

**FINANCIAL DEPTH OR BREADTH: WHAT REALLY MATTERS
FOR ECONOMIC GROWTH IN SUB-SAHARAN AFRICA?**

By

JOMBO, Wytone Yohane

THESIS

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KDI School of Public Policy and Management
in partial fulfillment of the requirements
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MASTER OF DEVELOPMENT POLICY

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ABSTRACT

The standardized beta coefficients are utilized in the environment of Pooled OLS, Fixed Effects and Two-Stage Least Squares estimators to determine that the exposure of a larger portion of adult population to financial services has a greater impact on economic growth than the sheer size of the financial sector. The paper, nevertheless, finds both financial depth and financial breadth indicators statistically and economically significant. The results are consistent and robust even when the estimation is conducted in stricter conditions and with competing models. While previous research work in this area has only focused on investigating whether financial development has an impact on growth or not, this paper nobly contributes to the existing literature by establishing that in the class of financial development indicators, financial breadth indicators are stronger in explaining economic growth in SSA than financial depth indicators.

DEDICATION

To My wife Rose

and

My Children Prince and Ayanda

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It is with great humility that I thank my supervisors Professor Sohn Wook and Professor Wang Shun for their sacrifice and patience in guiding me through the process of writing this paper. I am indebted to them for their invaluable comments that made this work better.

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CONTENTS

Chapter 1 : Introduction and Background	1
1.2 Problem Statement.....	3
1.3 Justification of the Study	4
1.4 Research Questions.....	5
1.5 The Organization of the Paper.....	6
Chapter 2: Literature Review	7
2.1 Theoretical Underpinnings	7
2.2 Empirical Literature.....	9
Chapter 3: Data and Methodology	16
3.1 Data.....	16
3.2 Methodology	19
3.2.1 Handling Endogeneity in the Growth Regressions.....	20
(a) Instrumental Variables and Two Stage Least Squares Regressions (2SLS).....	20
(b) Use of Initial Values and Lagged values in the Growth Regressions.....	20
Chapter 4 : Results and Discussion	21
4.1 Pooled OLS Regressions Results.....	21
4.2 Initial Values Regressions	22
4.3 Panel Fixed Effects Regression Results.....	23
4.4 The Two Stage Least Squares Regressions	25
4.5 Summary of the Results.....	27
Chapter 5: Conclusion and Policy Implications	28
5.1 Conclusion	28
5.2 Policy Recommendations	29
APPENDICES	오류! 책갈피가 정의되어 있지 않습니다.

List of Figures

Figure 1: Developments in Financial Depth Measures in SSA-(2000-2010) 14

Figure 2: Access to Financial Services 14

LIST OF TABLES

Table 1: Definition of Explanatory variables and Expected Signs	17
Table 2: Descriptive statistics for panel data	17
Table 3: Correlation Matrix	19
Table 4: Pooled OLS Regressions	21
Table 5: Pooled Initial Values OLS Regression	22
Table 6: Fixed and Random Effects Regressions	24
Table 7: Two Stage Least Squares Regressions using Legal Origin as Instrument.....	25
Table 8: Two Stage Least Squares using Internal Instrumental Variables	27

Chapter 1 : Introduction

This paper intends to empirically compare the impact of financial depth and financial breadth as measures of financial development on economic growth in Sub-Saharan Africa. The Finance-growth nexus is not as clear-cut as we thought since it has attracted persuasive controversies among economists. As Ross Levine (1997) points out, on one end of the continuum there are economists who highlight the importance of financial development on growth, for example, Walter Bagehot, John Hicks and Joseph Schumpeter. On the other end, however, are economists who staunchly believe that finance is not as important for economic growth as it has been glorified. For example, Joan Robinson (1952: 86) argues that economic progress creates a favorable atmosphere for financial systems and that "where enterprise leads finance follows." In addition, Robert Lucas (1988:6) asserts that economists "badly over-stress" the role of financial factors in economic growth, while, as Gerald Meir and Dudley Seers (1984), point out, a collection of essays by the pioneers of development economics, including three Nobel Laureates, does not mention finance as an important factor of economic growth. The debates and controversies are on-going.

Recent empirical evidence suggests a positive link between financial development and economic growth. For example, canonical work of King and Levine (1993) shows that financial development causes economic growth. Gelbard and Pereila (1999) confirm this conclusion using Sub-Saharan region data by declaring a positive relationship between financial depth and economic growth. Using microeconomic evidence, Dermirguc-kunt and Masimonic (1996) find out that firms that have access to more developed stock markets grow faster, hence enhancing economic growth.

It is not the intention of this paper to reinvent the wheel but rather attempt to contribute to the existing literature by comparing the impact of two broad measures of financial development,

namely financial depth and financial breadth on economic growth. The latter concept requires some explanation. 'Financial breadth' refers to what Inoue and Hamori (2013) call financial permeation: "The process by which financial intermediaries improve the accessibility and convenience of financial services for users by establishing an extensive national network rather than by expanding in scale." While the definition of financial depth emphasizes an increase in the availability of financial assets in the financial market (Ndebbio, 2004) and the size of financial intermediaries (Levine, 2007), financial breadth underlines accessibility of the financial services. Generally, as Thouraya Triki Issa Faye (2013) states, financial breadth can be explained as the magnitude of financial inclusion which refers to all initiatives that make formal financial services available, accessible and affordable to all segments of the population.

According to the World Bank, the topic of access to finance and financial inclusion in general has recently been of growing interest throughout the world, particularly in emerging and developing economies. Perhaps the reason for this growing interest could be that financial inclusion allows individuals and firms to take advantage of business opportunities, invest in education, save for retirement, and insure against risks (Demirgüç-Kunt, Beck, and Honohan 2008), and clearly, these are necessary ingredients of economic growth.

In addition, according to the IMF, the financial inclusion concept is rapidly gaining priority globally for policy makers in the aftermath of the Global Financial Crisis. Also, Sahar Nasr (2006), points to evidence suggesting that financing hindrances are more growth-constraining for small firms and they prevent all firms from reaching their optimal size, and that financial exclusion acts as a drawback on economic growth and development. In fact, different models agree that poor people's lack of access to finance is an inhibiting factor to human and physical capital accumulation, which we know, according to the Solow Growth Model, are

important factors for economic growth. This lack of access to finance not only hinder growth, as many valuable investment projects cannot be realized, but also results in continued income inequality (Galor and Zeira 1993; Banerjee and Newman 1993). The World Bank further states that if financial system assets are concentrated in relatively few individuals, firms, or sectors, “it can have potential negative consequences on macro stability of economies and evidence suggests that lack of macro stability is a recipe for slow economic growth.”

