, and 2010 to 2015 at the 1% and 5% levels.

Table 5.7: Pooled OLS: Financial Reforms and Credit Growth

Variables	[1980 - 1989]	[1990 - 1999]	[2000 - 2009]	[2010 - 2015]
Constant	0.249 (0.52)	0.634 (1.05)	1.978 ^a (4.45)	1.329 ^c (1.70)
Real interest rate	0.009 ^b (2.15)	0.005 (1.25)	0.010 (1.65)	0.011 (1.62)
per capita GDP (log)	0.363 ^a (4.68)	0.268 ^a (4.09)	0.623 ^a (10.26)	0.457 ^a (5.51)
per capita GDP gr.	-0.019 ^b (-2.49)	-0.029 ^a (-2.95)	0.001 (0.11)	-0.019 (-1.24)
Broad money gr.	-0.004 (-1.29)	0.003 (0.80)	-0.002 (-0.71)	-0.014 ^c (-1.72)
Investment (log)	-0.072 (-0.74)	0.148 (1.22)	-0.156 (-1.19)	0.047 (0.31)
Trade (log)	0.064 (0.54)	-0.199 (-1.13)	-0.797 ^a (-5.47)	-0.555 ^b (-2.54)
Central Africa	-0.052 (-0.38)	-0.079 (-0.50)	-0.428 ^a (-2.63)	0.927 ^a (5.29)
East Africa	0.076 (0.62)	0.603 ^a (3.48)	0.600 ^a (3.47)	0.813 ^a (5.49)
Southern Africa	0.269 (1.50)	1.087 ^a (5.66)	0.789 ^a (4.22)	0.967 ^a (4.39)
No. of observations	152	176	188	88
Year dummies	Yes	Yes	Yes	Yes
R-Squared	0.440	0.527	0.678	0.660
F-Statistic	6.550	9.612	20.382	9.493

Note: Dependent variable: Credit Growth (log); Numbers in parentheses are t-statistics based on White heteroscedasticity-consistent standard errors. Statistical significance: ^{a, b, c} indicate 1%, 5% and 10% levels respectively.

Source: Researcher's Computations

For the sub-regions, with the exception of period 1980 to 1989, both East Africa and Southern Africa have *increase* in credit growth while Central Africa experienced a significant *decrease* in credit growth in period 2000 to 2009, and a significant increase in period 2010 to 2015 relative to West Africa. The *F*-statistic further reveals that the regressors are jointly significant in explaining credit growth, the variation in credit growth that are explained by the regressors range from 44% to 68% while the year dummies control for time variation in the data. The model shows no evidence of multicollinearity (the variance inflating function is 1.41).

Thirdly, on the credit-inequality relationship (Equation 4.34), Table 5.8 reveals that credit growth has a significant equalising effect on income inequality at the 5% level for periods 1980 to 1989 and 1990 to 1999 while it aggravates inequality at the 10% in period 2010 to 2015. These outcomes for the first two periods are in line with the theoretical literature (Greenwood

& Jovanovic, 1990; Galor & Moav, 2004) and earlier studies (Ang, 2010; Agnello *et al.*, 2012; Dabla-Norris *et al.*, 2015) on the equalising impact of income inequality. Similarly, natural resources has an equalising effect on income inequality in periods 1980 through to 2009. On the other hand, the variables that aggravate inequality include primary enrolment rate in periods 1990 through to 2015 at the 1% and 5%; government expenditures at periods 1980 through to 2009 at the 1% and 10% significant levels and age-dependency ratio at periods 1990 through to 2009 at the 1% and 5% significance level respectively.

Table 5.8: Pooled OLS: Credit Growth and Income Inequality

Variables	[1980 - 1989]	[1990 - 1999]	[2000 - 2009]	[2010 - 2015]
Constant	4.16 ^a (33.00)	3.788 ^a (27.60)	3.846 ^a (41.58)	3.41 ^a (6.96)
Credit growth	-0.041 ^b (-2.01)	-0.051 ^b (-2.51)	0.014 (1.21)	0.127 ^c (1.82)
GDP growth	-0.001 (-0.85)	0.001 (-0.51)	-0.0003 (-0.52)	-0.003 (-1.13)
Primary education	-0.0004 (-1.59)	0.001 ^b (2.18)	0.001 ^a (3.01)	0.002 ^b (2.66)
Natural resources	-0.001 ^b (-2.04)	-0.002 ^a (-3.59)	-0.0004 ^a (-1.81)	0.002 (0.42)
Govt. exp. (log)	0.073 ^a (6.50)	0.063 ^a (5.50)	0.018 ^c (1.77)	-0.052 (-0.98)
Age-dependency (log)	-0.005 (-0.19)	0.074 ^a (2.92)	0.029 ^b (2.02)	0.079 (1.28)
Central Africa	-0.053 ^a (-2.86)	-0.103 ^a (-4.94)	0.006 (0.66)	-0.032 (-0.43)
East Africa	-0.096 ^a (-5.35)	-0.107 ^a (-3.78)	-0.049 ^a (-5.29)	-0.111 (-1.28)
Southern Africa	-0.017 (-0.67)	-0.002 (-0.04)	0.054 ^a (3.08)	-0.096 (-0.92)
No. of Obs.	142	147	165	54
Year dummies	Yes	Yes	Yes	Yes
R-Squared	0.499	0.593	0.602	0.335
F-Statistic	13.85	13.14	14.58	8.66

Note: Dependent variable: Gini Index (log); Numbers in parentheses are t-statistics based on White heteroscedasticity-consistent standard errors. Statistical significance: ^{a, b, c} indicate 1%, 5% and 10% levels respectively.

Source: Researcher's Computations

For the sub-regional analysis, results show that in Central and East Africa, credit growth has a more equalising effect on income inequality than West Africa in periods 1980 through 2009 at the 1% significant level. For Southern Africa, income inequality is higher in period 2000 to 2009 relative to West Africa at the 1% significant level. The sub-regional results are consistent with the stylised facts of Table 3.2 which indicates that on average the Gini index is lower in both Central and East Africa while higher in Southern Africa relative to West Africa. Also, the models have a good fit as the variation in the Gini index explained by the regressors range from 33% to 60% while the *F*-statistic is significant across all specifications evidencing the joint significance of the explanatory variables. The model shows no evidence of multicollinearity

(the variance inflating function is 1.56). Overall, from the pooled OLS results, the study concludes that the reform-credit-inequality nexus exists for SSA.

5.2.2 Fixed Effects Results

Using the fixed effects (FE) estimator relating to Equation 4.32, results displayed in Table 5.9 reveal the effects of financial reforms on the financial system. It shows that the real interest rate is positive and significant at the 1% level across all specifications evidencing the stability of the financial system after the reforms. Likewise broad money growth is positive and statistically significant at the 1% level across all specifications. Close observation on the impact of per capita GDP shows that it is a positive predictor of financial sector stability in periods 1980 to 1989, and 2000 to 2009 at the 1% and 5% levels respectively. Likewise broad money growth has a significant and positive effect across all the four time periods at the 1% level. Similarly, GDP per capita is a significant and negative predictor of financial sector stability for the periods 1980 through to 2009 at the 1% significant level. The specifications also evidence good fits with the *R*-Squared ranging from 42% to 75% and the *F*-statistics indicate that all the regressors are jointly significant at the 1% level.

Table 5.9: Fixed Effects: Financial Reforms and Financial Stability

Variables	[1980 - 1989]	[1990 - 1999]	[2000 - 2009]	[2010 - 2015]
Constant	-10.753 ^b (-2.56)	-9.408 (-1.48)	-18.986 ^b (-2.32)	-1.598 (-0.08)
Real interest rate	0.111 ^a (8.79)	0.081 ^a (8.24)	0.125 ^a (8.06)	0.256 ^a (9.58)
per capita GDP (log)	1.389 ^b (2.49)	0.872 (1.30)	2.857 ^a (3.32)	0.396 (0.22)
per capita GDP gr.	-0.098 ^a (-4.93)	-0.087 ^a (-3.52)	-0.136 ^a (-4.47)	-0.120 (-1.51)
Broad money growth	0.057 ^a (6.98)	0.046 ^a (5.97)	0.061 ^a (5.92)	0.114 ^a (3.36)
Investment (log)	0.083 (0.15)	0.441 (1.39)	0.122 (0.28)	0.956 (0.86)
Trade (log)	-0.044 (-0.07)	0.313 (0.40)	-0.728 (-0.74)	-1.693 (-0.95)
No. of observations	132	172	184	71
Year dummies	Yes	Yes	Yes	Yes
R-Squared	0.596	0.457	0.424	0.749
F Statistic	10.652	7.681	7.306	12.453

Note: Dependent variable: Financial Stability Index; Numbers in parentheses are t-statistics based on White heteroscedasticity-consistent standard errors. Statistical significance: ^{a, b, c} indicate 1%, 5% and 10% levels respectively.

Source: Researcher's Computations

On the financial reform and credit growth relationship (Equation 4.33), results shown in Table 5.10 reveal that financial reform stimulates credit growth with the positive significance of the real interest rate for periods 1980 to 1989, 1990 to 1999 and 2000 to 2009 at the 1% level. This

result supports those from similar studies (Odhiambo, 2010; Okoye & Eze, 2013; Chipote *et al.*, 2014).

Table 5.10: Fixed Effects: Financial Reforms and Credit Growth

Variables	[1980 - 1989]	[1990 - 1999]	[2000 - 2009]	[2010 - 2015]
Constant	2.282 ^a (2.71)	-0.875 (-0.67)	6.820 ^a (6.74)	1.636 (1.53)
Real interest rate	0.009 ^a (4.10)	0.004 ^b (2.13)	0.007 ^a (3.52)	-0.003 (-1.67)
per capita GDP (log)	-0.061 (-0.55)	0.339 ^b (2.46)	-0.332 ^a (-3.11)	0.094 (0.88)
per capita GDP gr.	-0.010 ^a (-2.78)	-0.014 ^a (-2.83)	-0.0003 (-0.08)	0.002 (0.69)
Broad money growth	0.0007 (0.48)	0.001 (0.64)	0.002 ^c (1.70)	0.0006 (0.34)
Investment (log)	0.028 (0.30)	0.029 (0.44)	0.048 (0.87)	0.424 ^a (6.50)
Trade (log)	0.168 (1.34)	0.232 (1.45)	-0.416 ^a (-3.37)	-0.092 (-0.98)
No. of observations	152	176	188	88
Year dummies	Yes	Yes	Yes	Yes
R-Squared	0.324	0.223	0.403	0.495
F Statistic	4.145	2.695	6.894	5.523

Note: Dependent variable: Credit Growth (log); Numbers in parentheses are t-statistics based on White heteroscedasticity-consistent standard errors. Statistical significance: ^{a, b, c} indicate 1%, 5% and 10% levels respectively.

Source: Researcher's Computations

Contrary to the OLS results, per capita GDP has positive and statistically significant impact in period 1990 to 1999 but has negative effect in period 2000 to 2009. In the same vein, broad money growth is a positive predictor of credit growth only in period 2000 to 2009 at the 10% significance level. Likewise, investment, is positive and statistically significant only in period 2010 to 2015 at the 1% level. On the other hand, per capita GDP growth and trade have negative and statistically impacts on credit growth in periods 1980 through to 1999 and 2000 to 2009 respectively at the 1% level. On the good-fit of the model, the value of the *R*-squared indicates that 22% to 50% of the variation in credit growth is explained by the regressors while the *F*-statistic indicate their joint significance. Given these results, it can be concluded that financial reforms stimulate credit growth in SSA thus rejecting the null hypothesis that credit growth is not stimulated by financial reforms.

5.2.3 Dynamic Fixed Effects Results

The credit-inequality relationship is examined within the framework of a dynamic heterogeneous panel. Given that *N* (number of countries is 20) is less than *T* (number of years is 36) it is applicable to estimate this heterogeneous panel using the dynamic fixed effects (DFE) estimator. It is required that *T* must be long enough so that each member of the group (panel)

can be estimated separately. Having divided the region into four sub-regions to highlight the heterogeneity across them, the estimations are done on the full sample and the sub-regional samples. Table 5.11 shows the results from the heterogeneous panel regression from the DFE estimator (Equation 4.34) from where it is seen that in the long-run, credit growth has an equalising impact on the Gini index in relation to the full sample and Southern Africa at the 10% level while inequality is aggravated in East Africa at the 5% level. The coefficients for Central and West Africa are negative but statistically not significant. This however supports the equalising effect of credit although not significant in this case. Other long-run results indicate that GDP growth rate and government expenditure significantly exacerbate inequality for SSA and East Africa at the 1% and 5% levels respectively while primary enrolment has an equalising impact on income inequality in East Africa at the 1% level.

In the short-run, credit growth intensifies inequality relative to the full sample and West Africa while it equalises inequality in East Africa both at the 5% level and 10% levels. The GDP growth rate significantly reduces inequality in East Africa while primary enrolment aggravates it. The age dependency ratio exacerbates inequality relative to the full sample and East Africa while it equalises inequality in Central Africa. The adjustment term is negative for SSA, East and Southern Africa samples indicating that adjustment to long-run equilibrium is at a speed rate of 12% to 26.2%. Overall, the null hypothesis that the finance-credit-inequality does not exist is rejected for the full sample, East and Southern Africa.

Table 5.11: DFE: Credit Growth and Income Inequality

Variables	[SSA]	[Central Africa]	[East Africa]	[Southern Africa]	[West Africa]
<i>Long-run:</i>					
Constant	-0.154 ^b (-2.22)	-0.070 ^c (-1.84)	-0.133 ^a (-5.66)	0.062 (0.18)	-1.549 (-1.31)
Credit growth	-0.062 ^c (-1.71)	-0.603 (-0.48)	0.036 ^b (2.07)	-0.207 ^c (-1.81)	-0.059 (-0.18)
GDP growth	-0.001 (-0.42)	-0.002 (-0.25)	0.006 ^a (3.17)	-0.002 (-0.32)	-0.009 (-0.41)
Primary enrolment	-0.001 (-1.35)	0.0089 (0.49)	-0.001 ^a (-5.53)	-0.002 (-0.45)	0.002 (0.22)
Govt. expend. (log)	0.073 ^b (2.50)	0.294 (0.52)	0.098 ^a (5.14)	0.184 (1.21)	0.143 (0.67)
Age-dependency (log)	0.096 (1.13)	-1.982 (-0.49)	0.067 (1.60)	-0.103 (-0.45)	4.341 (0.61)
<i>Short-run:</i>					
Adjustment	-0.174 ^a (-6.15)	0.008 (0.50)	-0.120 ^a (-5.79)	-0.262 ^a (-3.57)	-0.076 (-0.68)
ΔCredit growth	0.029 ^b (2.05)	-0.002 (-0.72)	-0.011 ^b (-2.13)	0.069 (1.19)	0.084 ^c (1.89)
ΔGDP growth	0.0002 (0.78)	0.000 (0.46)	-0.001 ^a (-3.80)	0.0001 (0.06)	0.001 (0.73)
ΔPrimary enrolment	0.000 (0.02)	0.0001 (1.55)	0.0002 ^b (2.26)	-0.001 (-0.35)	0.0003 (0.30)
ΔGovt. expend. (log)	-0.005 (-0.62)	0.001 (0.45)	-0.006 ^c (-1.89)	-0.011 (-0.19)	0.0003 (0.02)
ΔAge-dependency (log)	0.249 ^c (1.85)	-0.165 ^a (-3.01)	0.096 ^a (2.85)	1.059 (1.31)	0.940 (1.19)
No. of observations	457	115	171	105	66
R-Squared	0.105	0.143	0.368	0.183	0.180
F Statistic	4.521	1.491	8.099	1.831	1.034

Note: Dependent variable: Gini Index (log); Numbers in parentheses are t-statistics based on White heteroscedasticity-consistent standard errors. Statistical significance: ^{a, b, c} indicate 1%, 5% and 10% levels respectively.

Source: Researcher's Computations

5.3 Robustness Checks – System GMM Results

The Arellano-Bond (1991) method allows to explicitly take into cognizance the fact that the determinants of the dependent variable are either pre-determined or endogenous or both and that the dependent variable itself could depend on its past realisations. The problem of endogeneity that is often associated with the use of panel data will be resolved by the use of the system GMM estimator to estimate the relationship between the dependent variable and its regressors. The estimator eliminates biases arising from ignoring dynamic endogeneity and also provides theoretically based and powerful instruments that accounts for simultaneity while eliminating any unobservable heterogeneity (Alege & Ogundipe, 2014). Therefore, to check for the robustness of the previous estimators and also control for possible endogeneity in the models, all specifications are estimated using the two-step system GMM estimator.

Firstly, for the financial reform and financial stability relationship (Equation 4.32), results shown in Table 5.12 validate previous results obtained from the pooled OLS (Table 5.6) and fixed effects (Table 5.9) estimators. With the positive and statistical significance of the real interest rate which ranges from 1% to 10%, financial reform enhances the stability of the

financial system. The specification diagnostics reveal no evidence of second-order autocorrelation with the non-significance of the AR(2) coefficients and given the outcome of the Hansen statistic, the instruments sets are not over-identified.

