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The Role of Financial Inclusion on Economic Growth in Sub Saharan African (SSA) Region

By Masoud Mohammed Albiman[*] & Hamad Omar Bakar[±]

Recently, financial inclusion through improved access within SSA region has increased and at a faster rate compared to other regions. By estimating panel data on 45 countries between 2004 and 2017, using Generalized Method of Moments (GMM) method, this study examined whether financial inclusion through improved access contributed positively on economic growth. The study examines both linear and non-linear effects of financial inclusion using three different indicators including financial inclusion index. The results reveal that, financial inclusion promotes economic growth. Our results are robust irrespective of upper middle income within SSA region. The need to design policies that widen accessibility and sustain financial inclusion is rather important, as it improves economic growth, development and reduces poverty within SSA region.

Keywords: *SSA region, financial inclusion, GMM, nonlinear and economic growth*

Introduction

For the past two decades, SSA maintained economic growth rates of around 4.8% per year, placing the region among the top five of world's fastest growing economy (AfDB 2015, ECA 2015). However, the advantages were not inclusive and translated into tangible development (AfDB 2012, as cited in Makina and Wale 2019). Despite such positive trend, the region is still facing a myriad of socio-economic challenges including unemployment, national debts and extreme poverty (AfDB 2015, UNCTAD 2016). The population living in extreme poverty is still relatively high, compared to other regions.

In reports published several years ago, the percentage of people living on less than $1.25 a day in SSA accounted for 41 percent of the population, more than double that of Southern Asia, which is 17 percent (UNCTAD 2016, World Bank 2007, 2016, IMF 2017). It means that the population living in extreme poverty has increased to 330 million, which is at least 50 million higher compared to the last decade. It represents 30 percent of the world's poor, an appalling number representing merely a region (UNCTAD 2016, World Bank 2007, 2016, IMF 2017). UNCTAD (2014) identified 25 percent of people in the SSA suffering from hunger and unable to afford basic facilities, making the region one of the greatest food-deficient regions in the world. The World Bank believes that there is still more than one billion people living below the poverty line in the world, made out

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of people in the SSA and South Asia.

Lack of financial inclusion is one of the reasons people are in such challenges. More than three-quarter of the population lacks access to financial services such as financial products, bank accounts, insurance and affordable and suitable loans. Financial inclusion is defined as the process whereby individuals and businesses have access to financial industry to meet their needs by using useful financial products and services, such as making transactions and payments, using credit facilities, saving accounts and insurance in a sustainable and responsible way. Through bank accounts, financial inclusive consumers can send, receive and store money. The financial sector facilitates day-to-day living and helps families and businesses make plans for many things including retirement and business strategies.

For a long time, the region relied on agricultural exports, foreign aids, domestic investment, foreign direct investment (FDI) and financial development for its economic growth. However, these need other complements to ensure sustainable economic development within the region. In the past decade, the financial sector was believed to have reduced saving gap and even promote trade openness. The financial sector was believed to have promoted economic growth and development through funds channeling from the surplus side (savers) to the deficit side (borrowers). Recently, after acknowledging macroeconomic challenges in developing countries, the policy makers and leaders are optimistic that financial inclusion is not just encouraging financial development. It has been claimed that financial inclusion is a key enabler of sustainable economic growth in developing countries (World Bank 2018).

Recently, there were several efforts by the international development community and policymakers to expand access of affordable financial services to the excluded population. It is estimated that the world economy could create extra savings of about $157 billion if "unbanked" adults channel their informal savings into a formal financial system (Allan et al. 2013, as cited in Asuming et al. 2018). The governments of several countries initiated several programmes to increase financial inclusion. An increase in access to financial services to "unbanked population" is expected to improve financial conditions and living standards by creating financial assets that can generate income. This also helps to develop local economic sectors and in turn, diminishes income inequality at macroeconomic level.

Previous literatures on impact of financial inclusion grouped the impact into three categories, based on its main generation processes. The first category examines the role of micro credit, i.e., microfinance in rural areas (Jacoby 1994, Van Rooyen et al. 2012, Makina and Wale 2019). The second category involves micro level studies that are interested in the direct effect of financial inclusion per se on poverty and household income. This includes Burgess and Pande (2005), Ayyagari et al. (2013), Bruhn and Love (2014), Sanyal (2014) and the World Bank (2014).

In more recent years, several studies have emerged, examining financial inclusion effect on macro-economic growth using two main variables, the number of bank branches and the number of adult accounts. Most of these studies were done in Asia and other developing countries, but very few have been carried out in the SSA region. The studies include Pradhan et al. (2017), Sharma (2016), Kim et al. (2017) and Sethi and Acharya (2018). They found that financial inclusion

increases the poor's access to financial services, resulting in narrower gap in income inequality and lesser poverty (Beck et al. 2007, Demirguc-Kunt and Levine 2009).

Much evidence is still at individual and micro level (Demirguc-Kunt et al. 2017). Makina and Wale (2019) insisted that evaluations of micro finance activities such as savings and wealth are done more extensively in the SSA region, despite the still limited macroeconomic evaluations. The pronounced situation beleaguering SSA region makes empirical research exploring such linkage on SSA's economic growth more vital than it needs to be in other regions.

There are several macroeconomic studies of financial inclusion in the SSA region such as Andrianaivo and Kpodar (2012), Makina and Wale (2019) and Inoue and Hamori (2016). Other studies by Zins and Weill (2016), Chikalipah (2017) and Asuming et al. (2018) were only interested in examining the determinants of financial inclusion within the SSA region. Some researchers attributed this limitation to lack of long-time data on measures of financial inclusion which were only more available and taken seriously after the US subprime crisis (Makina and Wale 2019, Sahay et al. 2015). Moreover, the Millennium Development Goals (MDGs) which only started in 2000, acknowledged its importance then. Besides, determinants of economic growth and inequality require decades of data, it takes a while to compile, before any study can be initiated using them.