Utilizing the standardized beta coefficients in the environment of Pooled OLS, Fixed Effects and Two-Stage Least Squares estimators, this paper has found out that financial breadth indicators have a greater impact on economic growth than financial depth indicators.

1.2 Problem Statement

This paper intends to empirically compare the impact of financial depth and financial breadth in predicting economic growth in sub-Saharan Africa. Previous studies regarding the impact of financial development on growth have just looked at the two aspects in isolation without making a comprehensive investigation regarding which of the two aspects is important for growth. This paper is aware of various theoretical channels through which financial breadth and financial depth would impact on economic growth; however theory is not conclusive regarding which aspect matters most for economic growth. This study therefore intends to bridge this lacuna by empirically establishing the aspect of financial development that matters most for economic growth in the sub-Saharan Africa using data from 2004 to 2012 obtained from 40 countries in the region.

Although Inoue and Hamori (2013) specifically looked at financial permeation and economic growth in SSA using 2004 to 2010 data, their paper is not precisely addressing our questions in this paper. Firstly, there is no comparison that was conducted regarding financial permeation variables and financial deepening variables. Even if we were to compare the findings

in Inoue and Hamori (2013) paper and other findings in the region that were conducted using financial deepening variables, we are bound to make erroneous conclusions because the studies could be using different type of data in terms of time frame, variables and number of countries used in those studies. It was therefore important to conduct this study in order to ensure that the investigation is conducted under the same conditions. Moreover, we have some serious reservations with the results found in Inoue and Hamori (2013) paper considering that the paper disregarded the endogeneity problem, particularly, reverse causality that may have existed between financial permeation and economic growth.¹

1.3 Justification of the study

Literature reports that SSA region is falling short both in terms of financial depth and breadth. Since financial development is low in the region, the findings in this paper will be useful in suggesting whether countries in the region should emphasize on financial inclusion biased policies or indeed financial deepening policies to develop financial sector. If for example it is found that financial inclusion is more important for growth than depth, then economies can provide incentives that will ensure that financial services are accessible by large proportion of adult population.

Besides, the prioritization of financial inclusion by policy makers has only been popular in the recent years. It calls for empirical investigation to ascertain whether this new policy crusade is anything better warranting all the energies being invested in as far as inducing economic growth is concerned. Moreover, although there could be some correlation between financial depth and breadth, it is however not perfect, making this study necessary. As Demirgüç-Kunt and Levine (2008) report, financial systems can become deep without delivering

¹ In empirical work, endogeneity is a very serious issue that should be addressed thoroughly to make the results acceptable particularly when the issue of causality is concerned. For example, it is necessary to clearly explain why financial development causes economic growth and not otherwise.

financial access to all. In fact, they report for example that Colombia and Lithuania have similar levels of private credit to GDP (depth) at around 20 percent, but in Colombia 40 percent of households have accounts, whereas this ratio is 70 percent for Lithuania. This means that it is possible to have “shallow” financial sector but broader financial access. It is also possible to have a deep financial sector but narrow financial access, for example both Estonia and Switzerland have over 85 percent of households with accounts, but while Estonia’s financial depth is again around 20 percent, Switzerland’s is over 160 percent.² With these revelations, it is important to investigate, given the resource constraints in the sub-Saharan Africa, whether countries should advocate for financial depth or breadth to ensure sustainable economic growth.

Furthermore, statistics for financial inclusion has only started being compiled as late as 2004, therefore, very few studies have been conducted regarding financial breadth and growth, and to the best of our knowledge no study has compared the impact of the two measures of financial development on growth. It is therefore compelling to conduct this study particularly in sub-Saharan region where both financial sector and economies are not well developed.

1.4 Research questions

This study will attempt to provide answers to the following research questions:

- ◆ Do financial depth and financial breadth equally and significantly influence economic growth?

Specifically, we will seek answers to the following questions:

1. Does the size of financial sector really affect economic growth in SSA?
2. Does the credit to private sector significantly contribute to economic growth
3. Does more accessibility to financial services impact on economic growth?

² Demirgüç-Kunt and Levine, The World Bank Development Research Group Finance and Private Sector Team (2008)

1.5 The organization of the paper

The rest of the paper is organized as follows: chapter 2 discusses some selected literature in this research area, chapter 3 will review methodologies employed in similar research work while more emphasis will be placed on the methodology to be used in this paper. Chapter 4 discusses the findings of the study while chapter 5 will capture the conclusion of the study.

Chapter 2: Literature Review

2.1 Theoretical underpinnings

Since the persuasive works of McKinnon (1973) and Shaw (1973) that supported the so called supply-leading phenomenon, debate regarding financial development and economic growth relationship has remained elevated. Later works of Gupta (1984), Bencivenga and Smith (1991) and others have rallied behind this hypothesis. The supply-leading phenomenon generally postulates that financial development leads to economic growth. The opposite relationship, referred to as “demand following hypothesis”³ can also be true based on a priori grounds that proposes that as the real economy grows, it creates additional and new demand for financial services which are met rather passively from the financial side.⁴ According to this view, lack of financial development in developing countries is simply because there is no demand for financial institutions due to low economic activity.

Surprisingly, this debate is older than we thought. Economists, in good standing, like Walter Bagehot (1873), Joseph Schumpeter (1912) John Hicks (1969) are early proponents of supply leading hypothesis by arguing that financial development leads to economic growth. However, Joan Robinson (1952, p. 86) believes that economic growth induces financial development and that "where enterprise leads finance follows." In fact, Robert Lucas (1988, p. 6) asserts that economists 'badly over-stress' the role of financial factors in economic growth, while a collection of essays by the 'pioneers of development economics,' including three Nobel Laureates, does not mention finance as an important factor of economic growth (Gerald Meir and Dudley Seers 1984).

In theory, supply-leading phenomenon as stated by Levine (2004) predicts that “financial

³ Demand following hypothesis is a school of thought that propagates that financial development follows where there is economic growth and development.

⁴ For details, see Goldsmith (1969), Woolmer (1977)

development involves improvements in the (i) production of ex ante information about possible investments, (ii) monitoring of investments and implementation of corporate governance, (iii) trading, diversification, and management of risk, (iv) mobilization and pooling of savings, and (v) exchange of goods and services". Thus, theory predicts that each of these financial functions may influence savings and investment decisions and hence economic growth.

The relationships above, however, are associated with some ambiguities that render the supply-leading viewpoint questionable. Firstly, if financial development improves resource allocation, then it means improved efficiency and high returns. It is argued that higher returns may reduce savings rates due to the income and substitution effects. Secondly, economic agents save if risks are high; therefore lower risks will negatively affect savings. Thus savings may be affected negatively by financial developments that improve allocation of resources and reduces risks. These ambiguous relationships warn us about taking the finance growth relationship for granted and that empirical investigation is always important to ascertain a given relationship.