Table 5.12: System GMM: Financial Reforms and Financial Stability

Variables	[1980 - 1989]	[1990 - 1999]	[2000 - 2009]	[2010 - 2015]
Fin. stab. index_1	0.138 (0.95)	0.036 (0.27)	0.156 (1.58)	0.095 ^c (1.85)
Real interest rate	0.131 ^a (3.49)	0.066 ^a (3.10)	0.130 ^a (4.91)	0.1671 ^c (2.04)
per capita GDP (log)	0.644 (1.08)	1.005 ^b (2.35)	0.937 ^c (1.94)	
GDP growth				-0.121 ^b (-2.41)
Broad money gr.	0.066 ^a (3.81)	0.056 ^b (2.53)	0.064 ^a (4.37)	
Investment (log)	-0.512 (-0.52)	-0.665 (-0.52)	-0.886 (-0.50)	
Trade (log)	-0.693 ^b (-2.26)	0.101 (0.04)	-1.561 (-0.95)	
No. of observations	116	148	164	57
Year dummies	Yes	Yes	Yes	Yes
No. of instruments	20	23	23	14
AR (2)	0.402	0.355	0.631	0.225
Hansen Statistic	0.229	0.133	0.638	0.148
F Statistic	5.743	60.1	27.85	9.367

Note: Dependent variable: Financial Stability Index; Numbers in parentheses are t-statistics based on White heteroscedasticity-consistent standard errors. Statistical significance: ^{a, b, c} indicate 1%, 5% and 10% levels respectively. AR(2): Autocorrelation integrated of order 2.

Source: Researcher's Computations

Secondly, for the financial reform and credit growth relationship (Equation 4.33), results displayed in Table 5.13 are similar to those from the pooled OLS (Table 5.7) and FE (Table 5.10) estimators regarding the effect of the real interest rate on credit growth. With the exception of period 2010 to 2015, financial reform stimulates credit growth with a statistical significance ranging from 10% to 1%. Also, the past realisation of credit growth significantly stimulates its current form at the 1% significance level. The diagnostics also show that the specifications do not suffer from second-order serial correlation and the instruments are not over-identified.

Table 5.13: System GMM: Financial Reforms and Credit Growth

Variables	[1980 - 1989]	[1990 - 1999]	[2000 - 2009]	[2010 - 2015]
Credit growth (log)_1	1.050 ^a (13.75)	1.047 ^a (52.79)	1.038 ^a (28.23)	1.194 ^a (12.20)
Real interest rate	0.015 ^c (1.93)	0.008 ^a (3.60)	0.009 ^a (4.17)	0.004 (1.28)
per capita GDP gr.	-0.004 (-0.34)	-0.002 (-0.16)	-0.016 (-1.31)	-0.031 (-1.35)
Broad money growth	0.008 (1.20)	0.008 ^a (4.41)	0.003 ^b (2.21)	0.009 ^c (2.08)
Trade (log)	-0.063 (-0.72)	0.027 (0.97)	-0.069 (-0.58)	-0.099 (-0.80)
No. of observations	128	158	170	72
Year dummies	Yes	Yes	Yes	Yes
No. of instruments	21	24	24	14
AR (2)	0.155	0.336	0.314	0.106
Hansen Statistic	0.423	0.991	0.482	0.464
F Statistic	220.284	193738.909	14092.10	2860.13

Note: Dependent variable: Credit Growth (log); Numbers in parentheses are t-statistics based on White heteroscedasticity-consistent standard errors. Statistical significance: ^{a, b, c} indicate 1%, 5% and 10% levels respectively. AR(2): Autocorrelation integrated of order 2.

Source: Researcher's Computations

Lastly, on the credit-inequality relationship (Equation 4.34), results in Table 5.14 are similar to those obtained in Tables 5.8 for pooled OLS. The coefficient of credit growth is negative and statistically significant at the 1% level only in period 1980 to 1989 while for the remaining periods it is negative but not statistically significant. The *negative* coefficient of the credit growth variable is crucial in this context because it provides evidence that the variable has an equalising effect on income inequality if there is efficient financial intermediation. Also, on the diagnostics, the specifications give no evidence of second-order auto-correlation and there are no over-identifying restrictions.

Table 5.14: System GMM: Credit Growth and Income Inequality

Variables	[1980 - 1989]	[1990 - 1999]	[2000 - 2009]	[2010 - 2015]
Gini (log)_1	0.000 (.)	1.171 ^b (2.48)	1.038 ^a (7.33)	0.745 ^a (4.51)
Credit growth (log)	-0.073 ^a (-7.28)	-0.001 (-0.03)	-0.005 (-0.25)	-0.005 (-0.25)
GDP growth	0.026 (11.49)	-0.006 (-0.55)	0.001 (0.68)	-0.001 (-0.40)
Primary education	-0.001 ^a (-5.83)	-0.0002 (-0.40)	-0.0002 (-0.13)	
Age-dependency (log)	0.029 ^b (2.26)	-0.056 (-0.41)	-0.029 (-0.58)	0.012 (0.37)
Govt. expenditure gr.	-0.008 ^a (-13.01)	-0.000 (-0.23)	0.000 (0.05)	
No. of observations	104	118	129	39
Year dummies	Yes	Yes	Yes	Yes
No. of instruments	23	23	24	14
AR (2)	0.318	0.801	0.453	0.931
Hansen Statistic	1.000	0.928	0.697	0.078
F Statistic	15678.811	124.777	42.558	5619.183

Note: Dependent variable: Gini Index (log); Numbers in parentheses are t-statistics based on White heteroscedasticity-consistent standard errors. Statistical significance: ^{a, b, c} indicate 1%, 5% and 10% levels respectively.

AR(2): Autocorrelation integrated of order 2.

Source: Researcher's Computations

5.4 Research Objectives and Hypotheses Validation

Having undergone several empirical analyses of the SSA sample of 20 countries, this section summarises the results (in tabular form) verifying whether the outlined research objectives (section 1.4) and research hypotheses (section 1.5) are realised. Shown in Table 5.16 are the four research objectives and hypotheses with their corresponding outcomes. Conclusively, the objectives set out by this study are realised and the null hypotheses invalidated.

Table 5.15: Summary of Research Objectives and Hypotheses Validation

S/No.	Null Hypotheses	Research Objectives
1	<p>Null hypothesis 1: The financial sector is not significantly stable after the reforms.</p> <p>The null hypothesis is rejected:</p> <p>a) From the pooled OLS results in Table 5.6, the financial system is significantly stable after financial reforms given the positive and statistically significant coefficients of the real interest rate across the four periods.</p> <p>b) The fixed effects results shown in Table 5.9 reveal that the financial system is significantly stable after financial reforms given the positive and statistically significant coefficients of the real interest rate across the four periods.</p> <p>c) The system GMM results in Table 5.13 validate that the financial system is significantly stable after financial reforms given the positive and statistically significant coefficients of the real interest rate across the four periods.</p>	<p>Objective 1: Observe the stability of the financial sector after the reforms.</p> <p>Objective realisation: It is observed that across the four different time periods, the financial system of the selected SSA countries are significantly stable after the reforms.</p>
2	<p>Null hypothesis 2: Credit growth is not stimulated by financial reforms in selected SSA countries.</p> <p>The null hypothesis is rejected:</p> <p>a) From the pooled OLS results in Table 5.7, period 1980 to 1989 provide evidence that financial reforms significantly stimulate credit growth given the positive and statistically significant coefficient of the real interest rate.</p> <p>b) The fixed effects results shown in Table 5.10 reveal that credit growth is significantly stimulated by financial reforms given the positive and statistically significant coefficients of the real interest rate in periods 1980 to 1989, 1990 to 1999 and 2000 to 2009.</p> <p>c) The system GMM results in Table 5.14 validate that credit growth is significantly stimulated by financial reforms given the positive and statistically significant coefficients of the real interest rate in periods 1980 to 1989, 1990 to 1999 and 2000 to 2009.</p>	<p>Objective 2: Evaluate how credit growth is stimulated by financial reforms.</p> <p>Objective realisation: Credit growth is significantly stimulated by financial reforms in the selected SSA countries and this trend is consistent across the four periods.</p>

3	<p>Null hypothesis 3: Credit growth has no equalising effect on income inequality in SSA.</p> <p>The null hypothesis is rejected:</p> <p>a) From the pooled OLS results in Table 5.8, periods 1980 to 1989 and 1990 to 1999 provide evidence that credit growth has a significant equalising effect on income inequality given the negative and statistically significant coefficient of credit growth.</p> <p>b) The fixed effects results shown in Table 5.11 reveal that credit growth has a significant equalising effect on income inequality given the negative and statistically significant coefficient of credit growth in period 1980 to 1989.</p> <p>c) Results from the dynamic fixed effects in Table 5.12 on the SSA sample reveal that credit growth has a significant equalising effect on income inequality given the negative and statistically significant coefficient of credit growth.</p> <p>d) The system GMM results in Table 5.15 validate that credit growth has a significant equalising effect on income inequality given the negative and statistically significant coefficient of credit growth in period 1980 to 1989.</p>	<p>Objective 3: Examine how credit growth impacted on income inequality in SSA.</p> <p>Objective realisation: The outcome of the empirical analyses reveal that the impact of credit growth on income inequality varies across the different periods depending on the estimation method adopted. However, credit growth has an equalising impact on income inequality, overall.</p>
4	<p>Null hypothesis 4: The financial reforms and credit growth nexus on income inequality do not differ across SSA sub-regions.</p> <p>Using four sub-regional dummy variables and West Africa as the base dummy variable, the null hypothesis is rejected:</p> <p>a) The pooled OLS results in Table 5.7, reveal that financial reforms significantly stimulate credit growth in Central Africa for period 2010 to 2015; East Africa for periods 1990 to 1999, 2000 to 2009 and 2010 to 2015; and Southern Africa for periods 1990 to 1999, 2000 to 2009 and 2010 to 2015 relative to West Africa.</p> <p>b) The pooled OLS results in Table 5.8, reveal that relative to West Africa credit growth has a significant equalising effect on income inequality in Central Africa for periods 1980 to 1989 and 1990 to 1999; East Africa for periods 1980 to 1989, 1990 to 1999 and 2000 to 2009; while for Southern Africa the equalising effect is not evidenced.</p> <p>c) Results from the dynamic fixed effects in Table 5.12 on the sub-regional samples reveal that credit growth has a significant equalising effect on income inequality in Southern Africa, it significantly aggravates inequality in East Africa while the effects are equalising but not statistically significant in Central and West Africa.</p>	<p>Objective 4: Appraise how the financial reforms and credit growth nexus on income inequality differ across SSA sub-regions.</p> <p>Objective realisation: The outcome of the empirical analyses reveal that, given the empirical technique adopted, the financial reforms and credit growth nexus on income inequality differ across SSA sub-regions. Such that:</p> <p>a) financial reforms significantly stimulate credit growth in Central Africa, East Africa and Southern Africa relative to West Africa at different periods;</p> <p>b) credit growth has a significant equalising effect on income inequality in Central Africa and East Africa relative to West Africa at different periods; while the equalising effect is not evidenced for Southern Africa;</p> <p>c) credit growth significantly reduces income inequality in Southern Africa, it significantly exacerbates income inequality in East Africa while its impact in Central and West Africa, though negative, is not significant.</p>

5.5 Specific Approach – Time Series Analysis

The specific approach is undertaken to examine if the results obtained on the analysis of SSA and the four sub-regions hold when individual countries - Cameroon, Kenya, Nigeria and South Africa - are considered. These countries represent each sub-region in SSA and they are the economic power-houses of their respective regional blocs. Each country is analysed bearing in mind the heterogeneities across them and the peculiarities of their financial sectors. The respective country's varying characteristics make comparative study relevant and innate in channelling a sub-regional course of action in addressing the problem of income inequality. A few of these distinct observations and differences are mentioned herein.

In Cameroon, the real interest rate and not the deposit rate is the predictor of financial sector stability contrary to what obtains for Kenya, Nigeria and South Africa. Also, for Kenya and Nigeria, domestic credit to the private sector (% of GDP) and domestic credit to the private sector by banks (% of GDP) are not significantly different from one another. The correlation between both indicators is 0.9999 and 0.9998, respectively. Furthermore, the model is “well-behaved” for Kenya when domestic credit provided by financial institutions is used as a proxy for credit growth as against other variants of domestic credit. Similarly, broad money drives credit growth in Kenya and South Africa while it is driven by financial system deposits in Nigeria. Lastly, for Cameroon and Kenya, broad money growth is the predictor of financial stability as the exclusion of this variable in the model specifications renders the other coefficients in the equation to be statistically not significant. Therefore, in order to obtain impartial results (with minimal bias) and to enhance comparativeness, the specification for each country is augmented to give each a fair model representation. In this section, the analytical and empirical approaches are detailed in addition to the results. Thus, the estimations are carried bearing in mind that certain indicators behave poorly in some countries while responding well in some others.

5.5.1 Computing Financial Stability Index, 4 Countries

The study analyses begin with the computation of an index that captures financial system stability. The reasons for using the PCA are as stated in section 5.1.1. Using the “change” rather than the “level” of each variable, Table 5.17 shows some salient features of each country's computation of financial stability index.

Table 5.16: PCA and Eigenvectors, 4 Countries

Variables	Cameroon	Kenya	Nigeria	S/Africa
PCA eigenvalue (highest)	3.4341	3.6498	5.3142	2.9647
Proportion explained	0.5724	0.6083	0.8857	0.4941
Kaiser-Meyer-Olkin	0.6900	0.6687	0.7887	0.5018

Source: Researcher's Computation

For Cameroon, the first component has an eigenvalue (the variance of the component) of 3.4341 (a value higher than one implies that the component captures more variance than its nominal share of the total variance of the variables) and explains 57.24% of the common variance of the series. Same explanation can be deduced for Kenya, Nigeria and South Africa with eigenvalues of 3.6498, 5.3142 and 2.9647 respectively. The scree plots for the four countries are shown in Appendices Figure A5.1 to A5.4. The Kaiser-Meyer-Olkin (KMO) index above 0.50 and validates the use of PCA. Furthermore, the correlation between the respective PCA for each country and the variables used in the composition is shown in Table 5.18. The index of financial system stability (FSI) is strongly and positively correlated with variables of financial stability, an indication that the FSI best explains these variables simultaneously. It further shows that when the FSI increases, financial system stability improves.

Table 5.17: Correlation Matrix of Measures of Financial Stability and Financial Stability Index, 4 Countries

Variables	Cameroon	Kenya	Nigeria	S/Africa
Change in domestic credit by fin. inst.	0.7068	0.8025	0.8499	0.6347
Change in domestic credit	0.7806	0.8461	0.9489	0.7383
Change in domestic credit by banks	0.7804	0.8475	0.9487	0.9165
Change in financial system deposits	0.7484	0.6562	0.9738	0.6347
Change in liquid liabilities	0.7595	0.6411	0.9561	0.6565
Change in broad money	0.7608	0.8545	0.9638	0.5857

Source: Researcher's Computations

5.5.2 Summary Statistics and Correlation Matrix, 4 Countries

As a result of each country's heterogeneity, a total of 20 variables are used across the 4 countries. Cameroon has 14 variables, Kenya with 14, Nigeria has 11 and South Africa has 13 with 6 variables common to all of them. Table 5.18 shows the summary statistics (mean and standard deviations) for each variable.

Table 5.18: Summary Statistics, 4 Countries

Variables	Cameroon		Kenya		Nigeria		S/Africa	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Broad money			35.226	4.768			59.419	10.659
Broad money growth	8.318	11.794	15.517	8.520	24.403	17.275		
Deposit rate	5.610	1.788	9.310	4.107	11.486	4.090	10.973	4.224
Dom. credit to private sect.	16.033	8.295			14.999	6.100	111.429	33.633
Dom. credit by fin. inst.			36.603	4.017				
Financial stability index	6.18e-08	1.85	-2.94e-09	1.91	-2.94e-08	2.30	-2.19e-10	1.72
Financial system deposits					17.372	5.485		
GDP			1.949e+10	1.719e+10				
GDP per capita	948.430	233.555	564.208	323.671	874.872	907.833	4175.609	1664.692
GDP per capita growth	0.161	4.733			1.038	7.370	0.534	2.484
Gini index	58.076	0.603	60.349	1.252	56.565	4.000	66.816	5.418
Govt. consumption exp.	10.508	1.291	16.318	1.760			18.389	1.786
Gross fixed cap. formation	18.207	3.127	18.625	1.930	12.718	6.415	20.090	3.954
Gross fixed cap. growth	3.603	11.829	12.443	8.753			3.175	7.927
Inflation (consumer prices)	5.176	6.853	12.443	8.753	19.444	17.752	9.374	4.500
Liquid liabilities	18.331	3.076	35.429	5.486				
Loan-to-deposit ratio							114.528	13.231
Natural Resources	11.673	3.630						
Primary enrolment			104.775	8.915	94.350	9.278	99.436	11.151
Real interest rate	11.624	7.222						

Note: SD: Standard deviation

Source: Researcher's Computations

From Table 5.18 (limiting comparative analysis to the variables common to all), Nigeria has the lowest average Gini index of 56.57 while South Africa has the highest at 66.816 which in retrospect, is higher than the region's average index of 60.23. On average, Nigeria has the highest deposit rate (11.49) followed by South Africa (10.97) with Cameroon having the lowest (5.61). The country with the lowest average inflation rate (consumer prices) is Cameroon (5.176) and Nigeria has the highest (19.44). South Africa has the highest average per capita income (4175.61), followed by Cameroon (948.43), Nigeria (874.87) and Kenya (564.21) in that order. Average investment and government expenditures is highest in South Africa (20.09, 18.39) relative to others.