This paper took the study of financial inclusion further, taking into consideration non-linear behavior of financial sector and examining whether excessive financial inclusion may have an impact on the economy. Previous literatures suggest that financial inclusion has linear positive relationship with economic growth, but is this regardless of the size of financial inclusion? Could excessive efforts on financial inclusion results in wastage or an exponential effect on growth? This question is of our interest, given the information by the World Bank (2018) that financial inclusion is increasing rapidly in the SSA region.

The possibility that too much financial access result in wastage of resources may happen on both side; (a) the demand side; consumers may be involved in unproductive entrepreneurial activities and personal unproductive consumption, affecting their saving and (b) the supply side; banks may experience an increase in cost of providing ATMs and bank branches but demand on the financial services does not match the effort put in.

Both effects may be more pronounced in the African region due to social challenges faced by the population. In terms of gender inequality, women are less connected to financial service compared to men (Asuming et al. 2018, World Bank 2019). Higher illiteracy rates and poverty also remain as a main hindrance of financial inclusion (AfDB 2015, UNCTAD 2016, Ouma et al. 2017). Previous authors argued that, Africans still prefer to save through informal and traditional ways, limiting profits that can be expected from the banking sector.

Several empirical literatures acknowledged the existence of negative non-linear relationship between finance and economic growth (Law et al. 2017, Law and Singh 2014, Cecchetti and Kharroubi 2012). The problem of negative non-linear effect of finance on growth is more pronounced in low-income economies

such as the SSA region (Cecchetti and Kharroubi 2012, Law et al. 2017). The non-linear effect of finance may cause a rise in moral hazards and misuse of business credit for personal consumption and unproductive activities (Law and Singh 2014).

Financial inclusion is acknowledged by the AfDB as one of the building blocks for the Ten-Year Strategy spanning 2013-2022. SSA region makes a useful case study for this. The new evidence will bring into focus, the role of financial inclusion, to under developed financial system in the SSA. This evidence can contribute to policy formulation, avoidance of wastage of resources, maximization of success and identification of the best channels for economic growth and development in order to reduce income inequality within the SSA region.

This study differs from other past literatures in several aspects. Firstly, we used a large sample of 42 SSA countries and the most recent data. Also, we used three different financial inclusion access namely Automated Teller Machines (ATM) per 100,000 adults, Commercial Bank branches per 100,000 adults and its index termed Financial Inclusion Access Index (FIA), which was developed by the IMF.

The use of Financial Inclusion Index is very important to capture real and general impact, which most previous studies left behind (Chakravarty and Pal 2013). Its multidimensional nature, involving various institutions with different sizes and activities, increases accuracy (IMF 2016). This paper is divided into five main sections. The first is the introductory while the second explains the trend of financial inclusion in the SSA region compared to other regions. The third section details literature reviews, both theoretical and empirical, while the fourth details empirical methodology. The fifth section presents the discussion of the results and interpretation including both linear and non-linear approaches. The last section provides conclusion and recommendations for policy formulations.

The Rise of Financial Inclusion

Financial inclusion now becomes the main target of the World Bank Group's Universal Financial Access (UFA) 2020 initiative. Financial inclusion has been identified as an enabling tool for 7 of the 17 Sustainable Development Goals in 2016. The World Bank Group considers it a key to reducing extreme poverty and boosting shared prosperity and a more inclusive economic growth (World Bank 2014, IMF 2014, Ouma et al. 2017). The G20 is also committed to bring financial inclusion worldwide. This is made possible through saving enablement and borrowing to the poor, investment in education and entrepreneurial activities.

 Since 2010, more than 60 countries have either launched or developed a national strategy and 55 more made commitments to financial inclusion (World Bank 2018). These meant that nations are bringing together telecommunications, financial regulators, education and other relevant parties in the effort to promote financial inclusion which may help pace a fruitful reform.

According to the report by World Bank in 2018, population living below the poverty line around the world makes up more than one billion people. More than

three-quarter of the population, women and men alike, lacks access to financial services such as bank accounts, insurance and loans. Kendall et al. (2010) estimated that, adults with bank accounts in the world were about 6.2 billion. The world adults without bank accounts in developed countries stood at 19 percent, whilst that in developing countries stood at a whopping 72 percent.

In the SSA region, it was estimated that, about three-quarter of the adult population did not hold a bank account (World Bank 2014). Also, it was reported that, in the SSA region, almost 80 percent of the adult population lacks access to basic financial services (Demirguc-Kunt et al. 2014). Having said that, in the SSA region, adults that hold bank accounts increased to 34% in 2014 from 24% in 2011, while access to credit increased to 6 percent, up from 4.8 over the same period (Demirguc-Kunt et al. 2014). Recent progress on financial inclusion is encouraging, especially in Latin America, Asia and Africa, but the numbers say otherwise (World Bank 2018). Despite these improvements, the formal financial system in Africa is still not very inclusive (Beck et al. 2015).

Figures 1 and 2 show positive relationships between economic growth (GDP per capita) and Financial Inclusion Index (FIA) in 2004 and 2016.