2.1.1 Financial inclusion and Economic Growth: Theory

Discussions on financial inclusion have always been related to financial access and use and also income inequality. Generally speaking, financial access does not always guarantee financial use. Furthermore, the channel through which financial access and use affect economic growth is still inconclusive. When financial access and use is high in a given population, income inequality is often low (World Bank, 2008). While some theoretical view associates high income inequality with increasing economic growth (Kuznets, 1955, 1963), this view has not been accommodated by all economists. The Kuznets view has been on the basis that the need to finance large, indivisible investment projects that are very pivotal for growth means that wealth concentration in the hands of few rich people, leading to a fundamental trade-off between growth

and income inequality (World Bank 2008). We note, perhaps with sadness, that financial inclusion or access and use of finance or financial breadth that is recipe for income equality is not warranting economic growth out rightly, an important motivation therefore to carry out an empirical study to ascertain this relationship. This paper will therefore attempt to clarify whether it is financial access by firms or households that matter for growth or put differently, is it intensive margin or extensive margin that matter for economic growth in SSA?

2.2 Empirical Literature

Given the conflicting views regarding the finance-growth nexus as highlighted in the previous section, different studies have been conducted to establish, confirm or refute any theoretical relationship between finance and economic growth. Predictably, findings in the literature are ambiguous, with others in support of supply-leading hypothesis or demand-following hypothesis; some find no relationship at all.

Arguably, the most influential paper in this area is that of King and Levine (1993). Their paper used cross country data from 77 countries covering the period 1960-1989 to find out that “higher levels of financial development are significantly and robustly correlated with faster current and future rates of economic growth, physical capital accumulation, and economic efficiency improvements.” The findings of the paper also suggest that financial development leads economic growth, a perfect contrast to Robinson (1952:86) who argued that financial development follows economic growth. Using a sample from 44 developed and developing countries for the period 1975-1993, Levine (1998) investigated the banking development and economic growth particularly in the long run using the GMM methodology. The paper reports that banking development exogenously and positively affects physical capital accumulation, productivity growth and economic growth. A similar study was conducted by Levine, Loayza & Beck (2000) when they used pooled cross-section data from 1960-1995 to investigate the

relationship between financial intermediation and economic growth. Making use of GMM estimator, the paper reveals that financial intermediation exogenously and positively influences economic growth and this result was found to be robust.

Both supply-leading and demand following hypotheses received empirical support in a paper by Thornston (1996) covering selected developing countries. While evidence from Philippines, Nepal, Thailand and Malaysia supports the supply-leading hypothesis, Korea and Myanmar data supports the demand-following hypothesis. The results are based on annual data from 1950 to 1990.

A study by Christopoulos and Tsionas (2004) found that financial depth causes growth in 10 developing countries spanning the period 1970-2000 using panel co-integration analysis while Darrat (1999) found mixed results when country-specific finance-growth causality tests were conducted on three countries namely, Turkey, United Arab Emirates and Saudi Arabia. Specifically, the paper finds that finance leads growth in Turkey, thus in support of supply-leading hypothesis, growth causes finance in the UAE, supporting demand-following hypothesis and in Saudi Arabia, finance and growth affects each other or bi-directional causality. Hassan et.al (2010) find evidence of positive link between financial development and economic growth in developing countries but the paper however concluded that a “well-functioning financial system is a necessary but not sufficient condition to reach steady economic growth in developing countries because the other factors such as trade and government expenditure play an important role in explaining economic growth”.

2.2.1 Empirical evidence from sub-Saharan Africa

There are a number of studies that specifically looked at the finance-growth relationship in sub-Saharan region or some selected countries within the region. This section looks at some of the findings regarding this relationship from the region.

Using co-integration analysis, Ghirmay (2004), investigated the relationship between the level of financial development and economic growth in 13 sub-Saharan African countries. Evidence is mixed. While finance development uni-directionally causes economic growth in 8 countries, bi-directional relationship exists in the remaining 5 countries in the sample.

Evidence gathered by Odhiambo (2007) in his quest to explore the direction of causality between financial development and growth in 3 sub-Saharan countries suggests that the direction of causality is sensitive to how financial development is measured. Nevertheless, evidence from Kenya and South Africa suggests a strong support for demand following hypothesis while evidence from Tanzania supports the supply following hypothesis.

The above literature has generally defined financial development in financial deepening sense. Only few studies have explored the relationship between financial broadening or financial inclusion and economic growth. For instance, Inoue and Hamori (2013) empirically analyzes the role of finance in economic growth in Sub-Saharan Africa from the perspective of financial inclusion or what they termed 'financial permeation'. The paper estimates panel data from 37 countries in sub-Saharan Africa between 2004 and 2010, and finds that financial permeation has a statistically significant and robust effect on economic growth in sub-Saharan Africa. Their findings are however need to be treated with caution, because they did not take endogeneity problems into account, particularly reverse causality as such the results may not be robust.

From the literature, three issues are clear. Firstly, a big chunk of the studies have investigated the relationship between financial development and growth, using financial deepening variables rather than financial inclusion variables. Secondly, the few that have tried to look at financial inclusion variables, either they have concentrated in measuring the level of financial inclusion without linking it to economic growth empirically or they have linked the financial inclusion variables to economic growth in isolation, without a proper comparison in terms of the impact to growth between the two measures of financial development which, needless to say, is important for policy purposes. Thirdly, financial inclusion studies and financial deepening studies have been conducted independently with different data set, different measures of financial development, different sample sizes and regions as well as different period spans of the studies, making it absolutely difficult to make a reasonable comparison of the impact of the two broad measures of financial development on economic growth.

2.2.2 Macroeconomic and Banking System Performance in the last decade in SSA

Since the analysis in this paper will be focusing on the sub-Saharan region, it is naturally relevant that we understand the region's macroeconomic performance and financial sector development during the last decade which is the period in which this study will cover. This section specifically examines and provides a snapshot of factors that supported the region's economic growth and also key features and performance of the financial sector.