Likewise, correlation analysis among the variables is done on a country-level basis (see Appendix Tables A5.1 to A5.4 for full correlation matrix). From Table A5.1 on Cameroon, statistics reveal that there is no linear dependence among the variables except for a strong correlation between the deposit rate and the Gini index (-0.840) and between liquid liabilities

and domestic credit (0.848). Thus, the Cameroon model does not exhibit multicollinearity because these identified relationships are not included together in the same model. Similar analogy is drawn on Kenya in Table A5.2 which shows strong correlations between liquid liabilities and broad money (0.815) and between the GDP and per capita GDP (0.993). Also for Kenya, multicollinearity is mitigated as these identified relationships are not put together in the same model. For Nigeria in Table A5.3, financial systems deposits and domestic credit exhibit high correlation at 0.827. Again, multicollinearity is forestalled as both variables are not in the same model. Lastly for South Africa in Table A5.4, domestic credit and inflation exhibit strong negative correlation at -0.853 while broad money and per capita GDP are strongly correlated (0.879). Multicollinearity is also prevented as these identified relationships are not put together in the same model.

5.6 Optimal Lags Selection Results

The autoregressive distributed lag (ARDL) model is susceptible to the arbitrary use of lags but provides consistent coefficients despite the possible presence of endogeneity because it includes lags of dependent and independent variables (Pesaran *et al.*, 1999) to correct for any form of bias. Therefore, for each country, the order of the ARDL process must be augmented to ensure that the residual of the error-correction model be exogenous and serially uncorrelated. However, with limited time series, the ARDL order should not be overextended as this imposes excessive parameter requirements on the data. Since the primary interest is on the long-run parameters, hence optimal lags selection from the Bayesian Information Criterion (BIC) is used. Appendix Table A5.5 shows the optimal lags for each variable on country-by-country basis.

5.7 Unit Root Tests Results

Given that the order of integration is irrelevant under the ARDL model, but with the increase in time period of analysis, it is important to test the variables for unit root to be certain that none is integrated of order two, $I(2)$, by applying the Dickey-Fuller Generalised Least Squares (DF-GLS) and the Phillips-Perron (PP) unit root tests. The results displayed in Appendix Table A5.6 to A5.9 indicate none of the series is integrated of order two. However, a noticeable similarity across the four countries is that the index of financial stability is stationary at levels.

5.8 Bounds Test Results for Cointegration

Having established that the variables are integrated of different orders and that none is of order two, we proceed to analyse if there exists any cointegration among the variables using the

ARDL bounds test approach (based on the error correction representation) as developed by Pesaran, Shin, and Smith (2001). The bounds test is mainly based on the joint F -statistic whose asymptotic distribution is non-standard under the null hypothesis of no cointegration (i.e. $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0$, for instance, with a model with 5 restrictions) against the alternative hypothesis of a cointegrating relationship (i.e. $\beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq 0$). Under the bounds test, it is assumed that the model comprises both $I(0)$ and $I(1)$ variables and two levels of critical values are obtained. The first level is calculated on the assumption that all variables included in the ARDL model are integrated of order zero, while the second one is calculated on the assumption that the variables are integrated of order one. The procedure is to estimate the equation by ordinary least squares (OLS) and test for joint significance of the lagged levels of the variables. The null hypothesis of no cointegration is rejected if the F -statistic is higher than the critical value of both the $I(0)$ and $I(1)$ regressors, and not rejected if otherwise (Belloumi, 2014). In a situation where cointegration exists, an error correction model is specified and if otherwise, the ARDL model is specified. The cointegration results are shown in Table 5.19.

Table 5.19: Bounds Test Results

Models	Cameroon	Kenya	Nigeria	South Africa
Financial reforms and financial stability	4.914 ^a	20.194 ^a	8.549 ^a	10.279 ^a
Financial reforms and credit growth	3.627 ^c	3.874 ^b	3.729 ^c	7.262 ^a
Credit growth and income inequality	4.976 ^b	4.618 ^a	7.505 ^a	5.156 ^a

^{a, b, c} represent significance at 1%, 5% and 10% levels respectively. The critical values for the F -statistics from Pesaran, Shin & Smith (2001). Results are Stata-generated using the “*btest*” command.

Source: Researcher's Computations

The comparisons indicate that the null hypotheses of no cointegration is rejected at the 1% level for all models constructed for Kenya and South Africa while it is rejected at the 1% and 10% levels for models constructed for Cameroon and Nigeria. These results indicate that there are unique cointegrating relationships among the variables in the models and that the *long-run forcing variables* are the key explanatory and control variables. They also indicate that in all the relationships, the covariates are the forcing variables that move first when a common stochastic shock hits the system. The implication of the above finding is that: financial stability, credit growth and income inequality follow changes in these indicators.

5.9 Error Correction Model and Diagnostics Results

Estimation is done on a country-by-country basis whilst noting the key differences and similarities among them. For easy ordering, the error correction and diagnostic results relating

to each country are shown correspondingly. The error correction results are in three columns [1], [2] and [3] corresponding to (1) financial reform and financial stability relationship, (2) financial reform and credit growth relationship and (3) credit growth and income inequality relationship. These represent the estimations of Equations 4.35 to 4.37.

5.9.1 Cameroon

In column [1] of Table 5.20, the results show that in the long-run, given the statistical significance of the coefficient of the real interest rate (0.131) at the 10% level, financial reform stimulates financial stability. It demonstrates that an increase in the real interest rate stimulates financial stability by 0.13 percentage point, on average, *ceteris paribus*.

Table 5.20: Error Correction Results, Cameroon

	[1]	[2]	[3]
	Δ Financial Stability	Δ Credit Growth	Δ Gini Index
Constant	-4.583 (-0.24)	-3.354 ^b (-2.63)	0.043 ^c (1.79)
Long-run estimates:			
Real interest rate	0.131 ^c (1.85)		
Deposit rate		0.153 ^b (2.79)	
Credit growth			-0.036 ^b (-2.72)
Inflation (consumer prices)		-0.002 (-0.16)	
Liquid liabilities (log)			0.211 ^c (1.73)
Broad money growth	0.146 ^b (2.85)	0.011 (1.58)	
per capita GDP (log)	1.916 (0.56)	0.987 ^b (2.12)	
per capita GDP gr.			0.001 (0.45)
Natural resources			-0.0001 (-0.05)
Investment growth	-0.070 (-0.95)		
Investment (log)		2.051 ^a (4.16)	
Government exp. (log)	-4.521 (-0.82)	-0.725 (-0.72)	
Adjustment:	-0.888 ^a (-4.30)	-0.361 ^a (-3.11)	0.039 (1.16)
Short-run estimates:			
Δ Real interest rate	-0.014 (-0.20)		
Δ Deposit rate		-0.038 (-0.64)	
Δ Credit growth			-0.0021 (-1.69)
Δ Liquid liabilities (log)			0.0072 ^a (2.94)
Δ per capita GDP (log)	-0.531 (-0.12)	-0.361 (-1.28)	
Δ per capita GDP gr.			-0.0000 (-0.34)
Δ Natural resources			-0.0001 (-1.02)
Δ Investment growth	0.023 (0.67)		
Δ Investment (log)		-0.197 (-0.72)	
Δ Government exp. (log)	8.391 (1.41)	0.806 ^b (2.11)	
No. of Obs.	26	35	33
R-Squared	0.686	0.607	0.825

Note: Numbers in parentheses are *t*-statistics based on White heteroscedasticity-consistent standard errors. Statistical significance: ^{a,b,c} indicate 1%, 5% and 10% levels respectively. The variables lag length (1 1 0 1 1 1) for financial stability model, (1 1 0 0 1 1 1) for credit growth model and (2 1 1 1 1) for income inequality model are Stata-generated using the “varsoc” routine. Δ is the difference operator.
Source: Researcher's Computations

This finding differs from Akinboade and Kinfack (2014) who find that the real interest rate, which reflects the real cost of funds to the borrower and the real yield to the lender, was almost negative throughout the period under review in their analysis of financial development and economic growth in Cameroon. Results also reveal that the broad money growth is a positive predictor of financial stability by 0.15 percent, on average, *ceteris paribus* given its statistical significance at the 5% level. Overall, the positive coefficient of the real interest rate gives evidence that the financial sector is stable after reforms in Cameroon. In addition, the value of the *R* squared indicates that 69 percent of the variation in the financial stability index is explained by the independent variables while the adjustment term (-0.888) is statistically significant at the 1% level indicating that shocks to financial stability index are corrected for within the year at a convergence speed of 88.8 percent. There is also no evidence of multicollinearity as the coefficient of the variance inflating factor (VIF) is 1.86.

The results on the impact of financial reforms on credit growth shown in column [2] reveal that, in the long-run the deposit rate is a strong predictor of credit growth at the 5% statistical significance level, indicating that a one percentage increase in the deposit rate is associated with a 15.3 percentage increase in credit growth, on average, *ceteris paribus*. This finding contradicts Akinboade and Kinfack (2014) who conclude that the banking sector was unable to efficiently mobilise savings for efficient intermediation in the post-reform era. Other results reveal that, in the long-run both per capita GDP (0.987) and investment (2.051) have a positive impact on credit growth, on average, *ceteris paribus*, while credit growth is impacted by government expenditures (0.806) in the short-run. Again, these results validate that in Cameroon, financial reforms stimulate credit growth. Similarly, the adjustment term (-0.361) is statistically significant at the 1% level, suggesting that errors to credit growth are corrected for within the year at a convergence speed of 36 percent. Also, the value of the *R* squared indicates that 61 percent of the variation in credit growth (proxied by domestic credit provided by banks) is explained by the independent variables. There is also no evidence of multicollinearity as the coefficient of the variance inflating factor (VIF) is 2.07.

Lastly, the results in column [3] show that 83 percent variation in the Gini index are explained by the regressors. There is also no evidence of multicollinearity as the coefficient of the variance inflating factor (VIF) is 2.07. In the long-run, credit growth has a negative and statistical significance on income inequality at the 5% level. This implies that a percentage increase in credit is associated with a 0.036 reduction in income inequality, on average, *ceteris paribus*.

Results further show that in the long- and short-runs, liquid liabilities significantly exacerbate inequality at the 1% level. Lastly, shocks to the Gini index are not corrected, that is there is no long-run convergence. However, the finance-credit-inequality nexus is validated in Cameroon. The diagnostic results shown in Table 5.21 provide evidence that the models are stable (see Appendix Figure A5.6 for CUSUMSQ graph) and the specifications do not suffer from autocorrelation, heteroscedasticity, autoregressive conditional heteroscedasticity (except for model 2), multicollinearity, and omitted variables (except for models 1 and 3).

Table 5.21: Diagnostic Tests Results, Cameroon

Specification Test	Model 1	Model 2	Model 3
Durbin-Watson (autocorrelation)	2.027	2.425	2.00
White (heteroscedasticity)	0.408	0.42	0.141
ARCH LM	0.587	0.047 ^b	0.17
VIF (Multicollinearity)	1.86	2.07	2.18
Ramsey RESET (omitted variables)	0.096 ^c	0.161	0.042 ^b
CUSUMSQ (squared residuals)	Stable	Stable	Stable

Note: Statistical significance: ^{a, b, c} indicate 1%, 5% and 10% levels respectively. *ARCH-LM*: Autoregressive conditional heteroscedasticity-Lagrange Multiplier; VIF: Variance inflation factor; *RESET*: Regression specification error test; *CUSUMSQ*: Cumulative sum of squares. The *d*-statistic used for Durbin-Watson.
Source: Researcher's Computations

5.9.2 Kenya

Results in Table 5.22 for column [1] show that given the value of the R^2 , 93 percent variation in the financial stability index are explained by the independent variables. The adjustment term is larger (-1.361) suggesting that the rate of adjustment to long-run equilibrium is faster and that financial stability index adjusts to its realisation with a lag, correcting 136 percent of the discrepancy between the long-term and short-term financial stability index within the period. This coefficient is slightly below -1 but falls within the dynamically stable range (Pesaran *et al.*, 1999) since it is not lower than -2 (that is, within the unit circle). This indicates that feedbacks from financial reform is very effective in Kenya and convergence to long-run equilibrium after a shock to the explanatory variables is instantaneous for the financial system (Narayan, 2005). It also implies that the adjustment term produces dampened fluctuations around the equilibrium path of the financial stability index, but convergence to long-run stable state is very rapid (Narayan & Smyth, 2005).

Table 5.22: Error Correction Results, Kenya

	[1]	[2]	[3]
	Δ Financial Stability	Δ Credit Growth	Δ Gini Index
Constant	6.05 (0.79)	-0.904 (-1.31)	-0.443 ^a (-3.69)
Long-run estimates:			
Deposit rate	-0.100 ^c (-2.04)	0.009 ^c (2.04)	
Credit growth (log)			0.257 ^c (1.77)
Inflation (consumer prices)	-0.077 (-1.63)	-0.010 ^b (-2.40)	
Liquid liabilities (log)			-0.257 ^b (-2.89)
Broad money growth	0.130 ^a (2.93)		
Broad money (log)		0.512 ^b (2.80)	
GDP (log)			0.043 ^b (2.49)
per capita GDP (log)	1.329 ^b (2.61)	0.223 ^a (3.18)	
Primary enrolment			0.001 (0.78)
Investment (log)	-4.339 ^c (-1.92)		
Government exp. (log)		0.756 ^b (2.58)	
Adjustment:	-1.361 ^a (-9.29)	-0.520 ^a (-4.08)	-0.277 ^b (-2.69)
Short-run estimates:			
Δ Deposit rate	0.114 (0.84)	0.002 (0.49)	
Δ Gini index_1			0.184 (0.62)
Δ Credit growth			-0.037 (-1.64)
Δ Inflation (consumer prices)	0.095 ^c (2.00)	0.005 ^b (2.74)	
Δ Liquid liabilities			0.034 (1.03)
Δ Broad money growth	-0.067 (-1.70)		
Δ Broad money (log)		0.624 ^a (3.58)	
Δ GDP (log)			-0.002 (-0.12)
Δ per capita GDP (log)	-14.571 ^a (-4.66)	-0.302 ^a (-3.64)	
Primary enrolment			-0.0003 (-0.93)
Δ Investment (log)	8.025 ^b (2.23)		
Δ Government exp. (log)		-0.153 (-0.99)	
No. of Obs.	28	30	25
R-Squared	0.929	0.889	0.815

Note: Numbers in parentheses are *t*-statistics based on White heteroscedasticity-consistent standard errors. Statistical significance: ^{a,b,c} indicate 1%, 5% and 10% levels respectively. The variables lag length (1 1 1 1 1) for financial stability model, (1 1 1 1 1) for credit growth model and (2 1 1 1 1) for income inequality model are Stata-generated using the “varsoc” routine. Δ is the difference operator.

Source: Researcher's Computations

The coefficient of the deposit rate (-0.10, financial reform variable) is statistically significant at the 10% level indicating that a percentage increase in the deposit rate weakens the stability of the financial system by 0.10 percentage point, on average, *ceteris paribus*. This result is contrary to *a priori* expectation. Other results are that broad money growth (0.130) and per capita GDP (1.329) stimulate the financial system while investment (-4.339) negatively impacts

financial system stability in Kenya in the long-run. In the short-run, inflation stimulates financial stability by 0.09 percent, on average, *ceteris paribus*, while per capita GDP (-14.57) has a significant negative impact in the short-run.

From column [2], the regressors explain 89 percent variation in credit growth (proxied by domestic credit provided by financial institutions). The convergence to long-run equilibrium is at a speed of 52 percent and the adjustment term is negative and statistically significant at the 1% level. The presence of a significant coefficient of the error correction term indicates a strong feedback effect of the deviation of credit growth from its long-run growth path. Also, in the long-run, the deposit rate stimulates credit growth with a statistically significant coefficient (0.009) at the 10% level. This indicates that a one percent increase in the deposit rate contributes 0.009 percentage point increase to domestic credit, on average, *ceteris paribus*. This finding corroborates (Odhiambo, 2009) who finds that the coefficient of the deposit rate in the financial deepening model is positive and statistically significant. The implication of this result is that financial reforms have a positive impact on credit growth in Kenya. Also, per capita GDP (0.223) has a positive effect on credit growth. This finding also corroborates (Odhiambo, 2009) who find a similar effect between real income and financial deepening. Other results reveal that broad money (0.512), and government expenditures (0.756) have positive significance on credit growth while inflation (-0.01) has a negative impact. For the short-run analyses, inflation (0.005) and broad money (0.624) significantly increase credit growth at the 1% levels while per capita GDP (-0.302) has a significant negative impact.