Figure 1. *The Relationship between GDP per capita (USD) and Financial Inclusion Index (FIA) in 2004*
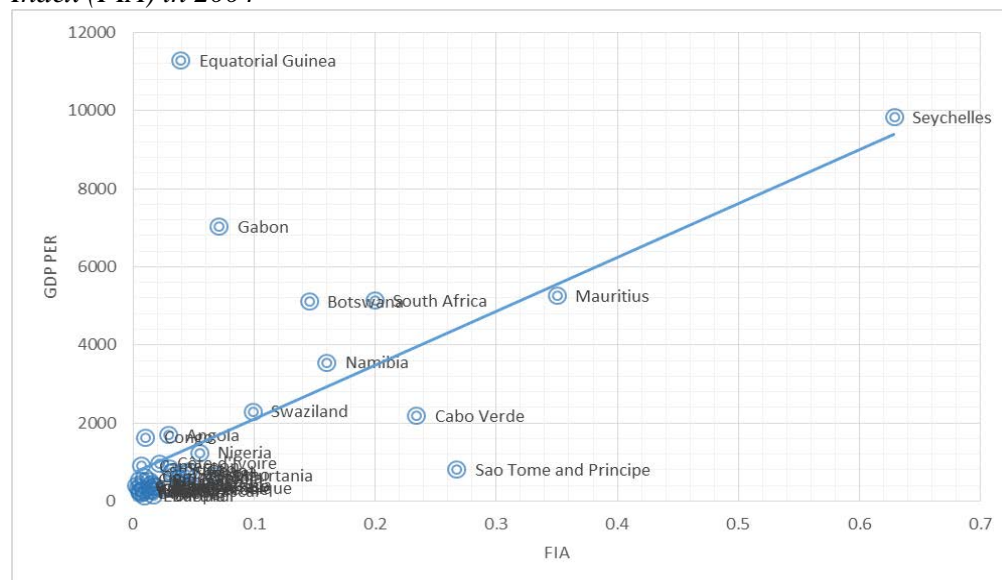
Source: Author's calculation from IMF online database (2016).

Figure 2. *The Relationship between GDP per capita (USD) and Financial Inclusion Index (FIA) in 2016*
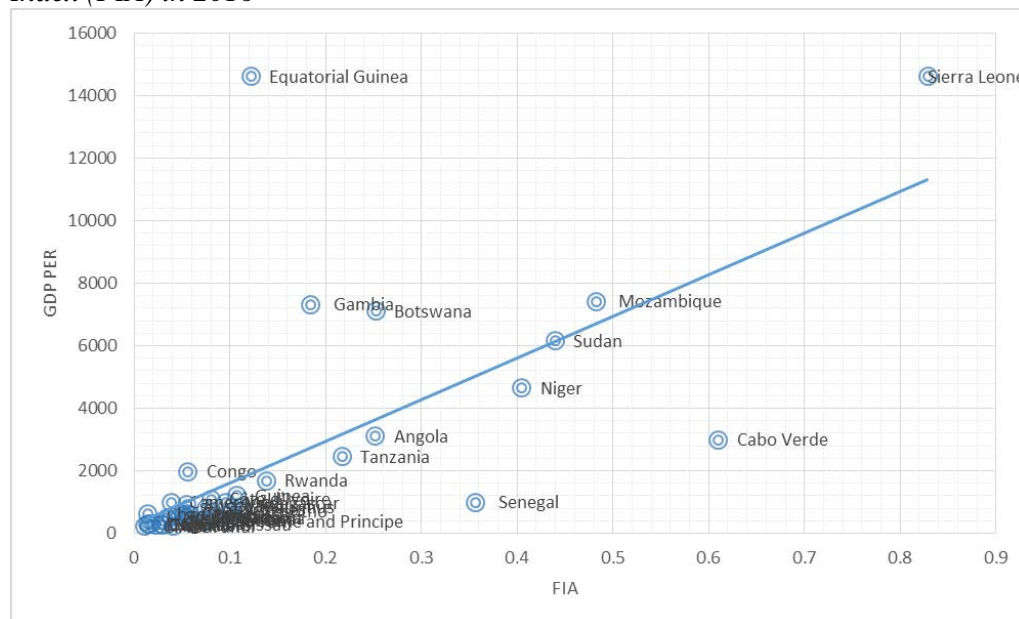
Source: Author's calculation from IMF online database (2016).

Literature Review

Theoretically, financial inclusion has a direct relationship with income inequality and macroeconomic growth. However, the World Bank (2008) observed a less clear-cut relationship between them. Entrepreneurial activity has long been a function that is able to direct funds into better and productive wealth (Banerjee and Newman 1993, Demirguc-Kunt and Levine 2009). Besides, access to formal financial services in developed economies have long been established. Thus, to link financial inclusion to growth in these economies, is a predicament. However, the situation is different in the case of developing economies, as the bulk of the adult population still lacks access to basic financial services (Ouma et al. 2017).

Through account ownership, people can easily access other financial products such as credit and insurance, invest in education or health, start and expand businesses and manage risks which may, in turn, improve their quality of lives. Sharma (2016) suggested that, financial inclusion helps build country's financial structure, hence economic growth and development. Thus, financial exclusion leads to the stunted growth and development (Sharma 2016). It is proven difficult to develop an economy when financial exclusion persists.

Fanta and Makina (2019) emphasized inclusive financial system as a pre-requisite to inclusive growth. They claimed that inclusive financial services ensure availability, accessibility and usage of formal financial services to all "unbanked" population. According to the United Nations (2006) in Fanta and Makina (2019), financial inclusion plays two important roles in economic development: (1) ensuring access to a range of formal financial services to the customers, from small credit and savings services to insurance and pensions services; and (2)

ensuring access to more than one financial services provider, creating competitions among the services providers.

The empirical literature can be grouped into three main generation processes. The first group examines the role of micro credit – micro financing in rural areas in terms of savings and education. The second looks into the direct effect of financial inclusion per se on poverty and household income. The third group is the most recent, examining the effect of financial inclusion on macro-economic growth using measurements such as bank branches and account penetration.

The first group of micro finance studies emerged due to the belief that it is the best step to curb poverty in the SSA region. The introduction of microcredit was carried out for a long time in the SSA region as a mean to promote financial inclusion. Most of the researches were divided into financial and non-financial impacts. By financial impacts, they meant effects in savings accumulation, income, wealth accumulation and expenditure while non-financial impacts are those affecting nutrition, housing, job creation, health and social cohesion. Van Rooyen et al. (2012) looked at the financial and non-financial effects of micro finance on households. Their results were rather inconclusive although Jacoby (1994) did conclude that, children with financial constraints face earlier withdrawal from education.