(a) Macroeconomic Performance

The sub-Saharan Africa has registered higher growth rates in the past decade, building from its momentum that can be traced as far back as mid-1990s. IMF (2008) reports that this economic growth pick up could be explained by firstly, improved macroeconomic policies that included strengthening of fiscal positions, enhanced efforts to achieve low inflation, exchange

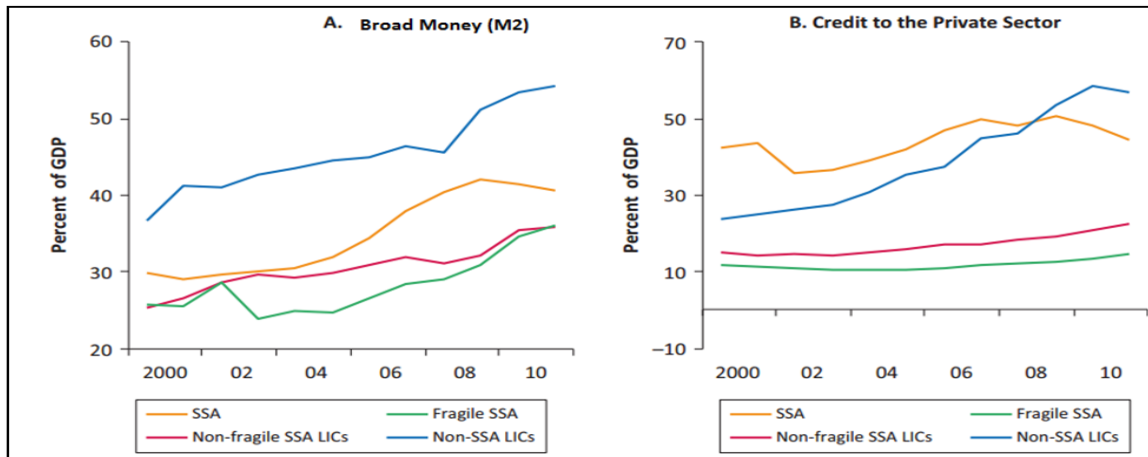
rate liberalization and building of foreign reserves to absorb unfavorable external shocks. Other factors include: trade liberalization and regulatory reforms, increased capital spending, improved institutional capacity, favorable commodity price trends and new resource discoveries and improved financial sector performance.

The region however continued to face significant challenges including poverty, poor infrastructure, low productivity and unfavorable business climate (Mlachila et.al 2013). Furthermore, the financial sector continues to be underdeveloped in the region thereby dampening growth prospects. It is however documented that “its limited integration with global financial markets helped countries weather adverse effects of the global financial crisis” (Mlachila et.al 2013).

(b) Financial Sector Development and Performance in SSA

SSA is generally characterized by underdeveloped financial sector which is dominated by the bank-based financial system. The financial depth, Kasende (2010) reports, has been increasing steadily in the past decade despite that it was from a low base. However, Mlachira et.al (2013) observes that the size of financial intermediation and access to financial services in the region remains relatively low, a reflection of a combination of low income levels, small absolute size, and infrastructure weaknesses. The two figures below provide illustrate these developments. It is easy to see from figure 1 that the two measures of financial depth (M2/GDP and Private sector credit/GDP) have been increasing overtime and until the dawn of the global financial crisis, the private sector credit/GDP ratio has been relatively higher than other low income countries (LICs).

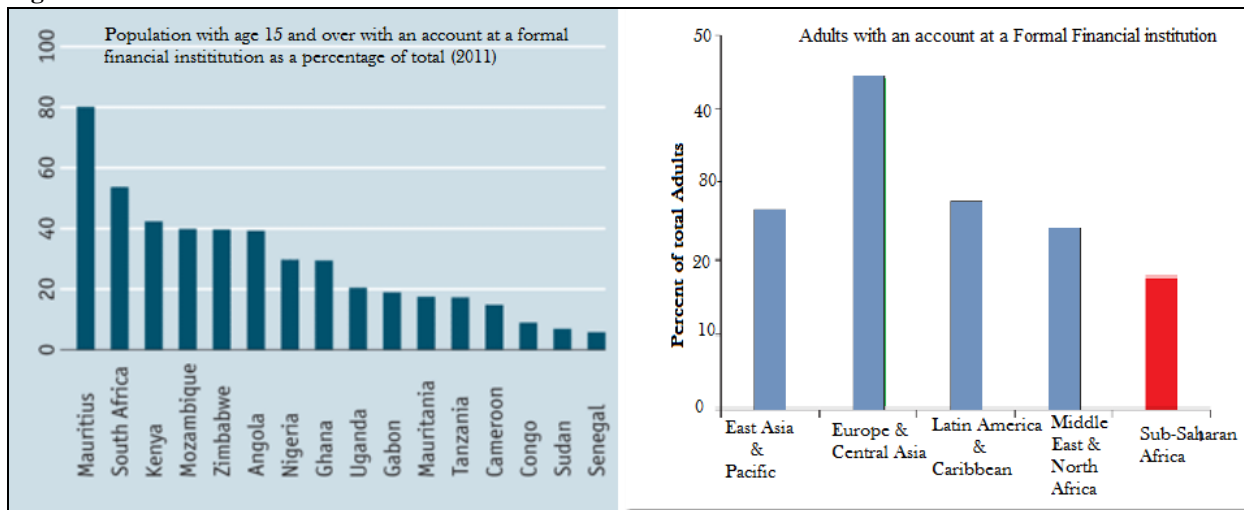
Figure 1: Developments in Financial Depth Measures in SSA-(2000-2010)



Source: IMF (2013)

It is noted in figure 2 that financial access as measured by adults with an account at a Formal Financial institution is lowest compared to other low income countries. Precisely, only about a fifth of the adult population in the region has an account with a formal financial institution.

Figure 2: Access to Financial Services



Sources: Mlachila et.al (2010) and The Economist

It is also conspicuous from the charts in figure 2 that some countries in the region like Senegal, Sudan and Congo have in effect no access to banks. With these striking revelations, it

is not surprising, therefore, that Čihák et.al (2012) report that SSA generally score lowest among the world's other low income regions on dimensions of financial development, for instance, depth and financial institutions' efficiency.

Chapter 3: Data and Methodology

3.1 Data

The study uses data from 44 countries in the sub-Saharan Africa region. The data has been sourced from World Bank and International Monetary Fund databases. Data on Financial Access is only available from 2004; given the purpose of this paper, this study uses data only from 2004 to 2012. The short period data coverage should not be worrisome as the study uses almost 100 percent of the population of countries in the region of interest.

This study augments the Solow growth model as specified by Levine and Renelt (1992). The general specification of this model is as follows:

$$gdppc_{it} = \beta_0 + \phi FD_{it} + \gamma X_{it} + u_{it}, i=1,2,\dots,N : t=1,2,\dots,T$$

Here, $GDPPC_{it}$ is the logarithm of real GDP per capita in country i during time period t , FD_{it} represents a vector variables for financial depth and breadth for country i during time period t . This paper has two financial depth variables, namely; liquidity liabilities of the financial system as percent of GDP and credit to the private sector as a ratio of total money supply. We also have two financial breadth variables namely number of commercial bank branches per 100 km² and Commercial bank branches per 100,000 adults. This data was sourced from the World Bank database.