On the impact of credit growth on income inequality, results in column [3] show that at the 10% statistical significance level, a percentage increase in credit growth exacerbates income inequality by 0.26 percent, on average, *ceteris paribus*. This is contrary to the *a priori* expectation. It implies that at a higher credit level, income inequality rises. However, the outcome of the dis-equalising effect of credit growth on income inequality in Kenya is not surprising given the fact that the country's financial market still remains sparse in the rural areas, as most financial institutions are located in urban and cash crop growing areas (Mutua & Oyugi, 2007). In addition, majority of self-employed individuals in the rural areas do not have formal bank accounts and instead, save in the form of animals or durable goods, in cash at their homes, or through Rotating Savings and Credit Associations (ROSCAs), which are commonly referred to as merry-go-rounds (Dupas & Jonathan, 2009). The provision of financial services in the rural areas of Kenya on a sustainable basis remains a challenging goal mainly due to the

rural environment that is characterised by poor. Other results show that in the long-run, GDP (0.043) is a positive predictor of income inequality at the 5% significance level while liquid liabilities (-0.257) have a significant equalising impact. In the short-run, none of the coefficients are significant, though with the expected signs. On the adjustment term, shocks to the Gini index are corrected at a convergence speed of 28%. The presence of a significant coefficient of the error correction term indicates a strong feedback effect of the deviation of the Gini index from its long-run growth path. Lastly, 82 percent variation in the Gini index is explained by the regressors. In conclusion, the finance-credit-inequality nexus is somewhat not validated in Kenya. The diagnostic results for Kenya shown in Table 5.23 provide evidence that the models are stable and the specifications do not suffer from autocorrelation, heteroscedasticity, autoregressive conditional heteroscedasticity (except for model 1), multicollinearity, and omitted variables (except for model 1).

Table 5.23: Diagnostic Tests Results, Kenya

Specification Test	Model 1	Model 2	Model 3
Durbin-Watson (autocorrelation)	1.864	2.467	1.62
White (heteroscedasticity)	0.411	0.414	0.4058
ARCH LM	0.035 ^b	0.221	0.4152
VIF (Multicollinearity)	1.28	2.62	1.79
Ramsey RESET (omitted variables)	0.091 ^c	0.212	0.313
CUSUMSQ (squared residuals)	N/A	N/A	N/A

Note: Statistical significance: ^{a, b, c} indicate 1%, 5% and 10% levels respectively. *ARCH-LM*: Autoregressive conditional heteroscedasticity-Lagrange Multiplier; VIF: Variance inflation factor; *RESET*: Regression specification error test; *CUSUMSQ*: Cumulative sum of squares. NA implies that the CUSUMSQ test cannot be performed due to data gaps in deposit rate and primary enrolment series. The *d*-statistic used for Durbin-Watson.

Source: Researcher's Computations

5.9.3 Nigeria

Results in Table 5.24 for column [1] show that given the value of the *R* squared about 82 percent variation in the financial stability index are explained by the independent variables. The adjustment term is larger (-1.031) suggesting that the rate of adjustment to long-run equilibrium is faster and that financial stability index adjusts to its realisation with a lag, correcting 103 percent of the discrepancy between the long-term and short-term financial stability index within the period. The coefficient of the deposit rate (0.313, financial reform variable) is statistically significant at the 10% level indicating that a percentage increase in the deposit rate stimulates the stability of the financial system by 0.31 percentage point, on average, *ceteris paribus*. This result is in line with *a priori* expectation. Other results reveal that in the short-run, the third lag of the deposit rate (-0.347) and per capita GDP (-6.287) have significant negative impacts on

financial stability. No evidence of multicollinearity as the variance inflating factor (VIF) is 1.60.

Table 5.24: Error Correction Results, Nigeria

	[1]	[2]	[3]
	Δ Financial Stability	Δ Credit Growth	Δ Gini Index
Constant	-5.203 (-1.06)	-0.582 (-1.03)	-0.493 ^b (-2.98)
Long-run estimates:			
Deposit rate	0.313 ^c (1.82)	0.039 ^c (1.81)	
Credit growth (log)			-0.0933 ^a (-3.20)
Inflation (consumer prices)	-0.039 (-1.01)	-0.002 (-0.38)	
Financial system deposits		1.371 ^a (7.43)	
Broad money growth			0.001 (1.67)
per capita GDP growth	0.041 (0.73)		-0.001 (-0.88)
per capita GDP (log)	0.359 (0.61)	-0.075 (-1.09)	
Primary enrolment			0.001 (1.19)
Investment (log)		-0.171 (-0.93)	
Adjustment:	-1.031 ^a (-6.11)	-0.771 ^a (-4.32)	-1.1310 ^a (-3.20)
Short-run estimates:			
Δ Deposit rate_1	-0.226 (-1.35)	-0.048 ^b (-2.75)	
Δ Deposit rate_3	-0.347 ^b (-2.33)	-0.020 (-1.49)	
Δ Credit growth (log)			0.106 ^a (4.65)
Δ Inflation (consumer prices)	0.024 (0.79)	0.0003 (0.13)	
Δ Inflation (consumer prices)_1	-0.003 (-0.10)	-0.001 (-0.31)	
Δ Financial system deposits		0.470 (1.45)	
Δ Primary enrolment			0.0004 (0.33)
Δ Primary enrolment_1			-0.006 ^a (-4.07)
Δ Broad money growth			-0.001 ^b (-2.50)
Δ Broad money growth_1			0.0004 (1.00)
Δ per capita GDP (log)	-6.287 ^a (-3.44)	0.396 (1.72)	
Δ Investment (log)		0.202 (1.43)	
No. of Obs.	31	31	22
R-Squared	0.818	0.899	0.866

Note: Numbers in parentheses are *t*-statistics based on White heteroscedasticity-consistent standard errors. Statistical significance: ^{a,b,c} indicate 1%, 5% and 10% levels respectively. The variables lag length (1 4 2 1 0) for financial stability model, (1 4 2 1 1 1) for credit growth model and (1 1 0 0 2 2) for income inequality model are Stata-generated using the "varsoc" routine. Δ is the difference operator.

Source: Researcher's Computations

From column [2], the regressors explain about 90 percent variation in credit growth (proxied by domestic credit provided by banks). Convergence to long-run equilibrium is at a speed of 77 percent with the adjustment term negative and statistically significant at the 1% level. Also, in the long-run, the deposit rate stimulates credit growth with a statistically significant coefficient

(0.038) at the 10% level. This indicates that a one percent increase in the deposit rate contributes about 0.04 percentage point increase to domestic credit, on average, *ceteris paribus*. In addition, broad money (1.371) is a positive predictor of credit growth. In the short-run, the first lag of the deposit rate (-0.046) significantly decreases credit growth at the 5% level. No evidence of multicollinearity as the variance inflating factor (VIF) is 1.53.

On the impact of credit growth on income inequality, results in column [3] show that at the 1% statistical significance level, a percentage increase in credit growth reduces income inequality by 0.09 percent, on average, *ceteris paribus*. This is an important finding, evidence of credit growth-inequality nexus. That is, at a higher credit level, income inequality falls in the long-run. Other results show that in the short-run, broad money growth (-0.001) and the first lag of primary enrolment (-0.006) have equalising impact on income inequality at the 5% and 1% significance level respectively while credit growth (0.106) exacerbates inequality at the 1% significance level. On the adjustment term, shocks to the Gini index are corrected at a convergence speed of 113%. Lastly, about 87 percent variation in the Gini index is explained by the regressors. Conclusively, the finance-credit-inequality nexus is validated in Nigeria. The diagnostic results for Nigeria shown in Table 5.25 provide evidence that the models are stable and the specifications do not suffer from autocorrelation, heteroscedasticity, autoregressive conditional heteroscedasticity, multicollinearity, and omitted variables (except for models 1 and 3). No evidence of multicollinearity as the variance inflating factor (VIF) is 1.08.

Table 5.25: Diagnostic Tests Results, Nigeria

Specification Test	Model 1	Model 2	Model 3
Durbin-Watson (autocorrelation)	2.139	2.096	2.911
White (heteroscedasticity)	0.4145	0.4145	0.3995
ARCH LM	0.5847	0.9277	0.248
VIF (Multicollinearity)	1.60	1.53	1.08
Ramsey RESET (omitted variables)	0.009 ^a	0.5101	0.0004 ^a
CUSUMSQ (squared residuals)	Stable	Stable	NA

Note: Statistical significance: ^{a, b, c} indicate 1%, 5% and 10% levels respectively. *ARCH-LM*: Autoregressive conditional heteroscedasticity-Lagrange Multiplier; VIF: Variance inflation factor; *RESET*: Regression specification error test; *CUSUMSQ*: Cumulative sum of squares. *NA* implies that the CUSUMSQ test cannot be performed due to data gaps in primary enrolment series. The *d*-statistic used for Durbin-Watson.
Source: Researcher's Computations

5.9.4 South Africa

Results in Table 5.26 for column [1] show that in the long-run, the coefficient of the deposit rate (0.278, financial reform variable) is statistically significant at the 5% level indicating that a percentage increase in the deposit rate stimulates the stability of the financial system by 0.28

percentage point, on average, *ceteris paribus*. This result is in line with *a priori* expectation and corroborates similar studies (Akinboade & Kinfack, 2014). Also, per capita GDP (2.6645) has a significant positive impact on financial system stability. In the short-run, the deposit rate (-0.463), its first lag (-0.550) and per capita GDP (-6.644) have negative impact on financial stability. Given the value of the *R* squared 78 percent variation in the financial stability index are explained by the independent variables. Also, there is no evidence of multicollinearity as the variance inflating factor (VIF) is 3.43.

Table 5.26: Error Correction Results, South Africa

	[1]	[2]	[3]
	Δ Financial Stability	Δ Credit Growth	Δ Gini Index
Constant	44.784 (1.72)	-0.197 (-0.42)	0.323 (0.14)
Long-run estimates:			
Deposit rate	0.278 ^b (2.41)	0.034 ^a (3.42)	
Credit growth (log)			-0.478 ^c (-2.49)
Inflation (consumer prices)		-0.027 ^a (-3.89)	
Broad money growth		0.448 ^a (1.88)	
per capita GDP growth			-0.027 (-1.23)
per capita GDP (log)	2.645 ^c (1.79)	0.371 ^a (3.51)	
Loan-to-deposit ratio			0.009 (2.00)
Investment growth	-1.688 (-0.73)	0.019 ^a (3.83)	
Investment (log)			0.743 ^c (2.91)
Government expend. (log)	-15.914 ^b (-2.24)		
Primary enrolment			-0.016 (-1.58)
Adjustment:	-1.675 ^a (-7.02)	-0.558 ^a (-5.43)	-1.106 ^b (-3.49)
Short-run estimates:			
Δ Deposit rate	-0.463 ^c (-1.94)	-0.033 ^a (-4.49)	
Δ Deposit rate_1	-0.550 ^b (-2.28)	-0.022 ^a (-2.91)	
Δ Deposit rate_2	-0.008 (-0.04)	-0.010 ^b (-2.13)	
Δ Credit growth (log)			0.491 ^c (2.48)
Δ Inflation (consumer prices)		-0.004 (-0.74)	
Δ Broad money (log)		0.229 (0.77)	
Δ per capita GDP growth			0.042 ^b (3.33)
Δ per capita GDP (log)	-6.644 ^c (-2.06)	-0.201 ^b (-2.29)	
Δ per capita GDP (log)_1	1.359 (0.46)	-0.369 ^a (-3.00)	
Δ Loan-to-deposit ratio			-0.001 ^c (-2.43)
Δ Govt. expenditures (log)	-8.879 (-0.70)		
Δ Investment growth		-0.006 ^b (-2.62)	
Δ Investment (log)	12.729 (1.72)		-0.112 (-0.22)
Δ Investment (log)_1			0.509 (1.95)
Δ Primary enrolment			-0.007 (-0.89)
Δ Primary enrolment_1			-0.006 (-0.71)
Δ Primary enrolment_2			-0.002 (-0.43)
No. of Obs.	32	31	18
R-Squared	0.782	0.899	0.957

Note: Numbers in parentheses are *t*-statistics based on White heteroscedasticity-consistent standard errors. Statistical significance: ^{a,b,c} indicate 1%, 5% and 10% levels respectively. The variables lag length (1 3 2 2 1) for financial stability model, (1 3 1 1 2 1) for credit growth model and (1 1 1 1 3 2) for income inequality model are Stata-generated using the "varsoc" routine. Δ is the difference operator.

Source: Researcher's Computations

The adjustment term is quite large (-1.675) suggesting that the rate of adjustment to long-run equilibrium very fast and that the index adjusts to its realisation with a lag, correcting about

168 percent of the discrepancy between the long-term and short-term financial stability index within the period. No evidence of multicollinearity as the variance inflating factor (VIF) is 3.43.

From column [2], in the long-run, the deposit rate stimulates credit growth with a statistically significant coefficient (0.034) at the 1% level. This indicates that a one percent increase in the deposit rate contributes about 0.03 percentage point increase to credit growth, on average, *ceteris paribus*. This finding supports Akinboade and Kinfack (2014) that savings have been better mobilised and effectively allocated to the economy and the financial sector has done well since the liberalisation of the sector. Likewise, broad money growth (0.448), per capita GDP growth (0.371) and investment growth are positive predictors of credit growth while the inflation rate (-0.027) has a negative impact in the long-run. In the short-run, and at different significance levels, the deposit rate (-0.033), its first lag (-0.022), its second lag (-0.010), per capita GDP (-0.201) and its first lag (-0.369) and investment growth (-0.006) decrease credit growth. On the model fit, the regressors explain about 90 percent variation in credit growth (proxied by domestic credit provided by banks). Also, the adjustment term (-0.558) is statistically significant at the 1% level indicating that shocks to credit growth converges to the long-run equilibrium at a rate of 56 percent. No evidence of multicollinearity as the variance inflating factor (VIF) is 2.57.

Lastly, on the impact of credit growth on income inequality, the results in column [3] show that the adjustment term (-1.106) signifies that the speed rate to long-run equilibrium is fast and that the index adjusts to its realisation with a lag, correcting about 110percent of the discrepancy between the long-term and short-term Gini index within the period. In the long-run, credit growth (-0.478) has a significant equalising at the 10% level while investment (0.743) has a significant dis-equalising impact at the 10% significant level. In the short-run, credit growth (0.491) and per capita GDP growth (0.042) significantly exacerbates income inequality at the 5% level. Lastly, about 96 percent variation in the Gini index is explained by the regressors and from these results, the finance-credit-inequality nexus is validated in South Africa. No evidence of multicollinearity as the variance inflating factor (VIF) is 3.14.

The diagnostic results for South Africa shown in Table 5.27 provide evidence that the models are stable and the specifications do not suffer from autocorrelation, heteroscedasticity, autoregressive conditional heteroscedasticity, multicollinearity, and omitted variables (except for model 1).

Table 5.27: Diagnostic Tests Results, South Africa

Specification Test	Model 1	Model 2	Model 3
Durbin-Watson (autocorrelation)	2.431	2.08	2.67
White (heteroscedasticity)	0.417	0.418	0.389
ARCH LM	0.277	0.665	0.349
VIF (Multicollinearity)	3.43	2.57	3.14
Ramsey RESET (omitted variables)	0.032 ^b	0.312	NA
CUSUMSQ (squared residuals)	Stable	Stable	NA

Note: Statistical significance: ^{a, b, c} indicate 1%, 5% and 10% levels respectively. *ARCH-LM*: Autoregressive conditional heteroscedasticity-Lagrange Multiplier; *VIF*: Variance inflation factor; *RESET*: Regression specification error test; *CUSUMSQ*: Cumulative sum of squares. *NA* implies that (1) the *RAMSEY* test cannot be performed because powers of fitted values collinear with explanatory variables (typically because all explanatory variables are indicator variables) and (2) the *CUSUMSQ* test cannot be performed due to data gaps in the primary enrolment series. The *d*-statistic used for Durbin-Watson.

Source: Researcher's Computations

5.10 Sensitivity Checks - Countries

Variable sensitivity checks are carried to confirm the stability of the estimates when another proxy of the financial reform variable (main explanatory variable) is used. Due to the paucity of data points on the real interest rate for these countries, hence the *interest rate spread* which is the difference between the lending rate and the deposit rate is used. The *a priori* expectation is that in the event that the interest rate spread is high (an implication that the lending rate is quite higher than the deposit rate), there will be a contraction in credit intermediation as borrowers will be discouraged from borrowing due to high lending rate.

5.10.1 Cameroon

The results shown in Table 5.28 is in line with *a priori* expectation and reveal that in the long-run, a high spread rate has a significant negative effect on credit growth at the 10% level, on average, *ceteris paribus*. Likewise in the long-run, broad money growth and investments significantly stimulate credit growth at the 5% levels respectively. Also, the adjustment term (-0.356) is statistically significant at the 1% level, suggesting that errors to credit growth are corrected for within the year at a convergence speed of 36 percent. In the short-run, only interest rate spread has a positive and significant effect in credit growth at the 5% level. Other diagnostic results reveal that there is a long-run cointegrating relationship at the 5% level (Bounds test), no evidence of autocorrelation, heteroscedasticity, autoregressive conditional heteroscedasticity and multicollinearity while the null hypothesis of no omitted variables *cannot* be rejected at the 5% significance level. The R-squared indicates that 61.2 percent variation in credit growth is explained by the regressors.