Burgess and Pande (2005) had evidence that, increasing bank branches in India gave a significant effect in reducing poverty in rural India. On top of that, World Bank (2014) reported an increase in access to saving and basic payments increases innovation, job creation and growth, as a result, reduces poverty to households. In another study, it was found that a financially empowered woman brings positive results to their families (Sanyal 2014).

For the second group, Bruhn and Love (2014) concluded that, increasing bank branches which are a mean of financial access to low-income individuals results in expansion of many economic activities, which in turn, improves employment and income level. Having said that, Ayyagari et al. (2013) who conducted a similar study in 15 Indian states, looking at financial depth and bank branches penetration in 1983-2005, had a mixed finding after 1991 (the period before financial liberalization). The selected variables had negative relationships with poverty with the effect is only positive among the rural self-employed.

The third group consist of macro level studies, either panel or cross sectional studies of a group of countries. Most of the literatures in this group acknowledge the positive effect of financial inclusion, using number of bank branches per 10,000 people and number of account users. Most of them relied on using specific variable of financial inclusion, ignoring the indices of financial inclusion. Also, it seems that most studies were concentrated in Asian countries while in the African region, the studies were more on determinants of financial inclusion rather than its effect on economic development. This group is further divided into three subsections, as follows:

Financial Inclusion has Direct Positive Impact on Economic Growth in Asian Countries

Kendall et al. (2010) included Micro Financial Institutions (MFIs), co-operative, credit institutions and finance companies along with banks in financial inclusion. They developed a measure for financial access for 139 countries worldwide. They concluded that the indicators of development and physical infrastructure are positively related to indicators of deposit accounts, loans and branch penetration. Also, Park and Mercado (2015) proved that, per capita income, demographic characteristics and rule of law significantly determine financial inclusion resulting in a significant reduction in poverty and inequality in Asian countries.

Rasheed et al. (2016) using GMM for 97 countries revealed financial inclusion has positive effect on economic growth in SAARC countries. In that same year, Pradhan et al. (2017) looked at insurance market penetration in promoting economic growth in ASEAN countries (1988-2012). The study confirms co-integration and numerous causal relations among the variables as well as the presence of short run bidirectional causality between insurance market and economic growth. Sharma (2016) utilized data surrounding 2004-2013, looking at the effect of various measures of financial inclusion on Indian economic development. They concluded that, an increase in bank penetration, availability of banking services and usage of banking deposits have positive correlations with economic development.

Kim (2016) suggested that, financial inclusion has a strong positive effect on economic growth of European Union (EU) and OECD countries, although the effect is much stronger in high fragility countries compared to low fragility countries. On top of that, Kim et al. (2017) claimed that in a GMM study (1990-2013), financial inclusion promotes economic growth in Organization of Islamic Countries (OIC) despite the disparity in level of financial inclusion among them. Sethi and Acharya (2018) too, examined the effect of financial inclusion on economic growth of 31 developed and developing countries between 2004-2010. They found a bidirectional causality between financial inclusion and economic growth and confirmed that financial inclusion promotes economic growth.

Dahiya and Kumar (2020) examined the impact of financial inclusion by using three dimension of financial inclusion usage, accessibility and penetration. Using panel data for the 2005-2017 period, they claimed a positive impact of financial inclusion on economic growth.

Financial Inclusion Affects Economic Growth with Conditionality

Previous studies acknowledge the positive effect of financial inclusion on economic growth. However, some studies, in 2015, started to warn about such over optimistic views. For example, Sahay et al. (2015), suggested that an increase in financial access by firms and households stimulates economic growth, but only to a certain threshold, after which, the effect would plateau or even be negative in some developed countries. They even warn that excessive and unregulated

financial access may risk financial stability. They cited increasing financial access, other than credit, enhances economic growth and financial stability. Sukmana and Ibrahim (2018), using quantile regression on 73 countries, suggested that, financial access reduces poverty only in countries with low income inequality. This implies that, in countries with high income inequality, increasing financial access may not be fruitful unless they improve on level of infrastructure.

Country Level Studies in African Region

Only a few studies in the region were interested in examining the effect of financial inclusion on economic development. Andrianaivo and Kpodar (2012), via GMM (1988-2007), utilized "deposits per 100 inhabitants and number of loans per 100 inhabitants" to assess financial inclusion effect on economic growth of 44 African countries. They reasoned that positive and significant effect of financial inclusion on economic growth only occur if the countries' financial sectors are well developed. This paper is interested in examining the joint impact of financial inclusion and mobile phone penetration in stimulating economic growth, in the hope to overcome methodological limitations in other studies.

Makina and Wale (2019) suggested that, number of commercial bank branches per 100,000 people for the period 2004-2014 contributes positively to economic growth of 42 SSA countries. Inoue and Hamori (2016) estimated panel data on thirty-seven SSA countries between 2004 and 2012, and concluded that financial access has a statistically significant and robust effect on economic growth.

Other African studies were only interested in determinants of financial inclusion. Chikalipah (2017) was interested in examining determinants of financial inclusion of 20 SSA countries and it was found that illiteracy is a major obstacle to financial inclusion in SSA. Asuming et al. (2018) also analyzed the determinants of financial inclusion in 31 SSA countries within 2011-2014 period. They claimed that although financial inclusion has increased significantly since 2011, the distribution was not equal. Education level, gender, GDP and financial institutions are significant determinants of financial inclusion. Meanwhile, Zins and Weill (2016) used probit model on 37 African countries to look at determinants of financial inclusion and found that education and income level influence financial inclusion.