X_{it} is the vector of control variables in country i during time period t , and u_{it} is the error term in country i during time period t . The variables are defined in detail in table 1. These control variables are widely used in the literature. The coefficient ϕ will be very important in this study since it will show us the significance of a given measure of financial development in explaining economic growth. More precisely, we will compare the strength of this coefficient to determine

the aspect of financial development that matter for economic growth in SSA. The rest of the variable definitions and their expected signs are summarized in the table below:

Table 1: Definition of Explanatory variables and Expected Signs

Definition	Expected Sign
Liquidity Liability	+
Credit to private sector/Money supply	+
Number commercial Banks per 100 km ²	+
Commercial bank branches per 100,000 adults	+
Population	-
Trade openness	+
Investment	+
Inflation	-

Table 2 shows descriptive statistics: mean, standard deviations, minimum and maximum observations of the data that we will use in this paper. Panel A of table 2 provides these descriptive statistics for contemporaneous data while Panel B presents descriptive statistics for initial values of the variables. These initial values were generated because they will be used in checking the robustness of our results, particularly to check the possibility of reverse causality.

Table 2: Descriptive statistics for panel data

Variable	Number of Obs.	Mean	Std. Dev	Min	Max
PANEL A: Descriptive Statistics for Contemporaneous values of variables					
GDP per capita	396	6.859469	1.154104	4.825349	10.06187
Branches/100, 000 adults	396	1.089986	1.074173	-2.041809	3.877131
Branches/100km²	346	6.053081	17.9926	.0112363	107.3892
Pvt Credit	383	11.49048	10.01273	-11.12384	79.17489
Liquidity Liabilities	396	3.39536	.5828827	1.82777	4.950602
Investment	396	21.82619	9.298909	5.47	68.24
Trade	396	3913636	.1837022	14	1.16
Inflation	396	5.119039	.700704	3.704753	7.904792
Population growth	396	1.898828	1.630222	-2.525729	5.104429
PANEL B: Descriptive Statistics for Initial values of variables					
Branches/100, 000 adults	396	6680981	1.222107	-2.04181	3.738668
Branches/100km²	342	4.608116	15.63615	.0112363	81.7734
Pvt Credit	396	10.26403	7.215947	.86769	27.2084
Liquidity Liabilities	396	3.226716	.6422587	1.989243	4.85927
Investment	396	19.51523	8.582927	6.3	47.37
Trade	396	4.018182	1986454	14	1.05
Inflation	396	4.809145	5703468	3.704753	6.510794
Population growth	396	1.806185	1.615884	-2.525729	4.887337

We present correlation matrix for all variables in table 3. Panel A of table 3 is a correlation matrix of all variables with contemporaneous values and panel B shows the correlation of initial values of all variables except the GDP growth variable which is our dependent variable.

The correlation matrix shows that all regressors are highly correlated with growth variable. Actually, all initial regressors are still highly correlated with the contemporaneous growth variable except the credit to private sector variable. Apparently, there are high and significant correlations among the regressors. However, as Goldberger (1991) argues, multicollinearity is a problem when the sample size is very small, a condition he proudly calls *micronumerosity problem*. Apparently, Goldberger, sarcastically, gets surprised when he sees most econometrics books devoting precious pages in explaining the multicollinearity problem when, in fact, it should be a problem analogous to running a regression with small sample size whose remedy is only to increase the number of observations. Fortunately, this study does not suffer from small sample problem.

Table 3: Correlation Matrix

Variable	GDP per capita	Branches/100,000 adults	Branches/100k m ²	Pvt Credit	Liquid Liabilities	Investment	Trade	Inflation	Population growth
GDP per capita	1.0000								
Branches/100,000 adults	0.5485 (0.000)	1.0000							
Branches/100k m²	0.3847 (0.000)	0.5733 (0.0000)	1.0000						
Pvt Credit	0.0119 (0.817)	0.0678 (0.1854)	-0.0643 (0.2404)	1.0000					
Liquidity Liabilities	0.2678 (0.000)	0.4860 (0.0000)	0.4256 (0.0000)	-0.0480 (0.349)	1.0000				
Investment	0.2624 (0.000)	-0.0070 (0.8901)	-0.0326 (0.5459)	-0.0247 (0.630)	-0.0189 (0.7078)	1.0000			
Trade	0.4100 (0.000)	0.0942 (0.0611)	0.1309 (0.0149)	0.0594 (0.246)	0.0824 (0.1016)	0.1410 (0.0049)	1.0000		
Inflation	-0.231 (0.000)	-0.0076 (0.8803)	0.0107 (0.8424)	-0.0242 (0.636)	0.0203 (0.6878)	0.0286 (0.5706)	-0.0878 (0.081)	1.0000	
Population growth	-0.463 (0.000)	-0.287 (0.000)	-0.372 (0.000)	0.1360 (0.008)	-0.264 (0.000)	-0.0687 (0.173)	-0.247 (0.00)	0.0528 (0.295)	1.0000

P-values in (parenthesis).

3.2 Methodology

As passively mentioned above, this paper adopts an augmented Solow model, as specified by Levine and Renelt (1992) and King and Levine (1993) where they essentially estimated growth regressions as the one specified in equation 1 above. This specification is widely used in the literature, for example, Levine and Zervos, (1998); De Gregorio and Guidotti, (1995); Ndikumana (2000). To reasonably compare the impact of financial breadth and depth on growth, this paper goes a mile further by using standardized beta coefficients rather than ordinary coefficients. This technique will involve transforming the values of all the variables into their respective z-scores to get all the variables into a ‘same unit’ to make their impact to economic growth comparable.

The study conducts a fixed effects panel analysis by using annual data on 44 countries in Sub-Saharan Africa between 2004 and 2012. The estimation technique was dictated by the results from the Hausman test. The null hypothesis for the test was:

Test: H_0 : *difference in coefficients not systematic*

And the result was that $prob > chi2 = 0.0000$, suggesting that fixed effects regression would be appropriate except for one model that suggested the use of random effects estimation.

3.2.1 Handling Endogeneity in the Growth Regressions

The debate that we have elucidated earlier in this paper regarding supply-leading and demand following hypotheses is a serious issue and therefore needs to be addressed adequately in order to have acceptable findings. More specifically, it is important to use techniques that will clearly show the direction of causality with certainty if the results of this paper are to be useful.