Table 5.29: Sensitivity Check, Cameroon

Variables	Δ Credit Growth
Constant	-1.697 (-1.55)
Long-run estimates:	
Interest rate spread	-0.057 ^c (-1.84)
Broad money growth	0.017 ^b (2.18)
Investment (log)	1.930 ^b (2.38)
Government expenditures (log)	0.977 (1.14)
Adjustment:	-0.356 ^a (-3.06)
Short-run estimates:	
Δ Interest rate spread	0.049 ^b (2.32)
Δ Investment (log)	-0.124 (-0.47)
Δ Government expenditures (log)	0.282 (0.63)
No. of Obs.	27
R-Squared	0.612
Bounds Test	4.354 ^b

Note: Δ is the difference operator. Numbers in parentheses are *t*-statistics based on White heteroscedasticity-consistent standard errors. Statistical significance: ^{a,b,c} indicate 1%, 5% and 10% levels respectively. The variables lag length for credit growth model (1 1 0 1 1) are Stata-generated using the “varsoc” routine. Diagnostic results: *Durbin Watson*: 2.397; *White (heteroscedasticity)*: 0.409; *Autoregressive conditional heteroscedasticity-Lagrange Multiplier (ARCH-LM)*: 0.093^c; *Ramsey regression specification error test (RESET for omitted variables)*: 0.075^c; *Variance inflation factor (VIF for multicollinearity)*: 1.65; *Cumulative sum of squares (CUSUMSQ for stability)*: stable

Source: Researcher's Computations

5.10.2 Kenya

The results shown in Table 5.29 indicates that the *a priori* expectation for the relationship between financial reform and credit growth is realised only in the short-run with the negative and statistically significant coefficient of interest rate spread at 10%. Other results indicate that in the long- and short-runs, inflation rate and per capita GDP have asymmetric effects on credit growth at the 1% significance level. Also, the adjustment term (-0.683) is statistically significant at the 1% level, suggesting that errors to credit growth are corrected for within the year at a convergence speed of 68 percent. Other diagnostic results reveal that there is a long-run cointegrating relationship at the 5% level (Bounds test), no evidence of autocorrelation, heteroscedasticity, autoregressive conditional heteroscedasticity and multicollinearity while the R-squared indicates that 75 percent variation in credit growth is explained by the regressors.

Table 5.29: Sensitivity Check, Kenya

Variables	Δ Credit Growth
Constant	0.291 (0.31)
Long-run estimates:	
Interest rate spread	0.0027 (0.52)
Inflation (consumer prices)	-0.016 ^a (-4.00)
per capita GDP (log)	0.275 ^a (4.01)
Government expenditures (log)	0.575 (1.69)
Adjustment:	
	-0.683 ^a (-5.59)
Short-run estimates:	
Δ Interest rate spread	-0.016 ^c (-1.93)
Δ Inflation (consumer prices)	0.007 ^a (3.03)
Δ per capita GDP (log)	-0.359 ^a (-3.47)
Δ Government expenditures (log)	0.069 (0.33)
No. of Obs.	30
R-Squared	0.752
Bounds Test	8.566 ^a

Note: Δ is the difference operator. Numbers in parentheses are *t*-statistics based on White heteroscedasticity-consistent standard errors. Statistical significance: ^{a,b,c} indicate 1%, 5% and 10% levels respectively. The variables lag length for credit growth model (1 1 1 1) are Stata-generated using the “varsoc” routine. Diagnostic results: *Durbin Watson*: 2.122; *White (heteroscedasticity)*: 0.414; *Autoregressive conditional heteroscedasticity-Lagrange Multiplier (ARCH-LM)*: 0.853; *Ramsey regression specification error test (RESET for omitted variables)*: 0.291; *Variance inflation factor (VIF for multicollinearity)*: 2.71; *Cumulative sum of squares (CUSUMSQ for stability)*: not applicable due to gaps in the data

Source: Researcher's Computations

5.10.3 Nigeria

The results shown in Table 5.30 is in line with *a priori* expectation and reveal that in the long-run, a high spread rate has a significant negative effect on credit growth at the 1% level, on average, *ceteris paribus*. Other results indicate that in the long- and short-runs, inflation rate and broad money growth have asymmetric effects on credit growth at the 1% and 10% significance level respectively. Also, the adjustment term (-0.611) is statistically significant at the 1% level, suggesting that errors to credit growth are corrected for within the year at a convergence speed of 61 percent. Other diagnostic results reveal that there is a long-run cointegrating relationship at the 5% level (Bounds test), no evidence of autocorrelation, heteroscedasticity, autoregressive conditional heteroscedasticity and multicollinearity while the null hypothesis of no omitted variables is rejected at the 1% significance level. The R-squared indicates that 71 percent variation in credit growth is explained by the regressors.

Table 5.30: Sensitivity Check, Nigeria

Variables	Δ Credit Growth
Constant	1.616 ^b (2.74)
Long-run estimates:	
Interest rate spread	-0.051 ^a (-2.38)
Inflation (consumer prices)	-0.017 ^a (-3.89)
Broad money growth	0.019 ^a (3.39)
Investment (log)	0.085 (0.52)
Adjustment:	-0.611 ^a (-3.59)
Short-run estimates:	
Δ Interest rate spread	-0.019 (-0.86)
Δ Inflation (consumer prices)	0.006 ^c (1.79)
Δ Inflation (consumer prices)_1	0.0001 (0.05)
Δ Broad money growth	-0.017 ^a (-2.94)
Δ Broad money growth_1	-0.0023 (-0.69)
Δ Investment (log)	0.029 (0.15)
No. of Obs.	34
R-Squared	0.708
Bounds Test	3.558 ^c

Note: Δ is the difference operator. Numbers in parentheses are *t*-statistics based on White heteroscedasticity-consistent standard errors. Statistical significance: ^{a, b, c} indicate 1%, 5% and 10% levels respectively. The variables lag length for credit growth model (1 1 2 2 1) are Stata-generated using the “varsoc” routine. Diagnostic results: *Durbin Watson*: 2.09; *White (heteroscedasticity)*: 0.419; *Autoregressive conditional heteroscedasticity-Lagrange Multiplier (ARCH-LM)*: 0.602; *Ramsey regression specification error test (RESET for omitted variables)*: 0.008^a; *Variance inflation factor (VIF for multicollinearity)*: 1.19; *Cumulative sum of squares (CUSUMSQ for stability)*: stable
Source: Researcher's Computations

5.10.4 South Africa

The results shown in Table 5.31 is in line with *a priori* expectation and reveal that in the long-run, a high spread rate has a significant negative effect on credit growth at the 10% level, on average, *ceteris paribus*. Other results indicate that in the long--run, the GDP significantly stimulates credit growth at the 1% level. Also, the adjustment term (-0.294) is statistically significant at the 5% level, suggesting that errors to credit growth are corrected for within the year at a convergence speed of 29 percent. Other diagnostic results reveal that there is a long-run cointegrating relationship at the 5% level (Bounds test), no evidence of autocorrelation, heteroscedasticity, autoregressive conditional heteroscedasticity, multicollinearity and omitted variables The R-squared indicates that 71 percent variation in credit growth is explained by the regressors.

Table 5.31: Sensitivity Check, South Africa

Variables	Δ Credit Growth
Constant	-2.261 ^b (-2.29)
Long-run estimates:	
Interest rate spread	-0.092 ^c (1.90)
GDP (log)	0.617 ^a (4.23)
Trade (log)	-0.669 (-1.03)
Investment (log)	-0.419 (-1.21)
Adjustment:	-0.294 ^b (-2.26)
Short-run estimates:	
Δ Interest rate spread	-0.014 (-1.12)
Δ GDP (log)	-0.117 (-1.10)
Δ Trade (log)	-0.071 (-0.49)
Δ Investment (log)	0.045 (0.26)
No. of Obs.	35
R-Squared	0.490
Bounds Test	3.762 ^c

Note: Δ is the difference operator. Numbers in parentheses are *t*-statistics based on White heteroscedasticity-consistent standard errors. Statistical significance: ^{a,b,c} indicate 1%, 5% and 10% levels respectively. The variables lag length for credit growth model (1 1 1 1) are Stata-generated using the “varsoc” routine. Diagnostic results: *Durbin Watson*: 2.080; *White (heteroscedasticity)*: 0.420; *Autoregressive conditional heteroscedasticity-Lagrange Multiplier (ARCH-LM)*: 0.591; *Ramsey regression specification error test (RESET for omitted variables)*: 0.003^a; *Variance inflation factor (VIF for multicollinearity)*: 1.80; *Cumulative sum of squares (CUSUMSQ for stability)*: stable

Source: Researcher's Computations

5.11 The Implication of Findings

The implications of findings on the nexus of financial reforms and credit growth on income inequality vary depending on the related sample. For the SSA sample, the significance of the real interest rate variable which reflects the real cost of funds to the borrower and the real yield to the lender portends some significant consequences. Its positive significance as a stimulator of financial stability and credit growth gives credence to the McKinnon-Shaw hypothesis that when the rate of interest is optimal efficient financial intermediation results and hence financial system stability. Therefore, since the real interest rate is the financial reform variable (which is often influenced by inflation rate dynamics), it becomes imperative for monetary authorities' prudence in keeping the inflation rate low to enhance the efficiency the real interest rate in stimulating credit.

Likewise, the effects of per capita GDP, broad money growth and investment as possible stimulants for both financial system stability and credit growth imply that these variables are necessary for both efficient intermediation and real sector growth. Contrarily, the negative effect of per capita GDP growth rate on both the financial stability index and credit growth portends a danger to the financial stability and real sector activities in SSA. It therefore requires

that the regulatory framework is enhanced or augmented to allow for the accommodation of unexpected shocks that may arise from fluctuations in the GDP. Similarly, the negative coefficient of the trade openness variable is an indication that SSA region is yet to take advantage of its potential in the world market that mutually-beneficial trade contracts and agreements needed to stimulate financial intermediation as obtainable in developed economies.

The implications of findings on the credit-inequality relationship are also diverse. On SSA, the negative significance of credit growth shows the equalising power of credit. That is, the ability of financial intermediaries to improve their efficiency in the dissemination of loans and advances to poor households without any discrimination or contractual barriers will contribute to reducing inequality gap in the region. Likewise, income from natural resources and education enrolment have income-equalising tendencies. The implications of these are that if revenue from natural resources are disproportionately skewed to the wealthy via the provision of public goods/amenities that are beyond the affordability of the poor, then inequality will be exaggerated. Similarly, the provision of basic education has shown to have an equalising effect on income inequality. Therefore, it becomes socially responsible for governments of SSA countries to provide essential educational services for its citizenry. Furthermore, since the region has a blend of CFA and non-CFA countries and knowing that financial dependence obtains in CFA countries (since they maintain strong economic and financial ties to France and ultimately to the European Union) it becomes obvious that a blanket monetary policy may not be plausible for the entire region.

With respect to the sub-regions, results on Central Africa attest to the fact that credit growth can have an equalising effect on income inequality. The non-significant negative coefficient may not be unconnected to the under-developed state of financial system in the sub-region. Be that as it may, some salient implications can be deduced in guiding monetary regulators into formulating policies that will foster more competition and intermediation such that the impacts of efficient intermediation is felt on income distribution in the sub-region in the long-run. The age-dependency ratio has shown to have an equalising impact on income inequality; however, this is a short-run phenomenon. This is an implausible outcome because it implies that as the ratio of dependants to the working population increases, income inequality falls. On sub-regional comparativeness, the results imply that Central Africa has a more stable financial system than West Africa in period 2010 to 2015. This outcome is not surprising since most, if not all the countries in Central Africa are CFA countries with strong monetary allegiance to

France and indirectly to the European Central Bank. It is noteworthy to state that the CFA franc is tied to the Euro and follows the monetary dictates of the European Central Bank who has strict monetary guidelines particularly in relation to interest rate and inflation rate regulations. In the same vein, relative to West Africa, the Central Africa sub-region shows to have reduced credit growth in period 2000 to 2009 and an increase in period 2010 to 2015. On income inequality, the sub-region's index are lower in periods 1980 to 1989 and 1990 to 1999 while higher in period 2010 to 2015 relative to West Africa.

For East Africa, the implication of the positive and significant coefficient of credit growth on income inequality may be that the dissemination of credit is still skewed to the wealthy class who can provide the requirements for accessing loans or poor households are unable to access credit due to high cost of loanable funds. Similarly, in the long-run, GDP growth and government expenditures aggravate inequality while primary enrolment reduces the inequality gap. The implications are that more government interventions towards making education affordable and accessible will reduce inequality while if the country's wealth and government spending are not well distributed, income inequality will widen. The short-run results imply that these variables – credit growth, GDP growth and government spending will reduce inequality while primary enrolment rate and age-dependency ratio will worsen income inequality. On sub-regional comparativeness, East Africa shows to have a more stable financial system relative to West Africa in period 2010 to 2015 in addition to witnessing consistent credit growth in periods 1990 to 1999, 2000 to 2009 and 2010 to 2015 relative to West Africa region. Likewise inequality is lower in periods 1980 to 1989, 1990 to 1999 and 2000 to 2015 relative to West Africa.

With respect to West Africa, the implication of the negative and not-significant impact of credit growth is that the financial system is not deepened enough to have the desired equalising impact. Therefore, it becomes necessary for financial regulators to explore measures that will foster competition and efficient financial intermediation. On relative comparativeness, the financial system in the sub-region is weaker to those in Central, East and Southern Africa in period 2010 to 2015 and likewise for credit growth.

Lastly, on Southern Africa, the implication of the negative significance of credit growth on income inequality is that more financial deepening has equalising effect. Other results are that

the sub-region has a stable financial system and higher credit growth than West Africa, but it is a more unequal sub-region than West Africa.

Regarding the four selected countries, their distinct heterogeneities lead to different implications for each country. For Cameroon, the effects of findings are that two financial reform instruments are identified. One, to ensure long-run stability in its financial system, the real interest rate is the reform variable. Two, to propel financial deepening and stimulate credit growth in the long-run, the deposit rate is the reform variable. The implication of these two identified financial reform instruments is that using the wrong financial reform instrument may lead to unsatisfactory results within its financial sector with adverse effects on income inequality. Others are that in the long-run, broad money growth, per capita GDP and investment are ingredients to sustaining its financial system and also in stimulating credit growth. While liquid liabilities have a significant dis-equalising effect on income inequality both in the long- and short-run. This result on liquid liabilities may not be unconnected to the underdeveloped state of Cameroon's financial sector leading to the inefficient transforming of liabilities to bank assets (that is loans). Lastly, the negative significance of credit growth implies that with efficient financial intermediation, income inequality abates in the country.

For Kenya, the country's financial dynamics responds to movements in its domestic credit provided by financial institutions and not that provided by banks. This is contrary to what is obtainable in the other three countries. By implication, this shows that shocks to credit provided by financial institutions will have more impact on its economy. Likewise, the deposit rate is the financial reform indicator that enhances both financial system stability and stimulates credit growth in the long-run. Other financial stability enhancers are broad money growth, per capita GDP and investment while the long-run stimulators of credit growth are broad money, per capita GDP and government spending while inflation, if not controlled, will be a drag on credit growth. Lastly, the positive significance of credit growth implies *inefficient* financial intermediation which aggravates income inequality in the country.

Similarly for Nigeria, the deposit rate is financial reform instrument need to ensure financial system stability and promote credit growth in the long-run. Another observation is that Nigeria's financial system responds to dynamics in its financial system deposits and not any other variant of deposit liabilities such as broad money and liquid liabilities as obtainable with the other three countries. The implication of this finding is that shocks to financial system

deposits will have more impact than those from any other variant of liabilities within the financial system. Lastly, the negative significance of credit growth implies efficient financial intermediation which has equalising impact on income inequality.

Finally for South Africa, the deposit rate is financial reform instrument need to ensure financial system stability and promote credit growth in the long-run. Another financial stability enhancer is per capita GDP while the long-run stimulators of credit growth are broad money growth, per capita GDP and investment while inflation, if not controlled, will be a drag on credit growth as obtainable in Kenya. To sum up, the negative significance of credit growth implies efficient financial intermediation which has equalising impact on income inequality.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

This thesis is motivated by the high and rising income inequality in Sub-Sahara Africa (SSA) and it investigates the finance-credit-inequality nexus using a sample of 20 selected countries from 1980 to 2015. In executing the task, it was necessary to first determine if the financial sector is stable after financial reforms since stability engenders efficient financial intermediation and also, if the reforms stimulate credit growth as efficient intermediation is evidenced by increase in domestic credit. Lastly, to establish the nexus, the equalising impact of credit growth on income inequality is then analysed.

Given the study scope, investigating this nexus took a different approach which makes the study unique. First, is the general-to-specific approach which investigates the nexus from the broader perspective of 20 countries before specifically analysing 4 countries - Cameroon, Kenya, Nigeria and South Africa. Second, is the use of different econometric tools to complement each other including such as pooled ordinary least squares (OLS), fixed effects (FE), dynamic fixed effects (DFE) and error correction model (ECM). Third, the analytical tactics employed include using 10-year non-overlapping window and the dividing the sample of countries across sub-regions in a bid to understand variation across time periods and sub-regions. Fourth, is the recognition of the distinct heterogeneities across these four countries in order to reduce estimation bias to a minimal level. Therefore, this section concludes with a presentation of summary of the major findings and some policy recommendations.