Emara and Mohieldin (2020) were also interested in the impact of financial inclusion in the MENA region. They also found a positive and significant impact of financial inclusion on economic growth. The most recent, Khan et al. (2021) examined, using panel data, the impact of financial inclusion on poverty, income inequality and financial stability between 2001-2019 for 54 African countries. They suggested that, financial inclusion reduces poverty, income inequality and improves financial stability.

Methodology

Theoretical Framework

The neoclassical growth theory suggested that, economic growth depends on advances in technology although technology level is an exogenous variable (Solow 1956). Meanwhile the theory assumed that, in steady state, both output per capita and capital stock per capita are fixed. So, the theory ignored the role of human capital and R&D in technology advancement. In response, Romer (1986) and Lucas (1988) developed the endogenous growth theory. The theory is based on the Cobb-Douglas production function, and rewritten as follows:

$$Y = \left\{ (AH^{1-\ell}, K^{\ell} \right\} \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots.(1)$$

Whereby "Y" refers to capital to economic growth, "A" to factor productivity, which depends on technological advancement, "H" to human capital or skilled labor force, "K" to capital stock and ℓ to elasticity of labor. The important lesson within this model is that capital stock would not diminish economic growth by itself due to the existence of technological efficiency and human capital and R&D. This is due to the presence of several factors such as financial sector, domestic investment, institutional quality and foreign direct investment fostering technology advancement.

In our case, we are more specific to the role financial sector plays on financial inclusion and economic growth. As suggested in financial economic literatures, the expansion of banking services such as account holdings, good financial infrastructures including ATMs and bank branches in remote areas promote entrepreneurial activities, induces savings, increases productivity and domestic investment.

As argued by Fanta and Makina (2019), inclusive financial services ensure availability and accessibility and usage of formal financial services to "unbanked" population. They went on to say that financial inclusion plays two important roles in economic development, ensuring access to a range of formal financial services from credit and saving to insurance and pensions to citizens and ensuring availability of a variety of financial service providers to promote competition, thus, reduces cost of service and boosts entrepreneurial activities.

Model Specification and Hypothesis Formulation

Looking at previous literatures (Andrianaivo and Kpodar 2012, Sahay et al. 2015, Inoue and Hamori 2016, Sethi and Acharya 2018) and based on endogenous growth theory, the following model was specified to examine the effect of financial inclusion on economic growth and income inequality:

$$InY_{it} = \alpha + \beta_1 InY_{it-1} + \beta_2 InFI_{it} + \beta_3 InINST_{It} + \beta_4 InHC_{It} + \beta_5 InTO_{it} + \beta_6 InDI_{it} + \beta_7 InFDI_{it} + \eta_{it} + \varepsilon_{it}$$

All variables were changed into log form to express them in percentage form. The symbols (i) implies cross sections or observations, in this case, presenting 42 countries. Time period is represented by (t) from 2004 to 2016. Since we were dealing with panel data the letter (η) represents unobserved panel specific effect of each country. The error term is represented by the symbol (ε), aimed to capture other factors influencing economic growth. The dependent variable is indicated by (InY_t) representing economic growth of SSA countries, which is in the form of GDP per capita. There are seven main independent variables in this study. To describe the symbol (InY_{it-1}) with coefficient β_1, its lagged dependent variables were included to capture dynamic process within the equation included in GMM. They were expected to be either positive (divergence) or negative (convergence) and significant.

The expression $InFI$ with coefficient (β_2) represents financial inclusion indicators with each indicator estimated separately. Following several previous studies (Bruhn and Love 2014, Kendall et al. 2010, Rasheed et al. 2016, Sethi and Acharya 2018), it is expected that financial inclusion brings positive impact on economic growth. However, there are studies by Naceur and Ghazouani (2007) and Pearce (2011) and that show financial inclusion having a negative effect on economic growth. Other variables with their estimated coefficients were included in the equation to complement endogenous growth theory including institutional quality -INST (β_3), human capital-.HC (β_4), trade openness –TO (β_5), domestic investment-DI (β_6) and foreign direct investment-FDI (β_7). According to the endogenous theory, all included variables are expected to contribute positively to economic growth.

Variables Description and Data Sources

In the context of financial inclusion, three variables were estimated in separate equations whilst the control variable was maintained. Financial inclusion can be measured in terms of (i) usage (ii) access and (iii) quality of financial services (Sharma 2016). However, in our case we are more concerned with access of financial services since it is still in infancy stage in the SSA region. Access to financial sector can be measured using these two variables: - Commercial Bank Branches per 100,000 adults, which reflects the degree of penetration of financial institutions (CBB) and Automated Teller Machines per 100,000 adult (ATM) which reflects ownership of accounts. The latter reflects ownership of accounts of people or firms at formal financial institutions. All data were collected from World Bank Indicators online database 2018.

Financial Inclusion Access index (FIA), which is a composite index prepared by the IMF (2016) online data base 2018, reflects two measurements of financial inclusion. The data for control variables were all collected from the World Bank (2018). Institutional quality was measured using the rule of law index[1], while FDI

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[1]See Law and Singh (2014).

was measured as ratios of country's FDI inflow to GDP. Trade openness was measured by ratio of sum of import and export over total GDP of the host country whereas domestic investment was measured by the value of fixed capital formation over GDP. The period collected (t) was from 2004 to 2016 (13 years). This was driven by data availability in the World Bank and IMF databases. Only 45 countries out of 51 SSA countries were selected due to data availability (Appendix A). South Sudan, Somalia, Saint Helena, Liberia, Comoro, and Djibouti had to be dropped due to inadequate data.

GMM as Estimation Method

As we are looking at the effect of financial inclusion on economic growth in the SSA region, we would like to note that, the relationship between finance and economic growth is not unidirectional and it could be one with a reverse causality. This may occur when economic growth increases the demand for financial services, or when there are significant reductions in poverty due to high economic growth, leading to more pressure on financial inclusion services. This relationship is simply known as endogeneity in the field of econometrics analysis and if it is not controlled, it can cause potential biases to the coefficients.