(a) Instrumental Variables and Two Stage Least Squares Regressions (2SLS)

One of the popular methods to establish this relationship is known as 2SLS, in which it involves the use of instrumental variables. In practice, finding instrumental variables has not been an easy task. Joint endogeneity of financial development on economic growth is addressed by Levine, Loayza, and Beck (2000) using countries' *legal origin* as the external instrumental variable and also uses *lagged values* of all explanatory variables in the panel regressions, as internal instruments. We will test, whether the instrumental variables are weak instruments or not later in the paper.

(b) Use of initial values and lagged values in the Growth Regressions

As part of robustness check, the study employs a technique by King and Levine (1993) when they used the initial values of financial of development measures as explanatory variables on contemporaneous growth variable. King and Levine also used lagged variables of all regressors as instruments and we will implement this technique in this study. This procedure will allow us to confirm and re-establish direction of causality of our explanatory variables.

Chapter 4 : Results and Discussion

This section will provide a detailed account of the results generated from our quantitative data analysis. Table 4, shows results from a pooled OLS regression, table 5 shows the fixed effects regressions, table 6 presents the results of a 2SLS when countries' legal origin is used as instrumental variable, table 7 shows an IV regression when internal instruments are used and table 8 provides a pooled OLS regression for initial values of regressors.

4.1 Pooled OLS Regressions Results

Table 4: Pooled OLS Regressions

VARIABLES	(1)	(2)	(3)	(4)
Population growth	-0.246*** (0.0339)	-0.181*** (0.0252)	-0.213*** (0.0313)	-0.274*** (0.0303)
Investment	0.0214*** (0.00480)	0.0248*** (0.00423)	0.0244*** (0.00474)	0.0201*** (0.00457)
Trade	1.667*** (0.233)	1.626*** (0.204)	1.374*** (0.239)	1.600*** (0.241)
Inflation	-0.424*** (0.0446)	-0.373*** (0.0454)	-0.459*** (0.0473)	-0.448*** (0.0446)
Liquid Liability	0.241** (0.107)			
Branches/100, 000 adults		0.455*** (0.0350)		
Branches/100km ²			0.0160*** (0.00175)	
Pvt Credit				0.00528 (0.00469)
Constant	7.092*** (0.447)	7.157*** (0.255)	8.027*** (0.292)	8.043*** (0.293)
β- coefficient (Financial Development Variable only)	.122	.423	.242	.045
Observations	396	396	346	383
Adjusted -R ²	.428	.568	.457	.414

^a Year dummies are used in all models.

^b The β- coefficient row provides the standardized coefficients for a variable of interest in each model i.e. liquid liabilities, Branches/100, 000 adults, Branches/100km² and Pvt Credit respectively in order to determine the variable with greater impact on growth.

^c Robust Standard errors in (parentheses) *** p<0.01, ** p<0.05, * p<0.1.

The pooled OLS regressions provide results that are in harmony with our *apriori* expectations. The financial development variables possess correct signs and are significant at 1 percent, except credit to the private sector which has a correct sign but insignificant. All the control variables also have correct signs and significant in all the four equations. It is also noted

that economic growth in sub-Saharan Africa responds negatively to population growth and inflation. The standardized beta coefficient for financial development variables reported in table 4 suggests that financial breadth measures have a greater impact on economic growth than financial depth measures.⁵

4.2 Initial Values Regressions

Similar to a previous methodology, we estimate a pooled OLS by regressing contemporaneous GDP per capita on initial values of independent values. The results are summarized in table 5.

Table 5: Pooled Initial Values OLS Regression

VARIABLES	(1)	(2)	(3)	(4)
Population growth ₂₀₀₄	-0.242*** (0.0345)	-0.195*** (0.0257)	-0.214*** (0.0329)	-0.271*** (0.0327)
Investment ₂₀₀₄	0.0327*** (0.00592)	0.0315*** (0.00419)	0.0364*** (0.00513)	0.0401*** (0.00496)
Trade ₂₀₀₄	1.220*** (0.221)	1.132*** (0.196)	0.873*** (0.223)	1.204*** (0.205)
Inflation ₂₀₀₄	-0.447*** (0.0621)	-0.527*** (0.0670)	-0.423*** (0.0590)	-0.371*** (0.0530)
Liquid Liability ₂₀₀₄	0.169* (0.101)			
Branches/100, 000 adults ₂₀₀₄		0.362*** (0.0268)		
Branches/100km ² ₂₀₀₄			0.0198*** (0.00199)	
Pvt Credit ₂₀₀₄				0.0321*** (0.00540)
β- coefficient (Financial Development Variable only)	.094	.384	.259	.201
Constant	7.390*** (0.494)	8.052*** (0.349)	7.802*** (0.347)	7.153*** (0.323)
Observations	396	396	342	396
Adjusted-R ²	.437	.568	.483	.467

^aThe β- coefficient row provides the standardized coefficients for a variable of interest in each model i.e. liquid liabilities, Branches/100, 000 adults, Branches/100km² and Pvt Credit respectively in order to determine the variable with greater impact on growth.

^bTime dummies are used in all models but not reported.

^cRobust Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

The basis for the pooled initial values OLS regression technique is to establish the direction of causality. Since future developments in economic growth are not expected to have any influence

⁵ As explained earlier in this paper, financial depth measures are: Liquid Liabilities and credit to the private sector. Financial breadth measures are Branches/100, 000 adults and Branches/100 km².

on the static, previous 2004 values, it is easy to see that this estimation technique will thwart any fears of reverse causality between the regressand and regressors. This technique is widely used in the literature. It will also hint on the long-run impact of the regressors on economic growth variable.

Table 5, again provides results that are consistent with the previous OLS results, with all financial development indicators statistically significant. The estimated coefficients suggest that initial values of financial development are good predictors of growth in the long run. Given the financial sector size in 2004, GDP grew cumulatively by 17.0 percent more than without it, in the SSA from 2004 to 2012. The regional economy expanded cumulatively by 36.0 more given the commercial bank network available in 2004, than without such network. The analysis is similar with the other regressors. Again, standardized beta coefficients suggests that financial breadth indicators have a greater impact economic growth than financial depth indicators.