6.1 Summary of Major Findings

From the sample of 20 countries, the descriptive analysis reveals that the average Gini index from the sample is very high and this is not significantly different from what is obtained across the sub-regions. Similarly, relative to the regional average and other sub-regions, the average domestic credit in Southern Africa region is higher, evidence of a more efficient financial intermediation while the average real interest rate (financial reform variable) is higher in Central Africa region relative to the regional average and other sub-regions. On the impacts, the findings reveal that the real interest rate, per capita GDP growth, broad money growth engenders financial sector stability and also stimulates credit growth. The implication is that these indicators are necessary to fostering financial stability and efficient intermediation in the region. On the contrary, per capita GDP growth and trade openness consistently distort both

financial stability and credit growth. This implies that in relation to the population, the growth rate of the GDP adversely affects the financial system. Likewise, the region's international trade performance is not at a desirable stage to foster both financial stability and stimulate lending. In addition, the sub-regional analysis reveals that Central and East African regions have a more stable financial system relative to West Africa. This may be attributable to banks in these regions being controlled by their governments coupled with membership of the "Communauté Financière d'Afrique" (CFA) countries' zone financial allegiance to France (and to the Euro) relative to financial independence that obtains in West Africa. For instance, Cameroon which is a member of the CFA made up of 14 African countries (Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Congo DR, Cote d'Ivoire, Equatorial Guinea, Gabon, Guinea Bissau, Mali, Niger, Senegal and Togo) has monetary dependence relative to other countries in the region. The deposit rate for Cameroon is observed to be quite low which is probably not unconnected to the fact that the CFA franc is pegged to the euro and therefore follows the monetary policy dictates of the European Central Bank (Gulde & Tsangarides, 2008; Agbor, 2012). Countries in the CFA have monetary regulations tied to that of the European Union which ensures stricter interest rate regulations. On the contrary, higher interest rates persists in non-CFA countries which are mostly in double-digits. This reflects their monetary independence and financial market competition.

On measures that may stem income inequality in SSA, findings reveal that credit growth, GDP growth, primary education and natural resources have an equalising impact while government expenditures contribute to the widening inequality gap. These findings reveal that particularly for credit growth, efficient financial intermediation can close the gap between the rich and poor. It further validates the significance of *credit availment*. On the impact of GDP growth, this shows that if properly harnessed the gains from economic growth can drive down income inequality. Also, having access to a basic level of education can significantly reduce inequality level in the region. This result validates the effectiveness of human capital development on income distribution.

Similarly, the availability of abundant natural resources if properly harnessed also contributes to reducing the inequality gap in SSA region. Furthermore, the age dependency ratio and the availability of natural resources show that each of these indicators can have both positive and negative impacts on income inequality. For instance, if the ratio of dependants (those with no income sources) rises relative to the working-age population, there will be some disequilibrium

in income distribution. However, findings on sub-regional levels are quite varying. Credit growth has an equalising impact in Southern Africa region but not significant to reduce inequality in Central and West Africa while it significantly escalates inequality in East Africa implying that financial intermediation requires strengthening in these countries. Lastly, comparatively, income inequality is lower in Central and East Africa while higher in Southern Africa relative to West Africa.

For the individual countries, the summary is limited to long-run impacts. On financial system stability and credit growth, all the countries experienced some measure of stability after the financial reform even though the reform variables differ. For Cameroon, it is the real interest rate while it is the deposit rate for others. The implication of this finding is that identifying the appropriate reform variable is an important precursor for financial stability. Likewise financial reform stimulates credit growth across the four countries. The per capita GDP has proven to be a positive predictor of both financial stability and credit growth among the countries except for Nigeria. Noticeably, financial system deposits, broad money and broad money growth are also positive predictors of financial system stability and credit growth in all the countries implying that policies that promote liability generation of the financial system will invariably ensure its stability and efficiency. On the effect on income inequality, the findings reveal that financial intermediation evidenced by credit growth significantly reduce inequality in Cameroon, Nigeria and South Africa while it aggravates inequality in Kenya. This is an important finding and it implies that the financial systems in these countries have the capacity to reduce income inequality if given the necessary impetus. Hence, from the country-level studies, the finance-credit-inequality is succinctly established for SSA.

6.2 Contributions to Knowledge

Having identified some gaps in the empirical literature, this research has contributed to the body of knowledge in the following ways:

- i. Due to the sparse finance-inequality literature exclusive to Sub-Saharan Africa (SSA), this study contributes to the body of knowledge by examining the finance-credit-inequality nexus in SSA. The contribution is not only exclusive but comprehensive from both broad and specific perspectives.

- ii. Given that, this study evaluates the extent of financial system stability after financial reforms, the impact of financial reform on credit growth and impact of credit growth on income inequality. Thus making it a novel study which its findings will be useful to stakeholders, policymakers and researchers in similar areas. To examine the interactive effects of financial reforms and credit growth on income inequality, a broad sample of twenty countries, sub-sample of four regions and four representing countries are analysed. In other words, the literature is enhanced with new findings on how these interactive effects affect SSA in general using different typologies of analysis and as such the findings can be generalised to other developing and emerging economies with common characteristics with SSA.
- iii. This study observes that there is not much examination about the stability of the financial sector after reforms as the bulk of extant literature is on the nexus between financial stability and economic growth. Hence, it provides evidence that it is needful to first ascertain the stability of the financial system after reforms. In other words, contribution to the literature is enriched with the results indicating that financial reforms enhance financial system stability in SSA. This findings are not only limited to the broad sample, but also evident across the four sub-regions and the four representing countries. It is expected that these outcomes will be useful to researchers and financial regulators that financial reform is an essential ingredient for sustaining financial system stability.
- iv. Another gap identified is the inability of studies to separately analyse the impact of financial reform on credit growth and the inability to separate the effect of credit growth from other financial reform indicators on income inequality. In other words, the finance-inequality literature has been unable to unbundle the cloudy effect of financial reform on income inequality. Given that credit growth is an outcome of financial reform, this research is able to contribute to knowledge by showing the channel of influence by which financial reform affects income inequality. In other words, findings reveal that financial reform has an *indirect* relationship with income inequality rather than a direct relationship as postulated by current literature. This is shown via the ability to separately analyse first, the impact of financial reform on credit growth and thereafter the impact of credit growth on income inequality. This is contrary to what obtains in the current literature.
- v. From the current finance-inequality literature, in analysing the relationship between finance and income inequality, *domestic credit to the private sector/GDP* (proxy for credit growth

and a measure of financial depth) is often included among the explanatory variables; thus, masking its impact on income inequality in addition to causing endogeneity bias among the explanatory variables. Thus, the study contributes to the literature by stating that the relevance of credit growth on income inequality is contingent on financial reforms. Unfortunately, the extant literature for the most part, has not explored the complex link, which this study has addressed. Consequently, contribution is made to the literature by improving the existing scholarship methodology. The empirical approach often used by researchers (several of whom have been cited in the literature review and theoretical framework) in evaluating the finance-inequality relationship is usually a single equation estimation technique which establishes the direct relationship between finance and income inequality.

- vi. The approach used in this study is that which has not been explored in the current literature which is the simulation of a two-equation analysis that shows the channel through which finance affects income inequality. An important outcome of this research is that financial reform has an equalising effect on income inequality through credit growth. In addition, the empirical approach used is that in analysing the *indirect* relationship between financial reforms and income inequality, the financial reform indicators (the real interest rate and/or the deposit rate) only explain credit growth while credit growth explains income inequality. This approach unmasks the transitory impact of financial reform via credit growth on income inequality and also removes any endogeneity problem that might arise from putting interest rate and domestic credit to the private sector/GDP in explaining income inequality as it is in current literature. Thus, contribution to literature is made by exploring this complex link and stating that the relevance of credit growth on income inequality is contingent on financial reforms.
- vii. This contribution, though not previously stated among the identified gaps in the empirical literature, shows that the choice of financial reform instrument is influential to the reduction of income inequality. That is, inappropriate financial reform instrument may exacerbate inequality. For instance, two financial reform proxies are used in the course of this research – the real interest rate and the deposit rate. On the broad sample, the four sub-regions the real interest rate in the reform instrument that enhances financial system stability and stimulates credit growth. For Kenya, Nigeria and South Africa, it is the deposit that that enhances financial system stability and stimulates credit growth while for Cameroon, the

real interest rate in the reform instrument that enhances financial system stability and the deposit rate is the reform instrument that stimulates credit growth. The literature is enhanced with this contribution because it shows that a uniform reform instrument may not be applicable to every economy.

- viii. Lastly, given the analytical approach used, the literature is enriched given that the results obtained from this study can be generalised to other developing and emerging economies. With analyses carried out on the full SSA sample (a selection of 20 countries), the four sub-regions and four countries (Cameroon, Kenya, Nigeria and South Africa), generalising this analytical approach to other economies is intuitive as it may provide the avenue to identifying the channel which inequality can be reduced.

6.3 Conclusion

The finance-inequality relationship has received much attention in extant literature. However, there is a dearth of knowledge regarding this nexus in exclusive relation to SSA and also the channels of influence through which finance affects income inequality. This thesis broadens the frontiers of knowledge in this area by examining the channel through which financial reforms impact on income inequality in SSA from 1980 to 2015 using broad and specific analytical approaches in addition to using five estimation techniques. The broad (general) approach is a panel data analysis of twenty countries which are further divided along four sub-regional delineations (Central, East, Southern and West Africa). The specific approach is a country-level analysis of four representative countries (Cameroon, Kenya, Nigeria and South Africa) each from its sub-region.

This analytical approach is intuitive in two ways: (1) to observe if findings obtained from the general approach hold when individual countries are considered and (2) to provide policy patterns such that whatever policies are applied to reduce income inequality in these representative countries, such policies may be applicable in reducing inequality in their respective sub-regions. Five estimation techniques are used evaluating these interactive relationships and in line with the theoretical and finance-inequality literature, the real interest rate, deposit rate, domestic credit to the private sector and the Gini index are the respective proxies for financial reforms, credit growth and income inequality. For the general approach, the estimators used are: pooled ordinary least squares (OLS), fixed effects (FE), dynamic fixed effects (DFE), and system generalised method of moments (system GMM) while for the

specific approach the estimator used is the error correction model (ECM) of the autoregressive distributed lag framework (ARDL).

Findings reveal that financial reform exhibits an *indirect* relationship with income inequality. That is, the equalising effect of financial reform on income inequality is through credit growth. Hence, contributions made to literature are summarised thus: (1) providing evidence that the reform-credit-inequality nexus exist for SSA, (2) improving the scholarship methodology by empirically unbundling the effect of financial reforms on income inequality by showing that finance exhibit an *indirect* relationship with income inequality and not directly as postulated by the current literature, (3) evidencing the channel of influence through which finance affects inequality which is via credit growth; (4) validating the McKinnon-Shaw (1973) hypothesis that at a higher interest rate, financial intermediation improves and (5) results also validate the extensive margin theory of Greenwood and Jovanovich (1990) that as credit is broadened and made available to those initially excluded due to price or other impediments, income inequality falls.

Given these findings, some of the recommendation is that financial reform policies that drive financial intermediation (i.e. lending) be pursued by stakeholders as this will indirectly lead to a reduction in income inequality. In other words, the ability to stimulate credit growth may be one of the avenues to reducing the income inequality gap in SSA and in developing economies in general. In conclusion, stakeholders, monetary and financial regulators, policy makers and researchers in similar fields will find this study's outcome relevant. The results can be generalised to other developing economies with characteristics similar to those of SSA countries (e.g. underdeveloped financial system) such that one of the Sustainable Development Goals (i.e. Goal 10) which is also linked to Goals 1, 2, 3, 4 and 8 – that is, to reduce inequality within and among nations – can be achieved.

6.4 Recommendations

Based on the findings of this study, some recommendations that are relevant to reducing the level of income inequality in SSA are proffered, first, on the broad sample of selected twenty SSA countries and then on the four countries of Cameroon, Kenya, Nigeria and South Africa.

For SSA, given the positive significance of real interest rate on financial system stability and credit growth, policy makers must maintain a low level of inflation rate in order to enhance the

return on investment both for the borrowing public and the financial intermediaries. This is because a high inflation rate may lead to negative real interest which hampers lending and thus may further aggravate income inequality. Likewise, the negative significance of credit growth on income inequality signifies that increased lending will contribute to reducing inequality in the region, therefore monetary regulators must pursue programmes and initiate policies that will engender the dissemination of credit to the public and to poor households in particular. Similarly, with the noticeable significance of some control variables – per capita GDP, trade openness, GDP growth, natural resources and primary education on the two outcome variables of credit growth and income inequality, the following recommendations are made. The negative significance of per capita GDP on financial stability index and credit growth portends danger.

Therefore, concerted efforts must be made to improve per income of populace by driving policies that will boost economic growth. In the same vein, the negative significance of trade openness is an indication that the region is yet to take advantage of its abundant resources and re-position itself in international trade negotiation. Thus, efforts must be by the respective governments to harness the opportunities embedded in international trade. Also, with the negative and significant effects of GDP growth rate, natural resources and primary education on income inequality, it is recommended that policies that will drive economic growth be pursued, potentials of SSA's natural resources be harnessed and education be made free and affordable to all citizenry as these will drive down income in equality in the region.

On the sub-regions, given the negative but insignificant effect of credit growth on income inequality in Central Africa, it is obvious that credit growth possesses an equalising effect but not significant in reducing inequality. Thus, it is recommended that policies that will encourage financial intermediation be pursued. It is also observed that the region has a more stable financial system relative to West Africa. This may not be unconnected to the fact that most Central African countries are CFA countries with allegiance to their colonial masters, France, and indirectly to the European Central Bank (ECB) which maintains strict financial discipline across its member-states. In East Africa, the cost of funds may be denying the public the opportunity to access credit. This is reflective of the positive and significant effect of credit growth on income inequality. Therefore, it becomes necessary to remove the impediments to accessing credit in the country. Likewise, policies that will positively drive GDP growth and the equitable use of government expenditures be pursued in order to reverse the adverse effects of these variables on income inequality. That primary education has a negative and significant

impact on income inequality, it is recommended that inclusive-education policies must be pursued by governments in that sub-region. For West Africa, since the equalising power of credit growth is not significant, it is recommended that pro-lending policies must be pursued to encourage efficient financial intermediation. Lastly, for Southern Africa, it is recommended that policies that promote lending be encouraged given the negative and significant effect of credit growth on income inequality.

On the countries' recommendations, Cameroon need to ensure that the inflation rate is maintained at a low level in order not to erode the influence of the real interest rate which enhances the stability of its financial system. Likewise, for the deposit rate which stimulates credit growth, it is recommended that the rate be maintained to stimulate saving in order to accumulate more loanable funds which ensure more financial intermediation. In the same vein, since broad money growth, per capita GDP and investment stimulate both financial system stability and credit growth, it is needful that policies that will further enhance the positive influence of these variables be promoted. The dis-equalising impact of liquid liabilities on income inequality requires that the financial sector and institutional regulatory need to fashion out ways of transforming liquidity into assets such that households and firms will have access to credit. Lastly, with the negative significance of credit growth on income inequality, it is recommended that the country's monetary regulators must promote policies and programmes that will enhance lending.

For Kenya, it is observed that the country's financial dynamics responds to domestic credit provided by financial institutions rather than those by banks. Therefore, the entire financial system must be taken into perspective whenever attempt is made to measure the extent of credit disseminated in the country. Also, since the deposit rate positively drives both financial system stability and credit growth, it is recommended that the rate be made competitive in order to stimulate saving and boost the volume of loanable funds. For other control variables – broad money, broad money growth, per capita GDP, investment, and government spending - with positive effect on financial system stability and credit growth, the recommendation is that pro-policies be pursued. The positive and significant effect of credit growth indicates inefficient financial intermediation in the country. It is therefore recommended that hindrances to efficient use of loanable funds by banks and other financial intermediaries be removed.

For Nigeria, it is recommended that the deposit rate be made competitive since it is the variable that enhances financial system stability and stimulates credit growth. Also, because the financial dynamics in the country responds to financial system deposits as opposed to other liability components of the financial system, it is recommended that policies that will enhance more financial system deposits be pursued. Given that credit growth has a negative impact on income inequality, regulators must pursue policies that enhance more financial intermediation. South Africa's recommendations are similar to those given for Nigeria with the exception that per capita GDP enhances both financial system stability credit growth while broad money growth and investment stimulate credit growth.

Summarily is the need for SSA countries to continually reform their financial sectors in order to ensure financial stability in addition to improving credit growth. Findings from this study show that financial reform further ensures efficient financial intermediation which is the improvement of lending roles of banks and other financial intermediaries in making loans and advances available and affordable to desired borrowers. Furthermore, efforts that improve financial intermediation will lead to a reduction in income inequality. That is policies that will enhance competition within the financial system be promoted such that the lending capabilities of financial intermediaries are enhanced evidenced by increased lending. These policies include but not limited to the relaxation of contractual agreements required for accessing credit because with stringent loan conditions, poor households will be exempted from engaging in mutually beneficial economic opportunities.