To address these potential biases, it is widely proposed that we use a dynamic panel estimator based on a GMM, developed to cover such specifications. The GMM was initially developed by Arellano and Bond (1991), and it was expanded to a system of equations that has instrument restrictions by Arellano and Bond (1995) and Blundell and Bond (1998). After computing GMM estimates using xtabond 2, J-statistics and Hausman tests, both were used to check if the instruments were not over identified and correctly specified. Also, we use GMM method due to the large value of N (n=45) compared to T(t=13) which is a very important condition of GMM so as to avoid over and under identification of instruments.

Discussion of the Results and Interpretation

Descriptive Statistics and Correlation

The descriptive statistics in Table 1, show that ATM has the highest mean value (ATM=0.14) while Financial Institution Access has the least mean value (FIA= -2.72). FIA is a more comprehensive data. It is usual to note that, financial inclusion is very low in SSA region due to small number of firms and entrepreneurs and high rate of poverty, rural population and illiteracy (Zins and Weill 2016, Chikalipah 2017, Asuming et al. 2018).

Among the control variables, human capital (HC) has the highest mean value (HC=13.98) with the lowest standard deviation (HC=1.68) compared to the rest of the control variables. FDI has the lowest mean value (FDI=8.26) and the highest standard deviation (FDI=2.56). Meanwhile, during the period, FDI was unevenly distributed in the SSA region.

Table 1. *Descriptive Statistics for the Period (2004-2016)*

Variable	Mean	Std deviation	Min	Max
Y	6.81	1.14	5.01	9.73
ATM	0.14	2.11	-6.51	5.43
CBB	0.12	1.84	-4.14	4.72
FIA	-2.72	1.10	-5.41	-0.19
HC	13.98	1.68	9.06	16.98
INST	0.22	0.26	-0.86	1.02
TO	-0.07	0.48	-2.17	1.11
DI	9.97	1.68	5.04	14.19
FDI	8.26	2.56	-12.21	12.92

Source: Calculations from STATA 14.

Table 2 demonstrates positive correlation between financial inclusion indicators (ATM, CBB, and FIA) against economic development (Y). The highest correlation is shown between FIA (FIA=0.77) and economic development. This provides a clear insight that there is a linear and positive correlation between financial inclusion and economic development in selected samples of SSA countries.

Table 2. *Correlation Matrix for the Period (2004-2016)*

	Y	ATM	CBB	FIA	HC	INST	TO	DI	FDI
Y	1.00								
ATM	0.47	1.00							
CBB	0.30	0.91	1.00						
FIA	0.77	0.78	0.64	1.00					
HC	-0.46	-0.31	-0.34	-0.42	1.00				
INST	-0.40	-0.26	-0.14	-0.44	0.34	1.00			
TO	0.44	0.17	0.06	0.34	-0.31	-0.30	1.00		
DI	-0.14	-0.19	-0.04	-0.15	-0.01	0.14	-.004	1.00	
FDI	0.06	-0.12	-0.03	0.10	-0.09	-0.06	0.10	0.13	1.

The Estimated Results from GMM

Three separate models with three indicators of financial inclusion (ATM, CBB and FIA) were estimated. Firstly, the estimated regressions were from the problem of second order serial correlation –AR (2) since we failed to reject the null hypothesis. Then, the Hansen test proved that, the instrument has no over identification problem, thus no problem of endogeneity faced.

The result from Table 3 shows that, coefficient signs of all three indicators of financial inclusion are positive. However, only two indicators (FIA=0.012, CBB=0.006) are statistically significant. Meanwhile, despite the mean value of ATM being the highest, it was not statistically significant. The positive impact of FIA and CBB results is in line with our hypothesis, that financial inclusion drives economic development of the SSA region. Also, FIA, as a composite index of financial inclusion gives a clearer picture on the importance of financial inclusion. Its coefficient is stronger compared to CBB. On the other hand, using separate variables, as in previous studies, results in bias or unsatisfactory conclusion. For

example, from the results, although FIA consists of CBB and ATM, only CBB remains positive and significant while ATM shows insignificant effect on economic growth.

Table 3. *The Long Run Impact of Financial Inclusion on Economic Development in the Main Period (2004-2016)*

	Dependent Variable : GDP per capita					
	One-step System- GMM			Two-step System-GMM		
Specifications	(1)	(2)	(3)	(4)	(5)	(6)
Independent variables	Coefficients	Coefficient	Coefficients	Coefficient	Coefficient	Coefficients
Constant	-0.149(0.00)*	-0.167(0.00)	-0.106(0.03)*	-0.152(0.00)*	-0.140(0.01)*	-0.092(0.05) *
Y(t-1)	1.011(0.00)*	1.010(0.00)*	1.005(0.00)*	1.001(0.00)*	1.008(0.00)*	1.005(0.00)*
ATM	0.001(0.67)	-	-	.002(0.31)	-	-
CBB	-	0.006(0.00)*	-	-	0.006(0.00)*	-
FIA	-	-	0.009(0.02)*	-	-	0.012(0.00)*
HM	0.003(0.26)	0.005(0.09)**	0.004(0.08)**	.003(0.08)**	0.004(0.07)**	0.003(0.17)
FDI	-0.001(0.51)	-0.001(0.40)	-0.001(0.26)	-0.001(0.00)*	-0.001(0.00)*	-0.001(0.00)*
INST	0.011(0.45)	0.010(0.53)	0.024(0.05) *	0.009(0.15)	0.011(0.09)**	0.038(0.00)*
TO	-0.001(0.13)	-0.008(0.21)	-0.004(0.48)	-0.004(0.65)	0.002(0.77)	-0.002(0.78)
DI	0.006(0.00)*	0.004(0.00)*	0.005(0.00)*	0.005(0.00)*	0.004(0.00)*	0.006(0.00)*
AR(1)	-5.49 (0.00)*	-5.51 (0.00)*	-4.41(0.00)*	-1.86(0.06)**	-1.87(0.06)	-2.94(0.00)*
AR (2)	-1.28 (0.20)	-1.38(0.17)	-2.46 (0.01) *	-1.08 (0.28)	-1.18(0.24)	-1.21 (0.23)
Sagan value	71.69(0.09) **	240.63(0.00) *	328(0.00) *	239.13(0.00) *	240.63(0.00) *	328(0.00) *
Hansen value	-	-		38.45(1)	39.26(1)	36.68(1)

Figures in parentheses (   ) denote p values except Hansen test. *and **imply significance levels at 5 and 10 percent respectively. AR(1) and AR(2) are serial correlation values at first and second order respectively.