4.3 Panel Fixed Effects Regression Results

However, as we know, the pooled OLS may suffer from biased coefficient estimates (although the estimates could be consistent). Moreover, the pooled OLS estimation does not control for time-invariant or time varying unobserved variables in our model. Since, naturally, there are still some variables that are not included in our model, measureable or immeasurable; we need a procedure that will allow us to handle this. In the literature we found different studies that used random effects models and fixed effects models. As dictated by Hausman test, we use fixed effects for models 1, 2 and 4 of table 6. Model 3 uses random effects technique. The results are summarized as follows:

Table 6: Fixed and Random Effects Regressions

Variable	(1)	(2)	(3)	(4)
Population growth	-0.246*** (0.00800)	-0.181*** (0.00915)	-0.213*** (0.0121)	-0.274*** (0.00999)
Investment	0.0214*** (0.00177)	0.0248*** (0.00121)	0.0244*** (0.00173)	0.0201*** (0.00187)
Trade	1.667*** (0.117)	1.626*** (0.0975)	1.374*** (0.0841)	1.600*** (0.0965)
Inflation	-0.424*** (0.0142)	-0.373*** (0.0173)	-0.459*** (0.0198)	-0.448*** (0.0154)
Liquid Liability	0.241*** (0.0477)			
Branches/100, 000 adults		0.455*** (0.0200)		
Branches/100km ²			0.0160*** (0.000531)	
Pvt Credit				0.00528 (0.00584)
β- coefficient (Financial Development Variable only)	.122	.423	.250	.046
Constant	7.557*** (0.215)	7.440*** (0.136)	8.516*** (0.0940)	8.549*** (0.104)
Observations	396	396	346	383
Adjusted-R ²	.420	.561	.454	.401
Hausman FE, RE test (χ ²) p-values	0.0000	0.0000	0.4903	0.0000

^a Year dummies were used in all models but not reported.

^b Equation 3, uses random effects model since the null hypothesis that the “difference in coefficients not systematic” is not rejected.

^c Robust standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1.

It is noted that using panel fixed effects models, the results are not very different from the ones found from the OLS models. Specifically, both of financial breadth variables are positively and significantly related to economic growth. A 1 percent increase in number of branches per 100, 000 adults predict a 0.46 percent increase in economic activity. We also note that the financial sector size as measured by liquid liabilities is also significant, inducing a 0.24 percent economic growth following a 1 percent increase of the sector size. Although, number of branches per 100km² is statistically significant, it is however not economically significant. Actually, we need to have a commercial branch at every square kilometer, just to induce a 1.6 percent change in GDP which is small and does not make economic sense. We find a measure of credit to private sector as a variant way to capture financial depth insignificant. Consistent with the previous results, the beta coefficients from the fixed and random effects models consistently suggest that the financial breadth indicators have stronger impact on economic growth than financial depth

indicators. Table 6 also shows that all the control variables have correct signs and statistically significant.

4.4 The Two Stage Least Squares Regressions

The above estimation techniques and their results can still be disputed because they disregard the endogeneity problem.

Table 7: Two Stage Least Squares Regressions using Legal Origin as Instrument

VARIABLES	(1)	(2)	(3)	(4)
PANEL A: SECOND STAGE REGRESSIONS FOR ECONOMIC GROWTH				
Population growth	1.622*** (0.247)	1.622*** (0.200)	1.296*** (0.245)	1.202*** (0.340)
Investment	0.0248*** (0.00648)	0.0251*** (0.00406)	0.0279*** (0.00518)	0.0216*** (0.00544)
Trade	-0.408*** (0.0548)	-0.369*** (0.0470)	-0.476*** (0.0478)	-0.418*** (0.0758)
Inflation	-0.181*** (0.0402)	-0.175*** (0.0339)	-0.145*** (0.0527)	-0.351*** (0.0512)
Liquid Liability	0.913*** (0.202)			
Branches/100, 000 adults		0.488*** (0.101)		
Branches/100km2			0.0326*** (0.00938)	
Pvt Credit				0.0813*** (0.0285)
Constant	4.683***	7.098***	7.872***	7.503***
PANEL B: FIRST STAGE FOR MEASURES OF FINANCIAL DEVELOPMENT				
	Liquid Liability	Branches/100, 000 adults	Branches/100km2	Pvt Credit
Population growth	.0167477 (-3.84)	-.1594552 (.033)	-3.26857 (.513)	1.292215 (.406)
Investment	-.003969 (.004)	-.0067999 (.005)	-.1233092 (.058)	-.0203552 (.051)
Trade	-.023736 (.134)	.0675989 (.274)	5.120775 (4.23)	3.888423 (2.64)
Inflation	-.0761675 (.036)	-.1529462 (.061)	1.06518 (.507)	-1.164016 (.913)
Anglophone	-.3937981 (.078)	-.4656614 (.134)	-15.10787 (3.26)	-3.016676 (1.372639)
Francophone	-.6543143 (.076)	-1.008698 (.149)	-17.39075 (3.46)	-6.699651 (1.40)
Adjusted-R ²	.324	.567	.402	0.325
D-W-Hausman test	0.0021	0.9672	0.0071	0.0001
Hansen' J χ^2	0.5046	0.2576	0.8090	0.0322
F-Statistic	25.8	46.7	9.7	6.8
Observations	396	396	346	383

Durbin-Wu-Hausman test determines the existence of Endogeneity in an equation that should justify the use of instruments; significant p-value is evidence of endogeneity. Hansen' J χ^2 tests for over identified restrictions, insignificant p-value shows that we are using right instruments. F-Statistic is a weak instruments test, if $F > 10$, it means we have strong instruments. Time dummies are used in all models but not reported. Robust Standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Moreover, the Durbin-Wu-Hausman test suggests that there is endogeneity except equation 2 of table 7. It is therefore important to solve this problem in order to have robust results. As already explained, we instrument our financial development variables using the countries' legal origin and regressors' lagged values, following Levine, Loayza, and Beck (2000). The results are found in table 7 and 8. It is important to note that diagnostic tests finds the chosen instrument to be strong in most of models except one model.

The results in table 7 show that all the financial development indicators are significant at 1 percent. Changes in size of the financial sector as measured by liquid liabilities and access to financial services as measured by Branches/100000 adults largely cause economic growth. A one percent increase in the size of financial sector, leads to a 0.9 percent increase in GDP. This entails that growth in financial sector is very important for economic growth in the sub- Saharan region. Also, a 1 percent increase in commercial banks branches per 100 000 adults, leads to 0.49 percent increase GDP. The partial elasticities are lower for credit to private sector indicator and number of branches per 100 km² indicator despite that they are both significant. The rest of the controls variables are significant, with correct signs.

The results are almost the same when we use internal instruments. From table 8, all the financial development indicators are also statistically significant. The control variables again possess correct signs and significant.