The rationale for this is that with increased access to credit, the income disparity between the rich and poor will gradually reduce. Another policy that will enhance credit growth is the expansion of more branch networks to the rural communities to make credit more available to those at the lowest income strata. Related to that is the regulation of prevailing rates that is optimal in attracting both loanable funds from depositors and enhancing efficient financial intermediation. That is, if interest rates are not competitive and optimal, depositors will have no incentive to save which creates a shock to loanable funds and prevents effective and efficient utilisation of funds. This implication can be explained from two standpoints. When a shock to loanable funds occurs, financial intermediaries will have to raise the lending rate which has a negative effect on investors who are averse to borrowing when rates are high. The overall implication is that income inequality will increase. Be that as it may, due to the demographics of CFA and non-CFA countries in the region, a blanket monetary policy is not plausible.

6.5 Limitations and Suggestions for Further Studies

The limited availability of inequality data for SSA countries is a major challenge despite rapid expansion of databases on inequality measures for developed economies – such as Household Budget Surveys (HBSs), Living Standards Measurement Study Surveys (LSMSs), Demographic and Health Surveys (DHSs) and Multiple Indicator Cluster Surveys (MICSs) – and the development of international databases on income inequality which have made the analysis of its levels, trends and determinants more feasible than in the past. Hence, this study joins in the call for the compiling of up-to-date data on measures of income inequality for the region. Another limitation is the inability to include the non-bank financial institutions in this study due to non-availability of data. This sub-sector of the financial system is also critical in the quest to solving the problem of income inequality in the sense that a sizeable proportion of the poor populace patronise these less-formal institutions for funds required to engage in economic opportunities. Hence, their incorporation into the study of reform-credit-inequality relationship will make analysis and evaluations more robust.

On the suggestions for further studies, data on health, education, wealth and income inequality will encourage more studies understand the interaction between wealth, income, education and health inequality which will propel the attainment of SDGs. In addition, for the derivation of a financial stability index, this study uses macroeconomic indicators of financial stability. Therefore, suggestions may be to examine financial system stability using microeconomic dimension of financial stability. These microeconomic indicators entail the use of aggregate prudential ratios indicators of financial stability such as ratio of non-performing loans to gross loans which is relevant as a warning signal for systemic banking insolvency, bank capital to total assets ratio, net interest margin, bank non-performing loans to gross loans, stock market volatility, banking Z-score, stock market capitalisation growth rate, return on assets, return on equity, liquid assets to deposits and short-term funding. Another suggestion may be to test the impact of credit growth on other measures of income inequality such as the Palma ratio, Atkinson Index, Robin index and so on in order to evaluate if the same result holds. Also, given the distributional effects of income inequality, it is suggested that its relationship with welfare using the human development index be explored. These suggestions may be taken up to further expand the frontiers of this research.

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APPENDIX

Table A1.1: Countries Representation by Average Gini Index, GDP and Population (1980 - 2015)

S/No.	Country	Gini Index	GDP (US\$)	Population
1	Botswana	63.86499	6,530,000,000.00	2,333,201
2	Burundi	56.46999	1,320,000,000.00	11,216,450
3	Cameroon	58.07629	14,600,000,000.00	24,678,234
4	Central African Rep.	63.07581	1,260,000,000.00	4,737,423
5	Chad	57.57475	4,280,000,000.00	15,353,184
6	Comoros	62.65013	304,000,000.00	832,347
7	Congo, Republic	59.77403	5,060,000,000.00	5,399,895
8	Gabon	59.01696	7,680,000,000.00	2,067,561
9	Gambia	66.40229	613,000,000.00	2,163,765
10	Kenya	60.34958	19,500,000,000.00	50,950,879
11	Malawi	62.44683	2,990,000,000.00	19,164,728
12	Mauritius	56.53348	5,200,000,000.00	1,268,315
13	Namibia	63.09323	5,420,000,000.00	2,587,801
14	Nigeria	56.56496	127,000,000,000.00	195,875,237
15	Rwanda	58.71748	2,990,000,000.00	12,501,156
16	Seychelles	58.49394	628,000,000.00	95,235
17	Sierra Leone	62.53993	1,590,000,000.00	7,719,729
18	South Africa	66.81614	187,000,000,000.00	57,398,421
19	Swaziland	64.6626	2,050,000,000.00	1,391,385
20	Tanzania	56.68555	17,200,000,000.00	59,091,392

Source: Researcher's Compilation from Lahoti *et al.*, (2016); World Bank (2016); <http://www.worldometers.info/population/countries-in-africa-by-population/>

A4.1 Derivation of Equation [4.16]

The Cobb-Douglas production function for the experienced worker is given as:

$$Y_t^e = A(L_t^e)^\alpha(K_t)^{1-\alpha} \quad [4.15]$$

where Y_t^e also represents the total income of the experienced individual in period t ; A represents expertise which is an outcome of education; L_t^e denotes labour hours for the individual; K_t is physical capital stock (assuming no depreciation) employed at period t and A is a function of human capital investment stock in the economy, (H^φ) such that $\varphi \geq 1$. Hence, equation [4.15] becomes:

$$Y_t^e = H^\varphi (L_t^e)^\alpha (K_t)^{1-\alpha} \quad [4.15']$$

and given that in equilibrium, the marginal productivity of labour equals the wage rate:

$$\frac{\partial Y}{\partial L} = w$$

then the wage rate of the experienced worker in period t equals its marginal product, that is:

$$\frac{\partial [H^\varphi (L_t^e)^\alpha (K_t)^{1-\alpha}]}{\partial L} = H^\varphi \alpha (L_t^e)^{\alpha-1} (K_t)^{1-\alpha}, \text{ and this becomes:}$$

$$w_t^e = Y_L(L_t^e, K_t) = H^\varphi \alpha \left(\frac{K}{L}\right)^{1-\alpha} \quad [4.16]$$

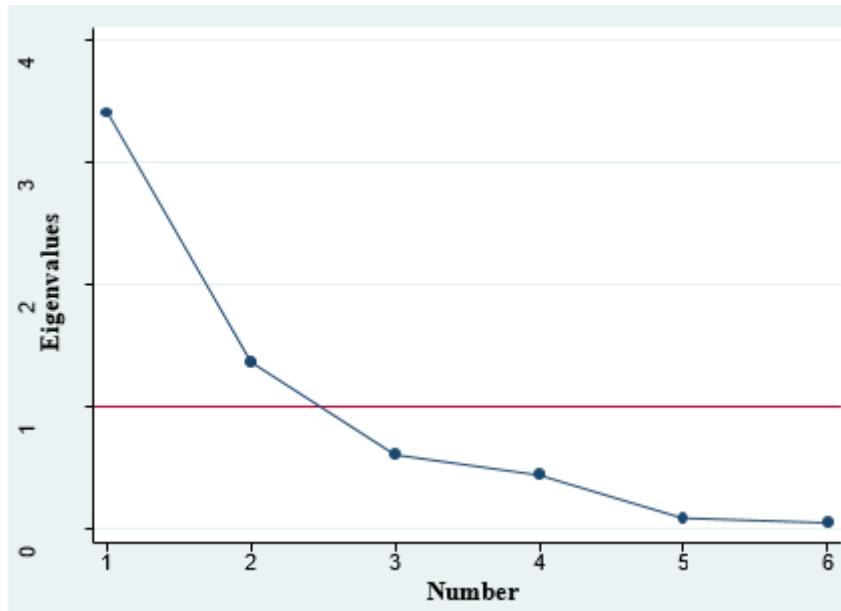


Figure A5.1: Scree plot, Sub-Saharan Africa (SSA)
Source: Researcher's Computation

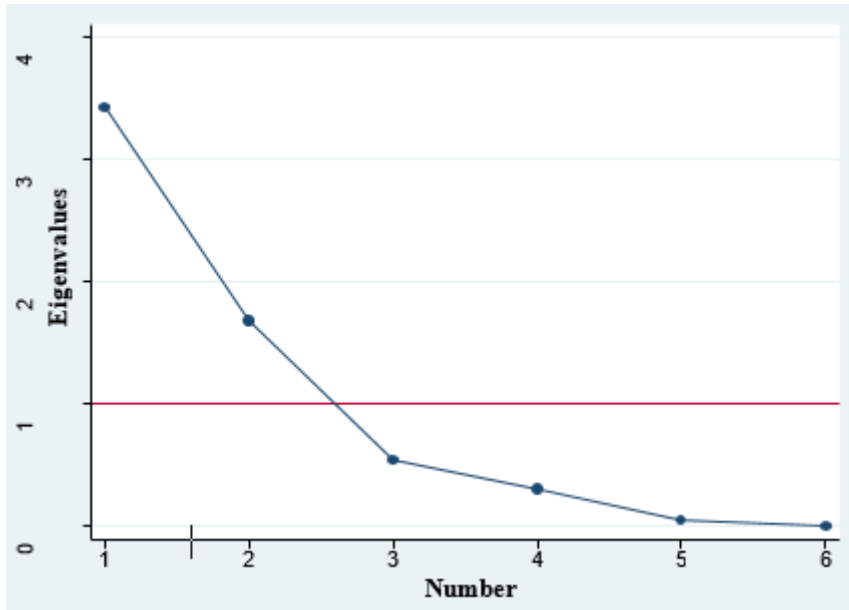


Figure A5.2: Scree plot, Cameroon
 Source: Researcher's Computation

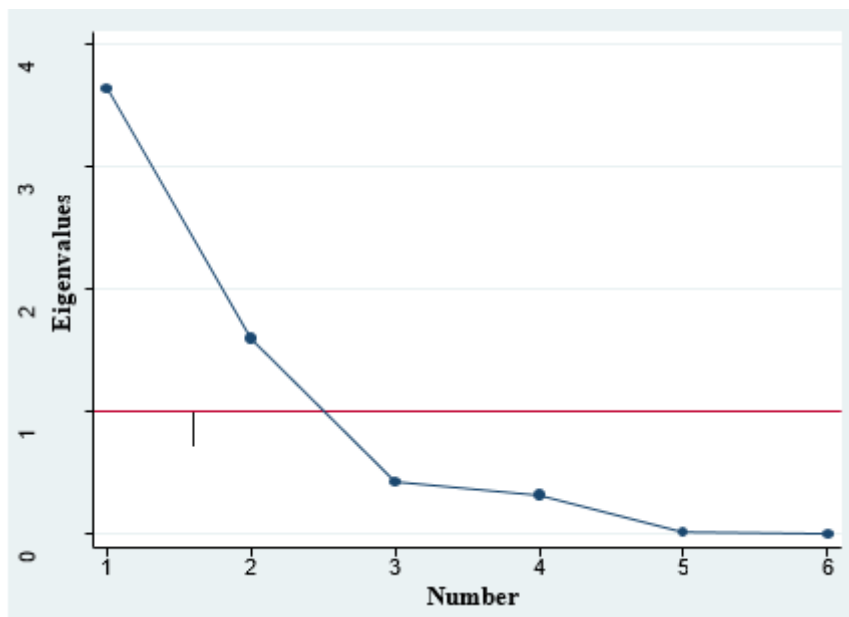


Figure A5.3: Scree plot, Kenya
 Source: Researcher's Computation

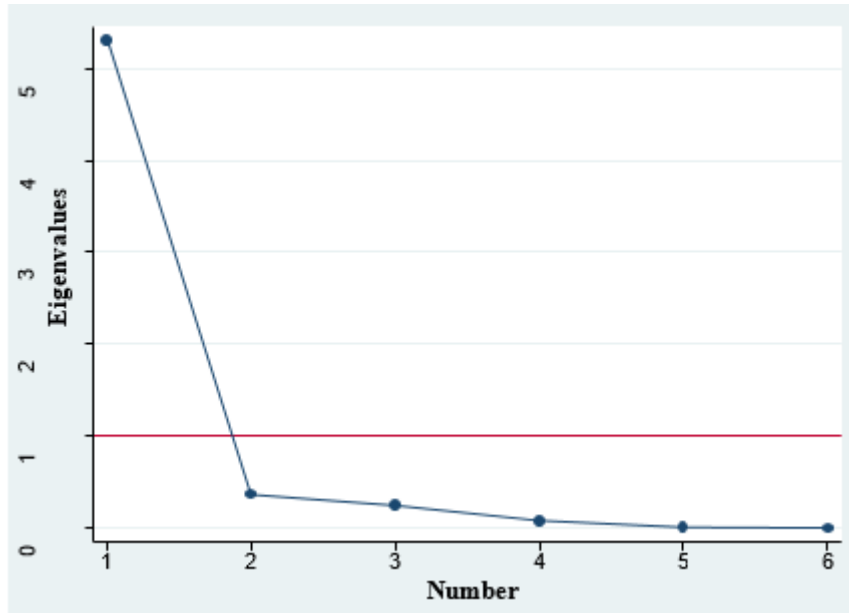


Figure A5.4: Scree plot, Nigeria
 Source: Researcher's Computation

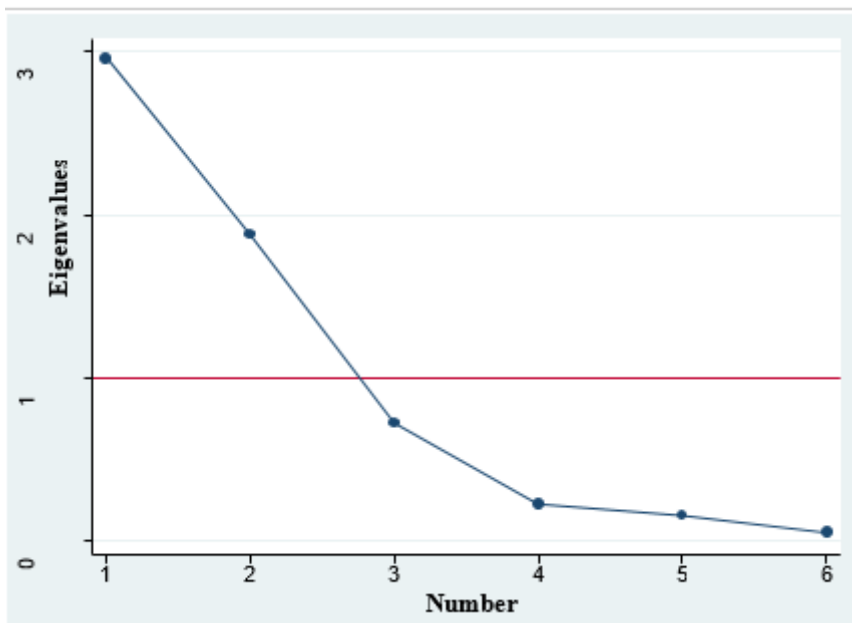


Figure A5.5: Scree plot, South Africa
 Source: Researcher's Computation

Table A5.1: Correlation Matrix, Cameroon

<i>Variables</i>	<i>FSI</i>	<i>Gini</i>	<i>DC</i>	<i>RR</i>	<i>DR</i>	<i>Inf.</i>	<i>Liq</i>	<i>BMG</i>	<i>PC</i>	<i>Gr.</i>	<i>GFCF</i>	<i>GF. GR.</i>	<i>Exp.</i>	<i>Nat.</i>
Financial stability index	1.000													
Gini index	0.347	1.000												
Domestic credit	0.146	-0.595	1.000											
Real interest rate	0.249	0.398	-0.446	1.000										
Deposit rate	-0.236	-0.840	0.753	-0.532	1.000									
Inflation (consumer prices)	0.111	-0.341	0.229	-0.428	0.389	1.000								
Liquid liabilities	0.026	-0.375	0.848	-0.350	0.708	0.146	1.000							
Broad money growth	0.492	0.156	0.122	-0.347	-0.041	0.428	-0.013	1.000						
GDP per capita	-0.121	-0.085	0.404	-0.087	0.311	-0.249	0.583	-0.411	1.000					
GDP per capita gr.	0.185	0.154	0.021	-0.188	-0.238	0.346	-0.172	0.606	-0.535	1.000				
Gross fixed cap. formation	0.299	-0.042	0.671	-0.144	0.246	0.101	0.566	0.088	0.360	0.259	1.000			
Gross fixed cap. form. gr.	0.171	0.259	-0.072	-0.174	-0.300	0.146	-0.233	0.548	-0.486	0.818	0.163	1.000		
Government consumption exp.	-0.244	-0.199	0.230	0.192	0.391	-0.366	0.471	-0.623	0.634	-0.767	0.092	-0.543	1.000	
Natural resources	0.011	-0.094	0.339	-0.539	0.118	0.353	0.259	0.563	-0.282	0.598	0.120	0.518	-0.507	1.000

Note: *FSI*: financial stability index; *DC*: Domestic credit; *DR*: deposit rate; *RR*: real interest rate; *Inf.*: inflation; *Liq*: Liquid liabilities; *BMG*: broad money growth; *GR.*: per capita GDP growth; *PC.*: per capita GDP; *GFCF*: gross fixed capital formation; *GFCF Gr.*: gross fixed capital formation growth; *Exp.*: consumption expenditures; *Nat*: Natural resources