If a bank branch is efficient in delivering formal banking services to customers, it can promote economic development. The same applies to SSA region, the recent increase in CBB implies that there is efficiency in bank branches delivering formal banking services. The positive effect implies that, financial inclusion enhances flow of money and resources allocation in rural areas which, in turn, lead to better economic development (Sharma 2016). Also, our results support previous literatures such as Inoue and Hamori (2016) and Makina and Wale (2019) who both suggested that the number of commercial bank branches per 100,000 people for the period 2004-2014 has positive contribution to their economic growth. This happened by relaxing constraints which stimulate economic activities, such as trade and transactions, between producers and financial institutions, as well as by reducing funding constraints.

Control Variables

Human capital (HC), institutional quality (INST) and domestic investment (DI), all have positive coefficients and in many cases statistically significant. This is in line with our expectation and the endogenous theory. Human capital (HC) effect ranges from the lowest of 0.003 to the highest value of 0.004. This is in line with several empirical literatures such as Andrianavo and Kpodar (2012) and Kim et al. (2017). Institutional quality (INST) lies between 0.11 and 0.038. The positive effect of Domestic Investment (DI) ranges from 0.004 to 0.006. In contrast, Foreign Direct Investment (FDI) has negative coefficients with values of about -0.001 in all three model specification. This is in contrast with endogenous growth

theory. However, some empirical studies argued that, this may happen due to the absence of good economic environment in the host country (Azman-Saini et al. 2010). The impact of trade openness (TO) also has mixed results.

Robustness Test

To ensure that our results are robust, we took into account the hypothesis that financial sector has strong impact on higher income countries. We ran another regression, excluding six upper-middle income countries indicated by the World Bank (2019). This helped us to ensure that our results become more sensitive, without the higher income countries. These countries are defined by Gross National Income (GNI) between \$3996 and \$12375. We considered them as 'outliers' and we regressed only 39 countries whilst maintaining similar time period (T=13, N=39). The SSA countries listed as outliers are Botswana, Equatorial Guinea, Gabon, Mauritius, Namibia and South Africa. The results are robust as they remain positive and significant for CBB and FIA while ATM remains positive but insignificant (Table 4).

Table 4. *The Long Run Impact of Financial Inclusion on Economic Development in the Main Period (2004-2016)*

	Two step SGMM		
Model Specifications	(1)	(2)	(3)
	Coefficient	Coefficient	Coefficients
Independent variables			
Constant	-0.099(0.25)	-0.045(0.60)	-0.016(0.85)
Y(t-1)	0.002(0.00)*	0.988(0.00)*	.996(0.00)**
ATM	0.001(0.45)	-	-
CBB	-	0.006(0.03)	-
FIA	-	-	0.015(0.00)*
HC	0.005(0.00)*	0.003(0.33)	0.005(0.08)**
INST	-0.005(0.09)**	0.012(0.09)**	0.012(0.50)
TO	0.04(0.079)	0.002(0.82)	0.007(0.53)
DI	.002(0.04)**	0.002(0.05)**	0.005(0.00)*
FDI	0.001(0.19)	0.001(0.23)	0.001(0.00)*
AR(1)	-1.65(0.09)**	-1.65(0.09)**	-2.58(0.01)**
AR(2)	-1.02(0.30)	-1.08(0.28)	-1.13(0.26)
Sagan value	224.66(0.00) *	226.38(0.00) **	335.54(0.00)**
Hansen value	33.37(0.89)	36.28(0.95)	34.46(0.95)

Non-Linear Effect of Financial Inclusion

In order to examine whether 'too much' financial inclusion may still promote economic growth, we carried out a non-linear regression by squaring the variables (Table 5). It is the best method to adopt, as suggested by Law and Singh (2014). The results suggest, doubling bank branches per 100,000 (CBB=0.027) and Automated Teller Machine (ATMs=0.007) still give positive and significant impact on economic growth. In contrast, Financial Inclusion Access (FIA) index gives a

negative yet insignificant effect. Although we acknowledge that FIA is the best and accurate measure of financial inclusion, it may still be inconclusive to believe that doubling financial inclusion has a positive effect on economic growth. However, we can still argue that doubling CBB and ATM has a positive and significant impact on economic growth. Our positive non-linear effect is against previous literatures that claimed negative non-linear effect (Law et al. 2017, Law and Singh 2014, Cecchetti and Kharroubi 2012). It is worth mentioning, that they relied on financial development indicators such as credit to private sector but not measures of financial inclusion per se. The presence of positive non-linear effect of financial inclusion implies that doubling the number of bank branches and ATM in rural areas is still very important to the SSA economies.

This may be true, due to the fact that, financial inclusion is still new in the region, despite its rapid increase. The mean values of financial inclusion range between 0.12 and 0.14 for both CBB and ATM. On the other hand, Financial Institution Access index (FIA), which is supposed to provide a general picture of financial inclusion, has a negative mean value (FIA=-2.72). Albeit its comprehensiveness, we must take into account the very low level of financial inclusion in the SSA region. It was argued that, the region still owes it to the small number of firms and entrepreneurs to hold bank accounts, faces extreme poverty, high population and illiteracy (Zins and Weill 2016, Chikalipah 2017, Asuming et al. 2018).