Table 8: Two Stage Least Squares using Internal Instrumental Variables

VARIABLES	(1)	(2)	(3)	(4)
PANEL A: SECOND STAGE REGRESSIONS FOR ECONOMIC GROWTH				
Trade	1.274*** (0.249)	1.082*** (0.208)	1.255*** (0.244)	0.599 (0.435)
Investment	0.0261*** (0.00569)	0.0276*** (0.00400)	0.0266*** (0.00479)	0.0227*** (0.00625)
Inflation	-0.390*** (0.0548)	-0.367*** (0.0540)	-0.449*** (0.0503)	-0.467*** (0.105)
Population growth	-0.221*** (0.0396)	-0.195*** (0.0255)	-0.210*** (0.0346)	-0.443*** (0.0688)
Liquidity Liability	0.504*** (0.143)			
Branches/100, 000 adults		0.534*** (0.0458)		
Branches/100km2			0.0146*** (0.00236)	
Pvt Credit				0.105*** (0.0365)
Constant	6.042*** (0.589)	7.294*** (0.294)	7.917*** (0.303)	7.882*** (0.606)
PANEL B: FIRST REGRESSIONS FOR MEASURES FINANCIAL DEVELOPMENT VARIABLE				
	Liquid Liability	Branches/100, 000 adults	Branches/100km2	Pvt Credit
Trade(-2)	-.2452994 (0.172)	-0.832158 *** (0.282)	-7.13754 (5.26)	-7.646085** (3.79)
Investment (-2)	0.0122789*** (0.006)	0.0171365** (0.007)	-0.0511487 (.093)	-.047823 (0.071)
Inflation (-2)	0.1428751** (0.100)	-.0741348 (0.143)	-1.38693 (2.40)	.7655103 (1.29)
Population growth (-2)	.0523564 (.035)	.0236167 (0.062)	2.929392** (1.19)	-.7255367 (0.664)
D-W-Hausman test	0.0021	0.9672	0.0071	0.0001
F-Statistic	51.2417	56.3795	15.1173	1.24513
Observations	333	333	319	333
Adjusted-R ²	.413	.605	.449	0.148

Robust Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. Time effects are controlled in all models. The F-test shows that all models have strong instruments except one.

4.5 Summary of the Results

The rigorously estimated results in this paper unequivocally suggest that the financial development is a good predictor of economic growth in sub-Saharan Africa. All the techniques used suggest that financial development, however it is measured, has a substantial impact on economic growth in SSA. This outcome can be attributed to two reasons: firstly, increased financial sector size (financial depth), will mostly be associated with efficient and diversified financial system which is expected to reduce transaction costs and risks. Secondly, number of commercial banks per 100,000 adults indicator (financial breadth) is generally capturing the exposure of the adult population to financial services. An increase in this indicator guarantees an

increased proximity of economic agents to financial services. This aspect of financial development is very important because it ensures that the services are not only available but also accessible. Generally, rigorous empirical investigation in this paper has established that both financial depth and financial breadth are very crucial to the economic growth and development agenda of developing countries in the SSA. In relative terms however, it is consistently unambiguous from the standardized beta coefficients estimated in the pooled OLS and fixed-random effects models that it is actually financial breadth measures of financial development that have stronger impact on economic growth than financial sector size. The paper has also confirmed that inflation and rapid population growth are serious impediments of economic growth in the region while trade openness and investment are key to the growth of the region, as widely found in the literature.

Chapter 5: Conclusion and Policy Implications

5.1 Conclusion

The financial inclusion campaign in the early 2000s as propagated by organizations like World Bank and IMF has only been accepted by countries worldwide, with belief and trust that financial inclusion, just like financial depth was important for economic growth. Hitherto, there was no thorough and empirical analysis to probe the impact of financial inclusion, which this paper has called financial breadth. This study, through a careful and rigorous empirical investigation, establishes that traditional financial depth and the more recent concepts of financial breadth are generally important to economic growth. The paper further found out that the financial breadth has a stronger impact on economic growth than financial depth. This study has put financial breadth-depth and growth controversy to bed, by subjecting financial depth and breadth indicators to the same data and time frame. While many research works in this area has

only focused on finding whether financial development has an impact on growth or not, this paper nobly contributes to the existing literature by establishing that in the class of financial development indicators, financial breadth indicators are stronger in explaining economic growth in SSA than financial depth indicators.

5.2 Policy Recommendations

While policy recommendations from this paper may not perfectly apply to every country in SSA, countries should generally strive to ensure that the financial services are accessible to the general populace. Governments can encourage banks to penetrate in all corners of their respective countries to improve accessibility. While not compromising on all the required risk-minimizing measures when providing credit, it is important that the financial institutions should extend credit facilities not only to big corporations but even to smaller enterprises. When provided with funds, these smaller enterprises have higher propensity to grow faster due to their unexploited potential than big companies which would have exhausted all of their economies of scale. Given the evidence in the literature that financial development is noticeably at its infancy in SSA region, both in terms of depth and breadth, it is imperative that countries in the region embark on improvement of both the size of the financial sector and indeed the availability of financial services. As our estimates in this study have consistently demonstrated, both of these aspects of financial development need to be advanced side by side to register firm economic progress in the medium term to long-run.

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Appendices

Appendix A. Countries used in the study

1	Angola	23	Lesotho
2	Benin	24	Liberia
3	Botswana	25	Madagascar
4	Burkina Faso	26	Malawi
5	Burundi	27	Mali
6	Cabo Verde	28	Mauritius
7	Cameron	29	Mozambique
8	Central African Republic	30	Namibia
9	Chad	31	Niger
10	Comoros	32	Nigeria
11	Democratic Republic of the Congo	33	Rwanda
12	Republic of Congo	34	São Tomé and Príncipe
13	Ivory Coast	35	Senegal
14	Equatorial Guinea	36	Seychelles
15	Eritrea	37	Sierra Leone
16	Ethiopia	38	South Africa
17	Gabon	39	Swaziland
18	The Gambia	40	Sudan
19	Ghana	41	Tanzania
20	Guinea	42	Togo
21	Guinea-Bissau	43	Uganda
22	Kenya	44	Zambia

Appendix B: Sample of SSA Former Colonies

I. Former British SSA Colonies

Botswana, Gambia, Ghana, Kenya, Lesotho, Malawi, Mauritius, Namibia, Nigeria, Sierra Leone, Sudan, Swaziland, Tanzania, Uganda, Zambia, and Zimbabwe.

II. Former French SSA Colonies

Benin, Burkina Faso, Cameroon, Central Africa Republic, Chad, Congo Rep, Cote D'ivoire, Gabon, Guinea, Madagascar, Mali, Mauritania, Niger, Senegal, Togo.

III. Former Portuguese, Belgian, Italian or Spanish SSA Colonies

Angola, Burundi, Congo Dem, Equatorial Guinea, Eritrea, Guinea-Bissau, Mozambique, Somalia.