Source: Researcher's Computation

Table A5.2: Correlation Matrix, Kenya

<i>Variables</i>	<i>FSI</i>	<i>Gini</i>	<i>DC</i>	<i>DR</i>	<i>Inf.</i>	<i>BM</i>	<i>BMG</i>	<i>Liq.</i>	<i>GDP</i>	<i>PC</i>	<i>GFCF</i>	<i>Exp.</i>	<i>Pry</i>
Financial stability index	1.000												
Gini index	0.048	1.000											
Dom. credit by fin. inst.	0.612	0.068	1.000										
Deposit rate	-0.003	-0.075	-0.015	1.000									
Inflation (consumer prices)	-0.214	0.084	-0.403	-0.081	1.000								
Broad money	0.507	0.035	0.752	-0.408	-0.348	1.000							
Broad money growth	0.520	0.121	0.151	-0.012	-0.074	0.164	1.000						
Liquid liabilities	0.242	-0.192	0.452	-0.396	-0.015	0.815	0.020	1.000					
GDP	0.155	0.181	0.407	-0.325	0.045	0.645	0.163	0.752	1.000				
GDP per capita	0.122	0.155	0.339	-0.291	0.105	0.573	0.184	0.724	0.993	1.000			
Gross fixed cap. formation	0.262	0.297	0.260	0.142	0.057	0.108	0.585	0.039	0.443	0.473	1.000		
Government consumption exp.	-0.179	-0.028	-0.309	0.189	0.198	-0.672	-0.109	-0.735	-0.752	-0.722	-0.253	1.000	
Primary enrolment	-0.285	-0.259	-0.250	-0.178	0.502	-0.209	0.163	0.181	0.327	0.398	0.285	0.119	1.000

Note: *FSI*: financial stability index; *DC*: Domestic credit; *DR*: deposit rate; *Inf.*: inflation; *Liq*: Liquid liabilities; *BM*: broad money; *BMG*: broad money growth; *PC.*: per capita GDP; *GFCF*: gross fixed capital formation; *Exp.*: consumption expenditures; *Pry*: Primary enrolment

Source: Researcher's Computation

Table A5.3: Correlation Matrix, Nigeria

<i>Variables</i>	<i>FSI</i>	<i>Gini</i>	<i>DC</i>	<i>DR</i>	<i>Inf.</i>	<i>PC</i>	<i>Gr.</i>	<i>BMG</i>	<i>FSD</i>	<i>GFCF</i>	<i>Pry.</i>
Financial stability index	1.000										
Gini index	0.425	1.000									
Domestic credit	0.506	-0.077	1.000								
Deposit rate	0.100	0.670	-0.250	1.000							
Inflation (consumer prices)	-0.179	0.265	-0.326	0.386	1.000						
GDP per capita	-0.220	-0.689	0.486	-0.456	-0.370	1.000					
GDP per capita growth	-0.109	0.131	-0.025	0.265	-0.068	0.210	1.000				
Broad money growth	0.426	0.498	0.125	0.503	0.123	-0.020	0.178	1.000			
Financial system deposits	0.418	-0.218	0.827	-0.383	-0.304	0.276	-0.244	-0.205	1.000		
Gross fixed cap. formation	0.083	-0.584	0.062	-0.435	-0.089	0.101	-0.485	-0.389	0.375	1.000	
Primary enrolment	0.184	-0.280	-0.030	-0.466	-0.281	-0.099	-0.148	-0.279	0.257	0.407	1.000

Note: *FSI*: financial stability index; *DC*: Domestic credit; *DR*: deposit rate; *Inf.*: inflation; *BMG*: broad money growth; *FSD*: financial system deposits; *PC.*: per capita GDP; *Gr.*: per capita GDP growth; *GFCF*: gross fixed capital formation; *Pry*: Primary enrolment

Source: Researcher's Computation

Table A5.4: Correlation Matrix, South Africa

<i>Variables</i>	<i>FSI</i>	<i>Gini</i>	<i>DC</i>	<i>DR</i>	<i>Inf.</i>	<i>BM</i>	<i>LDR</i>	<i>PC</i>	<i>Gr.</i>	<i>GFCF</i>	<i>GF.Gr</i>	<i>Exp.</i>	<i>Pry.</i>
Financial stability index	1.000												
Gini index	-0.197	1.000											
Domestic credit	0.096	0.416	1.000										
Deposit rate	0.103	-0.292	-0.582	1.000									
Inflation (consumer prices)	-0.170	-0.179	-0.853	0.570	1.000								
Broad Money	-0.030	0.634	0.775	-0.596	-0.524	1.000							
Loan-to-deposit ratio	0.042	0.170	0.742	-0.175	-0.706	0.271	1.000						
GDP per capita	-0.034	0.511	0.722	-0.645	-0.549	0.879	0.146	1.000					
GDP per capita growth	0.159	0.004	0.455	-0.514	-0.562	0.314	0.389	0.272	1.000				
Gross fixed cap. formation	0.050	0.107	-0.461	0.083	0.587	0.069	-0.779	0.023	-0.315	1.000			
Gross fixed cap. formation gr.	0.359	-0.100	0.293	-0.166	-0.413	0.239	0.216	0.237	0.736	-0.103	1.000		
Government consumption exp.	-0.206	0.291	0.678	-0.302	-0.595	0.444	0.544	0.572	0.023	-0.633	-0.017	1.000	
Primary enrolment	0.171	-0.080	0.397	0.324	-0.442	-0.074	0.655	-0.010	0.059	-0.649	0.224	0.469	1.000

Note: *FSI*: financial stability index; *DC*: Domestic credit; *DR*: deposit rate; *Inf.*: inflation; *Liq*: Liquid liabilities; *BM*: broad money; *BMG*: broad money growth; *LDR*: Loan-to-deposit ratio; *PC*: per capita GDP; *Gr.*: per capita GDP growth; *GFCF*: gross fixed capital formation; *GF.Gr*: gross fixed capital formation growth; *Exp.*: consumption expenditures; *Pry*: Primary enrolment

Source: Researcher's Computation

Table A5.5: Optimal Lags Selection (Bayesian Information Criterion)

Variables	Cameroon	Kenya	Nigeria	S/Africa
Broad money (log)	-	1	-	-
Broad money growth	0	1	2	-
Deposit rate	1	1	4	3
Domestic credit (log)	1	-	1	1
Domestic credit by fin. inst. (log)	-	1	-	-
Financial stability index	1	1	1	1
Financial system deposits (log)	-	-	1	-
GDP	-	1	-	-
GDP per capita (log)	1	1	1	2
GDP per capita growth	1	-	0	1
Gini index (log)	1	2	2	1
Government consumption exp. (log)	1	1	-	1
Gross fixed capital formation (log)	1	1	1	2
Gross fixed capital formation growth	1	-	-	1
Inflation (consumer prices)	0	1	2	1
Liquid liabilities	1	1	-	-
Loan-to-deposit ratio	-	-	-	1
Natural resources	1	-	-	-
Primary enrolment	-	1	2	3
Real interest rate	1	-	-	-

Source: Researcher's Computation

Table A5.6: Unit Root Tests, Cameroon

Variables	DF-GLS*			PP		
	Level	1st Diff.	Decision	Level	1st Diff.	Decision
Broad money growth	-4.196 ^a	-	<i>I</i> (0)	-4.340 ^a	-	<i>I</i> (0)
Deposit rate	-2.403	-4.406 ^a	<i>I</i> (1)	-0.145	-6.210 ^a	<i>I</i> (1)
Domestic credit (log)	-0.956	-3.565 ^b	<i>I</i> (1)	-1.423	-4.113 ^a	<i>I</i> (1)
Financial stability index	-4.285 ^a	-	<i>I</i> (0)	-3.748 ^a	-	<i>I</i> (0)
GDP per capita (log)	-1.844	-3.538 ^b	<i>I</i> (1)	-1.602	-5.226 ^a	<i>I</i> (1)
GDP per capita gr.	-3.110 ^b	-	<i>I</i> (0)	-3.299 ^b	-	<i>I</i> (0)
Gini index (log)	-2.260	-3.569 ^b	<i>I</i> (1)	-1.604	-4.656 ^a	<i>I</i> (1)
Govt. consumption exp. (log)	-2.234	-4.235 ^a	<i>I</i> (1)	-1.463	-4.691 ^a	<i>I</i> (1)
Gross fixed cap. form. gr.	-3.201 ^a	-	<i>I</i> (0)	-3.425 ^a	-	<i>I</i> (0)
Gross fixed cap. formation (log)	-1.881	-3.966 ^a	<i>I</i> (1)	-1.592	-6.016 ^a	<i>I</i> (1)
Inflation (consumer prices)	-5.318 ^a	-	<i>I</i> (0)	-4.554 ^a	-	<i>I</i> (0)
Liquid liabilities (log)	-1.305	-2.870 ^c	<i>I</i> (1)	-1.395	-4.620 ^a	<i>I</i> (1)
Natural resources	-2.836	-4.983 ^a	<i>I</i> (1)	-2.933 ^b	-	<i>I</i> (0)
Real interest rate	-2.138	-3.903 ^a	<i>I</i> (1)	-2.823 ^c	-	<i>I</i> (0)

Note: *DF-GLS*: Dickey-Fuller Generalised Least Squares; *PP*: Phillip-Perron; ^{a, b, c} denote statistical significance at 1%, 5% levels and 10% respectively. Estimations augmented with lag structures obtained from Bayesian Information Criterion (BIC) using the *varsoc* routine in Stata. * Interpolated critical values from Elliot, Rottenberg and Stock (1996).

Table A5.7: Unit Root Tests, Kenya

Variables	DF-GLS*			PP		
	Level	1st Diff.	Decision	Level	1st Diff.	Decision
Broad money (log)	-2.241	-3.695 ^b	<i>I</i> (1)	-1.522	-6.912 ^a	<i>I</i> (1)
Broad money growth	-2.392	-4.522 ^a	<i>I</i> (1)	-3.804 ^a	-	<i>I</i> (0)
Deposit rate	NA	NA	NA	-1.915	-5.574 ^a	<i>I</i> (1)
Domestic credit by fin. inst.(log)	-3.861 ^a	-	<i>I</i> (0)	-3.107 ^b	-	<i>I</i> (0)
Financial stability index	-5.200 ^a	-	<i>I</i> (0)	-7.828 ^a	-	<i>I</i> (0)
GDP (log)	-1.785	-3.382 ^b	<i>I</i> (1)	1.016	-4.170 ^a	<i>I</i> (1)
GDP per capita (log)	-1.619	-3.433 ^b	<i>I</i> (1)	0.511	-4.176 ^a	<i>I</i> (1)
Gini index (log)	-2.047	-2.929 ^c	<i>I</i> (1)	-1.639	-4.123 ^a	<i>I</i> (1)
Govt. consumption exp. (log)	-2.976 ^b	-	<i>I</i> (0)	-1.814	-5.275 ^a	<i>I</i> (1)
Gross fixed cap. Formation (log)	-3.313 ^b	-	<i>I</i> (0)	-2.938 ^b	-	<i>I</i> (0)
Inflation (consumer prices)	-3.523 ^b	-	<i>I</i> (0)	-3.381 ^b	-	<i>I</i> (0)
Liquid liabilities (log)	-2.064	-3.655 ^b	<i>I</i> (1)	-1.286	-6.118 ^a	<i>I</i> (1)
Primary enrolment	NA	NA	NA	-1.600	-5.459 ^a	<i>I</i> (1)

Note: *DF-GLS*: Dickey-Fuller Generalised Least Squares; *PP*: Phillip-Perron; *NA* implies that the *DF-GLS* process cannot be performed due to data gaps in the series. ^{a, b, c} denote statistical significance at 1%, 5% levels and 10% respectively. Estimations augmented with lag structures obtained from Bayesian Information Criterion (BIC) using the *varsoc* routine in Stata. * Interpolated critical values from Elliot, Rottenberg and Stock (1996).

Table A5.8: Unit Root Tests, Nigeria

Variables	DF-GLS*			PP		
	Level	1st Diff.	Decision	Level	1st Diff.	Decision
Broad money growth	-3.483 ^b	-	<i>I</i> (0)	-3.212 ^b	-	<i>I</i> (0)
Deposit rate	-1.473	-2.968 ^b	<i>I</i> (1)	-2.661 ^c	-	<i>I</i> (0)
Domestic credit (log)	-3.335 ^b	-	<i>I</i> (0)	-2.847 ^c	-	<i>I</i> (0)
Financial stability index	-4.126 ^a	-	<i>I</i> (0)	-5.534 ^a	-	<i>I</i> (0)
Financial system deposits	-2.639	-3.899 ^a	<i>I</i> (1)	-2.344	-5.254 ^a	<i>I</i> (1)
GDP per capita	-1.511	-3.626 ^a	<i>I</i> (1)	-0.294	-5.249 ^a	<i>I</i> (1)
GDP per capita growth	-5.370 ^a	-	<i>I</i> (0)	-4.508 ^a	-	<i>I</i> (0)
Gini index (log)	-3.056 ^b	-	<i>I</i> (0)	-2.584 ^c	-	<i>I</i> (0)
Gross fixed cap. formation	-1.870	-6.489 ^a	<i>I</i> (1)	-2.866 ^b	-	<i>I</i> (0)
Inflation (consumer prices)	-2.544	-4.233 ^a	<i>I</i> (1)	-2.964 ^b	-	<i>I</i> (0)
Primary enrolment	NA	NA	NA	-1.331	-2.745 ^c	<i>I</i> (1)

Note: *DF-GLS*: Dickey-Fuller Generalised Least Squares; *PP*: Phillip-Perron; *NA* implies that the *DF-GLS* process cannot be performed due to data gaps in the series. ^{a, b, c} denote statistical significance at 1%, 5% levels and 10% respectively. Estimations augmented with lag structures obtained from Bayesian Information Criterion (BIC) using the *varsoc* routine in Stata. * Interpolated critical values from Elliot, Rottenberg and Stock (1996).

Source: Researcher's Computations

Table A5.9: Unit Root Tests, South Africa

Variables	DF-GLS*			PP		
	Level	1st Diff.	Decision	Level	1st Diff.	Decision
Broad money (log)	-1.904	-3.745 ^b	<i>I</i> (1)	-0.561	-4.346 ^a	<i>I</i> (1)
Deposit rate	-1.680	-4.796 ^a	<i>I</i> (1)	-2.218	-3.772 ^a	<i>I</i> (1)
Domestic credit (log)	-1.701	-4.395 ^a	<i>I</i> (1)	-2.536	-5.487 ^a	<i>I</i> (1)
Financial stability index	-3.400 ^b	-	<i>I</i> (0)	-5.535 ^a	-	<i>I</i> (0)
GDP per capita (log)	-2.146	-2.911 ^c	<i>I</i> (1)	-1.209	-4.297 ^a	<i>I</i> (1)
GDP per capita growth	-3.184 ^c	-	<i>I</i> (0)	-3.704 ^a	-	<i>I</i> (0)
Gini index (log)	-2.816	-4.978 ^a	<i>I</i> (1)	-2.520	-7.978 ^a	<i>I</i> (1)
Govt. consumption exp. (log)	-1.853	-4.774 ^a	<i>I</i> (1)	-4.314 ^a	-	<i>I</i> (0)
Gross fixed cap. formation (log)	-1.657	-3.305 ^b	<i>I</i> (1)	-2.006	-3.824 ^a	<i>I</i> (1)
Gross fixed cap. formation gr.	-3.474 ^b	-	<i>I</i> (0)	-3.652 ^a	-	<i>I</i> (0)
Inflation (consumer prices)	-2.818	-5.408 ^a	<i>I</i> (1)	-1.753	-5.450 ^a	<i>I</i> (1)
Loan-to-deposit ratio	-1.524	-5.382 ^a	<i>I</i> (1)	-2.592 ^c	-	<i>I</i> (0)
Primary enrolment	NA	NA	NA	-2.159	-3.894 ^a	<i>I</i> (1)

Note: *DF-GLS*: Dickey-Fuller Generalised Least Squares; *PP*: Phillip-Perron; *NA* implies that the *DF-GLS* process cannot be performed due to data gaps in the series. ^{a, b, c} denote statistical significance at 1%, 5% levels and 10% respectively. Estimations augmented with lag structures obtained from Bayesian Information Criterion (BIC) using the *varsoc* routine in Stata. * Interpolated critical values from Elliot, Rothenberg and Stock (1996).

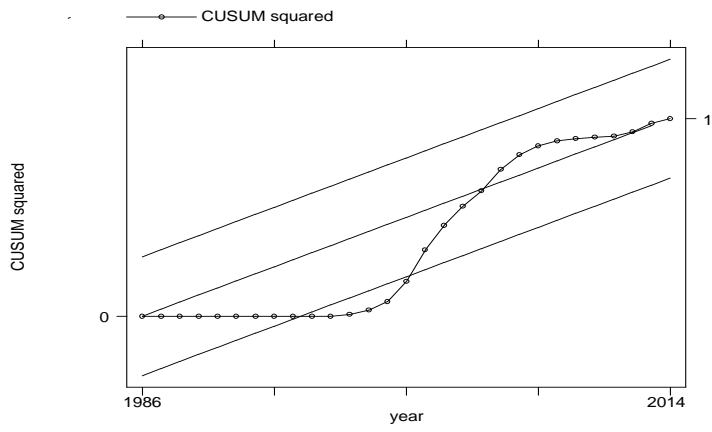


Figure A5.6: CUSUMSQ Graph, Cameroon
 Source: Researcher's Computation