Table 5. *Non-Linear Effect of Financial Inclusion on Economic Development in the Main Period (2004-2016)*

	Dependent Variable : GDP per capita					
	One-step SGMM				Two-step SGMM	
Specifications	(1)	(2)	(3)	(4)	(5)	(6)
Independent variables	Coefficients	Coefficient	Coefficients	Coefficient	Coefficient	Coefficients
Constant	-0.110(0.03)**	-0.089(0.09)**	-0.0747(0.13)	-0.048(0.43)	-0.096(0.02)**	-0.037(0.62)
$Y_{(t-1)}$	0.911(0.00)*	0.907 (0.00)*	0.851(0.00)*	0.920(0.00)*	0.905(0.00)*	0.901(0.00)*
ATM	-0.0140(0.00)*	-	-	-0.012(0.00)	-	-
ATM^2	0.002(0.00)*			0.002(0.00)*		
CBB	-	0.018(0.05)**	-	-	0.029(0.00)*	-
CBB^2		-0.005(0.06)**			-0.007(0.00)*	
FIA	-	-	0.002(0.84)	-	-	-0.002(0.81)
FIA^2			0.001(0.95)			-0.006(0.65)
HM	0.002(0.30)	0.004(0.86)	0.002(0.28)	-0.004(0.89)	0.007(0.69)	0.006(0.85)
FDI	-0.004(0.61)	-0.005(0.54)	-0.005 (0.46)	-0.005(0.03)**	-0.005(0.00)*	-0.005(0.00)*
INST	-0.013(0.34)	0.009(0.52)	0.021(0.06)**	0.001(0.95)	0.001(0.89)	0.022(0.00)*
TO	-0.010(0.08)**	-0.0081 (0.19)	-0.001(0.81)	-0.005 (0.41)	-0.005(0.27)	0.008(0.25)
DI	0.002(0.08)	0.004(0.00)*	0.003(0.00)*	0.003(0.00)*	0.004(0.00)*	0.003(0.00)*
AR(1)	-5.44 (0.00)*	-5.52 (0.00)*	-4.45(0.00)*	-1.86(0.06)**	-1.87(0.06)**	-2.96(0.00)*
AR (2)	-1.57 (0.11)	-1.36(0.17)	-2.50 (0.01) *	-1.26 (0.20)	-1.14(0.25)	-1.24 (0.21)
Sagan value	268.58(0.0) *	263.45(0.0) *	360(0.00) *	268.58(0.00) *	263.45(0.00) *	360.67(0.00) *
Hansen value	-	-	-	40.73(0.89)	38.08(0.85)	38.34(0.9)

Figures in parentheses (   ) denote p values except Hansen test. *and **imply significance levels at 5 and 10 percent respectively. AR(1) and AR(2) are serial correlation values at first and second order respectively.

Conclusion

Sub-Saharan Africa has struggled for a long time with poverty and income inequality, lagging behind in terms of economic growth. However, since the turn of the century, the region's economic growth has increased at a faster rate compared to global growth rates. Also, despite having low financial inclusion, in recent years, financial access has increased at a faster rate compared to other regions. By estimating panel data on 45 countries from Sub-Saharan Africa between 2004 and 2016, this study examined whether financial inclusion through improved access to formal financial services can contribute positively to economic growth of this region.

It was found that all three indicators of financial inclusion have positive effect on economic development of the SSA region but only Commercial Bank Branches (CBB) and Financial Institution Access (FIA) are statistically significant. This signifies benefits gained by the SSA from financial inclusion. It is also worth noting that, the Financial Institution Access (FIA) index has a strong effect compared to separate indicators, namely the CBB and ATM.

This means that a combination of ATM and CBB, represented by the index, plays a significant role in boosting economic development. In case of non-linear effect, we found that financial inclusion index (FIA) did not prove a positive return on economic growth. Therefore, we are still not in a position to conclude that doubling the level of financial inclusion gives positive returns to the economy. Therefore, the governments of SSA countries need to work together to work on strategies developed by international organizations such as the IMF and the World Bank to encourage financial inclusion to all corners of the region in order to improve economic growth and development.

The need to design policies that increase accessibility, thus promote financial inclusion is crucial. Efforts to make formal financial services and products readily available by increasing network of commercial branches in all corners of Africa is a sure start to financial inclusion. On top of that, the governments in SSA should give support to their banking sectors by reducing hindrances and bottlenecks in terms of access to formal financial services, improving literacy rate and encouraging use of mobile technology. Although expanding the network of commercial branches and improving accessibility for customers may increase burden of operating cost, but there is a need to balance between profit making and public interest.

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Appendix A

List of SSA Countries Used in Analysis

1. Angola	16. Ethiopia	31. Niger
2. Benin	17. Gabon	32. Nigeria
3. Botswana	18. Gambia	33. Rwanda
4. Burkina Faso	19. Ghana	34. Sao Tome and Principles
5. Burundi	20. Guinea	35. Senegal
6. Cabo Verde	21. Guinea-Bissau	36. Seychelles
7. Cameroon	22. Kenya	37. Sierra Leone
8. Central Africa	23. Lesotho	38. South Africa
9. Chad	24. Madagascar	39. Sudan
10. Comoros	25. Malawi	40. Swaziland
11. Congo	26. Mali	41. Togo
12. Côte d'Ivoire	27. Mauritania	42. Uganda
13. Democratic Rep. of Congo	28. Mauritius	43. Tanzania
14. Equatorial Guinea	29. Mozambique	44. Zambia

Note: Due to unavailability of data some countries were not included; includes: South Sudan, Somalia, Comoro, Djibouti, Liberia.